Appendix A: State Innovation Model in Model Test States: Colorado

Payment Model Development

- Colorado facilitated conversations between payers and providers regarding value-based payment (VBP) requirements.
- Colorado did not prescribe a specific SIM payment model, so SIM-participating providers did not have a clear understanding of how to pay for behavioral health integration.

Delivery Model Transformation

- To advance VBP, Colorado fostered payer-provider communication and supported three cohorts of primary care practices in practice transformation efforts.
- Coaching and health information technology (health IT) assistance helped practices integrate behavioral health, and patients receiving care in SIM-participating practices experienced reductions in total health care spending, small increases in behavioral health-related spending, and fewer inpatient admissions and ED visits.

Health IT and Data Analytics

- The electronic clinical quality measure (eCQM) pilot was time and resource intensive, but the tool eased the burden for practices participating in VBPs.
- Primary care practices and community mental health centers (CMHCs) were unsure how to obtain and use data to show payers the value of integrating behavioral health with primary care.

Population Health

- Population health activities supported development of local partnerships, collaborations, and infrastructure to successfully increase community capacity to address behavioral health.

Sustainability

- Primary care practices and CMHCs will sustain care delivery and behavioral health integration efforts.
- SIM partners’ investments, rather than new state or federal funding, will sustain some SIM Initiative activities.

Implications

- Convening payers and providers helped clarify expectations and implications for VBP participation but did not provide SIM-participating providers with a VBP for behavioral health integration.
- Partnering with many organizations to carry-out SIM Initiative activities facilitated partner buy-in, provided access to experts, and helped sustain some activities.

A.1 Key State Context and the Colorado State Innovation Model Initiative

A.1.1 Pre-State Innovation Model health care in Colorado

Several features characterized Colorado's health care environment prior to the SIM Initiative (see ***Exhibit A-1***). Colorado had relatively widespread insurance coverage by the time the SIM Initiative began, due in part to Colorado's expansion of Medicaid in 2014. Commercial payers and public payers had a history of cooperation and collaboration on health care re-design, as well as VBP reform, through federal initiatives like Comprehensive Primary Care. Prior to the SIM Initiative, Colorado state officials had identified access to behavioral health services for all citizens as a population health priority. But to advance this priority, state officials knew they would have to contend with significant statewide behavioral health workforce shortages, which were particularly acute in rural areas.

Exhibit A-1. Colorado's pre-SIM Initiative landscape informed its SIM priorities

- **Widespread insurance coverage,** including Medicaid expansion
- **Competitive health insurance market** with multiple commercial payers, but a **history of payer collaboration** regarding health care re-design
- Access to behavioral health services for all Coloradans as a **population health priority**
- Statewide **behavioral health workforce** shortage as a barrier to access to care

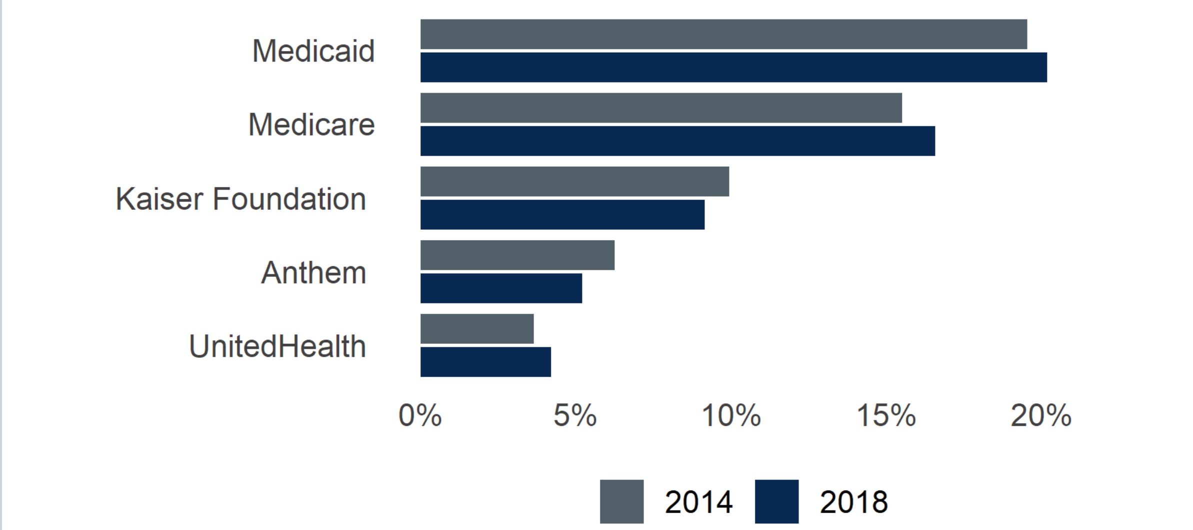
Note: CO = Colorado; SIM = State Innovation Model.

Source: CO SIM Operational Plan Year 1, 2015.

The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Colorado was relatively competitive. Together, commercial insurance makes up the largest share of the market, followed by Medicaid and then Medicare, in both 2014 and 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percentage of insured lives they covered between 2014 and 2018 (see ***Exhibit A-2***). In contrast, the percent of insured lives covered by the most prevalent commercial payers (Kaiser Foundation Group and Anthem Inc. Group) shrank slightly between 2014 and 2018.

Exhibit A-2. Medicare and Medicaid increased share of insured lives relative to commercial payers, 2014–2018 (top five payers in Colorado shown)



Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

A majority of Colorado practices were small and located in urban areas. In 2015, approximately 15 percent of primary care practices were located in rural areas and 58 percent had a single provider. Fifteen percent of primary care practices had an existing involvement in a Medicare fee-for-service (FFS) alternative payment model (e.g., CPC, CPC+, the Medicare Shared Savings Program).[1]

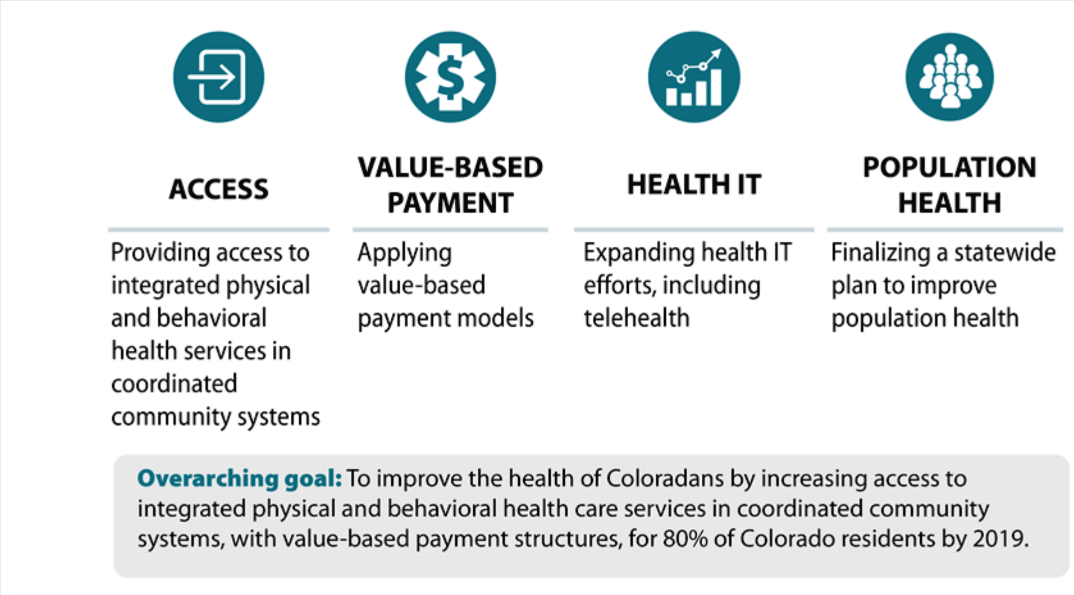
A.1.2 State Innovation Model Initiative in Colorado

To accomplish the state's goals to improve integration of behavioral and physical health, and to promote provider uptake of VBP, Colorado organized its SIM Initiative activities around four "pillars" (see ***Exhibit A-3***). The Colorado SIM Initiative Office, which administered the SIM Initiative from within the Governor's Office, partnered with numerous organizations to advance SIM-related activities under each of the pillars. These SIM partners—which included state agencies, universities, local health policy research groups, and statewide provider membership organizations—were tasked with helping design and implement SIM-related activities. Colorado also experienced a change in governorship seven months before the SIM

[1] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Initiative ended. During those last months of the SIM award, though the new Governor was developing his own health policy agenda, he and his cabinet were supportive of Colorado's SIM Initiative.

Exhibit A-3. Colorado organized its SIM Initiative activities around four pillars



Note: health IT = health information technology; SIM = State Innovation Model.

Source: https://www.practiceinnovationco.org/sim/about/what-is-sim/

Throughout the SIM Initiative, Colorado placed high value on stakeholder engagement, relying on seven work groups[2] to meet regularly to identify, discuss, and make recommendations in support of operations and state-level policy change.

In support of the four SIM pillars, the state provided practice transformation support for 319 adult and pediatric primary care practices and four CMHCs to integrate behavioral health and primary care services, optimize clinical data to improve quality of care, and prepare for VBP arrangements with payers. Seven payers—six commercial payers and Medicaid—agreed to support SIM-participating primary care practices with a VBP, which could be either a new reimbursement for SIM Initiative participation or a VBP the payer already had in place with a practice. CMHCs did not receive SIM-related VBPs.

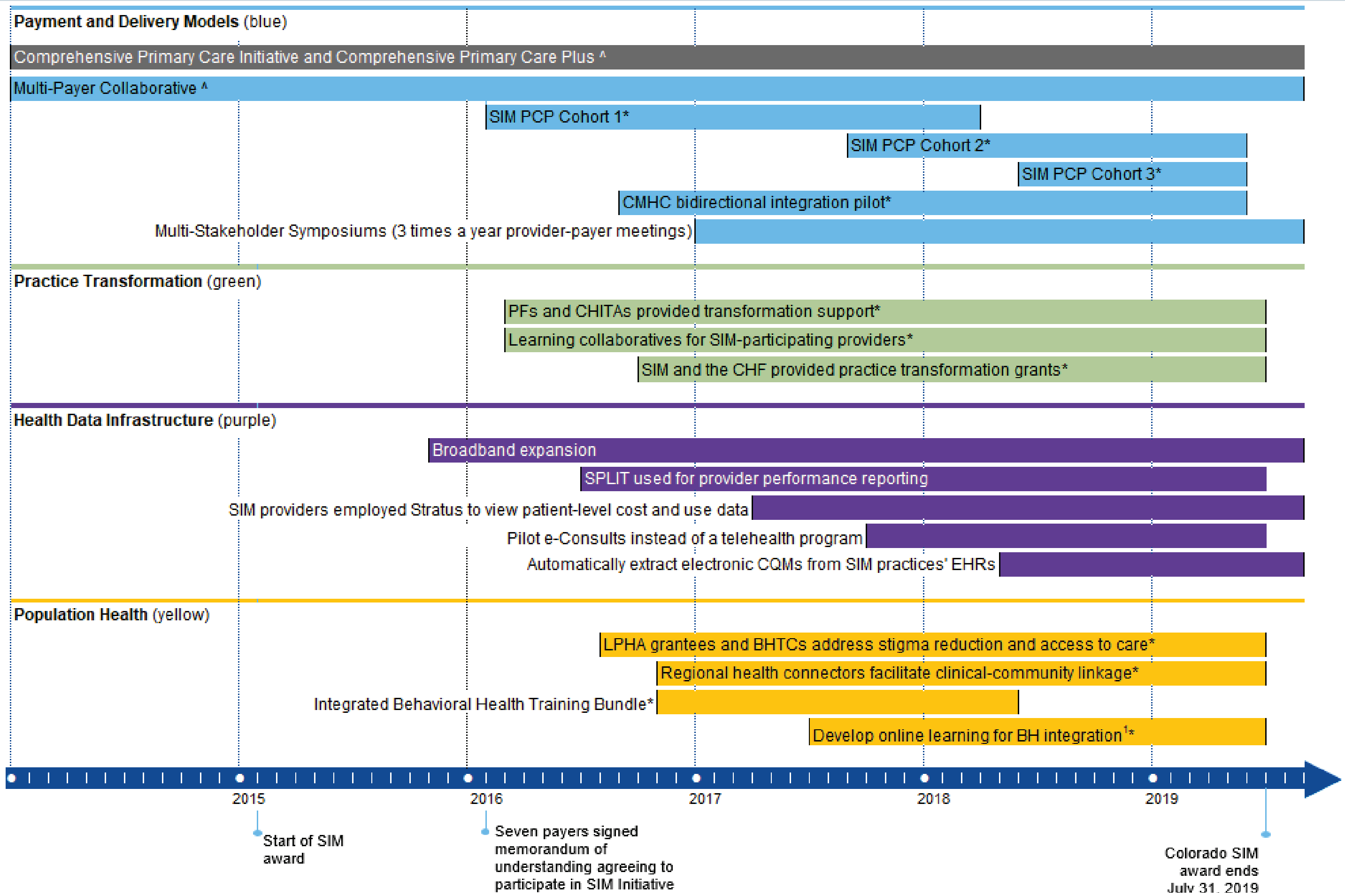
To advance population health, the Colorado SIM Initiative developed a new workforce, Regional Health Connectors, who connected clinical providers with community resources

[2] At the start of the SIM Initiative, there were eight work groups: payment reform, consumer engagement, evaluation, health IT and data, policy, population health, practice transformation, and workforce development. The payment reform workgroup was eventually disbanded, and payment reform issues were discussed in the Multi-Payer Collaborative.

needed to improve patient health. The state also funded local public health agencies (LPHAs) and collaboratives of school districts and mental health providers (Behavioral Health Transformation Collaboratives [BHTCs]) to address mental health stigma reduction and prevention, in addition to screening and referral for behavioral health treatment.

Colorado's SIM award ended in July 2019. ***Exhibit A-4*** depicts the timeline of major Colorado SIM Initiative and SIM-related activities.

Exhibit A-4. Timeline of Colorado SIM and SIM-related activities



Notes: [1] This activity ended, but learning module recordings will be archived and available online; [2] This activity ended, but recordings of the materials are archived for ongoing access; * This activity contributed to integrating primary care and BH. Gray bars (with ^) denote that the items are not SIM Initiative activities or policies but are important for context. BH = behavioral health; BHTC = Behavioral Health Transformation Collaborative; CHF = Colorado Health Foundation; CHITA = clinical health information technology advisor; CMHC = community mental health center; CQM = clinical quality measure; EHR = electronic health record; LPHA = local public health agency; PCP = primary care provider; PF = practice facilitator; SIM = State Innovation Model; SPLIT = Shared Practice Learning and Improvement Tool.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

A.2 Accomplishments from Colorado's State Innovation Model Initiative

This chapter section summarizes Colorado's SIM award activities, accomplishments, and stakeholder feedback in three sections: delivery models and payment reform (***Section A.2.1***), enabling strategies to support health care delivery transformation (***Section A.2.2***), and population health (***Section A.2.3***). The chapter concludes by summarizing Colorado's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section A.3***) and a discussion of implications and lessons learned from Colorado's experience (***Section A.4***).

The federal evaluation of Colorado's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM officials;
- A total of 78 interviews with state officials, primary care and behavioral health providers, Medicaid managed care organizations and commercial insurers, and other stakeholders over four annual interview rounds conducted since 2016, most recently in winter 2019;
- Focus groups with primary care providers (PCPs), including nurse practitioners and physicians; and Medicaid beneficiaries receiving care at a SIM-participating primary care practices, both beneficiaries receiving and those not receiving behavioral health services.
- Medicaid, Medicare, and commercial claims data provided through Colorado's all-payer claims database (APCD) from February 2013 through August 2018.

All-payer claims were used to examine trends in health care spending, utilization, and quality for Medicaid, Medicare, and commercial beneficiaries served by primary care practices that participated in Colorado's integrated behavioral health (IBH) model; and for comparison, Medicaid, Medicare, and commercial beneficiaries served by PCPs not participating in the IBH model. The IBH model was selected for quantitative analysis because the state invested a substantial portion of SIM funds in this initiative and launched it early enough to allow sufficient time to measure if outcomes changed for IBH participants. The multi-payer nature of Colorado's APCD was leveraged to examine the impact of the IBH model separately for Medicaid, Medicare, and commercially insured patients. Even though Medicare was not a SIM-participating payer, significant spillover effects were expected for all patients in a practice—because practices implemented IBH practice transformation activities for all patients, regardless of a patient's primary insurance coverage. Furthermore, the Colorado SIM Initiative also piloted a model in which four CMHCs integrated primary care for a select sample of patients with serious mental illness (SMI). Because the reach of the CMHC/primary care integrated model was limited (only four CMHCs and relatively few SMI patients per CMHC), the quantitative claims-based analysis did not include the SMI CMHC group.

A.2.1 Delivery models and payment reforms

Key Results
• Both primary care practices and CMHCs integrated behavioral and physical health and changed their care delivery with tailored practice transformation goals. • Because of difficulties estimating cost savings and health outcomes from the different IBH models, commercial payers remained reluctant to fund IBH. • During SIM-initiated multi-stakeholder symposiums, payers and providers discussed ways providers might accept more financial risks and show positive returns on investment (ROIs). • Challenges to implementing any VBP arrangements with providers included provider readiness and capacity to take on more risk, competitive insurance markets, and balancing nationwide priorities versus Colorado-specific priorities for national payers.

Under Colorado's SIM Initiative, 319 primary care practices and four CMHCs engaged in practice transformation to improve access to IBH and prepare for VBP (***Table A-1***). Over the course of the SIM Initiative, Colorado opened the application process to primary care practices in three waves, with a different cohort of practices selected to begin practice transformation in each wave. By the end of the SIM award, Colorado had met 80 percent of its goal of enrolling 400 primary care practices into the transformation initiative.

Table A-1. Colorado's delivery system and payment reforms

Delivery system reform	Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Primary care transformation—Integrating BH into primary care	**Cohort 1** Program start and end: March 2016–March 2018 **Cohort 2** Program start and end: September 2017–June 2019 **Cohort 3** Program start and end: June 2018–June 2019	100 primary care practices (92 remained active by March 2018). 156 primary care practices (144 remained active by the end of the SIM Initiative). 88 primary care practices (83 remained active by the end of the SIM Initiative).	• Each practice identified select practice transformation and IBH goals to pursue (e.g., using data-driven improvement, providing prompt access to care, establishing a patient–team partnership), and practices reported making progress meeting those goals. • SIM-participating payers had no uniform VBP for engaging in SIM Initiative activities. • For Cohort 3, the state enrolled fewer than the anticipated 150 practices. • State officials suggested the under-enrollment could be due to "reform fatigue" and the fact that practices had only one year to enact transformation.	• Individual practices might sustain practice transformation changes if they had the staffing and funding to do so. • Practices and payers reported that some providers might continue to receive VBP and practice transformation assistance from SIM-participating payers.
CMHCs—Integrating primary care into BH	Bidirectional health home pilot Program start and end: September 2016–June 2019	Four CMHCs: three partnered with an FQHC to deliver primary care and one CMHC hired its own PCPs.	• Each CMHC identified select practice transformation and IBH goals to pursue (e.g., using data-driven improvement, providing prompt access to care, establishing a patient–team partnership), and practices reported making progress meeting those goals. • There was no VBP from SIM-participating payers for engaging in SIM Initiative activities.	• Individual CMHCs might sustain practice transformation changes if they could arrange the staffing and reimbursement paths to do so.

Note: BH = behavioral health; CMHC = community mental health center; FQHC = Federally Qualified Health Center; IBH = integrated behavioral health; PCP = primary care provider; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Practice transformation model for primary care and community mental health centers

Since the February 2016 launch of Cohort 1 practices in Colorado's primary care practices transformation initiative, 760,992 Colorado residents became affiliated with a SIM-participating primary care practice, accounting for an estimated 14 percent of all Colorado residents by July 2019 (U.S. Census Bureau, n.d.).[3] Colorado reported it had reached 57 percent of its target enrollment (target was 1,345,188 enrollees) in the primary care practice transformation initiative. The number of Colorado residents attributed to the bidirectional CMHC health home pilot was relatively small (5,886). Only four CMHCs participated, and the only attributed patients were those with serious mental illness who the CMHC selected for participation in the pilot. However, Colorado reported reaching 117.7 percent of its target enrollment (5,000 enrollees) for its CMHC health home pilot.

Many providers in SIM-participating primary care practices and CMHCs reported improvements in identification of behavioral health and physical health needs, care coordination between primary care and behavioral health providers, and use of clinical and administrative data to identify gaps in care. Some PCPs attributed improvements to practice facilitators who helped practices self-assess gaps in care, and who also taught practices how to address those gaps. Other PCPs expressed appreciation for practice transformation grants that enabled them to add behavioral health clinicians or care coordinators. (See ***Section A.2.2****, Enabling strategies to support health care delivery transformation: Practice transformation* for a detailed discussion of practice facilitators and transformation grants.) Some CMHC providers described how the SIM Initiative gave them focused time to change care delivery. For example, one CMHC provider described using the SIM Initiative to improve monitoring of depression screening rates, and as a result, this provider's CMHC was able to restructure and expand care teams to increase screening. The state's independent evaluation supported these qualitative findings. Based on practice self-assessments, providers in all three cohorts of SIM-participating primary care practices reported higher levels of IBH after SIM Initiative participation (Colorado SIM Office, 2019, September 4).

> "So it's broken down some partnerships throughout the state, which has been unfortunate … it definitely shook things up right in the middle of the [SIM] Initiative. And so, that has been somewhat challenging."
>
> —Colorado state official

Some CMHC providers believed CMHC efforts to improve IBH were undermined by changes in the Medicaid program, however. In July 2018, Colorado's Medicaid agency enacted significant payment changes—under which seven Regional Accountable Entities (RAEs) became responsible for managing both the physical and behavioral health care of Medicaid enrollees.

[3] The estimate of 14 percent was derived by dividing the number of individuals enrolled in the IBH transformation initiative by the state population of Colorado (5,436,519 individuals). The state population estimate was found in the United States Census Bureau American Community Survey 5-Year Estimate 2013–2017. https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

RAEs negotiated payment arrangements with physical health and behavioral health providers in their area. As a result, some CMHCs were moved from capitated to FFS arrangements. At the same, Medicaid allowed primary care practices to bill up to six behavioral health therapy sessions within primary care. Providers in these CMHCs viewed the Medicaid changes as detrimental to the integrated care arrangements they had established over time with primary care practices. According to one state official, CMHC providers were concerned that some primary care practices would perceive they no longer needed to collaborate with CMHCs because the practices could use the new billing codes to provide patients with brief therapy sessions, and would then only refer those patients with the most serious and chronic behavioral health conditions to CMHCs for treatment. The shift in referral patterns to CMHCs would, in turn, result in more provider burn-out, because of the resulting disproportionately high-needs population CMHCs would be required to serve. In addition, according to some CMHC providers, capitated payment allowed CMHCs to pay for some IBH activities that would not be paid for under FFS. Thus, moving away from capitation meant CMHCs either would no longer be able to deliver those particular services, or would deliver the services but not receive payment for doing so.

> We want to figure out which ones [IBH models] work, and to stop the ones that don't."
>
> —Colorado payer representative

By the end of the SIM Initiative, SIM-participating PCPs were concerned about their ability to sustain practice transformations they had made to integrate behavioral health because PCPs perceived that payers were reluctant to pay for IBH. The SIM Initiative payment model for SIM-participating practices was unique; each participating payer was responsible for determining which services, and which members of a practice's patient panel, would be covered by a VBP (see ***Exhibit A-5*** for details). PCPs expressed frustration throughout the SIM Initiative, because they believed they were not being adequately reimbursed by SIM-participating payers for their services. Many practices had expected to learn the skills needed to negotiate with payers for alternative payment models (APMs) for IBH. However, many PCPs reported challenges obtaining adequate and accurate enough utilization, cost, and quality data from electronic health records (EHRs) and claims data to show a positive ROI—as measured by the impact IBH had on patients' clinical outcomes and total costs of care. Without this information, practices could not make an effective "business case" to payers for continued VBP for IBH. To address this challenge, state officials provided several data analysis tools and feedback reports, but the tools were not widely used (see ***Section A.2.2****, Enabling strategies to support health care delivery transformation: Health information technology and data analytics* for more details). The SIM Initiative Office also developed and widely disseminated a training on effective use of clinical and financial data to show the ROI for IBH, and how to negotiate new reimbursement models with payers. However, state officials had only anecdotal evidence on the extent to which practices actually reviewed and used the SIM training materials. Moreover, both payer representatives and state officials observed that practices approached IBH in many different ways. While state officials viewed this diversity of approaches as appropriate (as there was no one IBH model that would immediately fit all practices), many different models turned out to be a barrier to payers' ability to identify "successful" IBH activities payers would be willing to reimburse.

Exhibit A-5. Colorado gave SIM–participating payers flexibility to design a value-based payment for SIM–participating practices

PAYERS

6 commercial payers | **Medicaid**

PRACTICES

- Payers agreed to **support SIM-participating primary care practices with a VBP,** either a new reimbursement for SIM Initiative participation or a VBP that the payer already had in place with a practice (e.g., a CPC+ payment).
- Each payer was responsible for **determining which SIM Initiative practices it would support with a VBP.**
- Each payer **could select a portion of the practice's patient panel** that would be considered in a VBP arrangement.
- Payers were responsible for **negotiating the structure of these payments with each individual practice.**
- **All SIM-participating practices were supported** by at least one SIM-participating payer.

Notes: Medicare was not a participating SIM Initiative payer in this practice transformation initiative.
CPC+ = Comprehensive Primary Care Plus; SIM = State Innovation Model; VBP = value-based payment.
Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Value-based payment strategy and payment reform

Colorado took a multi-pronged approach to promoting VBP among SIM practices; and though VBP adoption was slow under the SIM Initiative, state officials perceived their approach as the right strategy. Colorado focused on: (1) building payer commitment to moving away from FFS and advancing at least one level in the Health Care Payment Learning and Action (HCPLAN) framework over the course of the SIM Initiative; (2) granting flexibility for participating payers to design IBH payment arrangements with their chosen SIM Initiative practices; (3) providing practice transformation support to help practices evolve into the kind of organizations that were fully prepared to enter into VBP; and (4) perhaps most importantly, leveraging a pre-existing payer forum (the Multi-Payer Collaborative) and funding implementation of Multi-Stakeholder Symposiums (MSSs), to engage in discussions around VBP adoption, IBH, and quality measure alignment. State officials believed this approach ensured commercial payer participation in moving towards VBP. Indeed, by the conclusion of the SIM Initiative, state officials reported that SIM-participating payers reported that each payer had moved some practices (though not necessarily SIM Initiative practices) up at least one level in the HCPLAN framework.

> “… It’s really jumpstarted payment reform in Colorado. I think practices are more ready for value-based purchasing as a result of SIM.”
>
> —Colorado state official

State officials maintained throughout that their gradual strategy was the right approach, even though the state acknowledged that payers’ and practices’ VBP adoption was slower than officials had hoped. Some state officials and providers noted that having multiple payers with different payment models was hard for practices to manage. In addition, practices struggled to measure impact and manage care delivery effectively when there was no payer alignment in IBH VBP expectations and requirements.

At the start of the SIM Initiative, some participating payers noted that primary care practices were often unfamiliar with risk arrangements—not sure if they were even in a VBP or how to use data to target and manage populations to change patients’ utilization of health services. Payers and state officials noted both practice- and payer-related challenges to implementing VBP. Practice challenges included capacity to take on more risk, particularly for small practices with low patient volumes and little excess capital to implement transformation activities that supported VBP. Payer challenges were market-related including competitive market environments that payers reported led to

> “A lot of what’s been done [has] been preparing practices for the conversations that they need to have with payers about how they can change what they’re doing to move into a new alternative payment model."
>
> —Colorado state official

de-prioritization of VBP in lieu of other activities that might capture greater market share, and the need for national payers to balance nationwide priorities with Colorado-specific requests to implement VBP specifically for IBH.

To help improve understanding, state officials convened MSS forums about three times per year, where representative of SIM-participating payers, Primary care practices, and CMHCs came together to discuss issues around VBP and IBH. Many payers and PCPs reported that the MSSs were instrumental in helping build trust, communicate expectations for performance, share experiences, debate different approaches to supporting VBP and IBH; and in coming to agreement on key principles like the value of quality measure alignment across payers (Colorado SIM Office, 2019, April). CHMC providers, as discussed below, found the MSS forums less satisfactory.

> "There are many, many, many, many more practices engaged than there have ever been, and there's an actual payer collaborative that's focused squarely on SIM … So to me, the change in the culture, that increase in awareness, wherever it happens, programmatically or financially, is the single most important thing."
>
> —Colorado payer representative

State officials, payers, and providers all acknowledged that early MSS meetings were contentious, with providers often venting frustration about IBH payment rates or lack thereof. As time went on, however, PCPs and payers expressed positive reactions to the forums. One PCP noted that hearing the payer perspectives were helpful, because high-level payer executives and providers were able to engage in an honest dialogue about what delivering IBH really cost practices. Another provider appreciated that payers were interested in discussing measure alignment and how to better negotiate VBPs. Payers, as a group, demonstrated their support for the MSSs and commitment to these forums; and agreed to fund two more MSS after the SIM Initiative ended.

CMHC providers, in contrast, continued to express concern about lack of effective VBP reform for behavioral health providers. CMHC providers reported using the SIM Initiative to try and quantify the value of IBH from a behavioral health provider's perspective (TriWest, n.d.), but expressed: (1) frustration that behavioral health providers lagged well behind PCPs in having meaningful conversations with payers about how to show value; and (2) a desire to be given the same opportunities as PCPs to engage payers in VBP discussions. State officials brought up that, since Medicaid was the primary payer for SIM-participating CMHCs, Medicaid would need to be a critical player in those discussions. An issue complicating the whole discussion was that the Colorado Medicaid program was concurrently undergoing its own significant changes in how CMHCs were reimbursed through the RAEs. As a result, state officials believed the timing was not ideal for further CMHC provider discussions on the behavioral health VBP issue.

The impact of the SIM Initiative on commercial payer premiums overall was unclear. Some commercial payers believed the SIM Initiative had no impact on the premiums charged in the state; others reported they did not know whether the SIM Initiative had an impact.

Despite the challenges voiced on all sides, many payer representatives expressed the view that many providers might be better able to meet and often exceed expectations in implementing VBP if payers could tailor the VBP requirements and expectations to a practice's own circumstances. For example, requirements could be tailored based on patient panel size, the rural nature of a practice, or lack of EHRs or other health IT support to support care management. Some payers explored creative solutions to address the challenge—like using risk pools, whereby payers would pool small practices together to achieve the critical patient volume needed for a successful VBP.

State officials and payer representatives believed that more providers did move into risk-based models over the course of the SIM Initiative. However, many state officials reported that Colorado's goal of increasing access to integrated physical and behavioral health care services in coordinated community systems with VBP for 80 percent of state residents was perhaps too aspirational. While progress was made, the state could not easily measure whether the state had met the 80 percent goal. Even so, state officials and payers thought Colorado would be close to the 80 percent goal if CPC+, Colorado's Medicaid rollout of a new APM for Medicaid primary care practices, and increasing use of VBP among commercial payers were included.

> "I don't think we're quite at getting rid of fee for service, but definitely eventually we're getting in that direction, moving in that direction slowly."
>
> —Colorado payer representative

Anecdotally, state officials reported that all SIM-participating payers had begun working with practices to take on more risk (e.g., moving more practices into Learning and Action Network Category 3 payments). Indeed, many payers themselves acknowledged moving to stronger risk sharing arrangements as the logical next step in provider payment. However, obtaining detailed data on VBP implementation from payers to assess the strength of any movement forward on VBP remained elusive. Despite spending significant time discussing data needs, state officials said payers (particularly large national payers) often could not report high-quality data on the number of covered lives in Colorado under different VBP arrangements.

A.2.2 Enabling strategies to support health care delivery transformation

Key Results
• According to providers, practice facilitators and clinical health information technology advisors (CHITAs) were helpful in integrating behavioral health and physical health care. Collaborative learning and e-learning opportunities helped providers share best practices, identify lessons learned, and transform their workforces. • Major challenges to providers' behavioral health integration efforts included workforce shortages and inadequate information sharing between primary care and behavioral health providers. • Although the Stratus tool was designed to aggregate data and provide feedback, the tool did not always provide accurate, timely data—limiting its utility for primary care practices. • Although time- and resource-intensive, the piloted eCQM tool showed promise in aligning practices' quality measures and reducing their reporting burden.

Practice transformation

SIM practice transformation efforts focused on helping primary care practices and the four bi-directional health home CMHCs implement practice change to integrate physical health and behavioral health, successfully engage in VBP, and align practice activities with other delivery system reforms—including the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) Quality Payment Program. Colorado's SIM Initiative relied on two types of practice transformation staff—practice facilitators (or coaches) and clinical health information technical advisors (CHITAs) (***Table A-2***). Practice facilitators and CHITAs met regularly with primary care practices and bi-directional health home CMHCs to help them implement practice change. By the end of Colorado's SIM Initiative, state officials, payers, providers, and other stakeholders agreed that most SIM-supported practice transformation assistance was beneficial to both PCPs and CMHC providers.

Table A-2. Colorado's practice transformation strategies

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Practice facilitator, provided by a PTO	SIM-participating primary care practices and bi-directional health home CMHCs	• Practice facilitators delivered a wide array of practice transformation assistance, including helping practices meet 11 transformation milestones (e.g., using data-driven improvement, providing prompt access to care, establishing a patient-team partnership). • Practice facilitators and their associated PTOs shared lessons learned through SIM-sponsored trainings and office hours. • Some payers and Medicaid RAEs provided additional practice facilitation. Some practices viewed facilitation as extremely time-consuming, and in some cases, duplicative.	• The number of practices planning to use practice facilitators' tools to continue with transformation was unknown. • Some payers offered practice facilitation, and would continue to offer the service, though the service might be less comprehensive compared to the SIM-funded facilitation.
CHITA	SIM-participating primary care practices and bi-directional health home CMHCs	• CHITAs provided support in reporting quality measures and using cost, utilization, and quality data to improve care processes. • Because over 40 EHRs were used across participating practices, CHITAs were not always adept at offering practices comprehensive health IT solutions. • Negotiating EHR changes with vendors was often cost-prohibitive or not operationally feasible, because EHR vendors were unwilling to make changes for a relatively small number of CO practices.	• The number of practices planning to leverage data and leverage tools learned from CHITAs was unknown.
Practice transformation small grants	SIM-participating primary care practices	• Funds were used as one-time investments to upgrade practice technology, train staff to better coordinate with and refer to BH providers, support family and patient engagement, and seed fund BH clinicians' salaries.	• SIM-funded grants ended July 31, 2019. • Not all practices identified other funding sources to continue investments pursued with small grants (e.g., some practices could not sustain BH providers' salaries).

Note: BH = behavioral health; CHITA = clinical health information technology advisor; CMHC = community mental health center; CO = Colorado; EHR = electronic health record; health IT = health information technology; PTO = Practice Transformation Organization; RAE = Regional Accountable Entity; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

State officials and payers reported that SIM Initiative practice transformation milestones helped practices identify where to focus practice change, though some practices saw the milestones as not targeted enough to fully support behavioral health integration. The SIM Initiative adapted the Bodenheimer's 10 Building Blocks of High-Performing Primary Care (***Exhibit A-6***) to provide participating practices and CMHCs with a set of practice transformation goals and milestones to achieve over the award period. Milestones were also developed to help align with CPC+, to better align delivery system reform activities within the state. Practices collaborated with their practice facilitators to plan a course of action to meet milestones, undertake select practice transformation activities, and assess progress in meeting SIM Initiative milestones.

Exhibit A-6. The SIM Initiative's building blocks for practice transformation

1. Engaged leadership that supports integration and change
2. Use of data to drive change
3. Practice empanelment
4. Use of team-based care
5. Building partnerships with patients
6. Risk stratification of a patient panel and active management of the population using data
7. Screening for behavioral health and substance use disorders and linking primary care to behavioral health and social services
8. Providing prompt access to care, including behavioral health care
9. Providing comprehensive care coordination for primary/behavioral health care
10. Providing fully integrated behavioral care to provide whole-person care

Note: SIM = State Innovation Model.

The SIM Initiative revised its program to give practices in Cohorts 2 and 3 small incentive payments for milestone achievement, and shared practices' progress directly with payers. Payers and state officials viewed the SIM Initiative milestones as an important guiding framework for transformation and as a key tool for assessing if practices were actively engaging in SIM Initiative activities. However, providers in some practices, including one CMHC, described the milestones as too narrowly focused on physical health to account sufficiently for both mental and physical health transformation progress.

Throughout the SIM Initiative, practice facilitators provided practices with technical assistance (TA) to meet transformation milestones and address challenges integrating behavioral health or primary care into the practice. The TA was broad, stretching from providing guidance on practice communications and patient flow to helping practices obtain NCQA patient-centered medical home certification. Many PCPs and some payers noted that the TA had helped primary care practices use their clinical data more effectively to negotiate payments with payers. Over the course of the SIM

> "… we've tended to go into practices with a much more of an open slate of here's kind of generally what we're trying to accomplish. And trying to help practices find their own path."
>
> —Colorado practice transformation organization representative

Initiative, many PCPs shared positive feedback about their practice facilitators. Even among the CMHCs that were newer to the practice facilitation process, practice facilitators were seen as a valuable resource in helping address the challenges of integrating primary care into their offices.

> "… [our CHITA] that's helping us with the SIM project comes through and has taught us how to use our EHR to pull all the reports. So whatever we're interested in, we just pull them."
>
> —Colorado primary care provider focus group participant

Providers and state officials offered mixed feedback about the effectiveness of CHITAs in working with SIM- participating practices (including CMHCs) to transform health IT systems to meet IBH needs and generate the data needed for VBP (e.g., working with practices to generate quality measures from their EHRs). Some providers and state officials shared that the effectiveness of CHITA support varied based on practices' needs and the skill-level of the individual CHITA. Some practices worked with CHITAs that were familiar with their EHRs and able to assist the practice in accessing useful clinical and quality data in the EHR. But some providers and state officials described CHITAs that were not knowledgeable about a practice's EHR or had only basic health IT support to offer.

> "… [the CHITA] wasn't pertinent for us. They want to help [our practice] kind of with an issue that we've been working on for 12 years and it's just never, it's something that has big barriers that they couldn't solve that no one could really solve."
>
> —Colorado CMHC provider

SIM-participating practices used about 40 different EHR vendors, which made it challenging for CHITAs to become expert in all EHRs. The large number of EHR vendors also increased the difficulty CHITAs faced in negotiating changes with vendors—when data outputs or reports needed to be customized to meet SIM Initiative practice transformation needs. Several providers observed, though, CHITAs became more adept at helping that practice create efficient and practical health IT improvements that produced useful and timely clinical data.

> "… not every CHITA … but, in general, I think [the supports the CHITAs offer] while [practices are] trying to make those changes has been something that has been incredibly important."
>
> —Colorado state official

Recognizing that capital investment was needed to transform care, Colorado's SIM Initiative implemented practice transformation small grants. The state combined $3 million from the Colorado Health Foundation with $640,000 in SIM Initiative funding—to offer one-time funds, through a competitive process, to 107 practices across the three primary care practice cohorts.[4] Providers consistently described the practice transformation small grants program as beneficial. Funds were used to start or enhance transformation efforts both tangible (hiring new staff) and intangible (initiating trainings to change practice culture to support IBH). Over the course of the SIM Initiative, practices most frequently used the small grants funding to hire behavioral health providers, in the hope that the behavioral health providers would generate enough revenue over time, through reimbursed services, to self-fund their positions after the grant ended. Other practices hired staff to help with non-reimbursable services, such as care coordination and patient data review and screenings. Grant funds were also used for practice renovations to accommodate new staff, technology enhancements, and staff trainings.

For more information, see ***Table A-8*** in the Addendum at the end of this chapter. For full results describing the impact of Colorado's integrated behavioral health model on Medicaid and Medicare beneficiaries' and commercial plan members' spending, utilization, and quality, see ***Appendix A-1***.

The quantitative impact analysis found that practice facilitation and clinical health IT support to help practices meet practice transformation milestones was associated with favorable changes in spending and utilization for Medicaid and Medicare beneficiaries and commercial plan members receiving care at SIM-participating primary care practices (***Exhibit A-7***). The goals of improving IBH were to slow total spending growth, increase behavioral health–specific spending, slow use of high-cost services such inpatient admissions and ED visits, and improve quality of care for all patients, not just those with a diagnosed behavioral health condition. Efforts to improve behavioral health integration appear to have achieved some of these goals. Total spending per person per month (PPPM) decreased among Medicaid beneficiaries attributed to IBH practices and increased in the comparison group, leading to a relative decrease for Medicaid beneficiaries during the first two years of IBH implementation (-\$26.43 PPPM). For commercial plan members, total spending PPPM increased for both the SIM-participating group and the comparison group but increased less for the SIM-participating group (-\$40.40 PPPM). Behavioral health–related spending PPPM increased for both SIM-participating Medicaid beneficiaries and comparison beneficiaries but increased slightly more for SIM-participating Medicaid beneficiaries (\$1.15 PPPM). For Medicare beneficiaries, behavioral health–related spending PPPM increased among SIM-participating Medicare beneficiaries and remained almost unchanged in the comparison group, leading to a relative increase for SIM-participating Medicare beneficiaries during the first two years of IBH implementation (\$1.26 PPPM). The finding of lower total spending PPPM for SIM-participating members relative to the comparison

[4] For Cohorts 2 and 3 of the SIM-participating PCPs, the Colorado SIM Initiative restructured small grants to be solely funded by the Colorado Health Foundation (CHF) and not by federal SIM funding. This restructuring removed federal restrictions on how practices could use small grants, making it easier for Cohort 2 and 3 practices to applying funding to areas of greatest need. For example, PCPs could use small grants to pay for behavioral health provider salaries, which they could not do if the small grants were funded with federal SIM funding.

group was also observed in the subgroup of Medicaid and commercially insured patients diagnosed with a behavioral health condition.

Exhibit A-7. Colorado's integrated behavioral health model had favorable impacts on spending and hospital service use, and unfavorable impacts on primary care provider visits in its first two years

1,185,151 Medicaid beneficiaries
591,811 Medicare beneficiaries
1,653,766 commercial plan members

COLORADO IBH

	Medicaid	Medicare	Commercial
Spending	☑ Total spending PBPM: Larger decrease	☐ Total spending PBPM	☑ Total spending PMPM: Smaller increase
	☑ BH-related total spending PBPM: Larger increase	☑ BH-related total spending PBPM: Larger increase	☒ BH-related total spending PMPM: Smaller increase
Utilization	☑ Inpatient admissions: Larger decrease	☐ Inpatient admissions	☑ Inpatient admissions: Larger decrease
	☐ ED visits	☑ ED visits: Smaller increase	☐ ED visits
	☐ PCP visits	☒ PCP visits: Smaller increase	☒ PCP visits: Larger decrease

☑ Favorable, statistically significant ☒ Unfavorable, statistically significant ☐ Not statistically different

Notes: Changes are relative to a comparison group.

BH = behavioral health; CO = Colorado; ED = emergency department; IBH = integrated behavioral health; PBPM = per beneficiary per month; PCP = primary care provider; PMPM = per member per month.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office. See ***Appendix A-1*** for more details.

Trends in utilization also aligned with expectations. Inpatient admissions decreased for SIM-participating Medicaid beneficiaries and commercial plan members and increased for the respective comparison groups, leading to relative decreases in inpatient admissions for the SIM-participating groups (-10.75 admissions per 1,000 Medicaid beneficiaries; -8.66 admissions per 1,000 commercial plan members). The same result of fewer inpatient admissions among SIM-participating members relative to the comparison group was also found in the subgroup of Medicaid and commercially insured members with a behavioral health condition. While ED visits increased for both the SIM-participating Medicare beneficiaries and comparison beneficiaries, they increased less for SIM-participating beneficiaries (-22.13 visits per 1,000 beneficiaries). Among the subgroup of patients with a behavioral health condition, ED visit findings were favorable. ED visits decreased for SIM-participating Medicaid beneficiaries and commercial plan members and comparison beneficiaries but decreased more for SIM-participating members.

Primary care provider visit findings did not align with expectations. Visits increased for both the SIM-participating Medicare beneficiaries and comparison beneficiaries but increased less for Medicare beneficiaries (-231.76 visits per 1,000 beneficiaries). Primary care provider visits did not change for Medicaid beneficiaries relative to the comparison group. For commercial plan members, primary care visits remained almost unchanged among the SIM-participating group but increased in the comparison group, leading to a relative decrease in the SIM-participating group (-214.60 visits per 1,000 members). Less reliance on in-person primary care may have been a result of increased focus on alternative modes of communication between patients and providers (e.g., use of a patient portal or email consults) to meet the SIM Initiative practice transformation milestone for prompt access to care transformation.

Claims-based metrics of quality of care, specifically related to behavioral health care, were limited to follow-up after a mental illness–related hospitalization. Results indicate some favorable changes in follow-up visit rates for commercial plan members and Medicaid beneficiaries. Because SIM-participating practices focused on improving quality measures derived from *health* records, one *claims-based* measure will inevitably under-estimate the extent of quality improvement efforts undertaken by SIM practices or their successes in meeting quality targets (see ***Table A-8*** in the Addendum at end of this chapter; for all results on beneficiary-level effects of Colorado's IBH model for primary care practices, please see ***Appendix A-1***).

Payers and select provider groups might sustain some practice facilitation support after the SIM Initiative ended. Numerous entities in Colorado—including payers, Medicaid RAEs, and other reform initiatives (such as accountable care organizations and independent physician associations)—offered providers in-person practice transformation assistance separate from the SIM Initiative. As a result, some SIM-participating practices had multiple practice facilitators (e.g., a SIM-funded facilitator plus a payer-funded facilitator). Because of this non-SIM funded facilitation, some SIM-participating practices expected to continue receiving practice transformation support after the SIM award period.

Workforce development

The goal of Colorado's SIM Initiative practice education efforts was to ensure that both primary care and behavioral health providers had the training and tools to work together in a team-based, coordinated care environment (***Table A-3***).

Providers viewed Colorado's SIM learning collaboratives and e-learning as informative, but sometimes too basic to meet their needs. As of May 2019, 800 people had accessed an e-learning module session (Colorado SIM Office, 2019, July 31). Learning collaborative sessions and e-learning modules covered a range of topics—such as depression, what integrated care was like for specific clinical populations, preventing burnout in primary care, and how to use clinical and financial data to negotiate with payers. Many providers and some payers described the learning collaborative meetings and e-learning modules as informative and a high-quality learning opportunity—particularly when sessions or modules covered topics relevant to a practice's challenges or area of desired transformation. Other providers highlighted that topics were often too basic or did not provide new information. These practices either did not attend the meetings and e-learning sessions or sent their lower-level staff.

Table A-3. Colorado's workforce development strategies

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Learning collaboratives	SIM-participating primary care practices and CMHCs	• Offered 14 practical learning and discussions across SIM-participating practices and CMHCs and their staff on BH integration topics, such as billing for BH services, telehealth, and negotiating VBP with payers. • Some topics were too basic or did not offer enough concrete guidance for specific providers, such as FQHCs.	• Videos and materials would be stored on the University of Colorado's School of Medicine's Department of Family Medicine website.
e-Learning modules	SIM-participating primary care practices and providers statewide, including BH providers	• The Colorado Department of Public Health and Environment, the UCDFM, and the Office of Behavioral Health created 21 e-learning modules and distributed them online. • A total of 672 people completed at least one e-learning module (as of July 2019). • Some modules provided physicians with Continuing Medical Education credits.	• Modules would be housed on the UCDFM website.
Integrated BH Training Bundle (funded in partnership with the Office of Behavioral Health)	BH providers in the state that were interested in working in integrated environments	• The curriculum was developed to train BH providers to work collaboratively in an integrated practice setting. • Since its launch in November 2018, more than 225 providers had received an IBH Training Bundle certificate of completion, as of July 2019. • Demonstrating the value-added of this certificate to payers would be an ongoing challenge.	• The Office of Behavioral Health would continue to house components of the certificate program, subject to available funding.

Note: BH = behavioral health; CMHC = community mental health center; FQHC = Federally Qualified Health Center; IBH = integrated behavioral health; PCP = primary care provider; SIM = State Innovation Model; UCDFM = University of Colorado Department of Family Medicine; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Throughout Colorado's SIM Initiative, stakeholders continually described the challenge posed by behavioral health workforce shortages, particularly in rural areas, where practices found it incredibly challenging to recruit behavioral health providers. Although psychiatrists were most often cited as the key shortage, practices also had trouble hiring behavioral health providers like licensed social workers. Even when practices could hire behavioral health staff, practices waited months to get behavioral health providers credentialed[5] with payers, because the credentialing process was slow. Providers also highlighted that the behavioral health workforce shortage was exacerbated by the fact that not all behavioral health providers worked well in an integrated practice setting. Without an available workforce trained to practice in integrated care settings, many practices found themselves unable to integrate behavioral health in the way they had envisioned when starting the SIM Initiative. To try and bridge the workforce gaps, Colorado developed the Integrated Behavioral Health Training Bundle. This program was developed in 2015 and launched in November 2018 as a series of trainings around eight core competencies for behavioral health providers working in primary care settings. The IBH Training Bundle was offered through numerous symposium and clinical provider fellowship programs, and then expanded to include a certificate of completion for participants who completed the training. The Office of Behavioral Health would continue to house components of the certificate program if funding was available.

Health information technology and data analytics

At the start of the SIM Initiative, state officials spent considerable time developing a health IT roadmap and a set of meaningful, potentially sustainable health IT use cases to advance health IT within clinical providers' care delivery reforms. By the end of the award, Colorado and its SIM Initiative partners had implemented several activities to help practices leverage health IT to transform care (***Table A-4***). To implement some of these activities, Colorado was able to leverage a functional health information exchange (HIE) that pre-dated the SIM Initiative.

Table A-4. Colorado's health information technology strategies

Activity	Target	Key accomplishments and challenges	Post-SIM Initiative sustainability
SPLIT	SIM Initiative practices	• Initial tool lacked the functionality practices and practice facilitators needed. • An upgraded tool was launched in June 2018, but some practices and their practice facilitators still found the redesigned tool challenging to use.	• The UCDFM assumed SPLIT ownership, with the intention of using it for other initiatives as they arose.

(continued)

[5] Credentialing is the process whereby the clinical provider can bill a payer for a service rendered and receive payment.

Table A-4. Colorado's health information technology strategies

Activity	Target	Key accomplishments and challenges	Post-SIM Initiative sustainability
Stratus	SIM Initiative practices	• All SIM-participating payers' data was included in the tool. • Payers were not always able to provide accurate data in a timely manner, limiting Stratus' utility for practices. • Medicaid had extensive delays uploading data due to Medicaid data systems changes. • Negotiating licenses for all SIM Initiative practices was a labor-intensive process that initially delayed Stratus use.	• The Multi-Payer Collaborative would continue to fund access to Stratus for SIM practices that also participated in CPC+ practices through 2022, but only CPC+ related claims would be made available.
eCQM Reporting Solution	Targeted up to 200 SIM practices	• Launched the solution in May 2018 with a contract for all three of Colorado's HIEs, and 144 practice sites participated in the pilot. • Practices needed CHITAs' help to upload EHR data to the tool. • CO made significant progress transferring CQMs to the data platform and validating the data.	• Colorado's Office of eHealth Innovation would continue to coordinate data governance of the Solution. • Colorado's Medicaid agency requested funding in the state budget and through HITECH/IAPD funding to use the tool for Medicaid practices.
Feedback reports on costs and utilization for SIM-attributed patients	SIM-participating practices and CMHCs	• Although some practices reported using the reports, many noted that reports were often considered not timely enough to be useful.	• With the conclusion of the SIM Initiative, reports would no longer be produced.
Telehealth/ e-consults	Two health systems that applied for funding to expand e-consults among specialty networks	• Initial efforts to invest in a BH telehealth pilot were shifted to focus on e-consults to align with Medicaid's priorities. • The e-consult pilot was short (six months). • The SIM Initiative worked with Medicaid on the policy needed to open e-consult codes for provider reimbursement.	• State officials expected Medicaid to implement reimbursement, expanding the use of e-consults over time.
Expanding Broadband services	300 health care sites	• Broadband was expanded to 381 health care sites. • Broadband expansion took longer than the state planned or expected.	• This initiative was only partially SIM-funded. Expansion would continue after the SIM Initiative ended using other funds.

(continued)

Table A-4. Colorado's health information technology strategies (continued)

Note: BH = behavioral health; CHITA = clinical health information technology advisor; CMHC = community mental health center; CO = Colorado; CPC+ = Comprehensive Primary Care Plus; CQM = clinical quality measure; HIE = health information exchange; HITECH = Health Information Technology for Economic and Clinical Health Act; IAPD = implementation Advanced Planning Document; SIM = State Innovation Model; SPLIT = Shared Practice Learning and Improvement Tool; TA = technical assistance; UCDFM = University of Colorado Department of Family Medicine.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Stakeholders viewed the Shared Practice Learning and Improvement Tool (SPLIT)—a tool to assist in monitoring transformation—as an innovative tool in concept, but hard to use and often unhelpful. The SIM Initiative developed SPLIT very early, as a web-based tool to help primary care practices and CMHCs track their progress in meeting practice transformation milestones.

After SPLIT's first year of operation, Cohort 1 PCPs said they found it challenging to retrieve the submitted milestone data. In June 2018, the SIM Initiative re-designed the tool, but not all SIM-participating practices and practice facilitators found the re-designed tool any easier to use. State officials and providers described SPLIT as a one-time, significant investment that could be used by other federal or state initiatives to track practice transformation.

> "… [the] SPLIT—there was a great vision [behind its development] that was very hard to accomplish over the course time that was allocated … ."
>
> —Colorado state official

Payers and providers described Stratus—a web-based platform for payers to share patient-level cost and utilization claims data with practices—as a valuable concept, but users found the tool itself impractical and infrequently used. Stratus was originally developed for practices participating in CPC+ and adapted for SIM-participating practices. From its creation, Stratus' design inherently limited its utility. SIM-participating payers submitted claims data only for those patients in a given practice who were in a SIM-related VBP—not for patients covered by a SIM payer but not in a VBP plan.[6] Practices found this partial snapshot of their patient panel difficult to act on. Furthermore, due to a change in Medicaid's claims data vendor, Medicaid claims data were not available in Stratus from April 2017 through June 2018. Without Medicaid,

> "… the underlying understanding that you can't really get your providers to go where you need to stay if they have to work across five or six different sources of truth. The notion behind Stratus is good although it has been a struggle getting providers to participate and use it."
>
> —Colorado payer

[6] Although Medicare was not a SIM-participating payer, Medicare data was made available in in Stratus for SIM participating practices in June 2019, a month before the SIM Initiative ended.

practices with a large number of Medicaid enrollees (e.g., Federally Qualified Health Centers, CMHCs, and pediatric practices) did not find Stratus useful for monitoring care delivery. Moreover, payers did not submit to Stratus complete behavioral health cost and utilization data out of confidentiality concerns;[7] without that behavioral health data, practices had an even less complete picture of patients' health care use. Providers acknowledged that practices often found more utility in data from their own EHR or a payer's data portal—an assessment with which state officials and payers concurred. In 2018, the SIM Initiative Office formed a Stratus workgroup, which conducted training webinars for providers and practice facilitators to help them more effectively use and provide feedback about the platform.

The *eCQM solution pilot*—which automatically extracted nine clinical quality measures[8] from 144 pilot practices' EHRs and uploaded them into a central data warehouse that payers could access (Colorado SIM Office, 2019, September 4)—was described by stakeholders as potentially sustainable. Development of the eCQM solution pilot emerged out of Colorado's Health IT Roadmap[9] and an extensive, SIM-funded review of health IT use cases that aligned with state-level health IT priorities. The pilot aimed to help practices participating in APMs to automatically extract EHR data, develop clinical quality measures (CQMs) from that data, and then report the CQMs to payers and to the SIM Initiative. State partners highlighted the tremendous effort required to implement this pilot, particularly validating CQMs—which involved confirming that data being pulled from practices' EHRs was accurate. State officials and payers highlighted the progress made in transferring CQMs from participating practices' EHRs to the data platform and validating the data. State officials also described CHITAs as critical in helping the practices participating in the pilot with the required electronic submission.

Given the promise of the eCQM tool to ease reporting for practices participating in APMs, Colorado's Office of eHealth Innovation (OeHI) was tasked with continuing to oversee development and governance of the eCQM solution after the SIM Initiative. In addition, the state's Medicaid agency applied for additional federal Medicaid funding through Health Information Technology for Economic and Clinical Health Act (HITECH) administrative funds to support practices' adoption and meaningful use of EHRs. If this funding could be secured, Medicaid and OeHI together would develop a long-term strategy for use of the tool within Medicaid. State officials reported they hoped OeHI would also engage commercial health plans to onboard practices to use eCQM for VBP reporting.

[7] 42 Code of Federal Regulations (CFR) Part 2 is a federal confidentiality law enacted in the 1970s that prevents the sharing of patient records and information associated with substance use treatment received from a federally assisted program.
[8] Nine eCQMs were selected for the pilot: body mass index, depression, maternal depression, adolescent obesity, diabetes A1c measures, hypertension, tobacco use, developmental screening and asthma.
[9] In November 2017, Colorado's Office of eHealth Innovation released a Health IT Roadmap, or plan, that outlines high-level initiatives that can be used to evaluate the direction of existing and future health IT projects within the state.

Electronic consults (e-consults)—a form of asynchronous, provider-to-provider communication through a shared EHR, web-based platform, or email—became a new SIM focus in October 2018. The shift aligned SIM Initiative activities with Colorado Medicaid's interest in building an e-consult program. The intent was to expand behavioral health access, particularly among Colorado's largely rural population. The changed focus to e-consults came only after extensive information gathering by the SIM Initiative suggested that a telehealth project would most likely be duplicative of other ongoing telehealth efforts in Colorado. Connecting PCPs with specialists through e-consults would afford patient access to specialty care without the patient having to meet face-to-face with a specialist. By the time the SIM Initiative Office decided to fund an e-consult pilot, however, little time was left in the award period. Thus, the pilot was purposefully short and focused primarily on program planning for the two health systems to build an e-consult program for behavioral health care in rural or underserved regions.

Even with Colorado's focus on data sharing through new health IT tools and innovative pilots, the state had challenges addressing a key concern for behavioral health integration—sharing substance use treatment data among providers. Colorado's ability to address challenges associated with substance use treatment data sharing among providers was limited. In particular, SIM-participating PCPs frequently cited federal regulations guiding patient confidentiality on substance use treatment (i.e., 42 Code of Federal Regulations [CFR] Part 2) as a major impediment to sharing patient data between PCPs and behavioral health providers. Moreover, some providers and state officials indicated that the confidentiality regulations were a significant roadblock to transmitting patient health data to the state's HIEs or transmitting data (electronic or otherwise) among clinical providers. The state spent considerable effort convening exerts across numerous state agencies to create recommendations for the Governor's office on providing guidance to clinical providers. As the SIM Initiative ended, efforts to clarify how providers could share behavioral health data without violating confidentiality remained ongoing.

Quality measure alignment

State officials described the SIM Initiative as a catalyst for coordinating quality measure alignment across payers and initiatives. By the end of the SIM Initiative, SIM-participating payers had identified a standard set of 13 adult primary care quality metrics that SIM-participating payers could use in future VBP or care delivery reform programs. ***Table A-5*** presents the quality measure alignment strategies for Colorado.

Table A-5. Colorado's quality measure alignment strategies

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Alignment of clinical quality measures across initiatives	Clinical providers statewide	• Held ongoing discussions with payers in the Multi-Payer Collaborative to align measures across SIM Initiative and other reform and payment initiatives. • Identified 13 quality metrics for adult primary care that could be used by payers. • Payers could not commit to using only those 13 measures in their respective VBP or care delivery programs. • Payers could not resolve the issue of practices' grappling with disparate requirements for reporting quality measures.	• Alignment of clinical quality measures across initiatives might continue as part of other CO payment reform initiatives.

Note: CO = Colorado; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, transcripts, and state documents.

> "I think we probably have been somewhat stagnant in our progress in the last year in terms of [quality measure alignment] … At the end of [our discussions] what we have is a list of 12 [sic] priority measures that may be used [by payers] in addition to other [payer-specific] measures that might also be used. Those are two different things."
>
> —Colorado state official

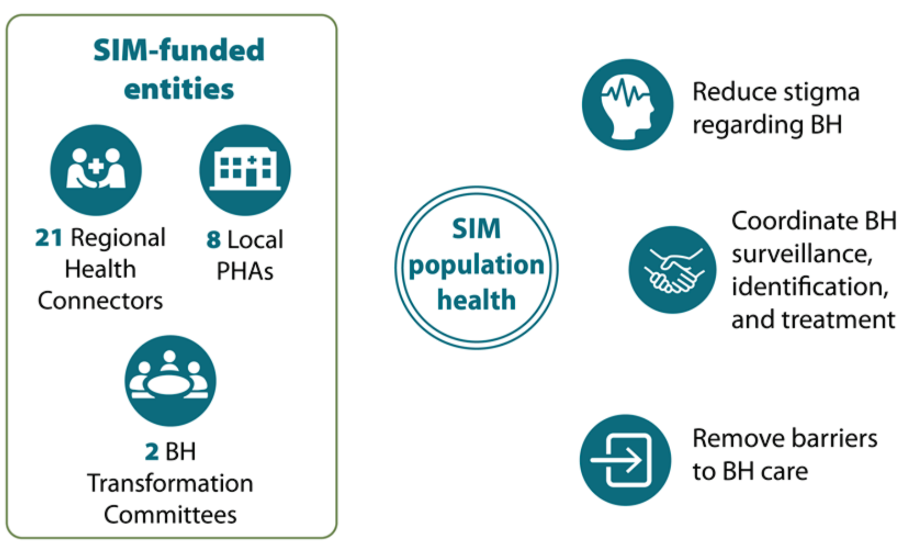
Early in Colorado's SIM Initiative, state officials recognized the importance of aligning quality measures across payers to reduce practice reporting burden. Multiple reform initiatives existed in Colorado, including CPC+, the Transforming Clinical Practice Initiative, and other payer-driven APMs—each of which had a unique set of clinical quality measures practices were required to report on and meet as part of their participation. The SIM Initiative convened payers in the Multi-Payer Collaborative to discuss quality measure alignment. Through discussions at the Multi-Payer Collaborative, commercial payers and Medicaid developed a list of standardized adult primary care measures but did not commit to using this list in their programs for several reasons. First, payers were reluctant to change their existing quality reporting programs which were designed before the SIM Initiative began. Second, payers with national markets were averse to revising quality measures just for the Colorado market. Third, commercial payers were reluctant to make changes to their quality measures just to align with Medicaid or Medicare measure specifications. Payer reluctance to make changes to their quality reporting programs led a few state officials to see alignment efforts as unsuccessful. However, one state official observed that even talking about measure alignment with payers was a "small win."

A.2.3 Population health

Key Results
• To address patients' behavioral and social needs, Regional Health Connectors connected clinical providers with community resources. • To address mental health stigma and improve behavioral health treatment, Colorado supported local public agencies (LPHAs) and the BHTCs of school districts and mental health providers. • Sustainability of population health activities depended on partner organizations securing non-SIM resources.

Colorado's goals for population health were to engage communities to reduce stigma around behavioral health; promote coordination of behavioral health surveillance, identification, and treatment within local health systems; and remove barriers to accessing care. Supported by multiple community investments (***Table A-6***), Regional Health Connectors, LPHAs, and BHTCs established partnerships and referral systems to carry out activities that enhanced community capacity to address behavioral health challenges (***Exhibit A-8***).

Exhibit A-8. Colorado funded three population health initiatives to reduce behavioral health stigma, coordinate treatment, and remove barriers to behavioral health care



Note: BH = behavioral health; PHA = public health agency; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Table A-6. Colorado's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
The Regional Health Connector program, including creation of one Veteran Health Connector in northeast CO	Clinical providers, community-based organizations, local governments, and other multi-sector groups Veterans and local organizations serving veterans	• The SIM Initiative funded 21 Regional Health Connector positions • Established or strengthened more than 3,000 local partnerships that resulted in projects such as helping to establish health clinics, non-emergency transportation, and referral networks between clinical providers and community-based agencies. • Difficulty showing the value of these connections to payers or other funders.	• Retention of Regional Health Connector positions depended on host organization investment; five of 21 organizations hosting Regional Health Connectors committed to funding the positions for one year after the SIM Initiative ended.
Statewide call to action	Male (boys and men) CO residents	• The Population Health Workgroup created a set of recommendations to improve BH disorder awareness, prevention, and treatment for boys and men. • Tri-County Health Department's Let's Talk Colorado messaging campaign was revamped to align with Call-to-Action.	• The activities and recommendations in the workgroup report were designed to be incorporated into partner agencies' work beyond the SIM Initiative.
Suicide prevention, stigma reduction, and general BH promotion efforts led by LPHA grantees	Adolescents, men and boys, community members in LPHA communities	• The SIM Initiative funded eight LPHAs. • LPHAs implemented many projects tailored to local priorities, for example, scaling the "Let's Talk" campaign[10] for men and boys; data-sharing systems for agencies involved in suicide prevention; training local media on how to report on suicide. • LPHAs established new partnerships with local community service organizations in the process of implementing the funded projects. • LPHAs noted that building relationships, common understanding across partners, and a collective vision for solutions takes significant time.	• One SIM-funded position previously housed in Colorado Department of Public Health and Environment to coordinate suicide prevention efforts statewide would be added to the Department's budget. • Depended on availability of other grants.

(continued)

[10] The Let's Talk campaign aimed to raise awareness of mental health concerns.

Table A-6. Colorado's population health activities (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
BHTCs	Public school students in Aurora and Larimer Counties	• The SIM Initiative funded two BHTCs. • One BHTC implemented a BH awareness curriculum in Aurora public middle and high schools. • In Larimer County, the second BHTC, Child, Adolescent, and Young Adult Connections Team, coordinated screening and service referral for students and their families.	• Continuation of activities depended on availability of non-SIM grants, but at least one BHTC partner planned to retain that program.

Note: BH = behavioral health; BHTC = Behavioral Health Transformation Collaborative; CO = Colorado; LPHA = local public health agency; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

The Regional Health Connectors constituted a key workforce program the SIM Initiative introduced to strengthen the health system's ability to address the social determinants of health in the state. The program was designed in recognition that medical providers often lacked the time and resources to address social factors, even factors with immediate impact on their patients' health. Starting in 2016, the 21 Regional Health Connectors deployed across the state had established and strengthened nearly 3,000 (Colorado Health Institute, n.d.) partnerships among medical and behavioral health providers, community-based organizations, and local government agencies by the end of the SIM Initiative. Community partners shared anecdotal accounts that the Regional Health Connectors had some success in improving clinical–community linkages**.** Results from three state-funded evaluations suggested that local organizations recognized the value in the connections the Regional Health Connectors facilitated and developed increasing trust in these relationships (Colorado Health Institute, n.d.; TriWest, 2019; Visible Network Labs, 2019). Notable examples of Regional Health Connector work included establishing first-ever primary care clinics in Park and Clear Creek counties; piloting mobile clinics in Douglas County at partner churches to provide health care to uninsured community members; and creating referral networks among medical, behavioral health, and social service providers in multiple counties across the state.

SIM-supported population health activities more generally brought together multi-sector partners to develop solutions for community-based behavioral health challenges. Several LPHAs reported that the SIM Initiative presented an opportunity for different local agencies to talk more about mental health and what role each agency played in a community system to support mental health. For example, one LPHA grantee established partnerships with schools, emergency responders, law enforcement, hospitals, and the coroner's office; and educated these partners on the value of using data to inform prevention efforts. Together, these entities designed a surveillance system to identify populations most at risk for mental health crises—enabling local agencies to develop more effective strategies to prevent teen suicide in their community going forward.

The SIM Initiative did not prescribe specific activities or ways to use SIM funding for Regional Health Connectors, LPHA, and BHTC grantees. As a result, some communities used SIM funding to create resources or kickstart programs that could be adapted and put to wider use after the SIM Initiative. For example, Let's Talk Colorado, implemented by Tri-County Public Health, was expected to be adapted for use in four other Colorado counties after the SIM Initiative. In Aurora County, BHTC funding was used to train middle- and high-school staff on a behavioral health disorder prevention curriculum school staff could continue to use after the SIM Initiative. Colorado also allowed its SIM-funded grantee organizations to braid together different funding streams, which encouraged resource pooling with other agencies and community organizations. For example, the Area Health Education Center (AHEC) in Southwest Colorado used additional resources to help expand the stigma reduction work one of the LPHAs carried out in the region to all nine counties the AHEC served. Another LPHA strategically identified at the outset of their SIM activities partners that had the staffing to take on the mental health surveillance, education, and coordination activities established through their SIM activities.

Colorado's use of SIM-funded grants to support population health activities posed risks to the sustainability of these activities, however. When the SIM Initiative ended, LPHAs, BHTCs, and organizations hosting the Regional Health Connectors had to start searching for new funding sources to continue activities started under the SIM Initiative. Overall, community partners were optimistic that funding would eventually be secured through partner organizations or through other grants. Among the SIM population health programs, the Regional Health Connector program, by design, had the best potential for being sustained by payer or health system investments—if the Regional Health Connector host organization could show payers a positive ROI (in reduced health care utilization through Regional Health Connectors' success in connecting patients to necessary clinical and community services). However, several state officials reported that host organizations did not capitalize on the opportunity to show an ROI, reducing the potential for sustaining the Regional Health Connector workforce.

A.3 Sustainability

Key Results
• SIM Initiative activities were not sustained through new state or federal funding. • To continue population health activities, partner funding facilitated short-term sustainability, but many partners had not yet pursued additional long-term funding when the award period ended. • Challenges remained to behavioral health integration, including a shortage of trained providers, inadequate payer reimbursement, and lack of clinical data sharing between primary care and behavioral health providers.

Colorado did not secure federal or state funding to sustain delivery system and payment reform SIM activities. In 2018, Colorado engaged Centers for Medicare & Medicaid Services (CMS) in discussing the potential roll-out of an all-payer hospital budget APM. By the end of the SIM Initiative, state officials reported that development of such a model would not be feasible—both because of shifting Center for Medicare and Medicaid Innovation (CMMI) priorities and because Colorado's new Governor (who took office in January 2019, seven months before the SIM Initiative ended) needed time to develop his own health policy agenda before engaging with CMS on new funding.

Colorado relied on SIM Initiative partners to continue SIM Initiative activities, a strategy that was expected to facilitate short-term sustainability**.** As described in ***Table A-7***, several key SIM activities would continue for at least some time under the guidance of partner organizations like the Colorado Multi-Payer Collaborative, the University of Colorado Department of Family Medicine, and the Colorado Department of Public Health and Environment. However, long-term sustainability of SIM activities would require these partners to find funding or secure in-kind resources to continue these SIM Initiative activities; and many interviewed partners had not yet pursued or planned to pursue additional funding for the longer term.

Table A-7. Sustainability of Colorado's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	Primary care practice transformation to support IBH	No	Not applicable.
	Bi-directional health homes (four CMHCs)	No	Not applicable.
	Multi-stakeholder symposiums	Yes, for a limited time	Payers in the Multi-Payer Collaborative would fund.
Population health	Regional Health Connectors	Yes, some positions	Partner organization investment.
	Funding BH-related population health activities for LPHAs and BHTCs	Yes, for some activities	Partner organization investment.

(continued)

Table A-7. Sustainability of Colorado's SIM Initiative activities (continued)

Activity type	Activity	Plans to sustain	Sustainability mechanism
Practice transformation	Learning collaboratives for SIM-participating primary care practices and bi-directional health homes	No	Not applicable.
	Practice facilitators and CHITAs	No	Not applicable.
Workforce	Provider education through nine online learning modules for identification and treatment of BH concerns	Yes	Colorado Department of Public Health and Environment to house the online modules.
Health IT and data analytics	Stratus	Yes, for SIM practices also in CPC+	Payers participating in CPC+.
	SPLIT	Yes	University of Colorado Department of Family Medicine to maintain tool for other initiatives.
	Primary care and CMHC practice feedback reports	No	Not applicable.
	Broadband expansion	Yes	Partner organization investment.
	eCQM solution pilot	Yes	Medicaid agency requested state and federal funding to use the tool for practices accepting Medicaid.
	e-consult pilot	No	Not applicable.

Note: BH = behavioral health; BHTC = Behavioral Health Transformation Collaborative; CHITA = clinical health information technology advisor; CMHC = community mental health center; CPC+ = Comprehensive Primary Care Plus; eCQM = electronic clinical quality measure; health IT = health information technology; IBH = integrated behavioral health; LPHA = local public health agency; SIM = State Innovation Model; SPLIT = Shared Practice Learning and Improvement Tool.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

A.4 Implications of Findings/Lessons Learned

- To advance payment reform, Colorado's SIM Initiative had to balance the advantage of engaging payers in VBP implementation against the disadvantage of not offering SIM-participating providers a clear path to reimbursement for their IBH efforts.
  - Not requiring or mandating commercial and public payer participation in a specific VBP for SIM-participating practices contributed to payers' willingness to discuss VBP reform throughout the SIM Initiative. This flexible approach also allowed payers to explore VBP for IBH at their own pace.
  - Lack of a prescribed VBP for SIM participation left participating primary care practices and CMHCs without a clear reimbursement model to help them implement IBH.
- Colorado's SIM Initiative was administered out of the Governor's office rather than a particular state agency. This helped the SIM Team operate more easily across state agencies, and across other types of organizations willing to advance SIM priorities.

- Colorado relied on an extensive number of partners—including state agencies, universities, local health policy research groups, and statewide provider membership organizations—to implement SIM Initiative activities. Multiple partners facilitated partner organization buy-in to SIM Initiative goals and gave the SIM Initiative access to outside experts to design activities. Partners willingness to absorb SIM Initiative activities for at least a while also provided an avenue for short-term sustainability.
- Throughout the SIM Initiative, the Colorado SIM Initiative Team relied on subject matter experts working in substantive area workgroups to define, oversee implementation of, and re-evaluate SIM activities. Because workgroup members came from numerous organizations within the state, Colorado was able to achieve a broad base of engagement with, and support for, SIM activities.
- To ensure Colorado met its SIM Initiative goals, state officials course-corrected and refocused SIM Initiative activities in response to changing circumstances. For example, telehealth expansion was originally a key feature of the SIM Initiative health IT efforts. However, state officials transitioned to an e-consult pilot after extensive information gathering suggested that a telehealth project would most likely be duplicative of other ongoing telehealth efforts in Colorado.
- SIM-participating providers reported that practice facilitation and clinical health IT assistance helped them implement IBH. However, behavioral health integration was not easy, and practice facilitation did not sufficiently address the core implementation challenges—including behavioral health workforce shortages, difficulties integrating trained behavioral health providers into primary care, confidentiality impediments to sharing clinical behavioral health data across providers, and lack of adequate IBH reimbursement.
- SIM-participating primary care practices' efforts to implement IBH resulted in favorable impacts on health care use and spending. Though results varied somewhat among Medicaid, Medicare, and commercial beneficiaries, patients receiving care in SIM practices generally experienced reductions in total health care expenditures, small increases in behavioral health–related spending, and fewer inpatient admissions and ED visits.

Addendum

Table A-8 Colorado's integrated behavioral health model had favorable impacts on spending, hospital service use, and mental health follow-up visits, and unfavorable impacts on primary care provider visits in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: CO IBH	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($) (Medicaid)	↓	↑	**-26.43†** (-32.78, -20.08)	-10.3	<0.001
Total Spending PBPM ($) (Medicare)	↑	↑	-0.54 (-7.15, 6.07)	-0.1	0.89
Total Spending PMPM ($) (commercial)	↑	↑	**-40.40†** (-48.14, -32.65)	-14.6	<0.001
Inpatient Admissions per 1,000 Population (Medicaid)	↓	↑	**-10.75†** (-12.13, -9.37)	-22.0	<0.001
Inpatient Admissions per 1,000 Population (Medicare)	↑	↑	-3.98 (-8.34, 0.37)	-3.2	0.13
Inpatient Admissions per 1,000 Population (commercial)	↓	↑	**-8.66†** (-10.26, -7.06)	-28.3	<0.001
ED Visits per 1,000 Population (Medicaid)	↓	↓	-12.99 (-31.20, 5.22)	-1.7	0.24
ED Visits per 1,000 Population (Medicare)	↑	↑	**-22.13†** (-34.92, -9.35)	-4.4	0.004
ED Visits per 1,000 Population (commercial)	↑	↑	-2.31 (-12.59, 7.98)	-1.2	0.71
BH-related Total Spending PBPM ($) (Medicaid)	↑	↑	**1.15†** (0.34, 1.95)	9.4	0.02
BH-related Total Spending PBPM ($) (Medicare)	↑	⊖	**1.26†** (0.94, 1.59)	16.6	<0.001
BH-related Total Spending PMPM ($) (commercial)	↑	↑	**-0.36‡** (-0.67, -0.06)	-7.8	0.05
PCP Visits per 1,000 Population (Medicaid)	↓	↓	-33.26 (-116.25, 49.73)	-1.9	0.51
PCP Visits per 1,000 Population (Medicare)	↑	↑	**-231.76‡** (-277.76, -185.76)	-6.0	<0.001
PCP Visits per 1,000 Population (commercial)	⊖	↑	**-214.60‡** (-303.26, -125.93)	-10.9	<0.001

(continued)

Table A-8 Colorado's integrated behavioral health model had favorable impacts on spending, hospital service use, and mental health follow-up visits, and unfavorable impacts on primary care provider visits in its first two years (continued)

Selected outcomes	Change in outcome from baseline to implementation period: CO IBH	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within seven days (Medicaid)	↑	↑	4.36 (-2.88, 11.59)	6.6	0.32
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within seven days (Medicare)	↓	↓	-5.26 (-13.15, 2.64)	-14.4	0.27
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within seven days (commercial)	↑	↑	**9.03†** (0.53, 17.54)	16.7	0.08
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within 30 days (Medicaid)	↑	↑	**8.42†** (0.47, 16.37)	9.4	0.08
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within 30 days (Medicare)	↓	↓	-6.67 (-14.28, 0.95)	-9.9	0.15
Percentage of Mental Illness-related Inpatient Admissions with mental health follow-up visit within 30 days (commercial)	↑	↑	5.29 (-2.06, 12.65)	6.5	0.24

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

BH = behavioral health; CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; PBPM = per beneficiary per month; PCP = primary care provider; PMPM = per member per month; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

Appendix A-1: Colorado's Integrated Behavioral Health Initiative Impact Results

A-1.1 Overview

The Colorado SIM Initiative recruited 319 primary care practices statewide, including both adult and pediatric practice, over three years to participate in practice transformation efforts. The goal of this effort was help practices implement care delivery models that integrate physical and behavioral health (hereafter referred to as integrated behavioral health [IBH]). Primary care practices interested in participating in the SIM Initiative were required to apply and be accepted into the initiative. Colorado opened the application process three times over the course of the SIM Initiative, and groups of practices (known as "Cohorts") that were selected to participate in each wave began the practice transformation process at the same time. One hundred primary care practices (Cohort 1) joined the SIM Initiative in February 2016, and 156 more practices (Cohort 2) joined in September 2017. Eighty-eight practices (Cohort 3) joined in June 2018.[11] Each cohort of practices focused on meeting practice transformation milestones to establish or improve behavioral health integration, engage in clinical quality improvement efforts, and report clinical quality measures. Primary care practices received practice transformation and clinical health information technology facilitation and access to funding for transformation activities. The practices also participated in biannual learning collaboratives. Colorado reported that an estimated 760,000 individuals were attributed to SIM-participating primary care practices.

Six commercial payers and Medicaid agreed to support SIM-participating primary care practices with a value-based payment (VBP). Medicare was not a participating SIM payer in this practice transformation initiative. The VBP could be either a new reimbursement for SIM participation or a VBP that the payer already had in place with a practice. Each participating payer was responsible for determining which SIM practices it would support with a VBP and which members of the practice's patient panel would be included in the VBP arrangement (a payer could choose to reimburse a practice with a VBP for a portion of the insurer's covered lives at that practice). Payers were responsible for negotiating the structure of these payments with each individual practice. All SIM-participating practices were supported by at least one SIM-participating payer. SIM-participating practices also contracted with other payers not participating in Colorado's SIM practice transformation efforts.

The Colorado SIM Initiative also piloted a program in which four community mental health centers (CMHCs) integrated primary care for a select sample of patients with serious

[11] Ninety-two practices out of the 100 enrolled Cohort 1 practices, 144 out of the 156 Cohort 2 practices, and 83 out of the 88 Cohort 3 practices remained active in SIM practice transformation activities for the duration of the SIM Initiative.

mental illness. Because the reach of this model is quite limited (four CMHCs across a select number of patients), impact analyses were not conducted on this group.

To assess the effects of Colorado's IBH model on care for beneficiaries the analysis addressed the following research questions:

- To what extent does the implementation of a primary care and behavioral health integration model result in changes in total and behavioral health–specific spending, the utilization of primary and behavioral health care,[12] and quality of health care received?
- Do changes in spending and utilization vary by the presence of behavioral health conditions versus no behavioral health conditions within the patient population?

The hypothesis for this analysis is that improved IBH will slow total spending growth, increase behavioral health–specific spending, and improve quality of care metrics. Hypothesized changes in utilization varied depending on the metric. For example, it was expected to see in the analysis reductions in total and behavioral health–related inpatient admissions and emergency department (ED) visits as practices invest in IBH and other practice transformation activities targeted to high utilizers. It was expected to see in the analysis increases in behavioral health visits because it was hypothesized that IBH would improve access to behavioral health care.

The impact of IBH on numbers of primary care visits was difficult to predict. On one hand, IBH and practice transformation may lead to more primary care use if patients seek screening and mental health treatment services in the primary care setting. On the other hand, principles of practice transformation that embrace team-based care between physical and behavioral health providers and alternative modes of communication (e.g., use of a patient portal or email consults) may lead to reductions in office-based primary care visits in favor of visits to specialists.

Because payers have flexibility to determine payment arrangements and not all payers with patients at these practices are participating, not all patients within a practice will technically be under an alternative payment structure. Regardless of the payment structure, practice transformation and integration of behavioral health into primary care will affect health care delivery for all patients in participating practices—even patients covered by non-SIM payers. Thus, the expectation is that the combined activities of integration support and alternative payment arrangements will contribute to observable impacts on spending, utilization, and quality

[12] The term "behavioral health" was used throughout, but it should be noted that the primary data source for this analysis, the Colorado all-payer claims database, does exclude substance use and chemical dependency claims pursuant to 42 Code of Federal Regulations (CFR) Part 2. As a result, the ability to capture the full range of behavioral health–related services was limited.

of care for all patients within the participating practices. ***Table A-1-1*** provides a snapshot of the study methods.

Table A-1-1. Methods snapshot

Method	Description
Participating providers	Primary care practices in Colorado applied to and were accepted into the IBH model. Practices joined the model in three cohorts between February 2016 and June 2018.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Medicaid, Medicare, and commercial claims data were provided through Colorado's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the Colorado Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the Colorado SIM office.
Sample	Analyses of patients were estimated separately by payer (Medicaid, Medicare, and commercial) to assess whether the model had differential impacts by payer group. The intervention group for the Medicaid and commercial analyses included all patients attributed to primary care practices in SIM Cohort 1 (n=93 practices) and SIM Cohort 2 (n=149 practices).[a] The intervention group for the Medicare analyses included Medicare beneficiaries attributed to SIM Cohort 1 only because of the lack of complete Medicare claims data over the analytic timeframe of interest. Cohort 3 was excluded from the intervention group for all payer analyses because of a lack of data in the intervention period. The comparison group included individuals attributed to primary care providers not participating in the SIM Initiative. The Medicaid analytic sample included 1,185,151 Medicaid beneficiaries who were either attributed to SIM-participating practices (n=324,806) or to primary care providers not participating in SIM (n=860,345). The Medicare analytic sample included 591,811 Medicare beneficiaries who were either attributed to SIM-participating practices (n=53,948) or to primary care providers not participating in SIM (n=537,863). The commercial analytic sample included 1,653,766 commercial plan members who were either attributed to SIM-participating practices (n=231,098) or to primary care providers not participating in SIM (n=1,422,668).
Timeframe	The timeframe for the impact analysis was February 2013 through August 2018. The study period was chosen to accommodate rolling entry at the practice level so that the analysis included three baseline years and up to two intervention years for each practice. The practices in Cohort 1 entered in February 2016, and the practices in Cohort 2 entered in September 2017. Claims data were available through December 2018, which allowed for two years of follow-up time for Cohort 1 (February 2016–January 2018) and one year of follow-up time for Cohort 2 (September 2017–August 2018).
Measures	The analysis assessed the effects of the IBH initiative on four core outcomes including total spending (annual PPPM in dollars), inpatient admissions, outpatient ED visits, and readmissions. Additional outcomes examined were behavioral health–related spending, inpatient admissions, ED visits, and provider visits; inpatient, ED, professional, and prescription spending; visits to primary care providers; behavioral health visits; and mental health follow-up visits within seven days and 30 days of discharge for a mental illness–related inpatient admissions.

(continued)

Table A-1-1. Methods snapshot (continued)

Method	Description
Statistical analysis	The analysis used logistic regression for binary outcomes, negative binomial regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in the payer. Standard errors were clustered at the provider level to account for correlation in outcomes within primary care providers. All models included controls for demographic, health status, and socioeconomic county-level variables.

Notes: [a] The number of practices included in the analysis was less than the number that joined the IBH model. Some practices merged or decided to end participation midway through the model, resulting in a different count of practices used for attributing patients to SIM practices.

D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; PT = practice transformation; SIM = State Innovation Model.

This chapter reports on the impact of IBH on spending, utilization, and quality for 324,806 unique Medicaid beneficiaries, 53,948 unique Medicare beneficiaries, and 231,098 unique commercial plan members who were attributed to 93 Cohort 1 practices and 149 Cohort 2 practices that participated in the IBH model.

A full description of the IBH model and a summary of the key impact analysis findings are available in ***Appendix A***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the IBH model's impact findings in tables and figures:

- ***Section A-1.2*** presents results of difference-in-differences (D-in-D) analyses for individuals in Colorado's IBH model who were covered by Medicaid, Medicare, or commercial insurance and their comparison group. In keeping with Colorado's expectation that practice transformation and integration activities could impact any patient at the practice, this analysis includes all individuals attributed to a participating SIM practice or comparison group provider, not just those with behavioral health conditions;
- ***Section A-1.3*** presents results of D-in-D analyses separately for individuals with or without behavioral health conditions for core outcomes;
- ***Section A-1.4*** provides information on annual covariate balance between the IBH and comparison groups before and after propensity-score weighting;
- ***Section A-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section A-1.6*** presents results from a sensitivity analysis that compares D-in-D estimates for core outcomes when trends in outcomes for the intervention and comparison groups are assumed parallel versus not parallel during the baseline period.

A-1.2 Estimates of Integrated Behavioral Health's Impact on Spending, Utilization, and Quality

Tables A-1-2 through ***A-1-6*** show estimates of Colorado's IBH model impact on health care spending, utilization, and quality for Medicaid and Medicare beneficiaries and commercial plan members. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome, results are presented for the overall intervention period for each payer and include the following:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of IBH impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

A-1.2.1 Estimates of integrated behavioral health's impact on core outcomes

Table A-1-2 shows the estimates of the IBH model on total spending per person per month (PPPM), inpatient admissions, ED visits, and readmissions for Medicaid and Medicare beneficiaries and commercial plan members attributed to IBH practices relative to individuals in the comparison group.[13] The findings are as follows:

- Total spending PPPM decreased in the Medicaid IBH group and increased in the comparison group, leading to a relative decrease of $26.43 for Medicaid beneficiaries attributed to IBH practices during the first two years of implementation (p<0.001). Total spending PPPM increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $40.40 less for the commercial IBH group during the first two years of IBH implementation (p<0.001). Changes in total spending did not differ between Medicare beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.
- Inpatient admissions decreased in the Medicaid IBH group and increased in the comparison group, leading to a relative decrease of 10.75 admissions per 1,000 beneficiaries for Medicaid beneficiaries attributed to IBH practices during the first two years of IBH implementation (p<0.001). Inpatient admissions also decreased in the commercial IBH group and increased in the comparison group, leading to a relative decrease of 8.66 admissions per 1,000 members for commercial plan members attributed to IBH practices during the first two years of IBH implementation (p<0.001). Changes in inpatient admissions did not differ between Medicare

[13] Total spending PPPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.

- ED visits increased for both Medicare beneficiaries attributed to IBH practices and comparison beneficiaries but increased by 22.13 fewer visits per 1,000 beneficiaries for the Medicare IBH group during the first two years of IBH implementation ($p=0.004$). Changes in ED visits did not differ between Medicaid beneficiaries or commercial plan members attributed to IBH practices and comparison groups during the first two years of IBH implementation.
- Changes in readmissions within 30 days of discharge did not differ between Medicaid-, Medicare-, or commercially insured individuals attributed to IBH practices and the comparison group during the first two years of implementation.

Table A-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Medicaid	255.38	276.80	248.59	296.39	-26.43 (-32.78, -20.08)	-10.3	<0.001
Medicare	369.29	370.62	438.83	440.70	-0.54 (-7.15, 6.07)	-0.1	0.89
Commercial	277.55	232.34	320.60	315.72	-40.40 (-48.14, -32.65)	-14.6	<0.001
All-cause acute inpatient admissions per 1,000 population							
Medicaid	48.87	54.21	40.16	56.37	-10.75 (-12.13, -9.37)	-22.0	<0.001
Medicare	123.98	122.74	127.75	130.31	-3.98 (-8.34, 0.37)	-3.2	0.13
Commercial	30.61	32.47	28.50	38.96	-8.66 (-10.26, -7.06)	-28.3	<0.001
ED visits per 1,000 population							
Medicaid	777.51	854.90	734.92	822.17	-12.99 (-31.20, 5.22)	-1.7	0.24
Medicare	508.27	521.56	623.91	663.63	-22.13 (-34.92, -9.35)	-4.4	0.004
Commercial	192.11	188.79	220.03	218.33	-2.31 (-12.59, 7.98)	-1.2	0.71

(continued)

Table A-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions in integrated behavioral health and the comparison group, by payer (continued)

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Medicaid	82.08	102.99	156.93	185.11	3.68 (-4.32, 11.69)	4.5	0.45
Medicare	110.27	123.26	146.64	169.45	-5.65 (-17.52, 6.22)	-5.1	0.43
Commercial	53.84	51.71	97.43	110.20	-11.58 (-25.16, 2.01)	-21.5	0.16

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for the inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). For Medicaid, inpatient admission, ED visit, and readmissions models assume that the CO IBH and comparison group outcome trends are parallel during the baseline period; the total spending model includes a differential trend between the IBH and comparison groups beginning in the baseline period. For Medicare, the total spending and ED visit models assume that the IBH and comparison group trends are parallel during the baseline period; inpatient admissions and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period. For the commercial analysis, the total spending model assumes the IBH and comparison group outcome trends are parallel during the baseline period; inpatient admissions, ED visits, and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period.

(continued)

Table A-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions in integrated behavioral health and the comparison group, by payer (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmission outcome is 2,367,356 for Medicaid; 441,716 for Medicare; 1,210,253 for commercial plans. The weighted *N* for the readmission outcome is 90,387 for Medicaid; 78,232 for Medicare; and 36,474 for commercial plans. These numbers include all person-year (or discharge-year) observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.2.2 Estimates of integrated behavioral health's impact on behavioral health–related outcomes

Table A-1-3 shows the estimates of the IBH model on behavioral health–related outcomes for Medicaid and Medicare beneficiaries and commercial plan members attributed to IBH practices relative to individuals in the comparison group. The findings are as follows:

- Total behavioral health–related spending PPPM increased for both Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries but increased by $1.15 more for the Medicaid IBH group during the first two years of IBH implementation (p=0.019). Total behavioral health–related spending PPPM increased in the Medicare IBH group and remained almost unchanged in the comparison group, leading to a relative increase of $1.26 for Medicare beneficiaries attributed to IBH practices during the first two years of IBH implementation (p<0.001). Total behavioral health–related spending PPPM increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $0.36 less for the commercial IBH group during the first two years of IBH implementation (p=0.048).
- Behavioral health–related inpatient admissions increased for both Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries but increased by 1.57 more admissions per 1,000 beneficiaries for the Medicaid IBH group beneficiaries during the first two years of IBH implementation (p<0.001). Behavioral health–related inpatient admissions decreased for both Medicare beneficiaries attributed to IBH practices and comparison beneficiaries but decreased by 0.43 fewer admissions per 1,000 beneficiaries for the Medicare IBH group during the first two years of IBH implementation (p<0.001).Behavioral health–related inpatient admissions increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by 0.40 more admissions per 1,000 members for the commercial IBH group during the first two years of IBH implementation (p=0.02).
- Total behavioral health–related ED visits increased for both Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries but increased by 3.72 fewer visits per 1,000 beneficiaries for the Medicaid IBH group during the first two years of IBH implementation (p=0.06). Total behavioral health–related ED visits decreased in the Medicare IBH group and increased in the comparison group, leading to a relative decrease of 1.82 visits per 1,000 beneficiaries for Medicare beneficiaries attributed to IBH practices during the first two years of IBH implementation (p<0.001). Total behavioral health–related ED visits increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by 1.22 more visits per 1,000 members for the commercial IBH group during the first two years of IBH implementation (p<0.001).

- The percentage of beneficiaries with a behavioral health visit[14] decreased in the Medicaid IBH group and increased in the comparison group, leading to a relative decrease of 4.63 percentage points for Medicaid beneficiaries attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Similarly, the percentage of commercial plan members with a behavioral health visit decreased in the commercial IBH group and increased in the comparison group, leading to a relative decrease of 1.03 percentage points for commercial plan members attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Change in the percentage of individuals with a behavioral health visit did not differ between Medicare beneficiaries and comparison beneficiaries during the first two years of IBH implementation.

[14] Behavioral health visits are modeled as a binary outcome instead of a count outcome because of the substantial amount of outlier frequency counts and, in turn, overdispersion of the count data.

Table A-1-3. Differences in the pre–post change in behavioral health–related total spending, behavioral health–related inpatient admissions, behavioral health–related emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Behavioral health–related total spending PPPM ($)							
Medicaid	12.28	9.88	18.03	14.47	1.15 (0.34, 1.95)	9.4	0.02
Medicare	7.61	9.18	8.94	9.24	1.26 (0.94, 1.59)	16.6	<0.001
Commercial	4.68	4.10	5.12	4.90	-0.36 (-0.67, -0.06)	-7.8	0.05
Behavioral health–related inpatient admissions per 1,000 population							
Medicaid	6.29	2.11	19.97	4.52	1.57 (1.16, 1.98)	25.0	<0.001
Medicare	6.06	9.05	5.70	8.02	0.43 (-0.49, 1.36)	7.2	<0.001
Commercial	2.95	2.05	4.30	2.44	0.40 (0.12, 0.67)	13.4	0.02
Behavioral health–related ED visits per 1,000 population							
Medicaid	26.35	24.24	36.06	36.53	-3.72 (-6.99, -0.45)	-14.1	0.06
Medicare	24.85	34.51	23.78	35.04	-1.82 (-5.48, 1.84)	-7.3	<0.001
Commercial	7.33	7.50	9.78	7.83	1.22 (0.51, 1.92)	16.6	<0.001

(continued)

Table A-1-3. Differences in the pre–post change in behavioral health–related total spending, behavioral health–related inpatient admissions, behavioral health–related emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group, by payer (continued)

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with a behavioral health visit							
Medicaid	26.70	21.74	25.37	24.70	-4.63 (-5.42, -3.84)	-17.3	<0.001
Medicare	14.03	12.55	16.42	14.40	0.33 (-0.15, 0.80)	2.3	0.26
Commercial	14.29	12.77	14.07	13.51	-1.03 (-1.49, -0.57)	-7.2	<0.001

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions and behavioral health visits, and a negative binomial model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a behavioral health visit was multiplied by 100 to obtain a percentage. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). For Medicaid, behavioral health ED visits and the percentage of beneficiaries with a behavioral health visit models assume that the CO IBH and comparison group outcome trends are parallel during the baseline period; the behavioral health spending and behavioral health inpatient admissions models include a differential trend between the IBH and comparison groups beginning in the baseline period. For Medicare, behavioral health spending and the percentage of beneficiaries with a behavioral health visit are modeled assuming a parallel trend; behavioral health inpatient admissions and behavioral health ED visits include a differential trend between the IBH and comparison groups beginning in the baseline period. For the commercial analysis, percentage of plan members with a behavioral health visit and the behavioral health spending model assumes that the IBH and comparison group outcome trends are parallel during the baseline period; the behavioral health inpatient admissions, behavioral health ED visits, and include a differential trend between the IBH and comparison groups beginning in the baseline period.

(continued)

Table A-1-3. Differences in the pre–post change in behavioral health–related total spending, behavioral health–related inpatient admissions, behavioral health–related emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group, by payer (continued)

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 2,367,356 for Medicaid; 441,716 for Medicare; and 1,210,253 for commercial plans. These numbers include all person-year observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.2.3 Estimates of integrated behavioral health's impact on spending categories

Table A-1-4 shows the estimates of the IBH model on inpatient spending PPPM, ED spending PPPM, professional spending PPPM, and prescription drug spending PPPM for Medicaid, Medicare, and Medicaid and Medicare beneficiaries and commercial plan members attributed to IBH practices relative to individuals in the comparison group. The findings are as follows:

- Inpatient spending PPPM decreased in the Medicaid IBH group and increased in the comparison group, leading to a relative decrease of $13.38 for Medicaid beneficiaries attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Inpatient spending PPPM increased for both Medicare beneficiaries attributed to IBH practices and comparison beneficiaries but increased by $5.72 less for the Medicare IBH group during the first two years of IBH implementation ($p<0.001$). Inpatient spending PPPM increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $14.88 less for the commercial IBH group during the first two years of IBH implementation ($p<0.001$).

- ED spending PPPM decreased for both Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries but decreased by $1.77 less for the Medicaid IBH group during the first two years of IBH implementation ($p<0.001$). ED spending PPPM increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $3.00 less for the commercial IBH group during the first two years of IBH implementation ($p<0.001$). Changes in ED spending did not differ between Medicare beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.

- Professional spending increased for both Medicare beneficiaries attributed to IBH practices and comparison beneficiaries but increased by $4.63 less for the Medicare IBH group during the first two years of IBH implementation ($p=0.01$). Professional spending increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $11.08 less for the commercial IBH group during the first two years of implementation ($p<0.001$). Changes in professional spending did not differ between Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.

- Prescription drug spending decreased in the commercial IBH group and increased in the comparison group, leading to a relative decrease of $5.65 for Medicare beneficiaries attributed to IBH practices during the first two years of IBH implementation($p<0.001$). Prescription drug spending increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by $4.74 less for the commercial IBH group during the first two years of IBH implementation ($p<0.001$). Because of data lags, Medicare prescription drug claims were unavailable for all time periods of this analysis.

Table A-1-4. Differences in the pre–post change in inpatient spending, emergency department spending, professional spending, prescription spending in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PPPM ($)							
Medicaid	30.23	37.41	23.44	43.96	-13.38 (-15.38, -11.37)	-44.2	<0.001
Medicare	23.77	42.39	32.22	56.55	-5.72 (-9.03, -2.41)	-24.1	<0.001
Commercial	58.11	55.16	63.53	75.45	-14.88 (-17.72, -12.05)	-25.6	<0.001
ED spending PPPM ($)							
Medicaid	24.78	24.91	24.05	22.41	1.77 (1.08, 2.46)	7.1	<0.001
Medicare	18.69	21.32	21.81	23.74	0.70 (0.04, 1.37)	3.8	0.08
Commercial	21.31	21.46	24.61	27.77	-3.00 (-4.05, -1.95)	-14.1	<0.001
Professional spending PPPM ($)							
Medicaid	94.99	92.23	96.48	96.17	-2.45 (-5.23, 0.33)	-2.6	0.15
Medicare	201.73	177.70	226.96	207.56	-4.63 (-7.39, -1.87)	-2.3	0.01
Commercial	80.15	60.78	85.41	77.10	-11.08 (-13.13, -9.02)	-13.8	<0.001

(continued)

Table A-1-4. Differences in the pre–post change in inpatient spending, emergency department spending, professional spending, prescription spending in integrated behavioral health and the comparison group, by payer (continued)

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Prescription drug spending PPPM ($)							
Medicaid	45.91	54.49	44.35	58.59	-5.65 (-7.48, -3.83)	-12.3	<0.001
Medicare	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commercial	45.77	37.16	56.50	52.61	-4.74 (-6.44, -3.03)	-10.4	<0.001

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; N/A = Medicare prescription drug expenditure data were not available for all time periods of this analysis; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). For Medicaid, all spending outcomes include a differential trend between the CO IBH and comparison groups beginning in the baseline period. For the Medicare and commercial analysis, all spending outcomes assume that the IBH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

The total weighted N for all outcome models is 2,367,356 for Medicaid; 441,716 for Medicare; and 1,210,253 for commercial plans. These numbers include all person-year observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.2.4 Estimates of integrated behavioral health's impact on utilization

Table A-1-5 shows the estimates of the IBH model on primary care provider visits for Medicaid and Medicare beneficiaries and commercial plan members attributed to the IBH model relative to comparison individuals. The findings are as follows:

- Primary care provider visits increased for both Medicare beneficiaries attributed to IBH practices and comparison beneficiaries but increased by 231.76 fewer visits per 1,000 beneficiaries for the Medicare IBH group during the first two years of IBH implementation ($p<0.001$). The primary care provider visit rate for the commercial IBH group remained almost unchanged and increased in the comparison group, leading to a relative decrease of 214.60 visit per 1,000 members for commercial plan members attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Changes in primary care visits did not differ between Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.

Table A-1-5. Differences in the pre–post change in primary care provider visits in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Primary care provider visits per 1,000 population							
Medicaid	1712.46	1790.25	1625.10	1735.36	-33.26 (-116.25, 49.73)	-1.9	0.51
Medicare	3895.06	3572.52	4357.02	4209.30	-231.76 (-277.76, -185.76)	-6.0	<0.001
Commercial	1961.09	1898.80	1960.55	2099.31	-214.60 (-303.26, -125.93)	-10.9	<0.001

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; IBH = integrated behavioral health; SIM = State Innovation Model.

Methods: The analysis used a negative binomial model to obtain D-in-D estimates for primary care provider visits. The estimated primary care provider visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). For the Medicaid and commercial analyses, the primary care provider visit model includes a differential trend between the CO IBH and comparison groups beginning in the baseline period. For Medicare, the primary care provider visit model assumes that the IBH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

(continued)

Table A-1-5. Differences in the pre–post change in primary care provider visits in integrated behavioral health and the comparison group, by payer (continued)

The total weighted N for all outcome models is any primary care provider visits for Medicaid is 2,367,356 for Medicaid; 441,716 for Medicare; and 1,210,253 for commercial plans. These numbers include all person-year observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.2.5 Estimates of integrated behavioral health's impact on quality

Table A-1-6 shows the estimates of the IBH model on mental illness–related acute inpatient admissions with a mental health follow-up visit for Medicaid-, Medicare-, and commercially insured individuals attributed to IBH practices relative to comparison individuals.

- The percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within seven days increased for both commercial plan members attributed to IBH practices and comparison plan members but increased by 9.03 percentage points more for the commercial IBH group during the first two years of IBH implementation (p=0.08). Changes in the percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within seven days did not differ between Medicaid or Medicare beneficiaries attributed to IBH practices and comparison beneficiaries during the first two years of IBH implementation.
- The percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within 30 days increased for both Medicaid beneficiaries attributed to IBH practices and comparison beneficiaries but increased by 8.42 percentage points more for the Medicaid IBH group during the first two years of IBH implementation (p=0.08). Changes in the percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within 30 days did not differ between Medicare beneficiaries or commercial plan members attributed to IBH practices and comparison individuals during the first two years of IBH implementation.

Table A-1-6. Differences in the pre–post change in mental illness–related acute inpatient admissions with a mental health follow-up in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within seven days							
Medicaid	65.66	44.49	78.74	56.56	4.36 (-2.88, 11.59)	6.6	0.32
Medicare	36.59	38.61	29.86	36.51	-5.26 (-13.15, 2.64)	-14.4	0.27
Commercial	54.08	55.12	65.91	58.33	9.03 (0.53, 17.54)	16.7	0.08
Percentage of mental illness–related acute inpatient admissions with a mental health follow-up visit within 30 days							
Medicaid	89.22	67.56	95.92	79.47	8.42 (0.47, 16.37)	9.4	0.08
Medicare	67.02	63.77	59.54	63.22	-6.67 (-14.28, 0.95)	-9.9	0.15
Commercial	81.71	79.22	88.00	82.12	5.29 (-2.06, 12.65)	6.5	0.24

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; IBH = integrated behavioral health; SIM = State Innovation Model.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for the mental illness-related inpatient admissions with a mental health follow-up visit. The estimated probability of a follow-up visit was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). All mental health follow-up visit models include a differential trend between the CO IBH and comparison groups beginning in the baseline period.

(continued)

Table A-1-6. Differences in the pre–post change in mental illness–related acute inpatient admissions with a mental health follow-up in integrated behavioral health and the comparison group, by payer (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 8,205 for Medicaid; 2,927 for Medicare; and 1,965 for commercial plans. These numbers include all person-year observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.3 Estimates of Integrated Behavioral Health's Impact on Populations with and Those Without a Behavioral Health Condition

The analysis assessed the Colorado IBH model's impacts separately on individuals with or those without behavioral health conditions for a selected set of outcomes. We define individuals with a behavioral health condition as having one or more behavioral health–related inpatient admissions or two or more behavioral health outpatient visits in the year before entering the IBH model. Because the IBH model is focused on increasing access to behavioral health care in primary care settings, the model could potentially produce larger impacts on health care spending and utilization for individuals with behavioral health conditions.

A-1.3.1 Estimates of integrated behavioral health's impact on core outcomes for individuals with a behavioral health condition

Table A-1-7 shows the estimates of the IBH model on total spending PPPM, inpatient admissions, ED visits, readmissions, and percentage of individuals with a behavioral health visit for Medicaid-, Medicare-, and commercially insured individuals with a behavioral health condition attributed to IBH practices relative to comparison group individuals. The findings are as follows:

- Total spending PPPM decreased for both Medicaid beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition but decreased by $68.60 more for the Medicaid IBH group with a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Total spending PPPM decreased in the commercial IBH group with a behavioral health condition and increased in the comparison group with a behavioral health condition, leading to a relative decrease of $97.65 for commercial plan members with a behavioral health condition attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Changes in total spending did not differ between Medicare beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition during the first two years of IBH implementation.
- Inpatient admissions decreased for both Medicaid beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition but decreased by 18.48 more admissions per 1,000 beneficiaries for the Medicaid IBH group with a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Similarly, inpatient admissions decreased for both commercial plan members with a behavioral health condition attributed to IBH practices and comparison plan members with a behavioral health condition but decreased by 21.63 more admissions per 1,000 members for the commercial IBH group with a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Changes in inpatient admissions did not differ between Medicare beneficiaries with a behavioral health condition attributed to IBH

practices and comparison beneficiaries with a behavioral health condition during the first two years of IBH implementation.

- ED visits decreased for both Medicaid beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition but decreased by 96.58 more visits per 1,000 beneficiaries for the Medicaid IBH group with a behavioral health condition during the first two years of IBH implementation ($p<0.001$). ED visits decreased in the commercial IBH group with a behavioral health condition and increased in the comparison group with a behavioral health condition, leading to a relative decrease of 31.33 visits per 1,000 members for commercial plan members with a behavioral health condition attributed to IBH practices during the first two years of IBH implementation ($p=0.07$). Changes in ED visits did not differ between Medicare beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition during the first two years of IBH implementation.

- Changes in readmissions did not differ between Medicaid-, Medicare-, or commercially insured individuals with a behavioral health condition attributed to IBH practices and comparison individuals with a behavioral health condition during the first two years of IBH implementation.

- The percentage of individuals with a behavioral health visit decreased in the Medicaid IBH group with a behavioral health condition and increased in the comparison group with a behavioral health condition, leading to a relative decrease of 13.14 percentage points for Medicaid beneficiaries with a behavioral health condition attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). The percentage of individuals with a behavioral health visit decreased for both Medicare beneficiaries with a behavioral health condition attributed to IBH practices and comparison beneficiaries with a behavioral health condition but decreased by 2.42 percentage points more for the Medicare IBH group with a behavioral health condition during the first two years of IBH implementation ($p<0.001$). The percentage of individuals with a behavioral health visit decreased for both commercial plan members with a behavioral health condition attributed to IBH practices and comparison plan members with a behavioral health condition but decreased by 11.37 percentage points more for the commercial IBH group with a behavioral health condition during the first two years of IBH implementation. ($p<0.001$).

Table A-1-7. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals with a behavioral health condition in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Medicaid	542.85	605.32	429.42	560.37	-68.60 (-87.61, -49.60)	-12.6	<0.001
Medicare	595.33	610.43	624.19	655.44	-16.15 (-36.97, 4.67)	-2.7	0.20
Commercial	534.54	443.98	466.59	473.69	-97.65 (-122.58, -72.72)	-18.3	<0.001
All-cause acute inpatient admissions per 1,000 population							
Medicaid	83.37	86.03	63.40	84.32	-18.48 (-22.26, -14.70)	-22.2	<0.001
Medicare	229.10	234.71	222.26	213.82	13.34 (-0.09, 26.78)	5.8	0.10
Commercial	65.02	73.73	37.94	64.31	-21.63 (-27.59, -15.67)	-33.3	<0.001
ED visits per 1,000 population							
Medicaid	1339.58	1412.60	1196.61	1363.57	-96.58 (-131.21, -61.96)	-7.2	<0.001
Medicare	1303.50	1382.28	1354.43	1458.65	-21.45 (-75.65, 32.75)	-1.6	0.52
Commercial	317.69	350.75	297.36	360.03	-31.33 (-59.66, -3.00)	-9.9	0.07

(continued)

Table A-1-7. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals with a behavioral health condition in integrated behavioral health and the comparison group, by payer (continued)

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Medicaid	112.26	108.15	167.92	171.10	-7.97 (-24.76, 8.82)	-7.1	0.43
Medicare	192.99	194.23	230.67	214.39	15.12 (-16.69, 46.93)	7.8	0.43
Commercial	114.35	85.15	161.06	127.77	-4.46 (-50.64, 41.72)	-3.9	0.87
Percentage of beneficiaries with a behavioral health visit							
Medicaid	76.72	69.42	66.26	70.26	-13.14 (-13.88, -12.40)	-17.1	<0.001
Medicare	77.36	74.89	70.60	69.79	-2.42 (-3.45, -1.39)	-3.13	<0.001
Commercial	76.51	71.41	64.92	69.57	-11.37 (-12.18, -10.56)	-14.9	<0.001

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for the inpatient admissions, readmissions, and behavioral health visits. The estimated probability of any inpatient admission and ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. The estimated probability of a behavioral health visit was multiplied by 100 to obtain a percentage. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, and the logged Hierarchical Condition Category risk score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year).

(continued)

Table A-1-7. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals with a behavioral health condition in integrated behavioral health and the comparison group, by payer (continued)

The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). For Medicaid, the inpatient admission, ED visit, readmissions, and percentage of beneficiaries with a behavioral health visit models assume that the CO IBH and comparison group outcome trends are parallel during the baseline period; the total spending model includes a differential trend between the IBH and comparison groups beginning in the baseline period. For Medicare, the total spending, ED visits, and the percentage of beneficiaries with a behavioral health visit models assume that the IBH and comparison group trends are parallel during the baseline period; inpatient admissions and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period. For the commercial analysis, the total spending and percentage of beneficiaries with a behavioral health visit models assume the IBH and comparison group outcome trends are parallel during the baseline period; the admissions, ED visits, and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except readmission outcome Medicaid models except readmissions is 373,005; for all Medicare models except readmissions is 38,759; for all commercial models except readmissions is 84,617. The total weighted N for the Medicaid readmissions model is 23,531; for the Medicare readmissions model is 13,871; and for the commercial readmissions model is 4,111. These numbers include all person-year observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.3.2 Estimates of integrated behavioral health's impact on core outcomes for individuals without a behavioral health condition

Table A-1-8 shows the estimates of the IBH model on total spending PPPM, inpatient admissions, ED visits, readmissions, and behavioral health visits for Medicaid-, Medicare-, and commercially insured beneficiaries without a behavioral health condition attributed to IBH practices relative to comparison beneficiaries. The findings are as follows:

- Total spending PPPM increased for both Medicaid beneficiaries without a behavioral health condition attributed to IBH practices and comparison beneficiaries without a behavioral health condition but increased by $22.05 less for the Medicaid IBH group without a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Similarly, total spending PPPM increased for both commercial plan members without a behavioral health condition attributed to IBH practices and comparison plan members without a behavioral health condition but increased by $34.97 less for the commercial IBH group without a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Changes in total spending did not differ between Medicare beneficiaries without a behavioral health condition attributed to IBH practices and comparison beneficiaries without a behavioral health condition during the first two years of IBH implementation.

- Inpatient admissions decreased in the Medicaid IBH group without a behavioral health condition and increased in the comparison group without a behavioral health condition, leading to a relative decrease of 9.19 admissions per 1,000 beneficiaries for Medicaid beneficiaries without a behavioral health condition attributed to IBH practices during the first two years of IBH implementation ($p<0.001$). Inpatient admissions increased for both Medicare beneficiaries without a behavioral health condition attributed to IBH practices and comparison beneficiaries without a behavioral health condition but increased by 6.78 fewer admissions per 1,000 beneficiaries for the Medicare IBH group without a behavioral health condition during the first two years of IBH implementation ($p=0.02$). Similarly, inpatient admissions increased for both commercial plan members without a behavioral health condition attributed to IBH practices and comparison plan members without a behavioral health condition but increased by 7.46 fewer admissions per 1,000 members for the commercial IBH group without a behavioral health condition during the first two years of IBH implementation ($p<0.001$).

- ED visits increased for both Medicare beneficiaries without a behavioral health condition attributed to IBH practices and comparison beneficiaries without a behavioral health condition but increased by 21.80 fewer visits per 1,000 beneficiaries for the Medicare IBH group without a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Changes in ED visits did not differ between Medicaid beneficiaries or commercial plan members without a behavioral health condition attributed to IBH practices and comparison individuals without a behavioral health condition during the first two years of IBH implementation.

- Changes in readmissions did not differ between Medicaid or Medicare beneficiaries or commercial plan members without a behavioral health condition attributed to IBH practices and comparison individuals without a behavioral health condition during the first two years of IBH implementation.

- The percentage of individuals with a behavioral health visit increased for both Medicaid beneficiaries without a behavioral health condition attributed to IBH practices and comparison beneficiaries without a behavioral health condition but increased by 3.38 percentage points less for the Medicaid IBH group without a behavioral health condition during the first two years of IBH implementation ($p<0.001$). Changes in the percentage of individuals with a behavioral health visit did not differ between Medicare or commercial plan members without a behavioral health condition attributed to IBH practices and comparison individuals without a behavioral health condition during the first two years of IBH implementation.

Table A-1-8. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals without a behavioral health condition in integrated behavioral health and the comparison group, by payer

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Medicaid	199.46	216.64	209.21	248.43	-22.05 (-27.45, -16.66)	-11.1	<0.001
Medicare	347.70	347.88	420.42	420.40	0.19 (-6.27, 6.65)	0.05	0.96
Commercial	257.13	214.70	312.39	304.91	-34.97 (-42.21, -27.73)	-13.6	<0.001
All-cause acute inpatient admissions per 1,000 population							
Medicaid	42.36	48.16	35.82	51.17	-9.19 (-10.33, -8.04)	-21.7	<0.001
Medicare	113.49	111.79	117.71	122.35	-6.78 (-11.48, -2.09)	-6.0	0.02
Commercial	28.18	29.52	28.28	37.24	-7.46 (-9.07, -5.86)	-26.5	<0.001
ED visits per 1,000 population							
Medicaid	672.96	743.71	648.69	718.61	-1.55 (-17.23, 14.14)	-0.2	0.87
Medicare	426.26	435.46	536.29	570.72	-21.80 (-33.17, -10.43)	-5.1	<0.001
Commercial	180.00	175.58	211.42	207.52	-1.58 (-11.64, 8.48)	-0.9	0.80

(continued)

Table A-1-8. **Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals without a behavioral health condition in integrated behavioral health and the comparison group, by payer (continued)**

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Medicaid	72.85	100.55	151.54	187.61	6.36 (-1.61, 14.32)	8.7	0.19
Medicare	92.81	107.01	129.83	160.95	-10.70 (-24.07, 2.66)	-11.5	0.19
Commercial	48.18	47.71	95.32	108.36	-9.23 (-23.20, 4.73)	-19.2	0.28
Percentage of beneficiaries with a behavioral health visit							
Medicaid	17.26	12.84	17.92	16.16	-3.38 (-4.25, -2.51)	-19.6	<0.001
Medicare	7.93	6.52	11.14	9.00	0.27 (-0.22, 0.77)	3.46	0.36
Commercial	9.68	8.47	10.41	9.43	-0.31 (-0.80, 0.17)	-3.25	0.29

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for the inpatient admissions, readmissions, and behavioral health visits. The estimated probability of any inpatient admission and the ED visit count to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. The estimated probability of a behavioral health visit was multiplied by 100 to obtain a percentage Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, and the logged Hierarchical Condition Category risk score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year).

(continued)

Table A-1-8. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, readmissions, and behavioral health visits for individuals <u>without</u> a behavioral health condition in integrated behavioral health and the comparison group, by payer (continued)

For Medicaid, the inpatient admissions, ED visits, readmissions, and percentage of beneficiaries with a behavioral health visit models assume that the CO IBH and comparison group outcome trends are parallel during the baseline period; the total spending model includes a differential trend between the IBH and comparison groups beginning in the baseline period. For Medicare, the total spending, ED visits, and percentage of beneficiaries with a behavioral health visit models assume that the IBH and comparison group trends are parallel during the baseline period; inpatient admissions and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period. For the commercial analysis, the total spending and percentage of beneficiaries with a behavioral health visit models assume the IBH and comparison group outcome trends are parallel during the baseline period; the inpatient admissions, ED visits, and readmissions models include a differential trend between the IBH and comparison groups beginning in the baseline period.

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CO IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmission outcome is 1,994,102 for Medicaid; 403,024 for Medicare; and 1,125,593 for commercial plans. The weighted N for the readmission outcome is 66,869 for Medicaid; 64,373 for Medicare; and 32,393 for commercial plans. These numbers include all person-year (or discharge-year) observations for both the CO IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.4 Annual Covariate Balance Between the Integrated Behavioral Health and Comparison Groups

As described in ***Appendix L**,* annual propensity scores were created for the overall comparison sample at the person-year level, at the inpatient discharge-level, and for any comparison subgroups. These subgroups included all individuals with behavioral health conditions, and individuals without behavioral health conditions.

Tables A-1-9 through ***A-1-11*** show covariate balance between the Colorado IBH and comparison groups for the Medicaid, Medicare, and commercial groups, respectively, in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The tables include the following:

- The covariate means for the IBH and comparison groups without propensity score weighting;
- The standardized difference between the IBH and comparison groups means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison groups ("comparison weighted"); and
- The standardized difference between the IBH group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year by using logistic regressions in which the dependent variable was an indicator of inclusion in the IBH group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included all covariates in ***Tables A-1-9*** through ***A-1-11*** in the propensity score models. Additional details on propensity score covariate selection, propensity score model specification, and calculation of standardized differences are available in ***Appendix L***.

Tables A-1-9 through ***A-1-11*** show balance between the IBH and comparison group covariates before and after applying weights to person-year observations for individuals with Medicaid, Medicare, and commercial coverage, respectively. Prior to propensity score weighting, standardized differences were greater than 0.10 for some individual- and county-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table A-1-9. Covariate balance between the integrated behavioral health and comparison groups in the last baseline year, Medicaid beneficiaries

Variable	Unweighted mean or percentage, CO IBH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	54.15	57.84	0.07	54.08	0.002
Age in years	19.8	24.7	0.28	20.0	0.01
Age in years, squared	704.5	941.4	0.21	718.5	0.01
Total months of enrollment during the year	11.1	10.4	0.24	11.1	0.0005
Percentage of people who have Medicaid and another type of insurance coverage in the year	10.63	12.36	0.0	10.66	0.001
Hierarchical Condition Category risk score, logged[a]	-0.3	-0.2	0.16	-0.3	0.004
Percentage of people who have a behavioral health condition	16.1	14.26	0.05	15.9	0.01
County level					
Percentage of people residing in a Metropolitan Statistical Area	84.13	86.52	0.07	83.48	0.02
Percentage of people living in poverty	12.9	12.1	0.20	13.1	0.03
Hospital beds per 1,000 people	2.6	2.4	0.16	2.7	0.03
Median age in years	36	36.1	0.01	36.1	0.02
Percentage of people (under 65 years) without health insurance	10.3	9.5	0.32	10.4	0.01
Percentage of people residing in a mental health professional shortage area	33.83	37.06	0.07	33.84	<0.01
Physicians per 1,000 people	3.2	2.9	0.20	3.2	0.01

Notes: [a] Hierarchical Condition Category risk score is a risk adjustment score calculated from ICD-9 and ICD-10 diagnosis codes, with larger Hierarchical Condition Category scores corresponding to higher predicted health care costs.

CO = Colorado; IBH = integrated behavioral health; ICD = International Classification of Diseases; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of Medicaid claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

Table A-1-10. Covariate balance between the integrated behavioral health and comparison groups in the last baseline year, Medicare beneficiaries

Variable	Unweighted mean or percentage, CO IBH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	56.53	55.56	0.02	56.54	0.0002
Age in years	69.7	71.3	0.14	69.7	0.0003
Age in years, squared	5001.7	5207	0.13	5002.7	0.0007
Total months of enrollment during year	11.4	11.3	0.02	11.4	0.0007
Percentage of people who have Medicare and Medicaid coverage during the year	22.84	14.82	0.21	22.85	0.0003
Percentage of people who have Medicare and another type of insurance coverage in the year	33.66	25.41	0.18	33.7	0.0008
Hierarchical Condition Category risk score, logged[a]	0.5	0.5	0.0003	0.5	0.003
Percentage of people who have a behavioral health condition	8.85	6.51	0.09	8.9	0.002
County level					
Percentage of people residing in a Metropolitan Statistical Area	81.86	87.0	0.14	82.1	0.01
Percentage of people living in poverty	12.5	11.6	0.24	12.5	0.01
Hospital beds per 1,000 people	2.5	2.3	0.15	2.5	0.0001
Median age in years	36.8	36.7	0.01	36.7	0.01
Percentage of people (under 65 years) without health insurance	9.5	9.0	0.18	9.5	0.002
Percentage of people residing in a mental health professional shortage area	42.75	32.39	0.22	42.19	0.01
Physicians per 1,000 people	3.1	2.8	0.21	3.1	0.002

Notes: [a] Hierarchical Condition Category risk score is a risk adjustment score calculated from ICD-9 and ICD-10 diagnosis codes, with larger Hierarchical Condition Category scores corresponding to higher predicted health care costs.
CO = Colorado; IBH = integrated behavioral health; ICD = International Classification of Diseases; SIM = State Innovation Model.
Sources: Federal Evaluation Team analysis of Medicare claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

Table A-1-11. Covariate balance between the integrated behavioral health and comparison groups in the last baseline year, commercial plan members

Variable	Unweighted mean or percentage, CO IBH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	55.02	55.56	0.01	55.12	0.002
Age in years	34	36.8	0.14	34	0.002
Age in years, squared	1593.2	1748.3	0.10	1596.2	0.002
Total months of enrollment during year	9.6	9.4	0.06	9.7	0.015
Percentage of people who have prescription drug coverage	94.28	93.7	0.02	94.26	0.001
Percentage of people who have individual (not employer sponsored) coverage	33.09	25.37	0.17	33.26	0.004
Percentage of people who have commercial coverage and another type of insurance coverage in the year	21.29	11.64	0.26	21.64	0.009
Percentage of people who have Medicaid coverage during year	16.97	7.41	0.30	17.27	0.008
Percentage of people who have Medicare coverage during year	4.33	4.24	0.005	4.39	0.003
Hierarchical Condition Category risk score, logged[a]	-0.2	-0.1	0.11	-0.2	0.004
Percentage of people who have a behavioral health condition	6.97	5.77	0.05	7.02	0.002
County level					
Percentage of people residing in a Metropolitan Statistical Area	85.72	90.44	0.15	85.33	0.011
Percentage of people living in poverty	11.8	10.7	0.27	11.9	0.023
Hospital beds per 1,000 population	2.3	2.2	0.09	2.3	0.005
Median age in years	36.4	36.3	0.02	36.4	0.010

(continued)

Table A-1-11. Covariate balance between the integrated behavioral health and comparison groups in the last baseline year, commercial plan members (continued)

Variable	Unweighted mean or percentage, CO IBH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
County level (continued)					
Percentage of people (under 65 years) without health insurance	9.4	8.8	0.22	9.4	0.001
Percentage of people residing in a mental health professional shortage area	29.25	24.16	0.12	29.52	0.006
Physicians per 1,000 population	3.1	2.9	0.13	3.1	0.012

Notes: [a] Hierarchical Condition Category risk score is a risk adjustment score calculated from ICD-9 and ICD-10 diagnosis codes, with larger Hierarchical Condition Category scores corresponding to higher predicted health care costs.

CO = Colorado; IBH = integrated behavioral health; ICD = International Classification of Diseases; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures A-1-1 through ***A-1-12*** show propensity score–weighted trends for all analysis years for the core D-in-D outcomes (total spending PPPM, inpatient admissions, ED visits, and readmissions) for individuals with Medicaid, Medicare, or commercial coverage in the IBH and comparison groups. As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the IBH and comparison groups to determine the specification of the D-in-D models.

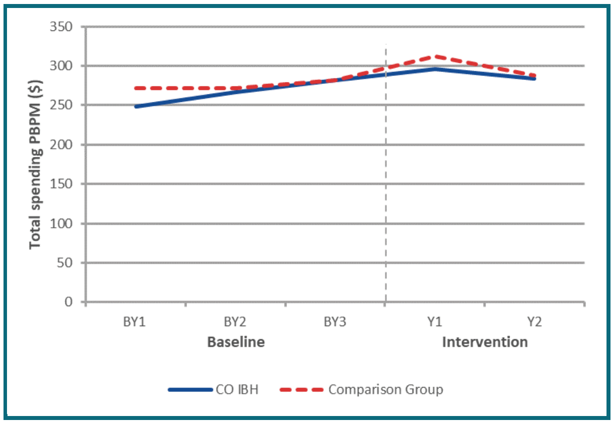
Across the four core outcomes (total spending, inpatient admissions, ED visits, and readmissions), trends were not uniformly parallel. There was variation by outcome and by payer. The same inconsistencies were also noted among non-core outcomes. In the Medicaid analyses, the IBH and comparison groups baseline trends for behavioral health–related inpatient admissions, primary care visits, behavioral health visits, and follow-up after a mental health inpatient admission were not parallel. In the Medicare analyses, IBH and comparison groups baseline trends for behavioral health–related inpatient admissions and ED visits and follow-up after a mental health inpatient admission were not parallel. In the commercial analyses, behavioral health–related inpatient admissions and ED visits, primary care visits, and follow-up after a mental health inpatient admission were not parallel.

A-1.5.1 Trends in core outcomes, Medicaid beneficiaries

Figures A-1-1 through ***A-1-4*** present trends for the four core outcomes (total spending PPPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the IBH and comparison groups. The findings are as follows:

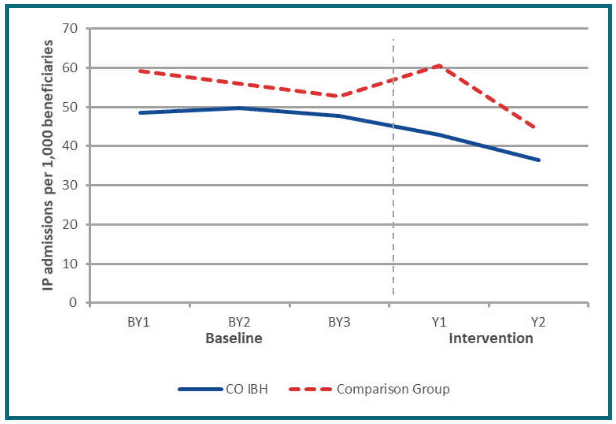
- Total spending PBPM increased during the baseline and intervention period, with a small decrease in spending from Year 1 to Year 2 of the intervention period (***Figure A-1-1***). The trends do not appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 beneficiaries steadily decreased during the baseline and intervention periods for the IBH group. In contrast, the comparison experienced a steady decrease in inpatient admissions in the baseline before spiking in the first year of the intervention period and then decreasing. The IBH group had lower rates of inpatient admissions (***Figure A-1-2***). The trends appear to be fairly parallel during the baseline period.
- ED visits per 1,000 beneficiaries showed a small but steady decline over the baseline and intervention periods for both the IBH and comparison groups. The IBH group had lower rates of visits (***Figure A-1-3***). The trends appear to be parallel during the baseline period.
- Readmissions within 30 days increased steadily during the baseline and intervention periods for both IBH and the comparison groups. The IBH group had lower rates of readmissions (***Figure A-1-4***). The trends appear to be parallel during the baseline period.

Figure A-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the integrated behavioral health and comparison groups



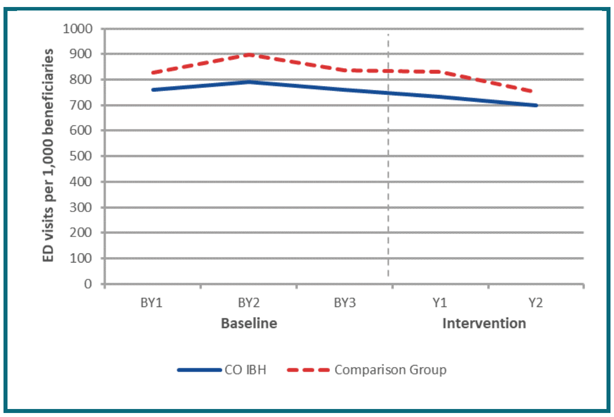
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; PBPM = per beneficiary per month; Y = year.

Figure A-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the integrated behavioral health and comparison groups



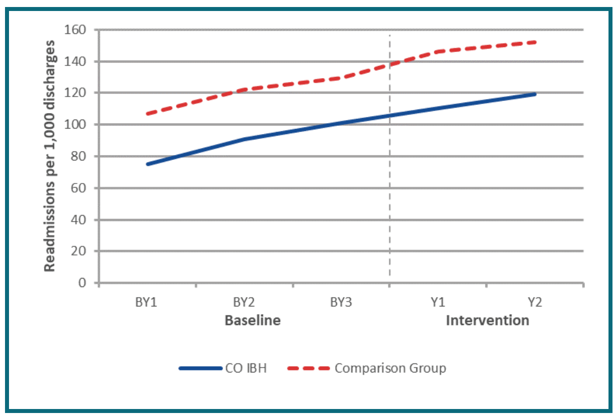
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; IP = inpatient; Y = year.

Figure A-1-3. Trends in emergency department visits per 1,000 Medicaid beneficiaries in the integrated behavioral health and comparison groups



Note: BY = baseline year; CO = Colorado; ED = emergency department; IBH = integrated behavioral health; Y = year.

Figure A-1-4. Trends in readmissions per 1,000 discharges in the integrated behavioral health and comparison groups



Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; Y = year.

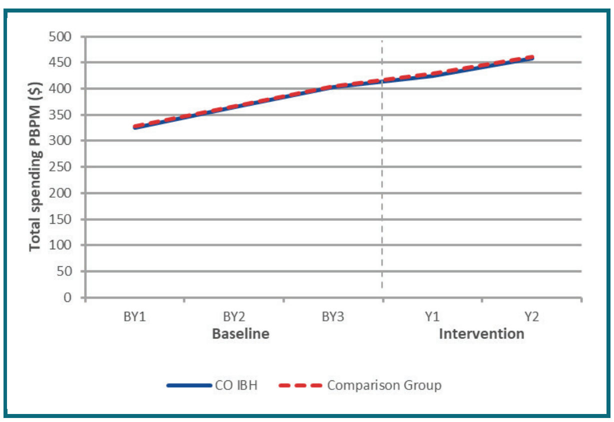
Sources: Federal Evaluation Team analysis of Medicaid claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office. All-payer claims database claims provided by the Center for Improving Value in Health Care.

A-1.5.2 Trends in core outcomes, Medicare beneficiaries

Figures A-1-5 through ***A-1-8*** present trends for the four core outcomes (total spending PPPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicare beneficiaries in the IBH and comparison groups. The findings are as follows:

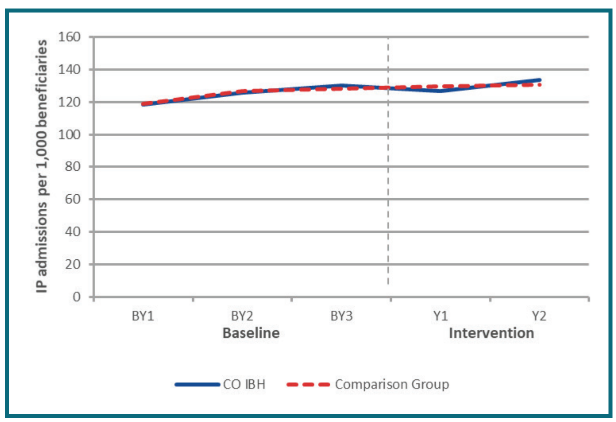
- Total spending PBPM increased during the baseline period before plateauing in the intervention period for both the IBH and comparison groups. Spending was almost identical between groups (***Figure A-1-5***). The trends appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 beneficiaries increased during the baseline period for the IBH and comparison groups. Although the comparison group showed a fairly steady but small increase in inpatient admissions during the intervention period, the IBH group experienced a decrease in inpatient admissions in Year 1 of the intervention before going back up (***Figure A-1-6***). The trends were not parallel during the baseline period.
- ED visits per 1,000 beneficiaries showed a steady increase over the baseline period before plateauing in the intervention period for the IBH and comparison groups. The intervention group had lower rates of visits (***Figure A-1-7***). The trends appear to be parallel during the baseline period.
- Readmissions within 30 days increased during the baseline period before plateauing for the IBH group and declining slightly for the comparison group. The IBH group had lower rates of readmissions (***Figure A-1-8***). The trends do not appear to be parallel during the baseline period.

Figure A-1-5. Trends in total spending per beneficiary per month for Medicare beneficiaries in the integrated behavioral health and comparison groups



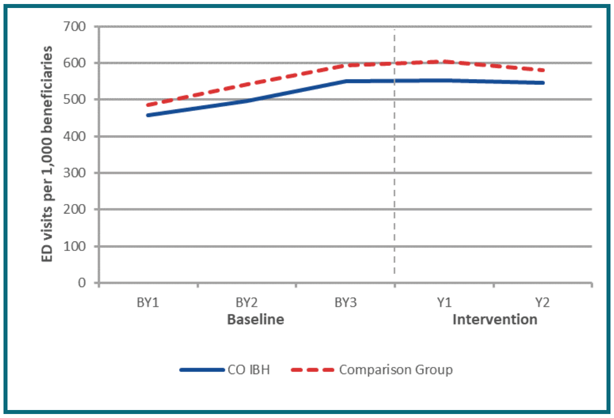
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; PBPM = per beneficiary per month; Y = year.

Figure A-1-6. Trends in all-cause acute inpatient admissions per 1,000 Medicare beneficiaries in the integrated behavioral health and comparison groups



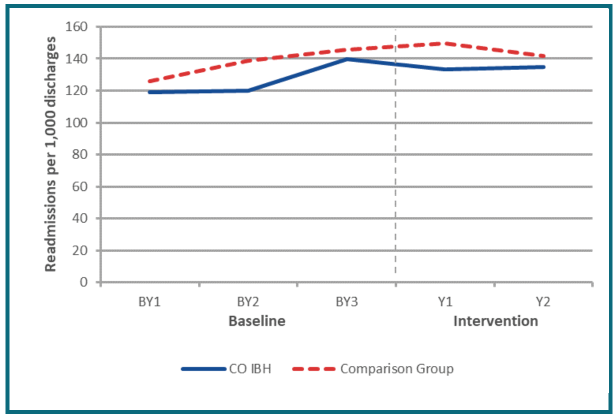
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; IP = inpatient; Y = year.

Figure A-1-7. Trends in outpatient emergency department visits per 1,000 Medicare beneficiaries in the integrated behavioral health and comparison groups



Note: BY = baseline year; CO = Colorado; ED = emergency department; IBH = integrated behavioral health; Y = year.

Figure A-1-8. Trends in readmissions per 1,000 discharges in the integrated behavioral health and comparison groups



Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; Y = year.

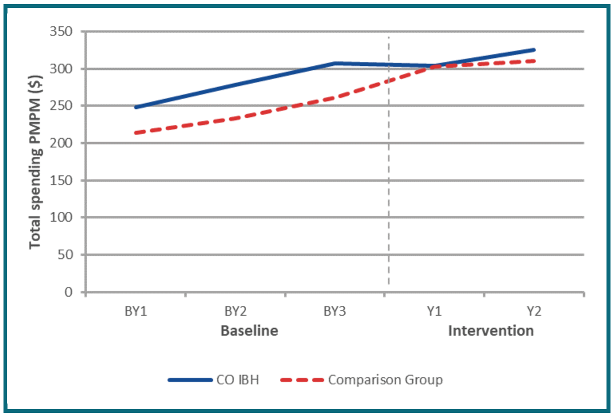
Sources: Federal Evaluation Team analysis of Medicare claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.5.3 Trends in core outcomes, commercial plan members

Figures A-1-9 through ***A-1-12*** present trends for the four core outcomes (total PPPM, inpatient admissions, ED visits, and readmissions) for the full sample of commercial plan members in the IBH and comparison groups. The findings are as follows:

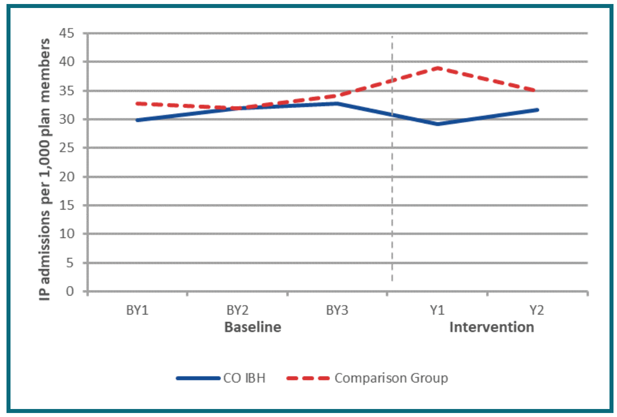
- Total spending PMPM increased during the baseline and intervention periods for both the IBH and comparison group. Spending was higher for the IBH group relative to the comparison group (***Figure A-1-9***). The trends appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 people did not change much during the baseline period for the IBH and comparison groups. Although the comparison group showed an increase in inpatient admissions during the intervention period, the IBH group experienced a decrease (***Figure A-1-10***). The trends do not appear to be parallel during the baseline period.
- ED visits per 1,000 people spiked for the comparison group in baseline Year 3 and remained high during the intervention period. In contrast, the IBH group had a steady increase in visits during the baseline period before going down in Year 1 of the intervention and then going back up in Year 2. The IBH group had lower rates of visits (***Figure A-1-11***). The trends do not appear to be parallel during the baseline period.
- Readmissions within 30 days increased during the baseline period for the IBH and comparison groups. The IBH group then experienced a decrease in readmissions during the intervention period while the comparison group experienced an increase (***Figure A-1-12***). The trends do not appear to be parallel during the baseline period.

Figure A-1-9. Trends in total spending per member per month for commercial plan members in the integrated behavioral health and comparison groups



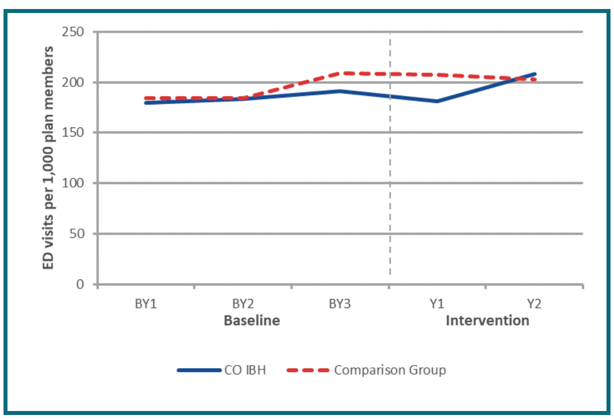
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; PMPM = per member per month; Y = year.

Figure A-1-10. Trends in all-cause acute inpatient admissions per 1,000 commercial plan members in the integrated behavioral health and comparison groups



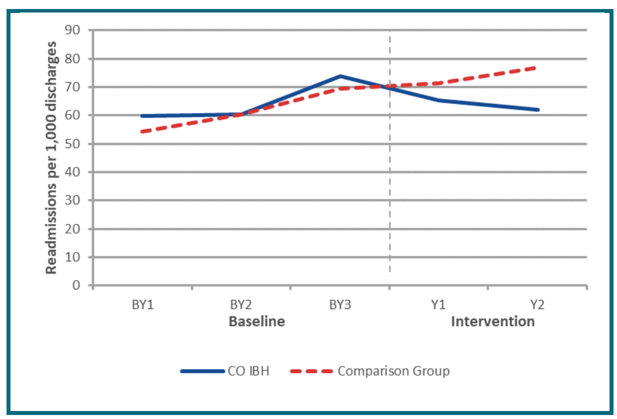
Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; IP = inpatient; Y = year.

Figure A-1-11. Trends in emergency department visits per 1,000 commercial plan members in the integrated behavioral health and comparison groups



Note: BY = baseline year; CO = Colorado; ED = emergency department; IBH = integrated behavioral health; Y = year.

Figure A-1-12. Trends in readmissions per 1,000 discharges in the intervention and comparison groups



Note: BY = baseline year; CO = Colorado; IBH = integrated behavioral health; Y = year.

Sources: Federal Evaluation Team analysis of commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

A-1.6 Sensitivity Analysis

Table A-1-12 shows how the impact estimates for Colorado's IBH model for the core outcomes differ when the D-in-D models assume either parallel or nonparallel baseline trends. Sensitivity analyses were robust to the main model specification for total spending, inpatient admissions, and inpatient readmissions. For ED visits in the Medicare and commercial populations, directions of the estimates were similar but statistical significance did change based on assumptions of parallel or differential trends. The findings are as follows:

- Within each of the payer-specific analyses, the overall total spending PPPM D-in-D estimates were in the same direction and significance across the two approaches, although the sensitivity analysis for the Medicaid population showed an estimate of a smaller magnitude.
- Within each of the payer-specific analyses, the overall inpatient admissions D-in-D estimates were in the same direction and significance and had similar magnitudes across the two approaches.
- The overall ED visits D-in-D estimates were not statistically significant in the main analysis or the sensitivity analysis for the Medicaid population. In the Medicare population, the estimate in the main analysis was statistically significant, but in the sensitivity analysis, the estimate was in the same direction but not statistically significant. In the commercial population, the estimate was not statistically significant in the main analysis, but in the sensitivity analysis, the estimate was significant and in the same direction as the main analysis.
- Within each of the payer-specific analyses, readmissions D-in-D estimates were not statistically significant in the main analysis or the sensitivity analysis for Medicaid and Medicare. In the commercial population, the estimate was not statistically significant in the main analysis, but in the sensitivity analysis, the estimate was significant and in the same direction and same magnitude as the main analysis.

Table A-1-12. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions in integrated behavioral health model and the comparison group, by payer

Outcome	Parallel trends assumption	Main analysis: Regression-adjusted D-in-D (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D (90% CI)
Total spending PPPM ($)			
Medicaid	Main: Not parallel Sensitivity: Parallel	-26.43*** (-32.78, -20.08)	-6.68** (-12.17, -1.20)
Medicare	Main: Parallel Sensitivity: Not parallel	-0.54 (-7.15, 6.07)	-3.61 (-13.39, 6.18)
Commercial	Main: Parallel Sensitivity: Not parallel	-40.40*** (-48.14, -32.65)	-46.99*** (-53.21, -40.78)
Inpatient admissions per 1,000			
Medicaid	Main: Parallel Sensitivity: Not parallel	-10.75*** (-12.13, -9.37)	-14.54*** (-16.60, -12.47)
Medicare	Main: Not parallel Sensitivity: Parallel	-3.98 (-8.34, 0.37)	-1.40 (-3.80, 1.01)
Commercial	Main: Not parallel Sensitivity: Parallel	-8.66*** (-10.26, -7.06)	-7.49*** (-8.66, -6.33)
ED visits per 1,000			
Medicaid	Main: Parallel Sensitivity: Not parallel	-12.99 (-31.20, 5.22)	15.59 (-1.04, 32.21)
Medicare	Main: Parallel Sensitivity: Not parallel	-22.13*** (-34.92, -9.35)	-14.96 (-33.18, 3.26)
Commercial	Main: Not parallel Sensitivity: Parallel	-2.31 (-12.59, 7.98)	-12.08* (-22.42, -1.73)
Readmissions within 30 days of discharge per 1,000 discharges			
Medicaid	Main: Parallel Sensitivity: Not parallel	3.68 (-4.32, 11.69)	-4.94 (-17.75, 7.86)
Medicare	Main: Not parallel Sensitivity: Parallel	-5.65 (-17.52, 6.22)	-0.40 (-7.20, 6.40)
Commercial	Main: Not parallel Sensitivity: Parallel	-11.58 (-25.16, 2.01)	-11.18* (-18.96, -3.41)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

(continued)

Table A-1-12. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions in integrated behavioral health model and the comparison group, by payer (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, the logged Hierarchical Condition Category risk score, and presence of a behavioral health condition in the year before entering the SIM model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). The Medicare model included an additional person-level variable (enrolled in both Medicare and Medicaid in the measurement year). The commercial model included additional person-level variables (individual coverage, prescription drug coverage, Medicaid coverage at some point in the measurement year, and Medicare coverage at some point in the measurement year). Assumptions about baseline parallel trends are included in the table above.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of IBH relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmission outcome is 2,367,356 for Medicaid; 441,716 for Medicare; and 1,210,253 for commercial plans. The weighted N for the readmission outcome is 90,387 for Medicaid; 78,232 for Medicare; and 36,474 for commercial plans. These numbers include all person-year (or discharge-year) observations for both the IBH and comparison groups.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

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Appendix B: State Innovation Model in Model Test States: Connecticut

Payment Model Development

- Connecticut's Person-Centered Medical Home Plus (PCMH+) grew to cover approximately 20 percent of all Medicaid beneficiaries in the state.
- After two waves of PCMH+, many practices had achieved improvements in quality metrics and shared savings, according to stakeholders.

Delivery Model Transformation

- The Community and Clinical Integration Program (CCIP) offered technical assistance (TA) to help PCMH+ practices with comprehensive care management, health equity, and behavioral health integration (BHI).

Health IT and Data Analytics

- A statewide health information exchange (HIE), all-payer claims database (APCD), and admission, discharge, and transfer (ADT) were established.
- The state achieved 70 percent alignment of the voluntary core quality measure set for Medicaid and commercial payers.

Population Health

- A community health worker (CHW) certification program was initiated.
- The Prevention Service Initiative (PSI) provided TA to formalize relationships between community-based organizations (CBOs) and health care organizations (HCOs).

Sustainability

- State funds will sustain a PCMH+ Wave 3, and a Wave 4 was expected to add dually eligible Medicare/Medicaid beneficiaries.
- Executive orders in January 2020 shifted statewide priorities for health care spending to primary care.

Implications

- The Connecticut SIM Initiative began numerous programs, but limited its focus over time to fewer programs with potentially greater impact.
- Practice transformation and TA were seen as most advantageous when tailored to a practice's specific needs, rather than being prescriptive.
- Collaboration between HCOs and CBOs revealed that CBOs needed additional help to administer new health programs.

B.1 Key State Context and the Connecticut State Innovation Model Initiative

B.1.1 Pre-State Innovation Model health care in Connecticut

Connecticut's population health and health care pre-SIM Initiative environment was shaped by three factors: (1) good population health overall but significant health disparities, (2) discontinuation of Medicaid managed care from private insurers and reversion to a managed fee-for-service (FFS) Administrative Service Organization model, and (3) Medicaid expansion. The state's large and dynamic commercial insurance market included 41 commercial payers (PwC, 2018, November). In both the commercial market and Medicare, shared savings programs (SSPs) had emerged that were in alignment with the state's planned SIM Initiative. In 2011, the state launched a voluntary value-based insurance design (VBID) program for state employees that was overseen by the Office of the State Comptroller.

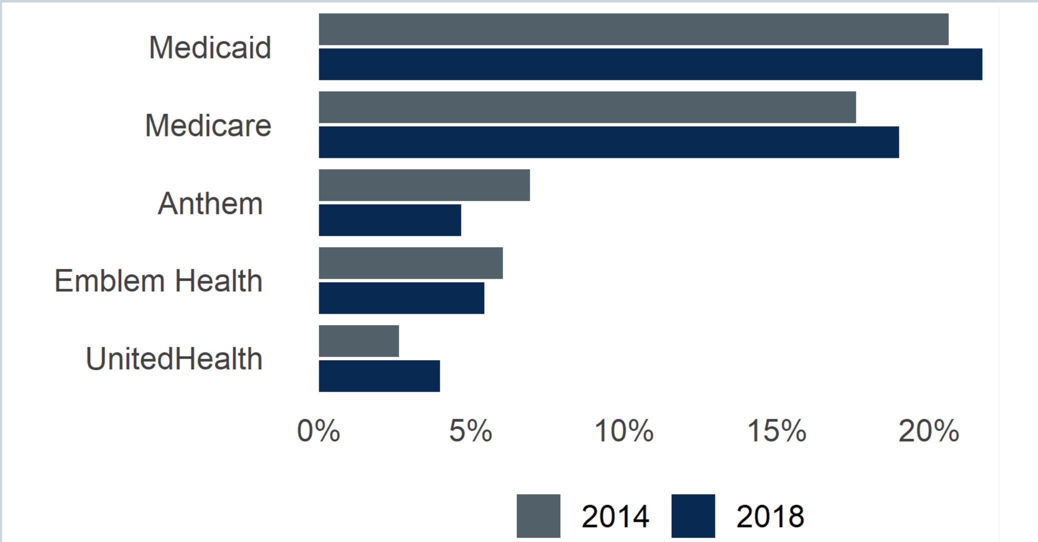
The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Connecticut was relatively competitive. Together, commercial health insurers made up the largest share of the market in 2014, followed by Medicaid, then Medicare. By 2018, Medicaid was the dominant insurer in the state overall in percent of insured lives, followed by Medicare (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percent of insured lives they covered over the same time period (see ***Exhibit B-1***). In contrast, the percent of insured lives covered by the most prevalent commercial payers (Anthem Inc. Group and Emblem Health) shrank between 2014 and 2018.

A majority of Connecticut practices were small and located in urban areas. In 2015, five percent of primary care practices were located in rural areas and 63 percent had a single provider. Twenty one percent of primary care practices had an existing involvement in a Medicare FFS alternative payment model (e.g., Comprehensive Primary Care [CPC], Comprehensive Primary Care Plus [CPC+], the Medicare Shared Savings Program).[15]

[15] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit B-1. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Connecticut shown)



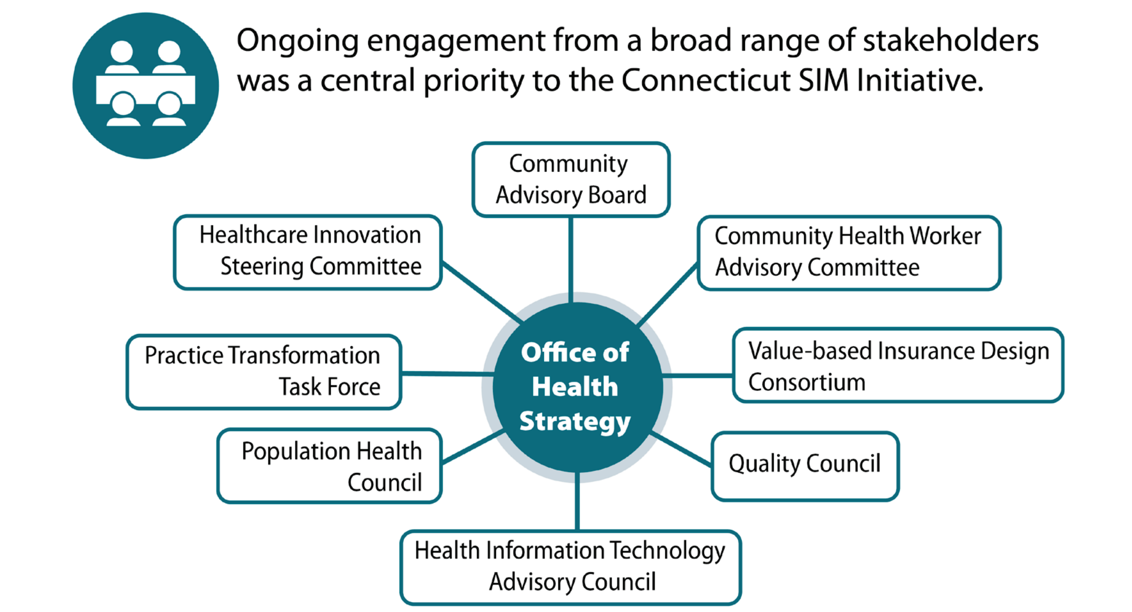
Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

B.1.2 State Innovation Model Initiative in Connecticut

Connecticut's Office of Health Strategy (OHS) led the state's SIM Initiative, the primary goals of which were to establish a whole person–centered health care system that improved community health and eliminated health inequities; ensured superior access, quality, and care experience; empowered individuals to actively participate in their health and health care; and improved affordability by reducing health care costs (***Exhibit B-2***). The SIM Initiative, which started in February 2015, aimed to achieve these goals through three key strategies: Person-Centered Medical Home Plus (PCMH+), the Advanced Medical Home (AMH) program, and the Community and Clinical Integration Program (CCIP).

Exhibit B-2. Connecticut engaged a variety of stakeholders in the development and implementation of the SIM Initiative



Note: SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

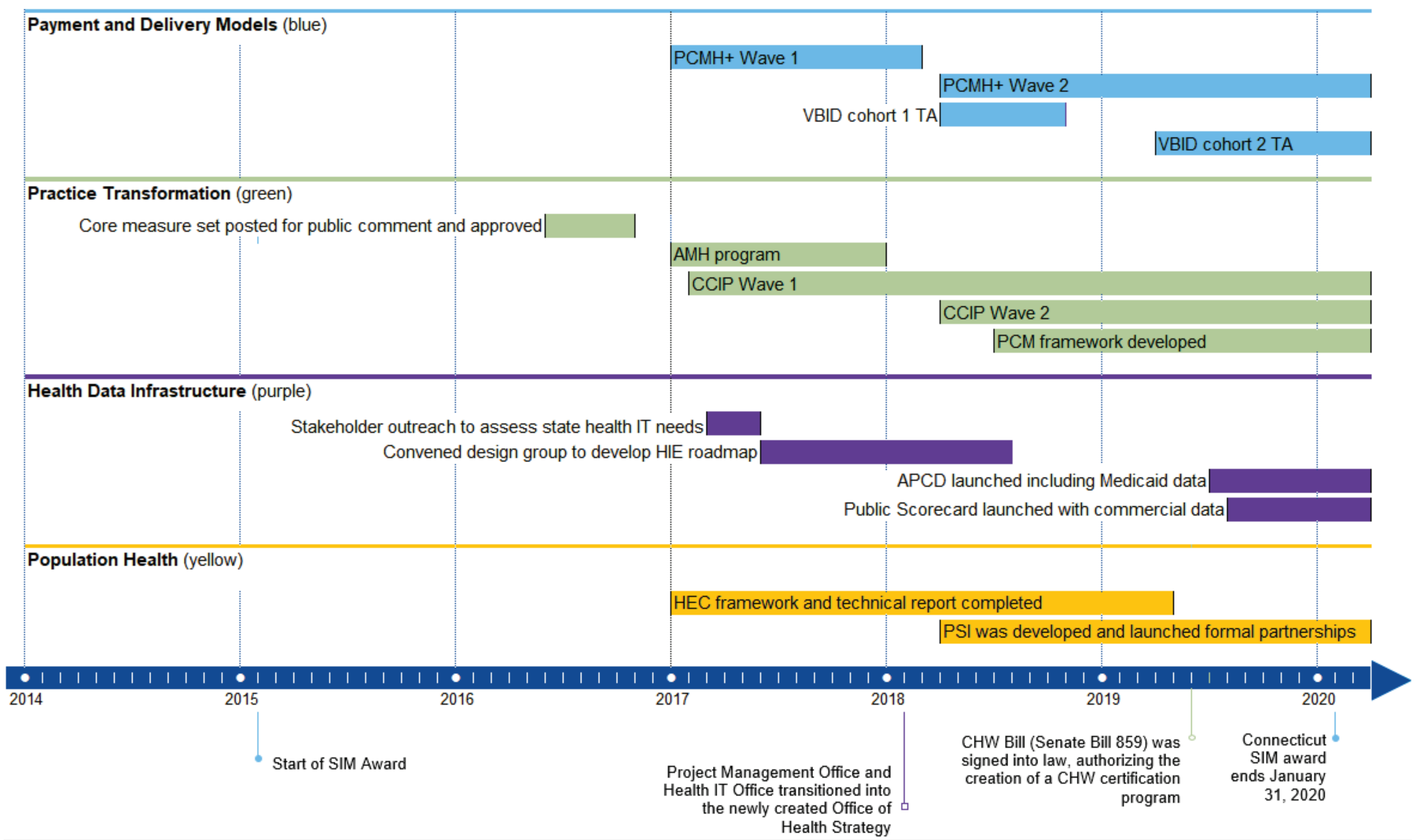
Ongoing engagement from a broad range of stakeholders was a central priority to the Connecticut SIM Initiative. The Healthcare Innovation Steering Committee (the Steering Committee), provided oversight and guidance to the OHS and activities related to the SIM Initiative implementation. The Practice Transformation Task Force provided AMH standards, advised on practice transformation processes, and fostered alignment with other care delivery models in the state. The Population Health Council developed a vision for improving population health around payment, insurance and practice reforms, community integration, and innovation. The Health IT Advisory Council advised the Health Information Technology Officer and coordinated health information technology (health IT) activities for state health reform initiatives. The Consumer Advocacy Board advocated for consumers and provided consumer input into the SIM planning and implementation process. The Quality Council recommended a core measure set for the assessment of primary care, specialty care, and hospital provider performance; and a common provider scorecard format for all payers. The VBID Consortium developed recommendations around the promotion and adoption of VBID model components by self-insured employers, fully insured employers, and private and public health insurance exchanges. Finally, the Community Health Worker (CHW) Advisory Committee advised on the training, promotion, utilization, and certification of CHWs; and established a framework for sustainable payment models.

The AMH program was designed to provide technical assistance (TA) to help practices transform into National Committee for Quality Assurance (NCQA)–recognized PCMHs. Participating entities (PEs) in PCMH+ received TA to enhance their capabilities in comprehensive care management, health equity improvement, and behavioral health integration (BHI). Using SIM funding, the state launched PCMH+, the state's first Medicaid SSP. PCMH+ rewarded HCOs that built onto patient-centered medical home (PCMH) standards by implementing enhanced care coordination activities and creating linkages with community-based organizations (CBOs). The intent was to improve outcomes and contain cost increases by addressing social determinants of health (SDoH) needs. PEs in PCMH+ received TA to enhance their capabilities in comprehensive care management, health equity improvement, and BHI. The CCIP offered targeted TA to PCMH+ PEs to enhance their capabilities in comprehensive care management, health equity, and BHI. CCIP practices were also eligible to receive transformation awards to support relevant activities.

The SIM Initiative made modifications throughout its implementation. The state discontinued the AMH initiative early due to lower than anticipated participation, reallocating the remaining funds to the CCIP. In response to consumer advocates' concerns, the launch of PCMH+ Wave 1 was delayed by a year, to January 2017, to allow for more community engagement activities. The start of PCMH+ Wave 2 was delayed until May 2018 due to state budget constraints and more than expected applicants; actual start dates of PEs varied slightly based upon contractual delays. In February 2018, the SIM Initiative's administration transitioned from the Office of the Healthcare Advocate (OHA) to the newly created OHS, which brought together the SIM Initiative and other state health IT efforts to provide a comprehensive and sustainable vision for the future of Connecticut's health care reform efforts. Following election of a new Governor, new commissioners were appointed to the Department of Social Services (DSS) and Department of Public Health (DPH). Stakeholders noted that the change in leadership brought about greater inter-agency collaboration around interventions and budgeting.

Connecticut's SIM Initiative award ended in January 2020. ***Exhibit B-3*** depicts the timeline of major Connecticut SIM Initiative and SIM-related activities.

Exhibit B-3. Timeline of Connecticut SIM and SIM-related activities



Note: AMH = Advanced Medical Home; APCD = all-payer claims database; CCIP = Community and Clinical Integration Program; CHW = community health worker; health IT = health information technology; HEC = Health Enhancement Community; HIE = health information exchange; PCM = Primary Care Modernization; PCMH+ = Person-Centered Medical Home Plus; PSI = Prevention Service Initiative; SIM = State Innovation Model; TA = technical assistance; VBID = value-based insurance design.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

B.2 Accomplishments from Connecticut's State Innovation Model Initiative

This appendix summarizes Connecticut's SIM award activities, accomplishments, and stakeholder feedback in three areas: delivery models and payment reform (***Section B.2.1***), enabling strategies to support health care delivery transformation (***Section B.2.2***), and population health (***Section B.2.3***). The chapter concludes by summarizing Connecticut's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section B.3***), and discussing implications and lessons learned from Connecticut's SIM Initiative experience (***Section B.4***).

The federal evaluation of Connecticut's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM officials;
- A total of 74 interviews with state officials, primary care providers (PCPs), health care administrators, consumer advocates, and other stakeholders over four annual interview rounds conducted since 2016, most recently in February 2020;
- A total of 14 focus groups with PCPs, CHWs, and Medicaid beneficiaries in the greater Hartford and New Haven areas;
- Medicaid claims for calendar years 2014–2018.

Medicaid claims were used to examine health spending, utilization, quality, and maternal outcomes for Medicaid beneficiaries served by primary care practices participating in PCMH+; and for comparison, Medicaid beneficiaries served by PCMHs not participating in the PCMH+ shared savings arrangement. The PCMH+ model was selected for quantitative analysis, because it was the SIM hallmark initiative in the state, receiving the largest investment of SIM funds.

B.2.1 Delivery models and payment reforms

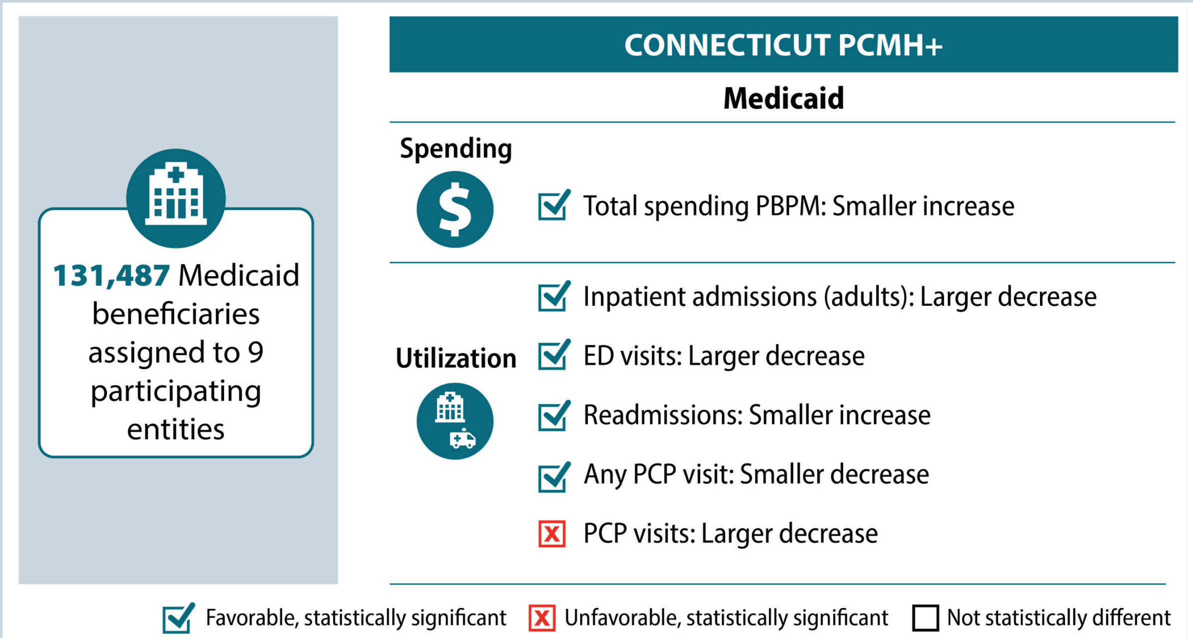
Key Results
• PCMH+ included 434 PCPs and covered 13 percent of all Medicaid beneficiaries in the state. • Stakeholders anticipated sustained funding for PCMH+, and the addition of dually eligible Medicare-Medicaid beneficiaries in future waves. • Providers, administrators, and beneficiaries reported that PCMH+ improved quality of care, care coordination, and customer service at federally qualified health centers (FQHCs). • The value of care coordination services, largely funded through the PCMH+ per member per month (PMPM) payments, were touted by PCMH+ providers as significant assets in providing comprehensive and person-centered care. • Strengthening BHI and colocation enabled PEs to better meet the whole health needs of beneficiaries. • The VBID initiative was discontinued in late 2019 after leadership believed they had reached saturation among interested employers.

Connecticut's delivery model and payment reforms activities included significant investments in primary care transformation, BHI and value-based purchasing support. The state used SIM funding to launch PCMH+, the state's first Medicaid SSP. The PCMH+ model rewarded HCOs that built onto PCMH standards by implementing enhanced care coordination activities and creating linkages with CBOs. The AMH program provided TA to practices to help them transform into NCQA-recognized PCMHs and enhance their capabilities in comprehensive care management, health equity improvement, and BHI. The VBID Consortium developed recommendations around the promotion and adoption of VBID model components by self-insured employers, fully insured employers, and private and public health insurance exchanges.

Person Centered Medical Home Plus (Medicaid Shared Savings Program)

PCMH+ built on the existing PCMH model with enhanced comprehensive, coordinated care for Medicaid beneficiaries. PEs included both FQHCs and Advanced Networks (ANs) (State of Connecticut, 2017). To improve care coordination, PCMH+ provided participating FQHCs with a $4.50 monthly care coordination payment per attributed life assigned to their practice; ANs were not eligible to receive the monthly advanced payment. All PEs were able to share in potential savings with Medicaid by meeting a series of common quality benchmarks (Mercer, 2019)—including well-care visits for adolescents, hemoglobin A1c (HbA1c) monitoring for people with diabetes, and timely prenatal and postpartum care.

Exhibit B-4. Connecticut's Person-Centered Medical Home Plus model had favorable impacts on spending, emergency department visits, and readmissions in its first two years



Notes: Changes are relative to a comparison group. A checkmark indicates a favorable impact.

CT = Connecticut; ED = emergency department; PBPM = per beneficiary per month; PCMH+ = Person Center Medical Home Plus; PCP = primary care provider.

Source: Federal Evaluation Team analysis of Medicaid claims from the CT Department of Social Services. See ***Appendix B-1*** for more detail.

The claims-based analysis for PCMH+ evaluated those beneficiaries attributed in Wave 1 of the model, which began on January 1, 2017. In general, claims-based analysis showed favorable outcomes for the PCMH+ model, indicating it largely met its intended goals of reducing utilization of high-cost acute care from emergency departments (EDs) and inpatient admissions, and containing spending increases (***Exhibit B-4***). ED visits decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased more for PCMH+ beneficiaries (-69.98 visits per 1,000 beneficiaries). Although changes to inpatient admission rates did not differ between the PCMH+ group and the comparison group for the total population, inpatient admissions decreased for both adult Medicaid beneficiaries attributed to PCMH+ participating entities and adult comparison beneficiaries but decreased more for adult PCMH+ beneficiaries (-6.60 admissions per 1,000 adult Medicaid beneficiaries). In addition, readmissions increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but

For more information, see ***Table B-5*** in the Addendum at end of this chapter. For full results describing the impact of the PCMH+ on Medicaid beneficiary quality of care, utilization, and expenditures, see ***Appendix B-1*** to this chapter.

increased less in the PCMH+ group than in the comparison group (-16.70 readmissions per 1,000 discharges).

The percentage of Medicaid beneficiaries with at least one primary care visit per year decreased for both PCMH+ beneficiaries and the comparison group but decreased less for the PCMH+ group (5.11 percentage points). This finding suggests that PCMH+ was successful in enhancing access to services. Despite these improvements, the total number of PCP visits per year decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased more in the PCMH+ group (-177.04 PCP visits per 1,000 beneficiaries)—a decline that qualitative evidence suggests may be at least partially attributed to the expanded role of care coordination services provided under PCMH+. One PCMH+ provider noted that the increase in care coordination supports, including the use of patient portals outside appointments, led to fewer medication management appointments for diabetics.

The generally favorable changes in utilization were accompanied by generally favorable changes in spending. Total spending increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but increased less in the PCMH+ group (-$26.83 per beneficiary per month [PBPM]). Favorable changes in total spending were driven by changes in both professional spending and prescription drug spending in the PCMH+ group. Professional spending PBPM decreased slightly in the PCMH+ group and increased in the comparison group, leading to a relative decrease in the PCMH+ group (-$10.19 PBPM). Prescription drug spending PBPM increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but increased less in the PCMH+ group (-$11.71 PBPM). Changes to ED and inpatient spending, however, did not differ between the PCMH+ group and the comparison group.

Primary care practices are also seen as a vital connection point for pregnant beneficiaries in need of maternity care. Maternity care quality measures were included as measures of PCMH+ success reflecting their role as a medical home. Practices were assessed on the timeliness of prenatal and postpartum care services for their pregnant attributed beneficiaries. The claims-based analysis also showed that the percentage of postpartum Medicaid beneficiaries with a postpartum visit increased among beneficiaries attributed to PCMH+ participating entities and decreased among comparison beneficiaries during the first two years of PCMH+ implementation, leading to a relative increased for the PCMH+ group (5.7 percentage points). On the other hand, the percentage of pregnant beneficiaries with a timely prenatal visit did not differ between Medicaid-enrolled beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.

PCMH+ was implemented in a series of three Waves. Wave 1 began in January 2017 and included nine PEs and 137,037 beneficiaries. Wave 2 began in April 2018, with all nine Wave 1 PEs and an additional five PEs, including 181,902 beneficiaries. Wave 3, which was limited to existing PEs, launched on January 1, 2020 and included 12 PEs (10 FQHCs and two ANs) covering 150,834 beneficiaries. Wave 3's reduction in PEs from 14 to 12 was due to enhanced participation requirements. The 24-month Wave 3 period of performance was scheduled to end on December 31, 2021 (***Table B-1***). Connecticut reported that 434 PCPs in FQHCs/ANs had participated in Medicaid PCMH+ by the end of the SIM Initiative. Due to data availability, the claims-based analysis is limited to beneficiaries and practices attributed in Wave 1.

Table B-1. Connecticut's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PCMH+	Medicaid beneficiaries	• Successfully launched three waves with up to 14 PEs, covering up to 150,000 lives in Wave 2.	• Continuation expected with expansion to include dually eligible Medicare-Medicaid beneficiaries
VBID	Employers	• Completed targeted TA to nine employers in Cohort 1 and three in Cohort 2.	• Not sustained
AMH	Primary care practices	• 125 primary care practices became NCQA-certified PCMHs.	• Not sustained

Notes: AMH = Advanced Medical Home; NCQA = National Committee for Quality Assurance; PCMH = patient centered medical home; PCMH+ = Person-Centered Medical Home Plus; PE = participating entity; SIM = State Innovation Model; TA = technical assistance; VBID = value-based insurance design.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

In 2019, state officials implemented new attribution rules to minimize the impact of beneficiaries' short-term eligibility lapses on practice attribution and subsequent payments. This change was in response to feedback from Wave 1 PEs that short-term eligibility lapses (one day or more) resulted in loss of attribution and lower payments, with no corresponding decrease in a practice's workload.[16] The revised policy stated that beneficiaries who lost Medicaid eligibility would not be removed from PCMH+ attribution if they were reinstated within 120 days. PEs reported that the attribution revision led to greater stability in preparing for and meeting the needs of a practice's attributed lives. However, Connecticut still fell short of its goal to reach upwards of 30 percent of Medicaid beneficiaries in PCMH+ Wave 2.

> "I think if you look at an FQHC that renovated its physical plant five years ago, they made bigger waiting rooms. Now they're thinking about it and they're making smaller waiting rooms and doing more to get people through those waiting rooms into service."
>
> —Connecticut state official

Multiple PEs cited improved quality of care for patients at PCMH+ practices, particularly at FQHCs. Several entities created new roles in 2018 specifically designed to manage quality improvement initiatives and reporting for initiatives such as PCMH+. Staff members dedicated

[16] See SIM 2 Annual Report 3 for a more comprehensive description of the attribution challenges.

to quality improvement came from a variety of backgrounds, including clinical and administrative expertise. PCMH+ implementation generated a centralized quality improvement strategy that helped synergize historically disparate efforts, thereby maximizing their combined effects. Streamlining necessary administrative activities such as program monitoring enabled providers and practices to focus their time and energy on providing whole person care.

In addition to improvements in medical care quality, multiple provider and state official stakeholders described how PCMH+ drove FQHCs to improve the overall patient experience with all types of clinic staff. One state official noted that, because PCMH+ practices were financially incentivized to retain beneficiaries, the program resulted in improved customer service and patient interactions with both clinical and administrative staff. PCMH+ resources were available for participating practices to invest as they deemed most appropriate to provide the best care for their patients. Stakeholders cited many types of patient access and care coordination efforts including behavioral health colocation, linkages to necessary specialty care, convenient access to clinicians and other staff via patient portals, and streamlined appointment making as having improved patient experience.

> “If you want to retain the members you guys [need to] be offering behavioral health, medical, dental, in an environment that’s conducive, healthy, [and] positive for the member. And it’s a business and you’re only going to keep the business if you’re offering the services in a way that people need.”
>
> —Connecticut state official

PCPs and state officials reported that targeting beneficiaries with the highest needs, and consequently highest costs, was the most strategic way to utilize PCMH+ investments and enable practices to receive shared savings under the program. Providers noted that advanced monthly payments allowed practices to have dedicated staff reach out to patients following ED visits or inpatient hospitalization. Practices identified beneficiaries with multiple chronic conditions such as diabetes, heart disease, and behavioral health conditions as priority populations for enhanced care coordination. But multiple providers expressed frustration at not knowing which beneficiaries would qualify for PCMH+-funded care coordination at the time of service delivery. Several described situations in which they knew a patient would benefit from a PCMH+ care coordinator’s assistance on a key SDoH issue (for example, housing) and referred them for services, only to find out later that the patient did not qualify because the patient was either not enrolled in PCMH+ or did not meet a practice’s own criteria for services.

> “We just recently extended our visit time and that’s because of PCMH+. Usually our visits are 15 minutes, which is not a lot of time to do anything. At 11:30, we can schedule patients for 30 minutes, if needed. So if we’ve identified a patient that needs that extra time, if it’s even to utilize language line or something like that, then we’ll be able to use that time slot to do that.”
>
> —Connecticut clinic administrator

Electronic health records (EHR) systems were either a key asset or hindrance for PCMH+ success, depending largely on practices' autonomy and ability to modify their systems. PCPs and state officials both described the role of EHRs in providing necessary reporting metrics to DSS for PCMH+. Multiple ANs noted that producing the requisite quality and utilization metrics was burdensome, and sometimes not even possible, for practices that were dependent on proprietary EHR systems they were often unable to modify. FQHCs generally fared better and adapted more easily to the demands of PCMH+, due in large part to owning their own EHR. One state official noted that many of the FQHCs' EHRs were designed specifically with Medicaid beneficiaries in mind. This meant that factors such as SDoH were already integrated into their existing platforms, thereby easing the introduction of new reporting needs.

> "I think the lesson that I've taken away from our site visits is that you either have an EMR that supports this work or you have an EMR that's a huge anchor and there's no middle ground."
>
> —Connecticut state official

Contrary to early predictions from participating practices and state officials, shared savings were achieved for PCMH+ PEs in both Wave 1 and Wave 2. PEs were eligible to receive savings from two pathways: individual savings and the challenge pool. The individual pool savings were based on aggregated quality metrics for all PCMH+ attributed lives at a PE, compared to non-participating practices with similar patient populations. Challenge pool awards, which consisted of all savings not claimed by the individual savings pools, were distributed to PEs based upon weighted quality metrics.

> "If you look at the results of the Wave 1 PCMH plus, some organizations had pretty significant shared savings. We were one of the most cost effective and highest quality rated, but we didn't get any shared savings. The ones that got the shared savings were the ones that were already the most costly. So the fundamental design is to get the low hanging fruit. If we're providing high quality care and one of the most cost effective, well what's the value that we get back from that by maintaining being a low cost, high quality provider."
>
> —Connecticut practice administrator

In Wave 1, two PEs, both multi-site FQHCs, earned savings from the individual savings pool, totaling over $915,000. All nine participating practices were awarded savings from the challenge pool, which ranged from $20,000 to $580,500, for a total of nearly $1.74 million. The two PEs receiving individual savings awards also received the largest share of the challenge pool savings. Wave 2 results touted $8.2 million in savings, with costs increasing at 2.66 percent—0.33 percentage points lower than the statewide average of 2.99 percent. Of the $5.53 million available to the PEs that saved through the individual savings pool, four PEs, all FQHCs, received a total of $1.86 million. Within the challenge pool, 11 of the 14 PEs shared the remaining $3.67 million. In Wave 2, between the individual savings pool and the challenge pool, 12 out of the 14 PEs were eligible to receive a shared savings payment.

Some participating practices expressed dissatisfaction in the methodology used to award savings in Wave 1. One site described the methodology as penalizing practices already performing with high quality and efficiency before PCMH+ implementation—thereby reducing already high-performing practices from realizing their appropriate return on investment. Practices with lower quality metrics had more room to improve, in other words, and thus could achieve more savings simply because they started from a low base. Other stakeholders noted that the savings benchmarks were inaccurate, as a true comparison group could not be developed to reflect the PCMH+ practice and beneficiary populations, because participating practices were the most ready to transform, irrespective of any PCMH+ influence. Although the savings methodologies were modified for Wave 2 to reflect the concerns expressed, stakeholder concerns persisted throughout the award period.

Value-based insurance design

The majority of Cohort 1 VBID-participating employers expressed a commitment to adopting VBID plans but had not implemented changes by the end of the SIM Initiative. Of the nine Cohort 1 employers, five committed to incorporating specific VBID components, three reported they were deciding which elements to incorporate, and one employer did not plan to adopt VBID. One employer reported being motivated to participate in the VBID cohort in order to compare its existing program with opportunities for benefits improvements under VBID. This employer cited learning best practices about how to communicate with its participants (including several program design strategies being considered for future implementation) as one of the most useful outcomes of participation. State officials saw VBID's Cohort 1 as a success, since it met the enrollment goal, received positive feedback from participants, and secured commitment to incorporating VBID plans by more than half of the employers. State officials also believed VBID provided the added benefit of engaging employers in other SIM Initiative priorities, which helped increase stakeholder engagement.

"… equally successful was getting large employers to the table because once we got to the table on VBID we can get them to the table on other stuff we're talking about like the Primary Care Modernization and everything. They need to be in on those discussions."

—Connecticut state official

In partnership with the state's Comptroller's Office, the VBID Consortium improved the VBID templates to further support employers in identifying ways to improve benefits in their health insurance plans. The Comptroller's Office co-led implementation of VBID alongside the OHS, building on the Comptroller's experience implementing VBID for the state employee population. The preventive care, chronic condition management, and high value provider templates were updated and new sections on prescription drugs added, to help reduce cost sharing for employees and improve medication adherence to high value drugs. VBID guiding principles were also updated to define how a high-value provider should be defined via transparent quality and cost measures. The templates were used as a tool to help the employers participating in VBID Cohort 1's targeted TA to develop their plans, as well as employers in any future VBID cohorts.

Recruitment for VBID Cohort 2 was more challenging than for Cohort 1, because employers were less responsive to recruitment. OHS reported in March 2019 that, despite the plan to launch two additional Cohorts during the SIM Initiative, only three additional employers were recruited for Cohort 2. OHS attributed this decline in interest to having exhausted the "pent up demand" for Cohort 1, which consisted of employers that already knew enough about VBID to be interested and ready to participate. Trying to recruit employers who were less knowledgeable and less interested, and did not see VBID as an essential strategy, was inevitably more difficult. Another recruitment limitation SIM Initiative leadership cited was the inability to estimate the return on investment (ROI) participants might generate by adopting VBID. Despite state officials' attempts to spark interest among employers through an informational recruitment webinar held in August 2019, during the recruitment phase in October 2019 efforts to launch Cohort 3 were paused indefinitely. Since the SIM Initiative's engagement with the commercial market remained limited, state officials hoped at the time that the planned Primary Care Modernization (PCM) initiative (see ***Section B.2.2***) would engage more commercial payers through a partnership with the state's Comptroller's Office in the post-SIM period.

Multi-payer engagement in alternative payment models

According to SIM-supported data collection regarding statewide penetration of value-based payment (VBP) arrangements, slightly more than one-third (36 percent) of Medicaid and nearly half (45 percent) of Medicare payments were in VBPs or alternative payment models (APMs) as defined by the Learning and Action Network Categories 2–4[17] in 2017. More than half (55 percent) of commercial payments (according to the four commercial payers surveyed) were in VBP or other APMs. All three payer groups had experienced a small increase in payments in VBP or APMs since 2016.

> "… We don't have this ability to say VBID will generate, you know, a 5% return, so that's a limitation."
>
> —Connecticut state official

[17] Annual Year 4 Updated Reporting Metrics, November 2019.

B.2.2 Enabling strategies to support health care delivery transformation

Key Results
• The CHW certification program to establish a formal education and training curriculum for CHWs was approved in 2019 and went into effect January 1, 2020. • CHWs played an integral role as part of the PCMH+ PE care teams to improve patient outcomes and address SDoH needs. • CCIP's PEs began collecting granular race and ethnicity data as part of the health equity core standard to better address disparities within their population. • Achieved 73 percent alignment of the voluntary core quality measure set for Medicaid and commercial payers. • Launched the Public Scorecard to help consumers make informed decisions about their health care and health care providers. • The PCM model, which the state had planned as a way to sustain SIM investments after the award period, was abandoned prior to implementation due to competing priorities and changes in leadership.

Table B-2 presents Connecticut's enabling strategies to support health care delivery transformation—CCIP, health IT initiatives (specifically with the health information exchange [HIE], the all-payer claims database [APCD], and an admission, discharge, and transfer [ADT] system), and quality measure alignment—during the SIM Initiative.

Table B-2. Connecticut's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
CCIP	Medicaid PCMH+ providers	• Integrated non-clinical community services with traditional clinical care. • Legislature approved a statewide CHW certification program which began in January 2020. • PEs collected and began to analyze granular race and ethnicity data to identify and address health disparities.	• Use of CHWs and Health Equity standard would be sustained by PEs.
Health IT	Medicaid PCMH+ providers	• Established health IT infrastructure and a statewide HIE, APCD, and ADT system.	• Legislation to fund the APCD was pending.
Quality measure alignment	Medicaid PCMH+ providers	• Implemented quality measure alignment following the core quality measure set. • Achieved 90 percent alignment of core measures across health plans (Medicaid/commercial). • Launched the Public Scorecard.	• State funding request to continue development of the Public Scorecard was pending.

Note: ADT = admission, discharge, and transfer; APCD = all-payer claims database; CCIP = Community and Clinical Integration Program; CHW = community health worker; health IT = health information technology; HIE = health information exchange; PCMH+ = Person-Centered Medical Home Plus; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Clinical and Community Integration Program

Practice transformation activities under CCIP funded TA and transformation awards for ANs and FQHCs participating in PCMH+, as PEs sought to meet three CCIP core standards: comprehensive care management, BHI, and health equity. CHWs were utilized in different capacities within the care team to help PEs meet the comprehensive care management standard. PEs used behavioral health specialists to expand BHI to the primary care teams. Granular race and ethnicity data were collected, so PEs could work toward achieving the health equity standard.

> "Having access to the CHWs in the various settings that they're deployed … they are wonderful assets. I think that because we're a complex organization because of the state's landscape, it's hard to do things sometimes. They've been proven flexible. They reduce the activation energy to actually get things done."
>
> —Connecticut provider

CHWs played an important role as an integrated part of the care team to improve patient outcomes and address SDoH needs. Thirty-four CHWs were integrated into primary care teams across 14 ANs/FQHCs as of January 2019 (Connecticut Office of Health Strategy, 2019, May). CHWs extended the reach of practices into the community and addressed SDoH by identifying potential barriers to care (such as transportation), and providing solutions to those barriers for patients. One stakeholder estimated that although 30 percent of CHW cases might be related to more medically complex needs, all cases required SDoH needs that CHWs helped address. CHWs also provided navigation services for patients to clinical and community resources, as well as chronic illness self-management support and education (Community Health Worker Advisory Committee, 2018). Practices identified CHWs as valuable resources to patients with high ED utilization, multiple hospital admissions, or hard-to-manage chronic diseases such as diabetes, hypertension, and asthma. Stakeholders agreed that consumers widely reported having positive experiences with CHWs and being excited to have access to CHW services.

The legislature approved a CHW certification program to establish education and training requirements for CHWs in the state in August 2019. A Community Health Worker Advisory Body (CHWAB) was formed to advise OHS and the DPH on requirements for the program, which began just as the SIM Initiative ended in January 2020. The CHWAB was set to continue implementation after the end of the SIM Initiative. OHS officials noted that the CHW certification program, whose establishment was achieved in large part because of SIM Initiative efforts, would provide a platform to integrate more CHWs into the clinical workforce. Stakeholders generally supported statewide certification, believing CHW integration was a positive step and that certification would help standardize the CHW role, while recognizing their important contributions to the care team. As of February 2020, nine CHWs had received certification in the state. Practices reported that certification was encouraged but not required of their CHWs, citing that the certification process was relatively new and its value still unknown. OHS also moved forward with plans to launch a CHW apprenticeship program—to provide TA for CCIP PEs, and continue to provide support around CHWs to PEs through a CCIP Learning Management System.

> "I think the whole point of the CHW is to say once you piloted it, can you afford not to have it?"
>
> —Connecticut provider

Demonstrating ROI from CHW utilization continued to be a challenge for practices, despite successful integration into care teams. CCIP transformation awards were intended to enable PEs to hire CHWs and sustain their activity through an ROI without any new funding sources. However, state officials and practices were pessimistic about the sustainability of CHWs because of the inability to measure ROI. Disentangling the value of CHWs in an environment with multiple primary care initiatives, as well as lack of a model to measure CHW impact on cost, were the main challenges to measuring ROI that state officials cited. OHS officials did not expect payers to introduce FFS reimbursement for CHWs or practices to demonstrate the necessary ROI. State officials believed additional funding options, potentially through the planned PCM efforts, would be necessary to demonstrate ROI and sustain CHWs after the SIM Initiative. State officials also viewed the CHW certification program as a positive development that could lead to new funding sources. The OHS reported that, despite the end of SIM funding all practices would continue employing the CHWs that were enabled by CCIP (Connecticut Office of Health Strategy, 2020).

Practices and consumers mostly agreed that behavioral health and primary care services were integrated at FQHCs. Practices described numerous integration variations, each explaining how their unique approach best fit the needs of their patients and the parameters of their facilities and staff. Strengthening screening within physical health visits, tightening referral networks, and closing service gaps with care coordinators were often cited as improvements. As one practitioner noted: "… it's not really behavioral health integration because, even though we call it that, it's more about enhancing the screening and ensuring a closer connection or referral connection." Several PEs in PCMH+ and CCIP also described the colocation of physical health and behavioral health services as fundamental to ensuring an adequate continuum of care. Several focus group consumers described the value of being able to see a clinician, a case worker, and a behavioral health specialist all in the same building in a single day. One consumer said the colocation led to greater coordination across the patient's care team and believed that behavioral and physical health providers worked in tandem for the patient's benefit. One practice reported that patients were more willing to partake in behavioral health treatment when it was embedded in their primary care treatment, because the patient now viewed the behavioral health provider as part of the trusted care team.

> "Don't assume where your inequities are. You need to measure; you need to get information at a granular level so that you can see where the disparities lies and create the programs to address those disparities."
>
> —Connecticut provider

CCIP PEs began collecting granular race and ethnicity data to identify gaps in care of subpopulations as part of implementing the CCIP health equity core standard. Some PEs struggled to develop a way to collect this data because of operational implementation ramifications, lack of technical capabilities with EHRs, and workflow issues. One large PE explained the challenges around workflow and technical capabilities to integrate the collection of this data throughout a health system with over 1,000 doors to the institution and multiple EHR systems. The PE also noted that trying to explain to a patient why the organization needed race and ethnicity information could be difficult, especially with the enormous number of other screening questions asked of patients. Collaboration among multiple PEs that used the same EHR system facilitated the addition of a second structured data field that enabled the practices to start collecting the granular race and ethnicity data. With vendor support, practices then began to analyze the race and ethnicity data that was collected to better understand their patient population and work towards eliminating health disparities according to PEs.

Health information technology

State officials' inability to execute data sharing agreements with HCOs, due to the complex conditions of the data sharing agreements, made the state unable to fully develop a HIE. In response, the state officials developed the HIE entity as a nonprofit, nongovernmental entity with a traditional Business Associate Agreement. Articles of incorporation were developed along with a legal trust framework, and the Core Data Analytics Solution (CDAS) environment was prepared to receive transactions in 2019. This enabled the HIE infrastructure to be built, and a team lined up "with their toes on the starting line waiting for the gun to go off," as one state official put it. In 2020, the Connecticut Information Exchange (CONNIE) was established to continue efforts to build a functional HIE with input from the state and external advisory boards.

> "That's one of the things we're finding as we go through this process is that the data sharing agreement has turned out to be the long pole in the tents. Not the technology, but the data sharing agreement has been the principal issue."
>
> —Connecticut state official

Providers were optimistic about the ADT alert system, which provided real time actionable data on their patient populations. PatientPing, a tool used to notify providers of patients' admissions, discharges, and ED visits, was rolled out to five CCIP PEs beginning in March 2019 (Connecticut Office of Health Strategy, 2019, May). DSS invested in an ADT tool called Project Notify, a similar but more affordable product than PatientPing, specifically for FQHCs. The providers' initial focus was to identify the populations where the notifications had the greatest impact, and the best way to deliver the notifications. Providers were optimistic that PatientPing would enable the CHWs and care coordinators to focus their efforts with the use of real-time data on attributed patients. One provider described using an FQHC's PMPM payments to pay for PatientPing, saying that the tool was very valuable, it would have been better offered as a public utility, so providers did not have to pay for it directly. The same provider also explained that, while the tool provided information about hospital admissions, it did not include the diagnosis, which the provider found annoying—because it meant that obtaining the necessary additional information required having a triage nurse conduct a follow-up call or visit with patients admitted the prior day.

> "I would say PatientPing has been huge because we never had the ability to get this information before in a timely way where it was actionable."
>
> —Connecticut provider

The APCD maintained its own infrastructure at OHS, funded for fiscal year 2020 through an underspend in OHS. The APCD advisory board had sought Medicaid data beginning in 2012, but ultimately received it at the end of 2019.

Building on CCIP's TA to enhance the collection of health equity data, the state completed a Health Equity Data Analytics (HEDA) project to identify critical SDoH data elements—including race, ethnicity, insurance status that needed to be reported at the neighborhood level. The project was established in large part to fill the gaps of other initiatives, such as the APCD, that were not designed to produce granular race, ethnicity or social determinant data at the neighborhood and community level. HEDA was designed to work in tandem with other health data sources, such as the APCD, to help policy makers and other stakeholders access neighborhood-level data to inform future health equity strategies.

Quality measure alignment

At the end of the SIM Initiative, Medicaid and commercial payers reported that 73 percent of their claims-based quality measures were aligned with the Quality Council's core measure set, with 98 percent alignment among commercial payers. This was higher than state officials expected, given the voluntary nature of measure alignment in the state.

> "I found that some of the measures are not clearly defined and are kind of difficult. For example, the asthma metric. You have to really understand what the measure is. There are two parts to it, if I'm not mistaken. You have to look at whether or not the patient picked up their medication and how long they've been on the medication. So that's tough when you don't have team members who are clinical to understand those measures."
>
> —Connecticut provider

Alignment of measures across populations was a challenge during the SIM Initiative, however. Several providers explained that certain measures were too specific to a particular population to be of general use. Consumer advocates petitioned for the inclusion of certain measures that some providers felt did not make sense clinically. Additionally, some of the PCMH+ measures were quite different from the core quality measure, adding additional documentation requirements at certain practices.

Providers noted that PCMH+ quality measures were not well defined, and there was uncertainty in reporting. DSS noted that they purposefully did not provide specific guidance and definitions for the PCMH+ measures, to enable practices to be innovative and create their own definitions, within reason. One FQHC hired a full-time quality improvement director to help do the research necessary to appropriately define the measures. Another provider noted the measures did not account for the unique challenges associated with providing care to medically complex patients. There was also uncertainty about how risk scoring should be incorporated into select measures such as inpatient admissions and readmissions. An official at DSS noted that the original intention of centering the consumer experience in quality measure alignment was aspirational, without broad uptake from providers or a regulatory legislative intervention.

Public Scorecard

In August 2019, the SIM Initiative launched the first iteration of the Public Scorecard, *Healthscore CT*, to assess the quality of care in Connecticut's ANs and FQHCs—with the intent to assist consumers in making informed decisions about their health care and health care providers. The launch made Connecticut one of only a few states to have an accountable care organization (ACO) scorecard to compare outcomes across ACOs—a major SIM Initiative achievement. The scorecard included the first set of 25 measures using commercial data from the ANs' APCD. In October 2019, OHS launched the cost estimator tool, an interactive component of the website that allowed consumers to compare cost of care at hospitals and provider networks. Although the scorecard was designed with the consumer in mind, state officials believed it would mostly be utilized by the rated entities to see how their own quality and costs compared with those of other providers.

The Quality Council was instrumental in creating the scorecard criteria, deciding how to rate entities (using the state average as the benchmark), determining the scoring categories, and choosing the final attribution model. Transparency in calculating the methodologies helped the rated entities develop a positive impression of the scorecard.

One of the major scorecard challenges was that some of the measures were either not feasible in practice or had to be modified because of data restrictions and limitations (i.e., data masking) placed on the APCD data (including date of service and date of birth). Medicaid data had not been incorporated into the scorecard by the time the SIM award ended.

> “We're kind of limited right now by statute as to the meaningful measures that we can produce.”
>
> —Connecticut state official

The scorecard initiative was considered successful, even though not completed when the SIM award ended. OHS provided an additional five months of funding in an effort to complete the scorecard with Medicaid data, and bridge funding until the next state budget.

Primary Care Modernization

PCM was intended to expand and sustain SIM-related improvements, continuing progress towards more mature APMs and advanced care delivery models after the end of the SIM Initiative. The PCM concept envisioned an accountability system in which data supplied by providers, health plans, and consumers would support program monitoring to ensure access, patient satisfaction, quality, and financial success.

In February 2018, the SIM Initiative released a report outlining the challenges HCOs were facing in achieving SIM-related goals. While HCOs received additional resources to provide care differently, the potential for practice transformation was ultimately limited because their payment was still FFS-based (SIM Connecticut State Innovation Model, 2018, February 1).

Particularly for primary care practices, upfront investments under FFS could lead to reductions in revenue or increased business costs without offsetting short-term savings. The SIM Practice Transformation Task Force examined these issues and conducted its first phase of stakeholder engagement in early 2019. With the assistance of a contractor, the PCM planning process engaged more than 600 stakeholders, whose input led to a report with recommendations to address the current limitations with more flexible payment mechanisms—such as upfront, bundled payments to participating FQHCs and ANs.

> "There's energy being generated behind those ideas and that's a success because it encompasses so much of the other elements of our other work streams kind of essentially a roll up that takes the best of all of it into one. So, um, while we don't have a thing yet, I think, but all of this kind of led to this, I think it's huge."
>
> —Connecticut state official

SIM leadership considered the PCM model to be critical to sustaining the primary care and community health improvement initiatives begun through the SIM Initiative. Stakeholders considered PCM crucial to continue progress towards the preponderance of care goal, defined as at least 80 percent of beneficiaries or total health care dollars attributed to an APM. At the same time, SIM leaders recognized that some consumer advocates would continue to object any type of VBID, because of fear that the plan could adversely affect the quality and quantity of care.

> "Everybody's trying to save money. And … there's not that much money to save … And so how are we really thinking like who's doing the math on that? Cause it doesn't pencil out … Yeah, the math is a little aspirational."
>
> —Connecticut provider

OHS began to develop a TA strategy for PCM in 2019. The Office of the State Comptroller conducted additional financial and actuarial modeling to reflect the final recommendations of the Payment Reform Council and Practice Transformation Task Force. Actuarial analysis found that health care spending for Connecticut Medicare beneficiaries could decrease by more than $505 million in net expenses over five years if all beneficiaries had access to an expanded and diversified primary care team and other PCM capabilities (Freedman Healthcare, 2020, January 31). DSS participated in the PCM planning but did not commit to Medicaid participation.

The PCM planning and design process did not move forward as initially planned, however, due to a number of factors. Despite making headway, by the end of the SIM Initiative stakeholders felt that they had not achieved the necessary buy-in from payers and providers to commit to participating in PCM going forward. State officials also noted that some changes to Medicare SSP likely also played a role in the reluctance of providers to join PCM as efforts were seen as duplicative. Although SIM activities would not be sustained through PCM as envisioned, stakeholders agreed that the PCM efforts to increase primary care spending and transform health care delivery would continue through the Governor's executive order providing sustaining funds for some SIM programs (see ***Section B.3.3***).

B.2.3 Population health

Key Results
• Delays in implementing the Prevention Service Initiative (PSI) compromised its ability to serve as a proof of concept with shared savings. • CBOs reported that PSI TA enabled them to form business partnerships with ANs/FQHCs—improving patient referrals to, and connecting patients with, community-based disease management programs. • The Health Enhancement Community (HEC) framework report received widespread support as an integral component to transforming primary care and health promotion in the state, though some stakeholders critiqued the model as too theoretical. • HEC implementation received mixed reviews as some stakeholders cited lack of clarity, duplication of effort, and implementation delays.

Connecticut state officials designed the SIM Initiative to address health within both clinics and communities. Health care payment and service delivery models designed to reduce health care costs and improve health outcomes were aligned with community-based strategies to address the factors causing, or contributing to, poor health in the state. The two core components of the state's population plan were the PSI and HECs (***Table B-3***). PSI was based on a linkage model that strengthened the relationships between CBOs and HCOs to enhance the delivery and expansion of evidence-based prevention programs in non-clinical settings. PSI aimed to accelerate adoption of effective prevention services CBOs offered; increase CBO capacity to deliver prevention services; improve provider performance on quality measures related to asthma, diabetes, hypertension, and associated ED utilization or admissions/ readmissions; and ultimately lead to shared savings. The goal of the HEC initiative was to support the health and well-being of Connecticut residents in all communities across the state, by improving community health and health equity and preventing poor health. Creation of HECs at the local level was to enable community members to work in a collaborative to address social, economic, and physical conditions in a community that enable residents to be healthy. HECs were to implement prevention and community health strategies that directly addressed the root causes of poor health by using data, community engagement, and cross-sector activities with a proven impact on population health.

Table B-3. Connecticut's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PSI	CBOs partnered with health care organizations	• Provided TA to support development of infrastructure and business case for formal business partnerships. • Formed six partnerships. • Delayed implementation.	• Contracts to continue with partnerships between clinical and community organizations.
HEC	Multi-sector community collaboratives	• Development of the HEC framework and the technical report. • Stakeholder support. • Roll out of pre-planning grants. • Delayed implementation.	• Blending and braiding of private foundation and state funding.

Note: AN = Advanced Network; CBO = community-based organization; CMMI = Center for Medicare and Medicaid Innovation; FFS = fee for service; FQHC = federally qualified health center; HEC = Health Enhancement Community; PCM = Primary Care Modernization; PSI = Prevention Service Initiative; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Prevention Service Initiative

Delays in implementing PSI jeopardized its ability to serve as a proof of concept with shared savings. PSI, which was projected to begin in January 2018 and ultimately began April 2018, consisted of six partnerships between five HCOs and six CBOs to deliver evidence-based programs on asthma or diabetes management. Six HCOs began the initiative, but one dropped out due to leadership changes and shifting priorities to other SIM activities. Of the five HCOs that remained, three were local health departments and two were combined health and community service organizations.

Connecticut's plan for primary care transformation anticipated adoption of enhanced evidence-based prevention programs through new incentives in value-based contracting. OHS, as a newly created state office, needed to create implementation processes, making the budget approval process timeline longer than anticipated. This, in turn, delayed contracting between HCOs and CBOs, as well as the legislative amendments that a delayed necessary funds for HCOs and CBOs to sustain PSI. Contracting-related delays ultimately limited the time available for project implementation. The partnerships discovered that patient recruitment and engagement was more time-consuming than expected, and required ongoing evaluation and adjustments, which ultimately improved enrollment but delayed reimbursement. One stakeholder pointed out that there was not enough time within the six- to eight-month implementation period to see any significant ROI during the SIM award period.

Stakeholders noted several PSI accomplishments, including strengthened partnerships between HCOs and CBOs. TA enabled organizations to formalize their relationships to improve referrals for health care and community-based disease management programs. CBO representatives noted that adding roles among staff to coordinate referrals, data exchange practices with the HCO, and read-only access to EHRs increased capacity for chronic disease management, CHW integration into care teams, and data sharing enhanced interventions designed to address SDoH. But CBO representatives also noted that additional TA on the effective use of health IT could have proven helpful. Participating sites noted that additional collaboration and information sharing before HCOs and CBOs entered into contractual relationships would have facilitated and improved partnerships.

> "We have always had social workers and community workers who would help mitigate barriers, but it was all based on the person getting in touch with us. Now, because of the project we're reaching out to them. So it's a reversal of the communication cycle. So we would never have known about these persons and their barriers had they not been referred to the project."
>
> —Connecticut community partner

CBOs expressed interest in continuing the PSI model after the SIM Initiative ended—with additional HCOs as well as the possibility of addressing additional topic areas within the current partnerships. One CBO representative reported that "[the partnership] aligns really well with where I think we might be heading in the future," but saw the SIM Initiative funding as critical to their ability to participate. To help sustain the initiative and build on the momentum established during the last year of the SIM Initiative, the state expected to leverage existing

> "So as for us, the staffing hours are the community health worker who might spend a half hour on the phone with Mr. Jones for every week for the next four or five weeks. There is no fee-for-service payment for that, but I do have some dollars coming in from the state that support her salary. That those dollars, if they were gone, it will become a much more time sensitive."
>
> —Connecticut community partner

state and federal grant resources for CBO-delivered interventions even without contracted delivery with HCO partners.

Health Enhancement Communities

In December 2018, SIM Initiative leaders released the HEC framework for public comment. The HEC framework identified and addressed aspects such as the governance model, financing, and common measures of community health. The model received widespread support as an integral component of transforming primary care and health promotion in the state.

> Engagement of what we call reference communities was almost the key aspect of that planning. Reference communities validated the assumptions and the concepts that were proposed as a plan. It provides a lot of confidence that what we're saying is reasonable, is within the context of Connecticut."
>
> —Connecticut state official

The HEC's health and economic outcomes required long-term strategies that were difficult to evaluate, however, so the HEC framework included short-term measurement solutions with metrics that could be assessed with rapid cycle measurement. A final technical report on the HEC was released in April 2019 (Connecticut State Innovation Model [SIM], 2019, April 30).

In August 2019, OHS released a Request for Proposals to solicit interested communities to participate in a rapid response 90-day HEC project design phase. During this phase, nine selected communities developed plans for key HEC elements—including their geographies, partners, governance structures, and leadership to inform HEC procurement as a next step. Three awardees received additional funds to develop an approach to collect provide rapid-cycle feedback on the effectiveness of HEC interventions.

> There is incredible richness in this in part because it is so aspirational and I think there is a sense of wow, this, you know, this could really be a game changer."
>
> —Connecticut state official

Despite the warm reception for the HEC framework, stakeholders expressed concerns with its delayed implementation and short period of performance, and some expressed frustration with unclear long-term goals and limited alignment between DPH's State Health Improvement Plan initiative. In fall 2019, commissioners from OHS, DPH, DSS, and other agencies undertook an assessment to determine HEC's future. Although many stakeholders noted that new leadership led to improved coordination and communication among agencies, they did not agree on a strategy for HEC sustainability.

> I don't think people were grasping clearly what HEC was going to do, so you're not going to even go close to the blending and braiding of funds … they don't see the added value to their agency's missions"
>
> —Connecticut state official

Stakeholders also saw sustained post-SIM funding as a challenge. The OHS and state partners discussed with CMS the feasibility of investing in the HEC's upstream solutions as tied to the planned PCM efforts as a coordinated community-based approach.

In January 2020, OHS released a financial impact model estimating potential short-term and long-term savings impacts on Medicaid spending with HEC implementation. The model projected per capita costs, controlling for risk, for the Medicaid-insured population with and without HEC community-based interventions addressing obesity and child well-being. A similar impact model incorporated commercial claims data from the APCD (Connecticut State Innovation Model [SIM], 2019, April 30).

> "I'm on the fence with this HEC stuff. I don't understand, and I don't think our consultants have done a good job articulating what the intervention is, other than involving communities … So, what I've been trying to push is a clearer articulation of what the actual interventions will be, and, importantly, how they will support and be part of all of the other work on ACEs [Adverse Childhood Events], on obesity, that are happening across state government already."
>
> —Connecticut state official

B.3 Sustainability

Key Results
• State funds will sustain a PCMH+ Wave 3. Stakeholders noted that Wave 4 is expected is also expected and will add dually eligible Medicare/Medicaid beneficiaries. • Several executive orders were signed as the SIM Initiative ended, directing the OHS to set targets for health care costs, quality, and primary care spending targets as a means to continue innovation and reforms going forward. • The CHW certification program was established to help practices seek reimbursement to sustain activities beyond SIM.

Table B-4 highlights the sustainability of Connecticut's SIM Initiative activities.

Table B-4. Sustainability of Connecticut's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/payment system	PCMH+	Yes	State investment/Medicaid SPA.
	VBID	No	Not applicable.
Population health	PSI	Yes	Federal/state investment.
	HEC	Yes	Federal/state investment, nonprofit/ foundation investment.
Practice transformation	AMH	No	Not applicable.
	CCIP	No	Not applicable.
	Quality measure alignment	Yes	OHS operationalized CDAS.
Workforce	CHW certification	Yes	Certification legislation established a fee to make the certification mechanism self-sustaining.
Health IT	APCD	Yes	State investment (pending legislation).
	HIE	Yes	Federal/state investment (Medicaid match) and payers.
	ADT notifications	Yes	Federal/state/private sector investment.
	CDAS	Probable	Federal/state/private sector investment.
	eCQMs	Yes	Federal/state investment (Medicaid match).
Data analytics	Public Scorecard	Probable	State investment.

Note: ADT = admission, discharge, and transfer; AMH = Advanced Medical Home; APCD = all-payer claims database; CDAS = Core Data Analytics Solution; CCIP = Community and Clinical Integration Program; CHW = community health worker; eCQM = electronic clinical quality measure; health IT = health information technology; HEC = Health Enhancement Community; HIE = health information exchange; OHS = Office of Health Strategy; PCM = Primary Care Modernization; PCMH+ = Person-Centered Medical Home Plus; PSI = Prevention Service Initiative; SIM = State Innovation Model; SPA = state plan amendment; VBID = value-based insurance design.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

The state's main instruments to sustain at least some SIM Initiative programs were continued stakeholder engagement, state funding, and the Governor's executive order. The PCM model, which had been planned as an important component of sustainability, was discontinued before implementation.

B.3.1 Stakeholder engagement

> “We’ve never called it the SIM Steering Committee; we call it the Health Innovation Steering Committee.”
>
> —Connecticut state official

The OHS planned to continue to engage stakeholders through its governance structure and outreach activities. In 2018–2019, several new members joined SIM Initiative committees and workgroups, including the Healthcare Innovation Steering Committee, Health IT Advisory Council, Community Advisory Board (CAB), Practice Transformation Task Force, and Quality Council. These new members represented payers, providers, employers, and consumers, including young adults. At that time, the CAB took on an advisory capacity for all OHS activities, and OHS hired a director of consumer engagement to spearhead activities. The CAB also continued to engage in community outreach to support the SIM goals through production of three videos to promote patient-centered care, and community events focusing on specific populations, including young adults. Some state officials expected the Steering Committee to be sustained after the SIM Initiative because of its role in advising OHS.

B.3.2 State funding

State officials reported that the financial support the Governor proposed would enable certain SIM Initiative activities to continue**.** The Governor’s budget proposed $750,000 in funding in fiscal year 2021 for DSS to continue implementation of PCMH+, replacing SIM funds as the award period ended.

The state budget also included funding designed to explore expanding PCMH+ in Wave 4 to dually-eligible individuals served by both Medicaid and Medicare. According to the budget language, by partnering with Medicare, “this initiative will facilitate improvements in data sharing, synthesis of program rules and procedures, and better supports for this population, including connections between PCPs and CBOs with the capacity to address social determinant needs, all of which will result in future savings” (Proposed state budget, March 22, 2019) (State of Connecticut Office of Policy and Management, 2019, February). According to the proposal, the department would begin expanding PCMH+ to include the nearly 70,000 individuals dually eligible for Medicare and Medicaid in Connecticut—which, although representing only 8 percent of the total Medicaid population, accounted for 30 percent of total Medicaid expenditures. Funds in fiscal year 2021 and fiscal year 2022 would include resources for consultants to support the PCMH+ expansion’s development and implementation. The anticipated start date was no later than January 1, 2023. Net state savings were expected to accrue beginning in fiscal year 2023. When fully annualized, Wave 4 was expected to generate net state savings of $3.6 million ($7.3 million after factoring in the federal share).

Prior concerns over the lack of legislative funding for the APCD after June 30, 2019 were allayed after the OHS committed to provide funding through the end of fiscal year 2020. One stakeholder was optimistic that funding for the APCD would continue to be supported in the fiscal year 2021 budget.

B.3.3 Executive order

An executive order from the Governor issued in January 2020 directed the OHS to develop annual health care cost growth benchmarks and set a goal to double the state's primary care spending as a percentage of total health care spending from 5 to 10 percent by 2025 (State of Connecticut, 2020a). The OHS was also to develop quality benchmarks across all payers, monitor and report annually on health care spending growth across all payers, convene a cost benchmark technical advisory team, and monitor ACOs and the adoption of alternative payment models. A second executive order from the Governor directed DSS to convene an advisory board to continue efforts to control costs and increase quality of care standards for Medicaid (State of Connecticut, 2020b).

> "There's a 2020 deadline to get a cost benchmark and then I think a 2025 deadline to get 10 percent towards primary care. You can't do those two things if you're not picking up the lessons we've learned in the context of SIM and moving those forward."
>
> —Connecticut consumer advocate

The executive orders were built on the premise, supported by other states' experiences and research, that investing in primary care would improve access and quality while lowering costs and addressing Connecticut's health disparities. By establishing a target primary care spend, stakeholders were optimistic that the work of the Practice Transformation Taskforce would serve as a foundation for continuing efforts. Stakeholders agreed that the executive orders built on the foundation laid by the SIM Initiative would sustain post-SIM efforts to improve quality and reduce costs.

B.4 Implications of Findings and Lessons Learned

Based on Connecticut's SIM Initiative implementation experience, stakeholders offered several opportunities, remaining challenges, and lessons learned for other states:

- PCMH+, the Medicaid SSP, was considered a success by providers, policy makers, and consumer advocates, reaching 20 percent of the Medicaid population by the end of the award period.
- The payment formulas needed revision after the first PCMH+ Wave, to ensure initially high-performing practices were not penalized compared to low-performing practices that had much more room to improve.

- The Connecticut SIM Initiative began with numerous disparate initiatives, many of which were discontinued or truncated over time. Other states might consider narrowing their focus early to achieve greater overall impact.
- Practice transformation and TA efforts were seen by stakeholders as most advantageous when tailored to a practice's specific needs, rather than being prescriptive.
- Practices with their own EHR systems found adapting to the new program requirements easier than practices that depended on proprietary EHRs, which were difficult, and sometimes impossible, to revise to reflect new program needs.
- Population health activities based on collaboration between HCOs and CBOs were delayed in part because CBOs needed additional help to take on the new administrative burdens of partnering with an HCO.

Addendum

Table B-5. Connecticut's Person-Centered Medical Home Plus model had favorable impacts on spending, emergency department visits, and readmissions in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: CT PCMH+	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)	↑	↑	**-26.83†** (-42.69, -10.98)	-8.0	0.005
Inpatient Admissions per 1,000 Population	↓	↓	-4.27 (-8.99, 0.45)	-7.5	0.14
Inpatient Admissions per 1,000 Population [Adults]	↓	↓	**-6.60†** (-10.38, -2.81)	-9.1	0.004
ED Visits per 1,000 Population	↓	↓	**-69.98†** (-94.81, -45.15)	-8.0	<0.001
Readmissions per 1,000 Discharges	↑	↑	**-16.70†** (-31.96, -1.44)	-18.5	0.07
Any Primary Care Visit (%)	↓	↓	**5.11†** (3.72, 6.50)	6.7	<0.001
Primary Care Provider Visits per 1,000 Population	↓	↓	**-177.04‡** (-280.67, -73.42)	-5.2	0.005
Timely Prenatal Visits (%)	↑	↑	-1.50 (-5.66, 2.66)	-2.8	0.55
Postpartum Visits (%)	↓	↓	**5.71†** (1.41, 10.01)	11.80	0.03

- † Significant change in expected direction
- ‡ Significant change in unexpected direction
- No change
- ↑ Favorable increase
- ↑ Unfavorable increase
- ↑ Increase from baseline through implementation
- ↓ Favorable decrease
- ↓ Unfavorable decrease
- ↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

Bolded D-in-D estimate indicates statistically significant finding.

Source: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services.

Appendix B-1: Connecticut Person-Centered Medical Home Plus Impact Results

B-1.1 Overview

Connecticut used SIM funding to implement the Person-Centered Medical Home Plus (PCMH+) program, a Medicaid upside-only shared savings program for existing patient-centered medical home (PCMH)–certified practices.[18] The PCMH+ program's goals were to improve Medicaid beneficiaries' health outcomes and care experiences and to contain Medicaid spending growth. To achieve these goals, PCMH+ incentivized practices to engage in a variety of care coordination activities to improve comprehensive primary care services to reduce emergency department (ED) visits and inpatient admissions. Participation was limited to federally qualified health centers (FQHCs) and Advanced Networks (ANs). AN is defined as a practice or group of practices with at least 2,500 attributed lives participating in the existing Medicaid PCMH program. Additionally, all participating entities needed to provide access or referral to physical, behavioral, or oral health services. PCMH+ refers to participating organizations as participating entities rather than practices to highlight that they often represent a large collaborative system of care, inclusive of multiple locations and numerous providers.

Participating FQHCs were eligible to receive a $4.50 per beneficiary per month (PBPM) payment to assist with care coordination activities, while ANs were not eligible for the supplemental payment. In addition to care coordination payments, all PCMH+ participating entities were eligible to receive shared savings by meeting designated quality and spending benchmarks. Practices that did not meet these benchmarks did not receive shared savings but were otherwise not financially penalized. In addition to financial incentives, some PCMH+ participating entities also received technical assistance to enhance their capabilities in comprehensive care management, health equity improvement, and behavioral health integration.

Key focus areas for PCMH+ were social determinants of health and care coordination for individuals with chronic conditions. As a result, PCMH+ participating entities were required to demonstrate partnerships with organizations that provide social services, such as housing, employment, transportation, and childcare. Moreover, several PCMH+ participating entities employed community health workers to provide community-based care coordination and support services to beneficiaries with chronic diseases, such as Type II diabetes.

Connecticut Medicaid implemented PCMH+ in three waves. Wave 1 began January 1, 2017, with seven FQHCs and two ANs participating. Wave 2 and Wave 3 practices began in 2018 and 2020, respectively. Because of implementation variations and the need for sufficient

[18] The PCMH+ program was originally named the Medicaid Quality Improvement and Shared Savings Program (MQISSP) before being renamed in 2016.

post-implementation data, this analysis focuses on practices and beneficiaries participating in PCMH+ Wave 1.

The PCMH+ model allowed for broad participation among beneficiaries with several exclusion criteria. All PCMH+ beneficiaries needed to quality for a comprehensive benefit package, not be enrolled in a Behavioral Health Home, not be receiving long-term or hospice care, and not be dually enrolled in both Medicaid and Medicare. Both children and adults were eligible.

To assess the effects of Connecticut's PCMH+ model on care for Medicaid beneficiaries the analysis addressed the following research questions:

- How did PCMH+ impact health care utilization, quality of care, spending, and maternity outcomes for Medicaid beneficiaries?

The hypothesis for this analysis is that PCMH+ implementation would result in slower growth of spending, reduced utilization of EDs and inpatient admissions, increased use of primary care services, and improved quality of care and maternity care measures. ***Table B-1-1*** provides a snapshot of the study methods.

Table B-1-1. Methods snapshot

Method	Description
Participating organizations	Seven FQHCs and two ANs participated in Wave 1 of PCMH+. To be eligible for the PCMH+ model, practices were required to be an FQHC or AN, actively participate in the Connecticut Medicaid PCMH program with at least 2,500 attributed lives, and provide comprehensive primary care services.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Connecticut Medicaid claims data were provided by the Connecticut Department of Social Services.
Sample	The analytic sample included 223,215 unique Medicaid beneficiaries who received the preponderance of their primary care from a PCMH-participating practice. The analysis measured the PCMH+ model's impacts on beneficiaries attributed to Wave 1 participating entities. The intervention group included 131,487 beneficiaries attributed to PCMH+ participating entities (n=9), and the comparison group included 91,728 beneficiaries receiving primary care from PCMH practices not participating in PCMH+'s shared savings component (n=87).
Timeframe	The timeframe for the impact analysis was January 1, 2014, through December 31, 2018, which includes three baseline years (January 2014–December 2016) and two intervention years (January 2017–December 2018).

(continued)

Table B-1-1. Methods snapshot (continued)

Method	Description
Measures	The analysis assessed the effects of PCMH+ on four core outcomes: total spending PBPM, inpatient admissions, outpatient ED visits, and readmissions. The analysis also examined impacts on additional outcomes, including inpatient, ED, professional, and prescription drug spending; visits to primary care providers; follow-up visits within 14 days of discharge; diabetes care measures; HbA1c testing for individuals with diabetes; well-child visits; and maternity outcomes. HbA1c testing and well-child visits were selected as quality outcomes to align with quality benchmark requirements for PCMH+ participating entities.
Statistical analysis	The analysis used logistic regression for binary outcomes, negative binomial for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the practice level to account for correlation in outcomes across time. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: AN = Advanced Network; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; HbA1c = hemoglobin A1c; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH = patient-centered medical home; PCMH+ = Person-Centered Medical Home Plus.

This appendix reports on the impact of the PCMH+ model on spending, utilization, quality, and maternity outcomes for 131,487 unique beneficiaries who were attributed to nine practices that participated in the PCMH+ model.

A full description of the PCMH+ program and a summary of the key impact analysis findings are available in ***Appendix B***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the PCMH+ model's impact findings in tables and figures:

- ***Section B-1.2*** presents results of difference-in-differences (D-in-D) analyses for Connecticut's PCMH+ Medicaid beneficiaries and their comparison group;
- ***Section B-1.3*** presents results of D-in-D analyses separately for children and adults for the core outcomes;
- ***Section B-1.4*** provides information on annual covariate balance between the PCMH+ and comparison groups before and after propensity score weighting;
- ***Section B-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section B-1.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for core outcomes change when PCMH+ and comparison group trends are assumed to be on non-parallel paths beginning in the baseline period.

B-1.2 Estimates of the Person-Centered Medical Home Plus Model's Impact on Spending, Utilization, Quality, and Maternity Outcomes

Tables B-1-2 through ***B-1-6*** show annual and overall estimates of Connecticut PCMH+ model's impact on health care spending, utilization, quality, and maternity outcomes for Connecticut Medicaid beneficiaries. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the PCMH+ and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of PCMH+ impacts;
- Relative differences, which measure change in the outcome from the baseline period; and the
- p-values, which indicate whether the D-in-D estimates are statistically significant.

B-1.2.1 Estimates of the Person-Centered Medical Home Plus model's impact on core outcomes

Table B-1-2 shows the estimates of the PCMH+ model's impact on total spending per beneficiary per month (PBPM), inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries attributed to PCMH+ participating entities relative to comparison beneficiaries.[19] The findings are as follows:

- Total spending PBPM increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but increased by $26.83 less for the PCMH+ group during the first two years of PCMH+ implementation (p=0.01).
- Changes to inpatient admissions did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- ED visits decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased by 69.98 more visits per 1,000 beneficiaries for the PCMH+ group during the first two years of PCMH+ implementation (p<0.001).
- Readmissions within 30 days of discharge increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but increased by 16.70 fewer readmissions per 1,000 discharges for the PCMH+ group during the first two years of PCMH+ implementation (p=0.07).

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[19] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

Table B-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	335.46	356.77	334.40	375.81	-20.07 (-38.47, -1.67)	-6.0	0.07
Year 2	335.46	356.77	348.84	404.21	-34.02 (-60.23, -7.82)	-10.1	0.03
Overall	335.46	356.77	341.40	389.59	-26.83 (-42.69, -10.98)	-8.0	0.01
All-cause acute inpatient admissions per 1,000 population							
Year 1	57.12	50.32	42.01	39.83	-3.47 (-9.46, 2.52)	-6.1	0.34
Year 2	57.12	50.32	40.96	40.31	-5.12 (-12.48, 2.24)	-9.0	0.25
Overall	57.12	50.32	41.50	40.06	-4.27 (-8.99, 0.45)	-7.5	0.14
ED visits per 1,000 population							
Year 1	879.75	768.08	819.74	776.99	-70.28 (-104.78, -35.78)	-8.0	<0.001
Year 2	879.75	768.08	796.24	755.65	-69.66 (-105.43, -33.90)	-7.9	0.001
Overall	879.75	768.08	808.35	766.63	-69.98 (-94.81, -45.15)	-8.0	<0.001

(continued)

Table B-1-2. **Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)**

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	90.07	82.50	121.48	128.22	-15.32 (-35.35, 4.72)	-17.0	0.21
Year 2	90.07	82.50	141.51	150.84	-18.13 (-41.24, 4.97)	-20.1	0.20
Overall	90.07	82.50	131.34	139.27	-16.70 (-31.96, -1.44)	-18.5	0.07

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, indicators for being a child or elderly, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or *a smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 1,156,000; the weighted N for the readmission outcome is 56,625. These numbers include all person–year (or discharge–year) observations for both the CT PCMH+ and comparison groups.

Source: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services.

B-1.2.2 Estimates of the Person-Centered Medical Home Plus model's impact on spending categories

Table B-1-3 shows the estimates of PCMH+ model's impact on inpatient spending PBPM, ED spending PBPM, professional spending PBPM, and prescription drug spending PBPM for Medicaid beneficiaries attributed to PCMH+ participating entities relative to comparison beneficiaries. The findings are as follows:

- Changes to inpatient spending PBPM did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- Changes to ED spending PBPM did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- Professional spending PBPM decreased slightly in the PCMH+ group and increased in the comparison group, leading to a relative decrease of $10.19 PBPM for Medicaid beneficiaries attributed to PCMH+ participating entities than for comparison beneficiaries during the first two years of PCMH+ implementation ($p<0.001$).
- Prescription drug spending PBPM increased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but increased by $11.71 less for the PCMH+ group during the first two years of PCMH+ implementation ($p<0.001$).

Table B-1-3. **Differences in the pre–post change in inpatient spending, emergency department spending, professional spending, and prescription drug spending for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group**

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	41.31	36.22	35.63	31.98	-1.44 (-6.25, 3.37)	-3.5	0.62
Year 2	41.31	36.22	44.92	42.81	-2.99 (-10.97, 4.99)	-7.2	0.54
Overall	41.31	36.22	40.13	37.24	-2.19 (-6.79, 2.40)	-5.3	0.43
ED spending PBPM ($)							
Year 1	24.78	22.53	24.84	23.32	-0.72 (-2.11, 0.66)	-2.9	0.39
Year 2	24.78	22.53	25.81	24.48	-0.92 (-2.25, 0.42)	-3.7	0.26
Overall	24.78	22.53	25.31	23.88	-0.82 (-1.78, 0.15)	-3.3	0.16
Professional spending PBPM ($)							
Year 1	90.35	112.17	89.09	119.70	-8.78 (-12.81, -4.75)	-9.7	<0.001
Year 2	90.35	112.17	85.71	119.23	-11.70 (-16.98, -6.41)	-12.9	<0.001
Overall	90.35	112.17	87.45	119.47	-10.19 (-13.49, -6.90)	-11.3	<0.001

(continued)

Table B-1-3. Differences in the pre–post change in emergency department spending, inpatient spending, professional spending, and prescription drug spending for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Prescription drug spending PBPM ($)							
Year 1	124.14	119.45	131.07	134.70	-8.30 (-15.25, -1.34)	-6.7	0.05
Year 2	124.14	119.45	130.83	141.50	-15.33 (-23.72, -6.93)	-12.3	0.003
Overall	124.14	119.45	130.96	138.00	-11.71 (-17.13, -6.28)	-9.4	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all spending outcomes. Models are adjusted for person-level variables (gender, age, indicators for being a child or aged, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 1,156,000. This number includes all person–year (or discharge–year) observations for both the CT PCMH+ and comparison groups.

Source: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services.

B-1.2.3 Estimates of the Person-Centered Medical Home Plus model's impact on utilization

Table B-1-4 shows the estimates of the PCMH+ model's impact on primary care provider visits and follow-up visits within 14 days of discharge for Medicaid beneficiaries attributed to PCMH+ participating entities relative to comparison beneficiaries. The findings are as follows:

- The percentage of Medicaid beneficiaries with at least one primary care provider visit decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased by 5.11 percentage points less for the PCMH+ group during the first two years of PCMH+ implementation ($p<0.001$).
- Primary care provider visits decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased by 177.04 more visits per 1,000 beneficiaries for the PCMH+ group during the first two years of PCMH+ implementation ($p=0.005$).
- Changes to follow-up visits within 14 days of hospital discharge did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.

Table B-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with at least one primary care provider visit during the year							
Year 1	76.12	89.67	71.40	84.38	4.43 (2.56, 6.30)	5.82	<0.001
Year 2	76.12	89.67	68.65	81.64	5.83 (3.76, 7.90)	7.66	<0.001
Overall	76.12	89.67	70.07	83.05	5.11 (3.72,6.50)	6.71	<0.001
Primary care provider visits per 1,000 beneficiaries							
Year 1	3386.36	3915.84	3203.13	3891.10	-162.19 (-285.65, -38.74)	-4.8	0.03
Year 2	3386.36	3915.84	3020.02	3715.02	-192.83 (-361.60, -24.07)	-5.7	0.06
Overall	3386.36	3915.84	3114.38	3805.69	-177.04 (-280.67, -73.42)	-5.2	0.005
Percentage of hospital discharges with a follow-up provider visit within 14 days of discharge							
Year 1	47.65	50.29	53.64	58.26	-1.94 (-4.23, 0.35)	-4.1	0.16
Year 2	47.65	50.29	53.33	56.75	-0.73 (-4.45, 2.99)	-1.5	0.75
Overall	47.65	50.29	53.49	57.52	-1.35 (-3.52, 0.82)	-2.8	0.31

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; PCMH+ = Person-Centered Medical Home Plus.

(continued)

Table B-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Methods: The analysis used a negative binomial model to obtain D-in-D estimates for visits for primary care providers and logistic regression models for beneficiaries with at least one primary care visit and follow-up visits within 14 days of hospital discharge. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a primary care visit and follow-up provider visit within 14 days of discharge was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, indicators for being a child or elderly, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 1,156,000; the weighted N for the readmission outcome is 56,625. These numbers include all person–year (or discharge–year) observations for both the CT PCMH+ and comparison groups.

Source: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services.

B-1.2.4 Estimates of the Person-Centered Medical Home Plus model's impact on quality

Table B-1-5 shows the estimates of PCMH+ model's impact on the rate of hemoglobin A1c (HbA1c) testing for Medicaid beneficiaries with diabetes, the probability of well-child visits by 15 months of age, and the probability of well-child visits by 3 to 6 years of age for child Medicaid beneficiaries attributed to PCMH+ participating entities relative to comparison beneficiaries. The findings are as follows:

- Changes to the percentage of beneficiaries with diabetes who received HbA1c testing did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- Changes to the percentage of children with at least six well-child visits by 15 months of age did not differ between Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.[20]
- The percentage of children aged 3–6 years with at least one well-child visit decreased for both Medicaid beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased by 7.73 percentage points more for the PCMH+ group during the first two years of PCMH+ implementation (p=0.046).

[20] This measure can only be estimated for Year 1 of the intervention period. This is because (1) beneficiaries were attributed to PCMH+ participating entities in 2017, and thus, any infants born after January 1, 2017, were not attributed to the PCMH+ or comparison groups; and (2) the well-child measure has an age requirement of 15 months.

Table B-1-5. Differences in the pre–post change in hemoglobin A1c testing for Medicaid beneficiaries with diabetes and well-child visits for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with diabetes who received HbA1c testing (%)							
Year 1	87.84	89.35	85.29	87.93	-0.96 (-3.75, 1.83)	-1.1	0.57
Year 2	87.84	89.35	84.11	86.69	-0.74 (-3.98, 2.50)	-0.8	0.71
Overall	87.84	89.35	84.72	87.32	-0.85 (-2.98, 1.28)	-1.0	0.51
Percentage of eligible children with at least six well-child visits by 15 months of age							
Overall	62.22	81.30	66.47	80.52	5.01 (-2.87, 12.89)	8.1	0.30
Percentage of eligible children aged 3–6 years with at least one well-child visit during the year							
Year 1	62.63	82.84	47.54	76.37	-5.45 (-12.42, 1.51)	-8.7	0.20
Year 2	62.63	82.84	39.51	73.87	-10.18 (-21.04, 0.69)	-16.2	0.12
Overall	62.63	82.84	43.67	75.17	-7.73 (-14.09, -1.37)	-12.3	0.05

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; HbA1c = hemoglobin A1c; PCMH+ = Person-Centered Medical Home Plus.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for HbA1c testing and well-child visits. The estimated probabilities of all outcome models were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). The diabetes outcome model includes an additional person-level indicator for elderly. All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

(continued)

Table B-1-5. Differences in the pre–post change in hemoglobin A1c testing for Medicaid beneficiaries with diabetes and well-child visits for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the HbA1c outcome is 57,028. The total weighted N for the well-child visits (15 months) is 11,951. The total weighted N for the well-child visits (3–6 years) is 107,760. These numbers include all person–year observations for both the CT PCMH+ and comparison groups.

Source: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services.

B-1.2.5 Estimates of the Person-Centered Medical Home Plus model's impact on maternity outcomes

Table B-1-6 shows the estimates of the PCMH+ model's impact on timely prenatal visits, postpartum visits, initiation of long-acting reversible contraceptive within 60 days of delivery, and initiation of a most effective or moderately effective method of contraception within 60 days of delivery for Medicaid beneficiaries with a live birth attributed to PCMH+ participating entities relative to similar comparison beneficiaries. The findings are as follows:

- Changes to the percentage of Medicaid beneficiaries with a timely prenatal visit did not differ between beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- The percentage of Medicaid beneficiaries with a postpartum visit decreased among both beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries but decreased by 5.7 percentage points less for the PCMH+ group during the first two years of PCMH+ implementation (p=0.03).
- Changes to the percentage of Medicaid beneficiaries with initiation of a most effective or moderately effective method of contraception within 60 days of delivery or a long-acting reversible contraceptive within 60 days of delivery did not differ between beneficiaries attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.[21]

[21] Contraception outcomes are assessed at both three days after delivery and 60 days after delivery. However, sample sizes for the contraception outcomes for three days after delivery were too small to produce a reliable estimate of model impact.

Table B-1-6. Differences in the pre–post change in timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with timely prenatal visits							
Year 1	52.79	45.16	62.06	57.55	-2.78 (-9.44, 3.88)	-5.3	0.49
Year 2	52.79	45.16	64.62	57.36	-0.02 (-4.60, 4.57)	-0.04	0.99
Overall	52.79	45.16	63.25	57.46	-1.50 (-5.66, 2.66)	-2.8	0.55
Percentage of beneficiaries with postpartum visits							
Year 1	48.42	50.84	46.53	40.03	8.84 (3.44, 14.24)	18.26	0.01
Year 2	48.42	50.84	41.73	42.00	2.10 (-4.76, 8.95)	4.33	0.61
Overall	48.42	50.84	44.31	40.93	5.71 (1.41, 10.01)	11.80	0.03
Percentage of beneficiaries with an initiation of a most effective or moderately effective method of contraception within 60 days of delivery							
Year 1	32.33	39.60	35.65	37.08	5.60 (-0.62, 11.82)	17.31	0.14
Year 2	32.33	39.60	29.05	36.74	-0.69 (-5.18, 3.79)	-2.15	0.80
Overall	32.33	39.60	32.59	36.93	2.68 (-1.25, 6.61)	8.29	0.26

(continued)

Table B-1-6. Differences in the pre–post change in timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with an initiation of long-acting reversible contraceptive within 60 days of delivery							
Year 1	13.70	14.61	12.54	12.68	0.66 (-4.94, 6.26)	4.8	0.85
Year 2	13.70	14.61	8.89	13.09	-3.48 (-7.53, 0.57)	-25.4	0.16
Overall	13.70	14.61	10.85	12.87	-1.26 (-4.80, 2.28)	-9.2	0.56

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; PCMH+ = Person-Centered Medical Home Plus.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all maternity care outcomes. The estimated probabilities for the maternity care outcomes were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 11,068. This number includes all person–year observations for both the CT PCMH+ and comparison groups.

Source: CT Medicaid claims data from the CT Department of Social Services.

B-1.3 Estimates of the Person-Centered Medical Home Plus Model's Impact on Adults and Children

The analysis assessed the Connecticut PCMH+ model's impact on adults and children separately for a selected set of outcomes. While implementation activities did not differ between the adult and child populations, the PCMH+ model could produce differential impacts on health care utilization and spending for these groups because of underlying differences in health needs.

B-1.3.1 Estimates of the Person-Centered Medical Home Plus model's impact on core outcomes for adults

Table B-1-7 shows the estimates of the PCMH+ model's impact on total spending PBPM, inpatient admissions, and ED visits for adult Medicaid beneficiaries attributed to PCMH+ participating entities relative to adult comparison beneficiaries. The findings are as follows:

- Total spending PBPM increased for both adult Medicaid beneficiaries attributed to PCMH+ participating entities and adult comparison beneficiaries but increased by $29.26 less for the adult PCMH+ group during the first two years of PCMH+ implementation (p=0.01).
- Inpatient admissions decreased for both adult Medicaid beneficiaries attributed to PCMH+ participating entities and adult comparison beneficiaries but decreased by 6.60 admissions more per 1,000 beneficiaries for the adult PCMH+ group during the first two years of PCMH+ implementation (p=0.004).
- ED visits per 1,000 beneficiaries decreased for the adult PCMH+ group and increased in the adult comparison group, leading to a relative decrease of 105.54 visits per 1,000 population for adult Medicaid beneficiaries attributed to PCMH+ participating entities during the first two years of PCMH+ implementation (p<0.001).

Table B-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	466.48	509.22	493.86	553.56	-16.96 (-39.05, 5.12)	-3.6	0.21
Year 2	466.48	509.22	514.89	599.73	-42.10 (-69.62, -14.58)	-9.0	0.01
Overall	466.48	509.22	504.15	576.10	-29.26 (-46.83, -11.70)	-6.3	0.01
All-cause acute inpatient admissions per 1,000 population							
Year 1	72.70	64.52	65.89	62.71	-4.88 (-8.84, -0.92)	-6.7	0.04
Year 2	72.70	64.52	63.91	63.97	-8.39 (-14.92, -1.86)	-11.5	0.03
Overall	72.70	64.52	64.92	63.33	-6.60 (-10.38, -2.81)	-9.1	0.004
ED visits per 1,000 population							
Year 1	1027.64	882.32	985.48	933.62	-101.31 (-145.94, -56.68)	-9.9	<0.001
Year 2	1027.64	882.32	975.35	932.03	-109.96 (-163.75, -56.17)	-10.7	<0.001
Overall	1027.64	882.32	980.52	932.84	-105.54 (-140.36, -70.73)	-10.3	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

(continued)

Table B-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Methods: The analysis used an OLS model for total spending, a logistic regression model for inpatient admissions, and a negative binomial model for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 625,296. This number includes all person–year observations for both the CT PCMH+ and comparison groups.

Source: CT Medicaid claims data from the CT Department of Social Services.

B-1.3.2 Estimates of the Person-Centered Medical Home Plus model's impact on core outcomes for children

Table B-1-8 shows the estimates of the PCMH+ model's impact on total spending PBPM, inpatient admissions, and ED visits for child Medicaid beneficiaries attributed to PCMH+ participating entities relative to child comparison beneficiaries. The findings are as follows:

- Total spending PBPM decreased for both child Medicaid beneficiaries attributed to PCMH+ participating entities and child comparison beneficiaries but decreased by $10.07 more for the child PCMH+ group during the first two years of PCMH+ implementation (p=0.005).
- Changes to inpatient admissions did not differ between Medicaid-enrolled children attributed to PCMH+ participating entities and comparison beneficiaries during the first two years of PCMH+ implementation.
- ED visits decreased for both child Medicaid beneficiaries attributed to PCMH+ participating entities and child comparison beneficiaries but decreased by 35.89 more visits per 1,000 population for the child PCMH+ group during the first two years of PCMH+ implementation (p<0.001).

Table B-1-8. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Baseline period adjusted mean, CT PCMH+	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CT PCMH+	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	170.69	172.64	143.13	155.43	-10.36 (-17.76, -2.96)	-6.1	0.02
Year 2	170.69	172.64	144.98	156.68	-9.76 (-19.14, -0.38)	-5.7	0.09
Overall	170.69	172.64	144.01	156.03	-10.07 (-15.99, -4.15)	-5.9	0.005
All-cause acute inpatient admissions per 1,000 population							
Year 1	32.36	28.83	15.04	14.36	-1.11 (-3.37, 1.15)	-3.4	0.42
Year 2	32.36	28.83	18.05	16.11	-0.14 (-1.83, 1.56)	-0.4	0.90
Overall	32.36	28.83	16.48	15.20	-0.64 (-2.07, 0.79)	-2.0	0.46
ED visits per 1,000 population							
Year 1	672.23	592.26	623.61	585.20	-40.19 (-67.46, -12.92)	-6.0	0.02
Year 2	672.23	592.26	601.59	558.96	-31.20 (-52.72, -9.68)	-4.6	0.02
Overall	672.23	592.26	613.07	572.63	-35.89 (-53.44, -18.33)	-5.3	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

(continued)

Table B-1-8. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). All outcome models assume that CT PCMH+ and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 522,785. This number includes all person–year observations for both the CT PCMH+ and comparison groups.

Source: CT Medicaid claims data from the CT Department of Social Services.

B-1.4 Annual Covariate Balance Between Person-Centered Medical Home Plus and Comparison Groups

As described in ***Appendix L***, annual propensity scores were created for the overall comparison sample at the person–year level and at the inpatient discharge-level and for any comparison subgroups. These subgroups included beneficiaries included in the maternity outcomes, all adults, all children, and condition-specific subgroups created for quality outcomes including diabetes HbA1c screening, well-child visits in the first 15 months of life, and well-child visits in the first 3–6 years of life.

Table B-1-9 shows the covariate balance between the Connecticut PCMH+ and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples is not shown. Covariate balance is also not shown for earlier baseline years.) Each table includes the following:

- The covariate means for the PCMH+ and comparison groups without propensity score weighting;
- The standardized difference between the PCMH+ and comparison group means without propensity score weighting ("unweighted standardized differences"); and
- The propensity score–weighted means for the comparison group ("comparison weighted").

The standardized difference between the PCMH+ group means and the propensity score–weighted comparison group means ("weighted standardized differences").The analysis estimated propensity scores in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the PCMH+ group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so only tables for the last baseline year are presented below.

The analysis included all covariates in ***Table B-1-9*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table B-1-9 shows the balance between PCMH+ and comparison group covariates before and after applying weights to person–year observations for all Medicaid beneficiaries. Prior to propensity score weighting, the PCMH+ group had higher proportions of Hispanic beneficiaries, was older than the comparison group, and had more total months of enrollment during the year, on average. After propensity score weighting, standardized differences decreased between the PCMH+ and comparison groups, indicating that propensity score weighting improved the covariate balance. In addition, for all covariates, standardized differences after propensity score weighting were below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table B-1-9. Covariate balance between Person-Centered Medical Home Plus and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, CT PCMH+	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	56.1	52.6	0.07	55.9	0.003
Age in years	26.1	19.7	0.35	26.0	0.003
Age in years, squared	1019.0	721.4	0.26	1022.5	0.003
Percentage of people aged 65 years old and older	0.8	0.8	0.00	0.8	0.003
Percentage of people aged 19 years old and younger	44.9	63.8	0.39	45.2	0.01
Percentage of people who are disabled	3.5	2.0	0.09	3.6	0.003
Percentage of people who are Black	14.8	11.8	0.09	14.3	0.01
Percentage of people who are Hispanic	32.1	20.8	0.26	33.4	0.03
Percentage of people who are Asian	2.1	3.1	0.06	2.0	0.01
Percentage of people who are another race (non-White)	28.7	28.4	0.01	29.6	0.02
Total months of enrollment during the year	11.6	10.8	0.42	11.6	0.01
CDPS risk score, logged[a]	-0.5	-0.4	0.11	-0.5	0.03
County level					
Percentage of people residing in a Metropolitan Statistical Area	99.1	91.7	0.36	99.1	0.001
Percentage of people living in poverty	10.9	10.6	0.13	11.0	0.04
Hospital beds per 1,000 people	2.7	2.6	0.09	2.7	0.01
Median age in years	39.8	40.1	0.25	39.8	0.03
Percentage of people (aged under 65 years) without health insurance	7.1	6.9	0.17	7.1	0.01
Median household income ($)	75226.0	74791.5	0.04	74933.3	0.03

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities.

CDPS = Chronic Illness and Disability Payment System; CT = Connecticut; ICD = International Classification of Diseases; PCMH+ = Person-Centered Medical Home Plus.

Source: CT Medicaid claims data from the CT Department of Social Services.

B-1.5 Trends in Core Health Care Spending and Utilization Outcomes

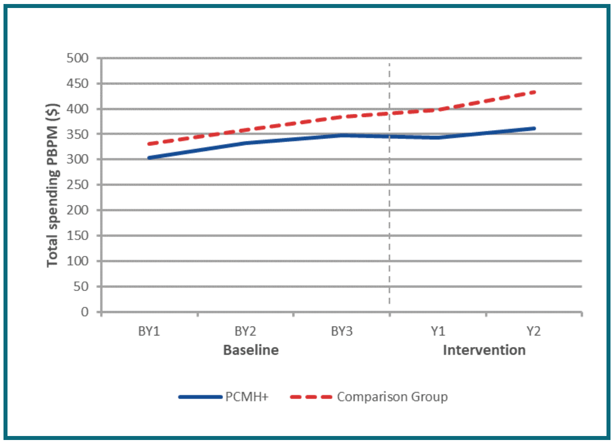
Figures B-1-1 through ***B-1-4*** show propensity score–weighted trends for all analysis years for the core D-in-D outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the Connecticut PCMH+ and comparison groups. Trends in the total spending PBPM, all-cause acute inpatient admissions, and outpatient ED visits appeared to be parallel between the PCMH+ and comparison groups during the baseline period. Readmissions did not appear to exhibit parallel trends during the baseline period.

As described in ***Appendix L***, the analysis examined outcome trends during the baseline period for the PCMH+ and comparison groups to determine the specifications of the D-in-D models.

B-1.5.1 Trends in core outcomes, all Medicaid beneficiaries

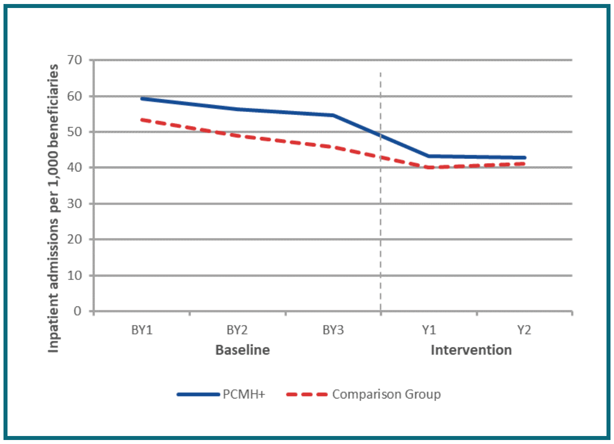
Figures B-1-1 through ***B-1-4*** present trends for the four core outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the PCMH+ and comparison groups. As described in ***Appendix L***, outcome trends for the PCMH+ and comparison groups were examined during the baseline period to determine the specification of the D-in-D models.

Figure B-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the Person-Centered Medical Home Plus and comparison groups



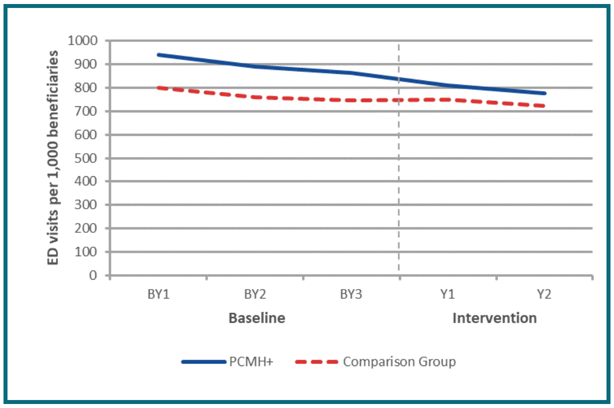
Note: BY = baseline year; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus; Y = year.

Figure B-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Person-Centered Medical Home Plus and comparison groups



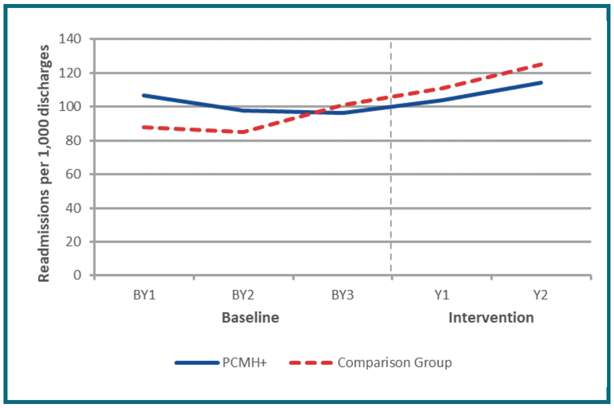
Note: BY = baseline year; PCMH+ = Person-Centered Medical Home Plus; Y = year.

Figure B-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Person-Centered Medical Home Plus and comparison groups



Note: BY = baseline year; ED = emergency department; PCMH+ = Person-Centered Medical Home Plus; Y = year.

Figure B-1-4. Trends in readmissions per 1,000 discharges in the Person-Centered Medical Home Plus and comparison groups



Note: BY = baseline year; PCMH+ = Person-Centered Medical Home Plus; Y = year.

Source: Connecticut Medicaid claims data from the Connecticut Department of Social Services.

The findings are as follows:

- Total spending PBPM increased in the baseline period for both the PCMH+ and comparison groups. Spending was consistently lower in the PCMH+ group than in the comparison group (***Figure B-1-1***). The trends appear to be parallel during the baseline period.
- Inpatient admissions decreased in the baseline period for both the PCMH+ and comparison groups. The rate was consistently higher in the PCMH+ group than in the comparison group (***Figure B-1-2***). The trends appear to be parallel during the baseline period.
- ED visits decreased in the baseline period for both the PCMH+ and comparison groups. The rate was consistently higher in the PCMH+ group than in the comparison group (***Figure B-1-3***). The trends appear to be parallel during the baseline period.
- Readmissions per 1,000 discharges increased in the baseline period for the comparison group and decreased in the baseline period for the PCMH+ group. Readmissions then increased for both the comparison and PCMH+ groups during the intervention period. (***Figure B-1-4***).

B-1.6 Sensitivity Analysis

Table B-1-10 shows how the impact estimates for the core outcomes for PCMH+ differ when the D-in-D models assume: (1) parallel trends in outcomes between the PCMH+ and comparison groups beginning in the baseline period or (2) non-parallel trends beginning in the baseline period (sensitivity analysis). The sign and statistical significance of the D-in-D models for total spending PBPM and ED visits were robust to an alternative specification that allowed for baseline trend differences between the PCMH+ and comparison groups. In contrast, D-in-D estimates for inpatient admissions and readmissions were sensitive to the alternative model specification. The findings are as follows:

- The D-in-D estimate for overall total spending PBPM was in the same in direction and significance across the two approaches. The magnitudes of the D-in-D estimates across the two approaches were similar.
- While the inpatient admissions estimate was not statistically significant in the main analysis, the sensitivity analysis showed a statistically significant decrease in inpatient admissions of 8.48 admissions per 1,000 beneficiaries among the PCMH+ group relative to the comparison group.
- The D-in-D estimate for ED visits was in the same direction and significance across the two approaches, though the sensitivity analysis found a D-in-D estimate that was smaller in magnitude.
- Although readmissions within 30 days of discharge estimate was statistically significant in the main analysis, the sensitivity analysis did not find a statistically significant impact on readmissions.

Table B-1-10. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Total spending PBPM ($)		
Year 1	-20.07* (-38.47, -1.67)	-17.39 (-35.15, 0.37)
Year 2	-34.02** (-60.23, -7.82)	-29.94** (-55.01, -4.88)
Overall	-26.83** (-42.69, -10.98)	-23.47** (-38.69, -8.26)
Inpatient admissions per 1,000 population		
Year 1	-3.47 (-9.46, 2.52)	-6.78** (-11.77, -1.79)
Year 2	-5.12 (-12.48, 2.24)	-10.28** (-17.38, -3.17)
Overall	-4.27 (-8.99, 0.45)	-8.48*** (-12.77, -4.18)
ED visits per 1,000 population		
Year 1	-70.28*** (-104.78, -35.78)	-57.16** (-94.69, -19.62)
Year 2	-69.66*** (-105.43, -33.90)	-50.29 (-102.51, 1.93)
Overall	-69.98*** (-94.81, -45.15)	-53.83*** (-85.68, -21.97)
Readmissions within 30 days of discharge per 1,000 discharges		
Year 1	-15.32 (-35.35, 4.72)	8.94 (-18.58, 36.46)
Year 2	-18.13 (-41.24, 4.97)	20.30 (-21.07, 61.66)
Overall	-16.70* (-31.96, -1.44)	14.53 (-10.17, 39.23)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH+ = Person-Centered Medical Home Plus.

(continued)

Table B-1-10. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in Person-Centered Medical Home Plus and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, indicators for being a child or elderly, Medicaid entitlement based on disability, race/ethnicity, a count of total months enrolled in the measurement year, and the logged CDPS score) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and median household income). Assumptions about baseline parallel trends are included in the table above.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CT PCMH+ relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH+ group relative to the comparison group after PCMH+ implementation. The relative difference is the D-in-D estimate as a percentage of the PCMH+ baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 1,156,000; the weighted N for the readmission outcome is 56,625. These numbers include all person–year (or discharge–year) observations for both the CT PCMH+ and comparison groups.

Source: CT Medicaid claims data from the CT Department of Social Services.

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Appendix C: State Innovation Model in Model Test States: Delaware

Payment Model Development	• At first, Delaware developed a voluntary, multi-payer framework for changing payment models. • By 2018, the state had moved from a voluntary approach toward fostering value-based payment models and primary care investment through state policies and Medicaid managed care contracting.
Delivery Model Transformation	• A significant portion of the state's SIM Initiative award funded technical assistance (TA) to primary care practices to reach transformation milestones reflecting capabilities of a patient-centered medical home. • Relative to a comparison group, Medicaid beneficiaries at primary care practices that received TA had more primary care visits and follow-ups after hospital discharge, but lower overall spending and emergency department (ED) use.
Health IT and Data Analytics	• The Delaware Health Information Network established the Health Care Claims Database (HCCD), which became operational to support tracking of health care costs and quality.
Population Health	• To address social determinants of health (SDoH), the Healthy Neighborhoods initiative established three local councils and piloted eight community programs.
Sustainability	• To hold all payers accountable for high health care costs, the legislature established the Cost and Quality Benchmark process and set spending growth targets. • To address SDoH, a new consortium, Healthy Communities Delaware, established a backbone organization and coalition to identify, fund, and evaluate strategies.
Implications	• Delaware's voluntary framework for value-based payment (VBP) adoption coupled with TA to providers increased commitment from payers in VBP arrangements and uncovered provider challenges requiring payer collaboration to resolve.

C.1 Key State Context and the Delaware State Innovation Model Initiative

C.1.1 Pre-State Innovation Model health care in Delaware

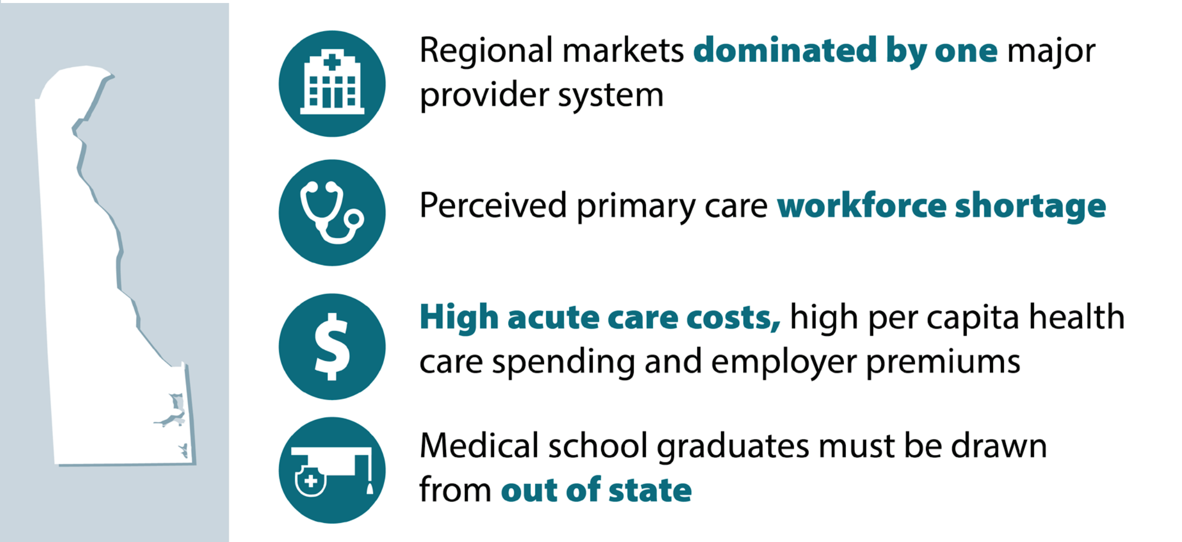
As a small state of some 900,000 residents, Delaware had several insurance market factors that restricted the competitiveness of its health policy environment (***Exhibit C-1***). First, the state did not have the necessary leverage to persuade national health insurance carriers to adopt a value-based payment (VBP) model designed specifically for the state. Delaware's insurance market was dominated by a single insurer, Highmark Blue Cross Blue Shield. The Division of Medicaid and Medical Assistance (DMMA) in the Delaware Department of Health and Human Services (DHHS) administered Medicaid through managed care contracts with two health plans, Highmark Health Options and AmeriHealth Caritas. Ameri-Health, which won the Medicaid managed care contract in 2018 after UnitedHealthcare withdrew from the market, did not have a commercial line of business in Delaware.

Two major stakeholder concerns shaped the design of Delaware's SIM Initiative. The first was high acute care costs. Delaware's per capita health care spending and employer premiums were both higher than the national average as of 2017 (Agency for Healthcare Research and Quality, n.d.). Payers attributed high acute care costs in part to non-competitive and increasingly consolidated provider markets. Delaware's three regional markets were dominated by one major provider system. Six hospitals—which were dispersed geographically and did not compete for referrals—anchored three large health systems. This health landscape positioned hospitals to leverage access to their health systems when negotiating health plan prices for an insurer's provider network.

The second stakeholder concern was a perceived shortage of primary care physicians—a concern that was fueled by a University of Delaware physician survey that projected a shrinking supply of physicians (Delaware Department of Health and Social Services, 2018, September). Although the number of primary care physicians per capita in the state was higher than the national average in the early 2010s, physicians were distributed unevenly across the state (State Health Access Data Assistance Center [SHADAC], n.d.).[22] Delaware had to compete with its larger neighboring states for medical graduates, a difficulty compounded by the absence of medical schools in the state.

[22] Based on Health Resources and Services Administration data on physicians, there were an estimated 14.0 physicians in Delaware and 12.7 in the U.S. per 10,000 population. Also in 2012, 21.4 percent of the Delaware population lived in a primary care professional shortage area.

Exhibit C-1. Delaware's SIM Initiative landscape



Note: SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

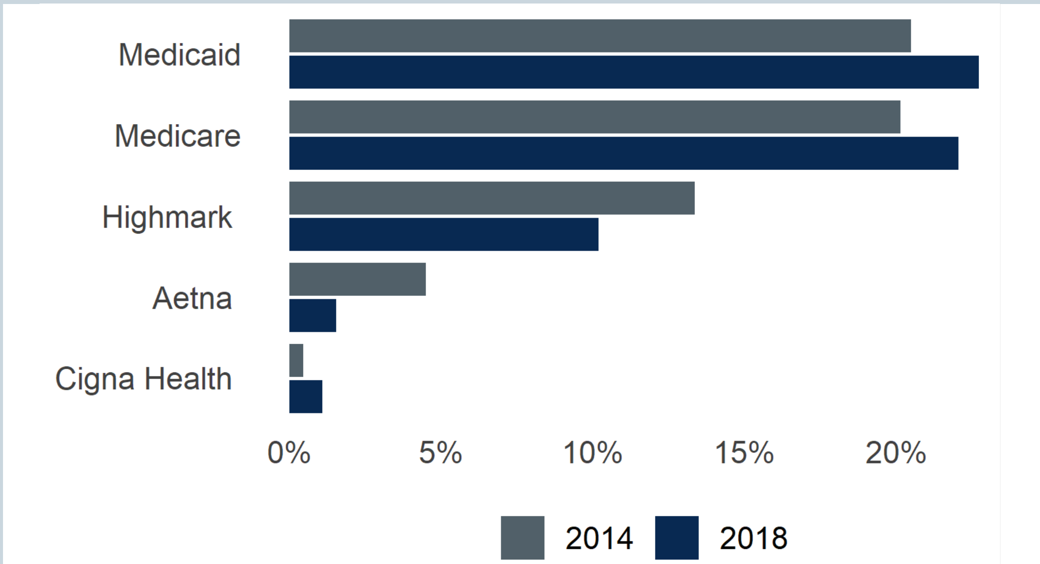
At the start of Delaware's SIM Initiative on February 1, 2015, VBP contracting had not begun in Medicaid but was emerging in Medicare markets. Within the SIM Initiative's first year (February 2015 to January 2016), all six hospitals formed Medicare accountable care organizations (ACOs), the majority of which joined a major Medicare VBP arrangement, the Medicare Shared Savings Program. In response to the new VBP programs in Medicare, SIM-funded research in 2016 documented that a significant proportion of primary care practices organized into ACOs or Clinically Integrated Networks (CINs) (Delaware Center for Health Innovation [DCHI], 2016, February). Throughout the SIM award period, stakeholders consistently reported that independent practices continued to join or sell their practices to large health systems, enabling those practices to access the resources of the larger systems. This trend has concentrated Delaware provider markets into large, non-competitive provider networks.

The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Delaware was relatively concentrated, as measured by relative market share of lives covered by commercial insurance. Medicaid made up the largest share of the market, followed by Medicare and then commercial insurance, in both 2014 and 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percentage of insured lives they covered between 2014 and 2018 (see ***Exhibit C-2***). In contrast, the commercial payers with the largest shares of covered lives (Highmark Group and Aetna Group) shrank.

A majority of Delaware practices were small and located in urban areas. In 2015, about 18 percent of primary care practices were located in rural areas and 63 percent had a single provider. Eight percent of primary care practices had an existing involvement in a Medicare fee-for-service alternative payment model (e.g., the Medicare Shared Savings Program).[23]

Exhibit C-2. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Delaware shown)



Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

C.1.2 State Innovation Model Initiative in Delaware

Stakeholders initially conceived Delaware's SIM Initiative as a consensus-based, voluntary promotion of VBP models across major payers, focused on enhancing capacity and care coordination in primary care (Delaware Department of Health and Social Services, 2016). Although stakeholders sought to accelerate payment reform already occurring across the state, the SIM Initiative's central focus was to assure that primary care providers received payments across payers to facilitate delivery changes and prepare providers for VBP participation—while improving provider satisfaction and assuring primary care availability statewide.[24] Stakeholders

[23] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***.

[24] State Innovation Model Operational Plan, February 2016.

viewed behavioral health integration (BHI) with primary care as critical to treating behavioral health disorders, improving patient experience, and reducing health care costs.[25]

Core SIM Initiative programs in Delaware used contractors to deliver technical assistance (TA) and training, and distribute mini-grants to primary care and behavioral health practices. Delaware's SIM Initiative also funded pilot projects developed by county-based local councils and their partners through the Healthy Neighborhoods initiative—to address non-clinical, social determinants of health (SDoH) and barriers to care; and to promote healthy living (RTI International, 2016). In addition, Delaware included two initiatives to provide new data and enhance analytic tools to help payers control health care cost growth and providers to succeed under VBP arrangements:

- The Health Care Claims Database (HCCD), a centralized database containing claims data from multiple payers, developed to increase transparency and enable evidence-based transformation; and
- The Common Scorecard, a set of quality measures selected through consensus, designed to serve as a "centralized place for providers to view their performance across their entire patient panel, regardless of payer (Choose Health Delaware, 2016, May 2).

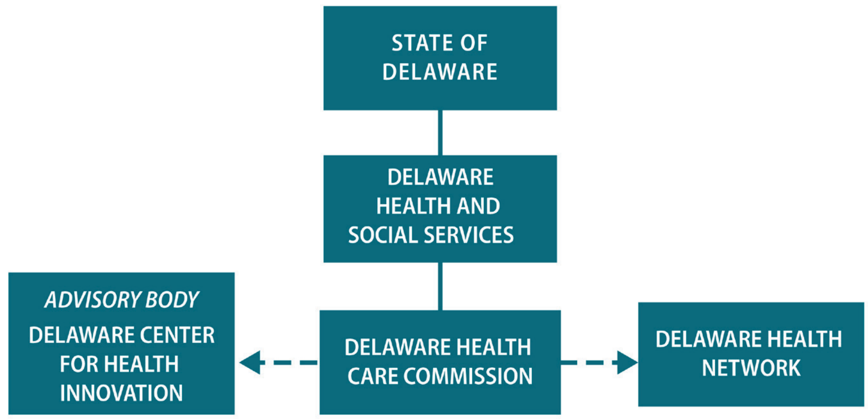
The implementation framework for Delaware's SIM initiative comprised three entities (***Exhibit C-3***). In 2014, the state established the first such entity—the Delaware Center for Healthcare Innovation (DCHI) as a nonprofit entity public-private collaboration. DCHI was tasked with designing the state's SIM Initiative under the SIM Model Design award and building SIM infrastructure. DCHI played a prominent role facilitating multi-stakeholder input at the outset of the SIM Initiative and continued to convene stakeholders throughout the SIM Initiative. In 2016, DCHI developed the recommended collaborative framework for the second implementation entity, the Delaware Health Care Commission (HCC). Upon receiving the SIM Model Test award, Delaware Department of Health and Social Services (DHSS) established HCC as the SIM Initiative's governing authority. The third implementation entity was the DHIN—the existing, non-profit statewide health information exchange organization. The state tasked the DHIN with developing the HCCD and the Common Scorecard.

Throughout the SIM Initiative, the DHIN also pursued other health information technology (health IT) initiatives funded primarily through provider subscriptions to access health IT data and services, which were intended to aid providers and enhance patient engagement. The SIM Initiative supported promotion of the Community Health Record (CHR) by the DHIN. The CHR is a longitudinal record of a patient's clinical history in a searchable online portal, which is supplied to providers through subscription. The CHR is also available to patients through a portal enabling patients to engage in their own health decisions. The CHR was

[25] DCHI, Integration of Behavioral Health and Primary Care, January 2016.

established before the SIM Initiative and continued to be funded independently during the SIM award period with subscription fees.

Exhibit C-3. Governance and implementation framework: Delaware SIM Initiative



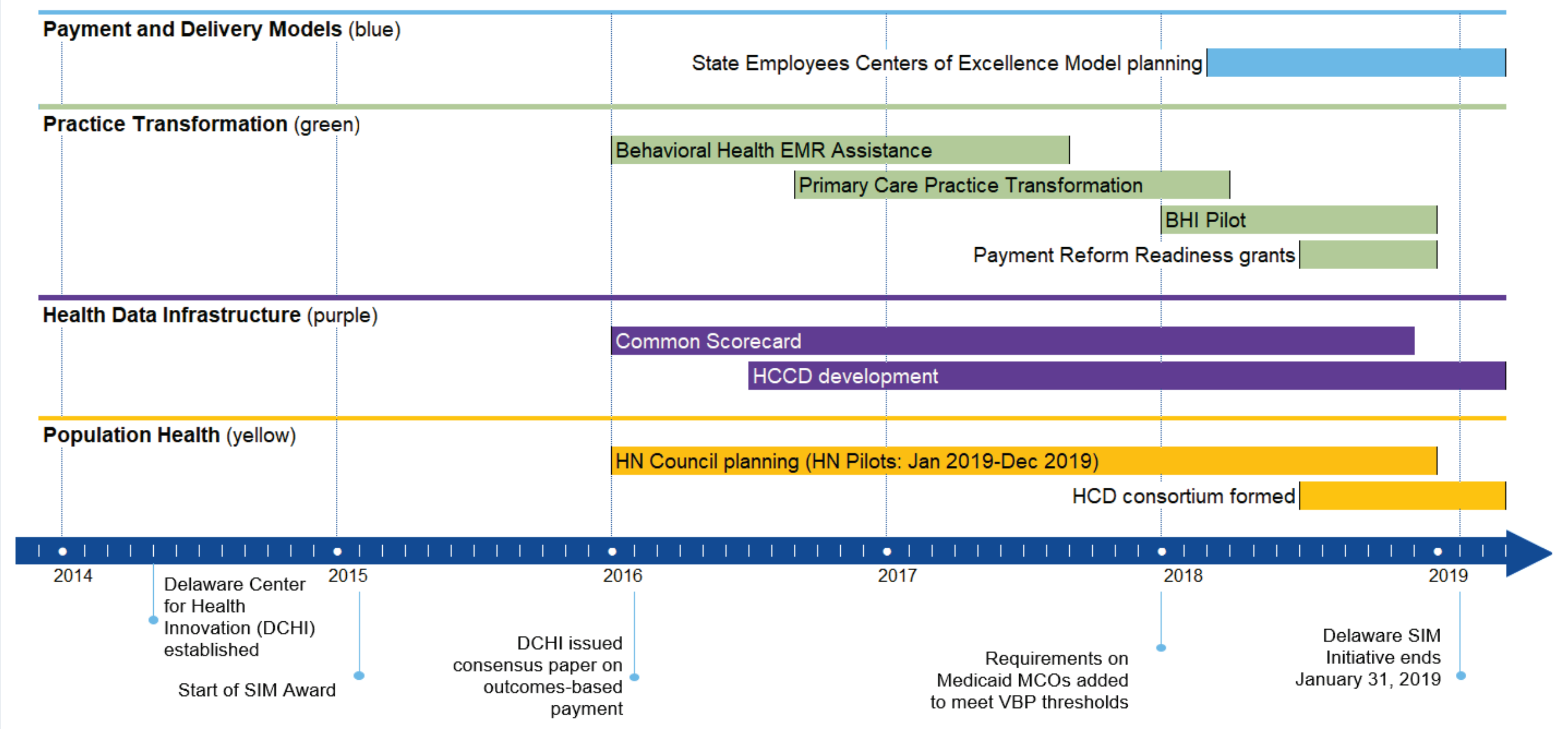
Notes: DCHI, which is a public-private partnership entity, served as the advisory body for SIM planning and implementation. The Delaware Health Information Network, which is an independent non-profit, implemented key health IT–related components of the DE SIM.

DCHI = Delaware Center for Health Innovation; DE = Delaware; health IT = health information technology; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Delaware's SIM award ended in January 2019. ***Exhibit C-4*** depicts the timeline of major Delaware SIM Initiative and SIM-related activities.

Exhibit C-4. Timeline of Delaware SIM and SIM-related activities



Note: BHI = behavioral health integration; EMR = electronic medical record; HCD = Healthy Communities Delaware; HCCD = Health Care Claims Database; HN = Healthy Neighborhoods; MCO = managed care organization; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

C.2 Accomplishments from Delaware's State Innovation Model Initiative

This section summarizes Delaware's SIM award activities, accomplishments, and stakeholder feedback in three distinct topic areas: delivery models and payment reform (***Section C.2.1***), enabling strategies to support health care delivery transformation (***Section C.2.2***), and population health (***Section C.2.3***). The chapter concludes by summarizing Delaware's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section C.3***) and a discussion of implications and lessons learned from Delaware's experience (***Section C.4***).

The federal evaluation of Delaware's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM officials;
- A total of 68 interviews with state officials, primary care and behavioral health providers, Medicaid managed care organizations, and commercial plans and other stakeholders, over four annual interview rounds conducted starting in 2016, most recently in spring 2019;
- Focus groups with primary care practices and community health centers that received SIM-funded TA (e.g., primary care Practice Transformation Initiative [PTI] and BHI Pilot), and Medicaid beneficiaries served by these practices; and
- Medicaid claims for calendar years (CYs) 2014–2018.

The quantitative analysis used Medicaid claims data to examine changes to health care expenditures, utilization and quality for Medicaid beneficiaries attributed to primary care practices in the PTI relative to Medicaid beneficiaries attributed to non-PTI primary care practices. The PTI was selected for quantitative analysis because the state invested a substantial portion of SIM funds in this initiative. Furthermore, because PTI initially launched in 2016, several years of Medicaid data were available post-PTI implementation, allowing for sufficient time to observe the initiative's potential impacts.

C.2.1 Delivery models and payment reform

Key Results
• The Delaware SIM Initiative's initial development of a voluntary, multi-payer framework for outcomes-based payment to primary care providers resulted in little progress through 2017. • To better advance VBP adoption, the Medicaid agency required Medicaid managed care plans to meet annual VBP targets beginning in 2018. • To strengthen primary care capacity, state legislation mandated commercial plans to increase primary care reimbursement beginning in 2019. • To control health care cost drivers statewide, DHHS set quality and spending benchmarks beginning in 2018, and required payers to submit cost data beginning in 2019.

Delivery transformation framework

Delaware's SIM Initiative developed its initial framework for promoting delivery system changes through the work of committees established under DCHI. DCHI produced consensus papers in early 2016 on primary care transformation, care coordination, and BHI (Delaware Center for Health Innovation Clinical Committee, 2016, January 13). These three papers specified the changes expected from providers to make them eligible for direct support from payers, through additional per beneficiary per month (PBPM) reimbursement and payments based on value. Another consensus paper set forth DCHI recommendations for payment structures all payers would be expected to offer in return for the required provider changes. Details about the Delaware SIM Initiative's subsequent delivery system and payment reform activities can be found in ***Table C-1***.

Table C-1. Delaware's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Consensus-based voluntary approach to outcomes-based payment facilitated by DCHI	Public and commercial insurers, provider systems, and associations	• Engaged stakeholders and recommended a framework for payment for primary care, care coordination, and multi-payer outcomes-based payment. • Primary care providers continued to report insufficient capital and reimbursement to enhance care.	• A public private–funded partnership sustained DCHI. • Stakeholder committees continued to coordinate on payment gaps.
Health care cost and quality benchmark implementation	All insurers and large providers in the state	• Established methodology and health care cost growth targets for CY 2019 through CY 2023. • Insurers were expected not to exceed targets and to share cost data with DHSS. • There was no enforcement in the trial year (CY 2019).	• Health Care Delivery and Cost Advisory Group continued work under DHSS. • FY 2020 budget request included funding.
Mandated increased reimbursement for primary care and chronic care management	Group, individual, and marketplace insurers subject to requirement	• SB 227 mandated increased reimbursement up to Medicare rates, effective January 1, 2019. • Health plans raised concerns that investment in primary care would not control cost growth. • No plan was established to evaluate the impact of changes on total spending.	• Mandate was put into effect for three years.

(continued)

Table C-1. Delaware's delivery system and payment reforms (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Established PCRC	Public testimony solicited from all stakeholders	• SB 227 established a public forum for dialogue, promoting transparency and accountability among stakeholders. • In January 2019, the PCRC recommended increased investments in primary care. • Providers and insurers disagreed on solutions.	• The PCRC continued to convene with DHSS-HCC oversight.
Medicaid MCO contracts added VBP requirements and financial penalties	Medicaid MCOs	• Effective January 1, 2018, plans had to demonstrate higher thresholds for VBP participation annually up to 60 percent of spending in 2022. • Plans were subject to potential financial penalties starting in January 2020. • Providers were not subject to the same requirements.	• Contracts were effective January 1, 2018 through December 31, 2019, and could be extended up to five years.
SEBO launched Centers for Excellence model	Third-party administrators for state employees and retirees	• Established risk-sharing arrangements with ACOs and their specialty providers. • Effective for 2020 benefit year.	• SEBC continued to explore cost-containment options.

Notes: ACO = accountable care organization; CY = calendar year; DCHI = Delaware Center for Healthcare Innovation; DHSS = Department of Health and Social Services; FY = fiscal year; HCC = Health Care Commission; MCO = managed care organization; PCRC = Primary Care Reform Collaborative; SB = Senate Bill; SEBC = State Employees Benefits Committee; SEBO = State Employees Benefits Office; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.
DHSS Division of Medicaid and Medical Assistance. (2018). Medicaid Managed Care Master Service Agreement. Retrieved from DHSS website: https://dhss.delaware.gov/dmma/files/mco_msa2018.pdf

Based on DCHI's recommendation for a primary care transformation framework, the SIM Initiative established the PTI (discussed further in ***Section C.2.2***), which was designed to support practices in their transformation goals, as measured by nine recommended transformation milestones, reflecting nine patient-centered medical home (PCMH) capabilities (Delaware Health and Human Services: Division of Medicaid and Medical Assistance, 2016, January 13). The transformation framework also encouraged small practices to come together in a legal entity to share risk or to meet minimum panel-size requirements (as in an ACO or Independent Practice Association model), and recommended technical support to form joint entity (Delaware Center for Health Innovation [DCHI], 2016, February). However, neither formal plans nor supporting regulations materialized.

To develop a strategy for primary care and BHI, DCHI convened an advisory group of experts in 2015, and consulted purchasers, health plans, and providers. Informed by the 2016

DCHI consensus paper (Delaware Center for Health Innovation Clinical Committee, 2016, January 13), the BHI Pilot was designed to assist providers adopt integration goals for successfully practicing within one of three models for integration, as discussed in more detail in ***Section C.2.2*** (Brousseau, Kamp, Pekkala, & Whittemore, 2019, January).

Upfront and prospective payments to primary care practices did not materialize quickly enough to fuel widespread provider investment in their practices—leading policy makers to use legislative mandates to strengthen the primary care system and explore solutions to promoting payment reform**.** The 2018 legislation (Senate Bill [SB] 227) contained two mandates to increase primary care investment, estimated at the time to fall between 3 and 4 percent of total health care spending. One mandate required individual, group, and state employee plans to reimburse primary care practitioners for chronic care management and primary care services at no less than Medicare rates for three years, effective January 1, 2019 (Delaware General Assembly, 2018, August 29). Rates among commercial payers for primary care at the time ranged between 65 and 85 percent of Medicare rates, much lower than the national range of 120 to 140 percent, according to the bill details. The other mandate charged the HCC to convene the Primary Care Reform Collaborative (PCRC). The PCRC held public forums and recommended to the General Assembly in January 2019 a general framework to stabilize and strengthen primary care through reforms (Delaware General Assembly, 2020). Recommendations included progressive increases in goals set for minimum spending on primary care annually for payers (i.e., Medicaid, fully insured, self-insured, and state employee plans), to eventually reach 12 percent of total health care spending, which would be enforced by legislative statute or regulations (Delaware General Assembly, 2020).

Although not explicitly part of the SIM Initiative, establishment of the PCRC stemmed from SIM Initiative work and many stakeholders viewed the PCRC process positively. State officials noted that the PCRC process enabled participants to delve deeply into concerns and helps derive regulatory oversight solutions to address them. But several payers, providers, and state officials commented that insurers remained critical of the PCRC recommendations. In fact, several insurers expressed concern that the recommended increase in primary care spending up to 12 percent of health care spending was not based on evidence of a return on investment, and might not have the intended effect of controlling total cost of care (TCC).

Payment reform framework

DCHI and its stakeholders, through the consensus process, agreed in February 2016 to recommend transition toward "outcomes-based payment" on a voluntary, multi-payer basis, without a formal payment model or payer mandates (Delaware Center for Health Innovation [DCHI], 2016, February). Instead, a vision and principles emerged by consensus to form a framework that promoted VBP adoption by Medicaid and commercial health care plans through the use of "multiple 'on-ramps' to outcomes-based payment, suitable to providers who differed in scale, capabilities, and capacity to shoulder financial risk (Delaware Center for Health

Innovation [DCHI], 2016, February).” The vision stressed flexibility in health plan choices, acknowledging the efforts health plans were already making to standardize their offerings across multiple states. The only requirement set forth in the framework was that health plans use a common set of quality metrics included in Delaware’s Common Scorecard to measure provider performance—a requirement intended to “create consistent incentives across a patient panel while minimizing complexity and administrative burden for providers.” The DCHI had already developed the Common Scorecard measures through SIM-funded collaboration with payers and providers (RTI International, 2017b).

DCHI made three strong recommendations to payers. First, payers should offer care coordination funding in the form of either fee-for-service reimbursement for discrete tasks or a fixed payment calculated on a PMPM basis. Payers could assess practice readiness for these payments based on achievement of transformation milestones. Second, payers should offer two types of outcomes-based payment models to primary care practices: pay for value (P4V) or TCC payment models. Both P4V and TCC models should pay for efficiency—based on utilization measures in P4V and per capita total costs in TCC, conditional on achieving quality and patient satisfaction thresholds based on measures from the Common Scorecard. TCC models could include gain sharing or risk sharing with providers for the per capita TCC. Payers were encouraged to tailor these outcome-based payment options for small, independent practices although no formal guidelines were developed.

Within the voluntary transformation framework, and over the 2016–2017 period, health plans reported making satisfactory progress enrolling more providers in contracts that gave incentive payments for meeting quality goals (corresponding to the P4V principles defined by DCHI), but slower progress finding providers interested in gain-sharing or other TCC models (RTI International, 2017a). In response to the slow adoption of provider risk-sharing and under direct guidance from CMMI, the incoming state administration in 2017 adopted new and aggressive strategies to accelerate payment reform that were implemented in the remaining award years. These strategies included renegotiating Medicaid managed care organization (MCO) contracts, leveraging state employee purchasing authority to advance VBP adoption, and designing the Cost and Quality Benchmark to create accountability with payers and large health systems for controlling health care spending growth.

In conjunction with steps the new administration took, the DHSS Secretary released an overarching plan in December 2017, the Road to Value, to implement payment transformation, reduce health care costs, and increase quality in Delaware (Delaware Department of Health and Social Services, 2017, December). The Road to Value, which was disseminated widely, further recommended shifting responsibility for SIM Initiative implementation from the DCHI to the HCC—the SIM governing entity within DHSS. The HCC subsequently assumed a more active management role of the SIM Initiative, retained vendors to implement major initiatives, and hired consultants to conduct research on policy solutions.

As one component of the comprehensive strategy, the new administration promoted VBP arrangements by renegotiating Medicaid MCO contracts effective January 1, 2018. The DMMA added requirements that MCOs meet annual thresholds for VBP contracts as a percentage of expenditures. Thresholds were set for CY 2019 at 30 percent and increased 10 percentage points annually to 60 percent by CY 2022 (Delaware Health and Social Services, 2017, December 19). New contractual terms gave the DMMA the option to impose financial penalties on MCOs failing to reach the thresholds.

State officials expected the steps taken by DMMA to increase provider readiness for VBP statewide, because nearly one-quarter of Delaware residents were covered by Medicaid.[26] One state official believed Medicaid's new contracting requirements gave increased payer leverage with large providers in the Delaware market to secure VBP contracts. While insurers interviewed generally concurred, they also explained that placing the mandate only on the health plans had an unintended consequence, in some cases, giving more leverage to large providers each MCO needed in its network. Knowing MCOs faced penalties if unable to achieve the prescribed proportion of VBP contracts, certain providers could bargain for more favorable terms in VBP contract renewals.

As another component of the administration's comprehensive VBP strategy, the State Employees Benefits Office (SEBO), developed a new model for state employees to help patients identify lower-cost, high quality sites of care (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). The SEBO collaborated with its third-party administrators on developing the Centers for Excellence model throughout 2018, which launched for the 2020 benefits year. The model included VBP arrangements structured as risk-sharing arrangements with ACOs and their specialty providers—with provider incentives focused on elective procedures (e.g., knee/hip replacements, bariatric surgery, transplant). Incentives for patients to choose to use Centers for Excellence service providers included eliminating out-of-pocket costs and providing travel and lodging reimbursement when the facility was over 100 miles from the member's home (Willis Towers Watson, 2019, June 10).

As another component of its comprehensive strategy, DHSS used SIM Initiative funds to hire consultants to conduct research on providers' capacity for VBP adoption. The consultants presented stakeholders with several policy frameworks used by other states to control health care costs—research that informed the design of the Quality and Cost Benchmark framework, as described below.

To directly address Delaware's unsustainable health care cost growth, House Joint Resolution 7 (HJR 7) was signed into law in September 2017, which charged DHSS with establishing annual health care spending benchmarks (Delaware General Assembly, 2017). The

[26] From March 2019 testimony (Microsoft PowerPoint presentation) made by Medicaid Director Stephen Groff) to the Delaware Joint Finance Committee on the 2020 budget.

legislative and executive intent, as reflected in a later executive order, was for the Benchmark to serve as a spending growth threshold the "state, payers and providers should strive to stay below" (State of Delaware, Office of the Governor John Carney, 2018). By executive order, the incoming governor created the Delaware Health Care Delivery and Cost Advisory Group (State of Delaware, Office of the Governor John Carney, 2018), and charged the Group with providing input to DHHS on a benchmark methodology. The Group's recommendations led DHSS to develop methodologies to produce quality and cost benchmarks, measure statewide performance, collect data, and set future benchmarks (Delaware Department of Health and Social Services, n.d.; Delaware Department of Health and Social Services & Walker, K. O., 2018, August 27). Subsequently, spending benchmarks for CY 2019 through CY 2023 were set as 3.5 percent, 3.25 percent, 3.0 percent, and 3.0 percent per capita spending growth, respectively (State of Delaware, Office of the Governor John Carney, 2018). The first year of benchmarking in 2019 served as a trial year to pilot the methodology and reporting, with enforcement mechanisms on hold. Insurers and other payers were obligated to submit cost and quality data in fall 2019 and annually thereafter, to include provider-level and service-level data for large providers.

State officials believed the process for developing the initial SIM-funded benchmark report, its release, and the planned data analytics helped achieve several goals. State officials credited the benchmark development process for promoting effective dialogue with difficult-to-engage commercial payers and large providers who anticipated the benchmark initiative would lead to new regulations. State officials anticipated that the process would become an important tool for the HCC in working transparently with the health care industry to: (1) understand cost drivers and how to better influence them; (2) develop mechanisms for incentivizing cost reductions and quality improvements, as necessary; and (3) determine when and how annual growth benchmarks should be changed. As the benchmarking process matured, state officials expected that data gathered and shared would encourage payers and providers to weave accountability for performance into future payment arrangements.

Many stakeholders interviewed in March 2019 described the new mandates on payers midway through the SIM Initiative to be a necessary shift in strategy in light of the slow progress in VBP adoption. The same stakeholders also viewed the voluntary multi-payer consensus-based approach taken at the outset of the SIM Initiative as the right decision at the time, because it encouraged collaborative dialogue among all sectors of the health care market—dialogue that later paid off in a way that would not have happened within an initial framework of mandates.

> I really think it was a good decision [to not enforce a common VBP model] that actually helped practice transformation move on. I think that any attempt to try to create that type of a payment model would have just made more doctors leave Delaware."
>
> —Delaware provider

Because Delaware did not establish a statewide multi-payer VBP model or place requirements on commercial health plans to advance VBP, the Quality and Cost Benchmark became the only lever available to state officials to promote accountability for Delaware's high health care costs from commercial payers and large health systems. HCC described the benchmark as a "transparency lever" (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). Other stakeholders interviewed in 2019 anticipated that the benchmarking process would lead health systems with market power to engage in meaningful dialogue on solutions to high acute care costs.

> "I think we could have done more to at least define general parameters so that payers could be more aligned."
>
> —Delaware state official

> "[The Benchmark report] is probably the only tool I can imagine that will allow us to get at the commercial segment right now … We otherwise don't have levers over the commercial segment."
>
> —Delaware state official

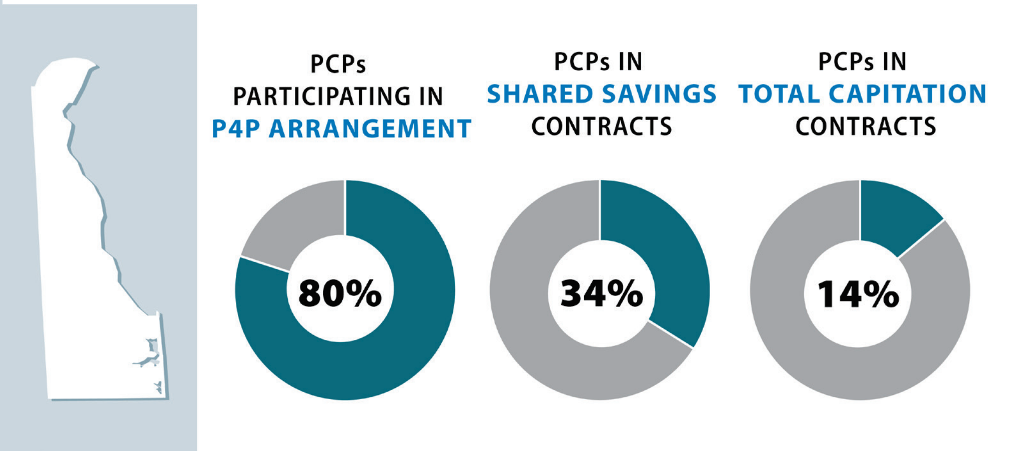
A key goal of the SIM Initiative was to move toward widespread adoption of VBP approaches and at least 80 percent of care delivered in an alternative payment model. As the end of the SIM Initiative approached, providers, payers, and state officials remained concerned about the readiness of primary care providers for VBP adoption and slow progress toward risk-sharing arrangements, despite the progress that was made during the latter half of the SIM award period. Health plan representatives interviewed in spring 2019 still considered most primary care practices to be ill-prepared for VBP—primarily because of the lack of experience with using data and analytic functions in their electronic health records (EHRs). SIM Initiative leadership attributed slow progress toward VBP adoption to "[lack of] the capacity of Delaware providers to bear risk and to manage TCC"; the inability of insurers to negotiate these risk-sharing contracts with providers in a market with consolidated health systems; and the absence of planned, systematic monetary support for smaller, independent primary care practices (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). One insurer described independent practices as critical for healthy provider competition that kept costs down. Despite such challenges, health plans reported making VBP contracting inroads into the Medicaid and commercial markets throughout 2018 and predicted further progress through 2020.

Progress on VBP adoption appeared to vary among Medicaid managed care plans and between the Medicaid and commercial markets. Toward the end of the SIM award period, Medicaid health plans were sharing with the HCC their progress on VBP adoption, but inconsistent reporting strategies by plans to date left an incomplete view of that progress. Highmark, which covered approximately half of Delaware's residents through Medicaid and commercial products, reported 2018 success in moving about 30 percent of its members across business lines away from fee for service to its True Performance program, which paid providers for quality.[27] Aetna and Ameri-Health, which covered small shares of the commercial and Medicaid markets, respectively, reported more progress in 2018 than Highmark in moving providers into risk-sharing contracts. Notably, Aetna included all its primary care providers under a PCMH contract described as TCC risk-sharing.[28] Perhaps insurers with small market shares had more success expanding risk-sharing contracts across their networks by recruiting only providers with superior capacity, whereas insurers with large market shares had to retain a large network of practices (requiring insurers to accommodate providers with low readiness for VBP).

Another source of progress toward VBP adoption is available from the University of Delaware's 2018 Primary Care Survey (***Exhibit C-5***). Physicians targeted by the survey were affiliated with independent practices, physician hospital associations, accountable care associations, and PCMH practices. According to this survey, 80 percent of Delaware primary care physicians reported participating in some type of pay-for-performance payment method, with 34 percent holding shared savings contracts and 14 percent a total capitation contract (Delaware Department of Health and Social Services, 2018, September). These percentages reflect participation in no-risk VBP and risk-sharing arrangements in Medicare, commercial, and Medicaid contracts. Percentage participation was not broken out by payer. The denominator reflected the state's physician population weighted for survey non-response. The large minority of practices in risk-based contracts reported in the university survey likely reflects the capacity of ACO-affiliated practices to take on risk. The challenges adjusting to the VBP landscape described in interviews were largely attributed to independent practices.

[27] Data submission by Highmark to the Delaware Health Care Commission reflects VBP participation as of January 31, 2019.
[28] Data submission by Aetna to the Delaware Health Care Commission reflects VBP participation as of January 31, 2019.

Exhibit C-5. Delaware survey of primary care providers, 2018



Note: DE = Delaware; P4P = pay for performance; PCP = primary care providers.

Source: DE Department of Health and Social Services, Division of Public Health, Primary Care Physicians in DE 2018 (September 2018).

C.2.2 Enabling strategies to support health care delivery transformation

Key Results
Practice transformation assistance
• The primary care PTI helped primary care practices reach transformation milestones reflecting PCMH capabilities, but small practices reported difficulty sustaining changes.
— ***Impact:*** PTI had favorable impacts on Medicaid beneficiary PBPM spending, emergency department (ED) visits, and post-discharge follow-up visits, compared with Medicaid beneficiaries seen by non-PTI participating practices.
• The BHI Pilot Program increased screening, communication, and referrals across primary care, behavioral health, and substance use disorder providers, but lack of payment for integration impeded sustained change.
Health IT and data analytics
• The HCCD established a foundation for tracking the cost and quality of care.
• The Common Scorecard was not widely adopted by providers as a tool for improving their performance, leading to its discontinuation as a product for providers.

The HCC developed SIM Initiative efforts to support practices in the transformation of care delivery and readiness for VBPs (***Table C-2***) in three ways: supporting practices to achieve their transformation goals, primarily with TA; health IT tools; and stakeholder engagement. Practice transformation assistance consisted of TA under the PTI and the BHI Pilot Program; the Behavioral Health Electronic Medical Records (EMRs) Assistance program; and Payment Reform Readiness mini-grants—all of which the SIM Initiative funded with the balance of funds remaining after HCC ended the Behavioral Health EMRs program. Health IT and data analytics tools consisted of the HCCD and Common Scorecard. Stakeholder engagement focused mostly on supporting the Cost and Quality Benchmark and BHI Pilot.

Primary care Practice Transformation Initiative

The PTI helped primary care practices reach transformation milestones reflecting core PCMH capabilities. From September 2016 through April 2018, enrolled practices received SIM-funded training in a curriculum tailored to their needs and based on assessment of transformation readiness. The PTI supported 112 primary care practices through the PTI for approximately 12 months, reaching 250 physicians and 100 other advanced practice practitioners that represented over one-third of Delaware's primary care workforce (Delaware General Assembly, 2019). The average scores for each of the nine milestones increased over the course of the PTI, with the most significant progress made in extended access to care, plans for ED use reduction, and processes for post-discharge follow-up with patients (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019).

Table C-2. Delaware's enabling strategies supporting delivery transformation and payment reform

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PTI	Primary care practices	• A total of 112 practices received coaching. PTI was considered successful but struggled to reach independent practices.	• No future funding planned. • Resources and tools available for other practices online.
BHI Pilot program	Primary care practices and BH providers	• A total of 22 primary care and BH practices received coaching, as well as collaborative learning and networking. • Lack of payment for BHI work was the key impediment for practices.	• No future funding planned. • Resources and tools produced available for other practices online.
BH EMR Assistance program	BH providers	• Six BH practices received funding for EHR implementation or upgrade. • Participation was lower than expected.	• Program discontinued prior to the end of the SIM Initiative.
Payment Reform Readiness mini-grants	Primary care practices and BH providers	• In 2018, funded 11 short-term, focused projects to support payment reform readiness.	• No future funding planned.
Common Scorecard	All Delaware health care providers and the public	• State officials were successful in achieving alignment and developing application, but unable to garner interest from providers.	• Delaware made aggregate and statewide data available to the public, and used the data to inform the Cost and Quality Benchmark.

(continued)

Table C-2. Delaware's enabling strategies supporting delivery transformation and payment reform (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
HCCD	All Delaware health care practices and payers submitting claims data	• Policy development and technical development resulted in a functional database despite hesitancy from providers.	• The HCCD was sustained in short-term with state appropriations. Agreements with stakeholders enabled HCCD use for research.

Note: BH = behavioral health; BHI = behavioral health integration; EHR = electronic health record; EMR = electronic medical record; HCCD = Health Care Claims Database; PTI = Practice Transformation Initiative; SIM = State Innovation Model.

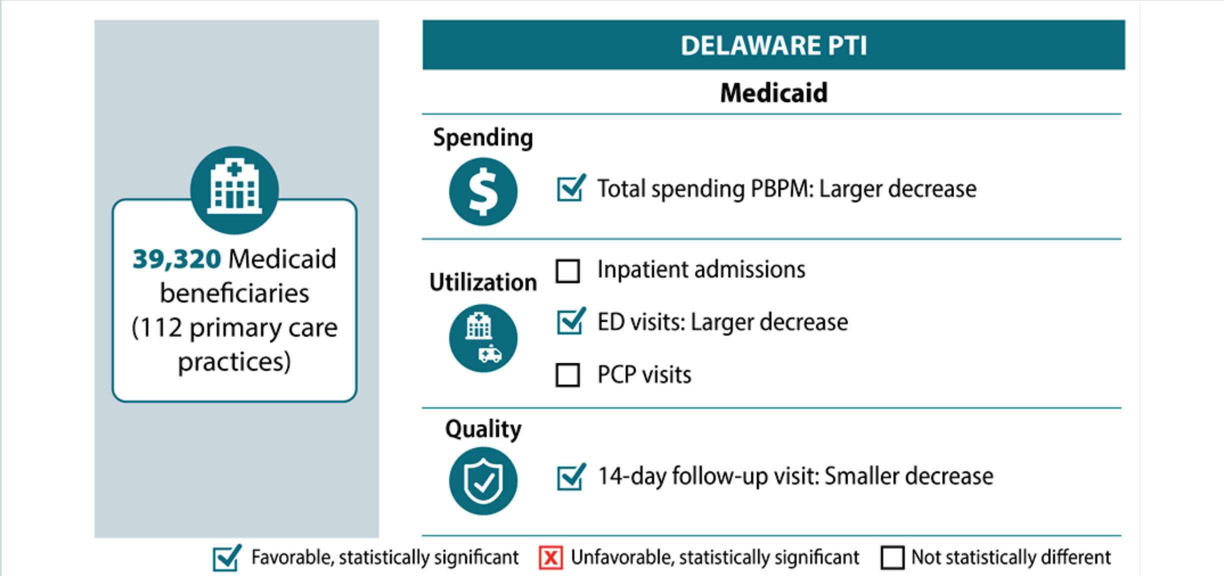
Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Claims-based analysis of the PTI showed that progress on PTI milestones was associated with favorable changes in beneficiary-level outcomes (see ***Exhibit C-6***). Practice-level improvements in the processes for contacting patients after hospital discharge seem to have resulted in positive results for the PTI group: although both PTI and comparison groups demonstrated a decline in the percentage of hospital discharges with a follow-up provider visit within 14 days of discharge, there was a smaller decline in the PTI group (difference of 2.10 percentage points). Moreover, changes in follow-up care—along with plans for reducing ED use—appear to have produced greater declines in ED visits for the PTI group overall than for the comparison group (-169.4 ED visits per 1,000 beneficiaries). Furthermore, inpatient admission rates for *adults* decreased for both beneficiaries attributed to PTI providers and the comparison group but decreased more for the adult PTI group (-15.15 inpatient admissions per 1,000 population). However, there was no change in the inpatient admission rate for the overall PTI group—which includes both adults and children—relative to the comparison group after PTI implementation. There was no change in readmission rates within 30 days of hospital discharge in the PTI group relative to the comparison group. And practice-level changes extending access to care did not translate into a significant change in the number of PCP visits among Medicaid beneficiaries attributed to PTI relative to non-PTI practices.

Claims-based analyses of Delaware's Practice Transformation Initiative

For more information, see ***Table C-5*** in the Addendum at end of this chapter. For full results describing the impact of the PTI on Medicaid beneficiary quality of care, utilization, and expenditures, see ***Appendix C-1***.

Exhibit C-6. Delaware's Practice Transformation Initiative had favorable impacts on spending, emergency department visits, and follow-up visits in its first three years



Notes: DE = Delaware; ED = emergency department; PBPM = per beneficiary per month; PCP = primary care provider; PTI = Practice Transformation Initiative.

Changes are relative to a comparison group. A checkmark indicates a favorable impact.

Source: Federal Evaluation Team analysis of Medicaid claims data from the DE Department of Health and Social Services. See ***Appendix C-1*** for more detail.

Total spending PBPM decreased for both beneficiaries attributed to PTI practices and the comparison group but decreased by $73 PBPM more in the PTI group. Changes in total spending were driven by changes in ED spending and inpatient spending. ED spending decreased in both the PTI and comparison groups but decreased more in the PTI group (-$8.04 PBPM), and inpatient spending increased in both the PTI and comparison groups but increased less in the PTI group (-$70.29 PBPM).

Despite the favorable findings in quality, utilization, and spending outcomes for Medicaid beneficiaries and the Medicaid program as a whole, lack of financial or structural resources to sustain practices through transformation continued to be a barrier for change among independent and small practices**.** State officials noted that the lack of financial or structural resources to sustain practice changes was both a reason some practices did not participate in the PTI and an impediment for those that did participate. Without transparent, sustained, and assured revenue streams, independent practices did not see any benefit from participating in SIM Initiative training opportunities and could not enhance capacity. As a result, PTI-participating practices were almost exclusively affiliated with an ACO—a contextual factor that may limit the generalizability of the beneficiary-level findings, since some of the findings may be at least partially because PTI participating practices were affiliated with ACOs while comparison practices were not. Even though state officials would have preferred to be more successful at reaching more small and independent practices with the PTI, the state did not extend any added incentives or support to help transformation.

> “On the Clinical Committee, one of the things we recognized with [the] SIM Initiative was that we need to pay for care management and care coordination upfront. Practices need this infrastructure and need some upfront payment to get there. Those conversations never happened for whatever reason. We didn’t get those payments done and care coordination never happened through the SIM grant.”
>
> —Delaware FQHC representative
> Primary Care Reform Collaborative meeting

Behavioral Health Integration Pilot and Behavioral Health Electronic Medical Records Assistance Program

The BHI Pilot Program provided 22 primary care and behavioral health practices with support in practice transformation toward one of the three models providers could choose among for integrating behavioral health into primary care (Brousseau, Kamp, Pekkala, & Whittemore, 2019, January). The first, most introductory, model was “coordination or remote collaboration.” This model consisted of types of care that occurred in separate settings but had established relationships that allowed for enhanced referrals or greater connectivity through telehealth. The second model was “co-location,” which included delivery of behavioral health and primary care services at one site but with separate billing—accomplished through one provider type contracting with, or hiring, the other provider type. The third model was “collaboration or full integration.” This model incorporated a team-based approach through development and execution of a care plan for patients that involved both primary care and behavioral health providers.

Beginning in January, 2018 and over the next 12 months, primary care and behavioral health practices received “comprehensive, multi-faceted assessment, training, and coaching … including face-to-face group training collaboratives, facilitated sharing sessions, virtual education and networking, and individualized practice coaching.” (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). The TA enabled practices to set attainable goals towards the level/model of integration they chose. Delaware's TA contractor produced BHI tools for the cohort practices, including a simple BHI registry intended to help primary care and behavioral health providers track referrals and monitor follow-up care. The products developed from the BHI Pilot subsequently became available to all practices on Delaware's ***Choose Health*** website.

In spring 2019, BHI cohort representatives from primary care and behavioral health practices reported in focus groups that their practices had seen multiple benefits from in-person learning collaboratives, which helped break down cultural barriers between primary and behavioral health providers and raise awareness about nearby substance abuse treatment providers. Providers from both care settings indicated they had found new partners for integration through the learning collaboratives. Using the training and coaching services, practices established with their new partners communication workflows that enabled enhanced referrals and co-located contacts. Providers also said the collaboratives helped them better understand the language and perspective of providers in other care settings, allowing for greater comfort in reaching out to one another.

Tools provided by the BHI Pilot enabled practices to more closely monitor their patients, using an evidence-based screening process and incorporating measurement-based care. Focus group participants from both primary care and behavioral health practices stated they had implemented universal and repeated mental health screenings as a direct result of coaching. This approach enabled them to uncover mental health issues during visits for other problems, and evaluate patient mental health over time. Providers also were able to use a simple BHI registry to track the needs of specific patients. One primary care provider developed a spreadsheet and program specifically for their practice to track outcomes based on specific mental health screening tools. Another primary care provider used their new BHI registry to ensure routine communication with a suicidal patient, which resulted in "a huge turnaround just with that person to case manage and to coordinate."

Lack of payment for BHI work was the key impediment to advancing and sustaining practice transformation, according to many BHI program participants (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). One provider noted that, absent the guarantee of ongoing funding, "they don't want to learn something that they don't think they're going to get to use." Others expressed their belief that, before adopting new methods of practice, payers and providers had to collaborate and agree on new incentive structures and outcome expectations. This belief was consistent with the sentiments conveyed by some focus group participants in

> "We were very frustrated because we were reaching out to primary care groups … and not getting … callbacks, getting defensive reactions from doctors, and just blowing us off when we tried to go drop off brochures … So this has been what we've been looking for … and we hope that we can continue, that practices will be open to us and we can work together."
>
> —Delaware substance use disorder provider

spring 2019, particularly with respect to small providers. As one participant explained: "Unfortunately, being smaller, there was no grant money, and so nothing's really gotten up and running because of reimbursement. Insurances have not opened up codes that allow us to consult, collaborate."

The behavioral health EMR Assistance Program had only low participation, so remaining funds were transferred to other strategies. Implemented in 2016, the program was intended to assist behavioral health practices prepare for VBP arrangements by funding new or upgraded EHRs, but providers noted at the time that, despite the perceived need, they lacked the "capacity to train staff on new or enhanced systems," which diminished their interest in implementing such technology.

Payment Reform Readiness mini-grants

Payment Reform Readiness mini-grants enabled providers to test and implement focused reforms (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). In fall 2018, HCC awarded 11 projects, ranging from $15,000 to $250,000, for projects focused on "improving coordination of care, and enhancing [health IT] through data analytics and system upgrades." According to a final report to the HCC, mini-grant recipients reported successfully strategizing alternate payment modeling, developing workflows and policies to improve coordinated care, and upgrading EHR infrastructure practice to support data sharing and more effectively manage their populations (Delaware Health and Social Services, 2019). Grantees described successes specific to EHRs: "billing system enhancements, transitions of care, total cost of care … and screening for social determinants of health." Multiple practices used SIM Initiative awards to establish connections to the DHIN, which reported that data connection and contributions continued to slowly increase as the DHIN's value became better understood. One Federally Qualified Health Center (FQHC), as reported in an interview, used mini-grant support to begin sending ambulatory data, which increased the number of providers submitting data to the DHIN by 17 percent.

Health information technology and data analytics

Prioritizing the HCCD throughout the SIM Initiative established the infrastructure to inform future health policy decisions. SIM Initiative leadership used funds to establish the rules and regulations for HCCD data collection, database implementation, and functionality testing. In the first half of 2018, the DHIN performed a proof-of-concept matching claims data with clinical records that demonstrated the HCCD could be used for clinical research. When payers initially did not volunteer claims submissions to the HCCD, the General Assembly added a provision to SB 227 (passed into law in August 2018) requiring all Delaware payers to submit claims (Delaware General Assembly, 2018, August 29). In the second half of 2018, the HCCD worked with insurers to upload historical data from 2013 through 2017 from State Employee Health Plans, Medicare Advantage Plans, Qualified Health Plans, and Pharmacy Benefit Managers (Delaware Department of Health and Social Services & Delaware Health Care Commission, 2019). In early 2019, the SEBO was already sending monthly data feeds from the DHIN to its vendor to conduct data analytics. The HCCD finished uploading all Medicaid data by June 2019 and was scheduled to upload all commercial data by January 2020.

> This [Benchmark Reporting Process] is a tool that can help them [legislators] understand the current landscape in ways that they couldn't. Everybody knows it feels broken, but to fix it, you need not just data but information and we're just so excited about the chance to be a part of that."
>
> —Delaware state official

Continued health IT infrastructure progress at the state level established a foundation for tracking the cost and quality of care in Delaware. With the HCCD effectively operational, the DHIN focused on two tasks. The first was enabling HCCD access for payers and state officials expected to inform research on health care cost drivers with specific emphasis on the Cost and Quality Benchmark. The second task was to enable providers to conduct quality-related analyses through the HCCD's link to clinical data—to use that data to impact provider decisions on an ongoing basis. The DHIN also promoted use of clinical data available through the CHR.

The DHIN promoted the database and its potential benefits to stakeholders through demonstrations and presentations. Many stakeholders were excited about the potential benefits of the HCCD—expressing that state leadership and the DHIN's success in operationalizing the HCCD would aid in transparency, creating essential infrastructure for evaluating the cost and value of care in the state. Stakeholders also felt this achievement would ultimately drive payer and provider decisions. Increasing submission of practices' data to the DHIN, albeit incremental, increased the value of existing tools and aided practices in improving quality of care. During the SIM Initiative but without SIM Initiative funds, the DHIN drew on subscriber revenue and state funding to enhance and promote health IT tools that predated the SIM Initiative, in an effort increase awareness as well as tool adoption. Tools included the CHR and the Event Notification System (ENS), which sent notifications to payers and providers when a member/patient had a hospital admission or discharge. According to the DHIN, as of April 2019 the ENS provided notifications to subscribed providers from 200 hospitals in a six-state region. Through the CHR, clinicians also could request the DHIN to send "Results Summaries" for their patients, which included lab test results and radiology reports. In addition, the CHR was available to consumers through an online patient portal free of charge. Provider interviewees who accessed the DHIN tools regularly found them to be of high value in their practice, especially when integrated into their EHR. Some BHI Pilot focus group participants reported using DHIN data, despite glitches, for VBP programs they participated in.

Although the DHIN enhanced its tools for providers, it was not clear if provider demand for health information exchange services was broad enough to facilitate widespread impact on patient care. The state hoped that continued DHIN outreach to educate providers about their enhanced portfolio of tools might increase providers' perception of the DHIN's value. Provider and practice interviewees not using DHIN resources said they were still unconvinced of the value of investing money and labor to establish a connection and data feed to the DHIN, making them unwilling to pay for DHIN products or submit clinical data to it. Some practices with established EHRs said they had not taken the steps to link with the DHIN because they felt DHIN subscription fees were too expensive. The task of connecting providers to the DHIN was compounded by two additional factors: (1) use of many different EHR vendors statewide; and (2) lack of vendor interest in exploring data exchange options with the DHIN, because most had relatively small market shares in the state (Choose Health Delaware, 2016).

> We're hooked in with the DHIN. We get ER visit alerts. We can check our clients. We look at the "PNPs" [incidents of "Party and Play"] for their benzo or stimulant or opioid use. We're utilizing a lot of health information systems so that we can stay connected and in the know for what our patients are doing outside of our office."
>
> —Delaware provider in the BHI Pilot

The state discontinued the Common Scorecard in late 2018 because of lack of uptake. The HCC had collaborated with stakeholders and the DHIN to establish the scorecard in Award Year 1 (February 2015–January 2016) as a set of 26 quality measures for providers to track their performance across all payers. The application was launched statewide for provider use in late 2016, but providers did not widely adopt it. One stakeholder involved in the scorecard's development made the notable criticism that the scorecard was designed before its objective was settled.

Despite the assumption that providers would value the presentation of quality metrics for their full panel—since it was intended to eliminate the need for providers to submit their own clinical data for performance measurement—individual health plans generated their own quality measures for providers. Providers said they preferred these plan-generated reports as the "source of truth," as one put it, because the plan reports were a more accurate reflection of a specific practice's attributed members. Health plans interviewed in spring 2019 described supporting their network providers with customized analytic reports tailored to practice needs. The Common Scorecard metrics, in contrast, had two disadvantages: (1) it could not be used by individual practitioners to gauge their own performance, and (2) the metrics were not aligned consistently with direct payer reports and payments. Even so, payers and providers viewed the scorecard's alignment around a common measure set as key progress; and health plans interviewed in spring 2019 reported using at least a subset of the Common Scorecard measures in their VBP contracts.

Stakeholder engagement

After the DCHI established the initial voluntary multi-payer framework for outcomes-based payment for the first half of the SIM Initiative period, SIM-funded payment reform efforts were limited to monitoring payer progress through DCHI and HCC committees. When the incoming administration added aggressive strategies to support payment reform in early 2017, most were executed through policy levers that did not rely on SIM Initiative funding.

One exception was the activities supporting the Cost and Quality Benchmark. After passage of HJR 7 and subsequent executive orders mandating establishment of the Benchmark, SIM Initiative funding supported stakeholder summits, development of recommendations by the Economic and Financial Advisory Council, consultant research and development of the methodology, the Implementation Manual, and the first Benchmark Report.

The DCHI Payment Model Monitoring Committee, formed in 2014, continued to facilitate stakeholder coordination to tackle barriers to VBP adoption with SIM Initiative support throughout 2018. The Payments Committee's core responsibilities were to identify and design common elements of VBP models, increase understanding of new models, and monitor VBP availability and enrollment. The committee included representatives from a diverse range of provider systems and all payers operating in Delaware, including DHS (Delaware Center for Health Innovation [DCHI], 2014, October). Using SIM Initiative funds, DCHI engaged a contractor to facilitate meetings and draft committee reports.

The Payments Committee monitored the percent VBP penetration among providers in monthly meetings throughout 2018, with payers sharing VBP transition plans and details of their main VBP programs. In fall 2018, the committee explored the potential of global budgeting in health care delivery systems, identified provider-led VBP initiatives, and assessed provider readiness. Importantly, the committee served as a forum to discuss the alignment or parallel course of VBP strategies with the Benchmark approach, as well as with other statewide payment reform initiatives.

Beginning in September 2018, the Payment Committee formed a BHI workgroup to review progress by the SIM Initiative BHI practice cohorts toward integration and shared reimbursement coding practices by all payers. The workgroup identified reimbursement for primary care in behavioral health settings as an important step payers could take towards incentivizing providers to integrate physical and behavioral health treatments.[29]

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[29] Health Management Associates. DCHI Payment Workgroup Meetings Report. Prepared for Delaware Center for Health Innovations, January 17, 2019.

The workgroup considered Medicare's Psychiatric Collaborative Care Model (CoCM) procedure codes, which became available for Medicare in 2018, as a potential billing structure. SIM-funded consultants offered experiences from other states that had opened the CoCM codes in Medicaid; and DMMA expressed a commitment to "open the codes for a limited set of diagnoses and with clear guidance," so Medicaid MCOs could test the model. Activating these codes posed challenges to providers and patients, however. In spring 2019, providers cautioned that CoCM code use triggered an extra $50 copay for Medicare patients (who were also charged a copay for the visit that prompted CoCM use) and required patient consent, which could be challenging during a psychiatric crisis.

Medicare's Psychiatric Collaborative Care Model (CoCM) Codes

On January 1, 2018, Medicare released three procedure codes (Current Procedural Terminology [CPT][30] codes 99492, 99493 and 99494) to make payment to a BHI primary care team consisting of a treating (billing) practitioner, behavioral health care manager, psychiatric consultant, and the beneficiary. These codes allowed a billing practitioner and a behavioral health care manager to bill for visit and non-visit services for BHI—including an initiating visit, 70 minutes of a behavioral health care manager's time in the first month, and 60 minutes in subsequent months to perform systematic follow-up, and caseload review with a psychiatric consultant.

—Medicare Learning Network, (Behavioral Health Integration Services, 2021, March) May 2019

C.2.3 Population health

Key Results
• The SIM Initiative implemented three county-based local councils as part of the Healthy Neighborhoods program to address population health priorities in local communities.
• The Healthy Neighborhoods program awarded eight demonstration mini-grants for community-level initiatives that were judged successful but lacked the continued funding needed for major impact.
• Early plans to establish a certification program and curriculum for community health workers (CHWs) were set aside to focus on SIM Initiative practice transformation and payment reform efforts.

SIM Initiative leadership intended, under DCHI direction, to collaboratively work with stakeholders to develop community-based strategies to fund activities (***Table C-3***) that would address health issues local communities identified and prioritized. The SIM Initiative's intent in launching the Healthy Neighborhoods program was to establish 10 county-based local councils to address local barriers to care related to SDoH.

[30] CPT codes and descriptions are copyright 2018 American Medical Association. All rights reserved.

Table C-3. Delaware's progress on population health

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
HN	DE's population served through the three county-based HN	• Eight community-driven initiatives received mini-grant funding and TA to address specific PH needs. • The process of establishing HN was slower than expected, resulting in only three of 10 planned councils being implemented.	• No future funding planned. • New PH metric portal, My Healthy Community, will be available for local councils to select areas for prioritization of future funding opportunities.

Note: DE = Delaware; HN = Healthy Neighborhoods; PH = population health; SIM = State Innovation Model; TA = technical assistance.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

Development of the neighborhood councils moved slowly at first and required substantial effort by state officials. To concentrate investment and increase the chance of success, the state narrowed the program goal to establish three of ten local councils initially planned. To accelerate development, HCC hired a contractor to support the neighborhood councils' development through intensive stakeholder outreach and engagement, disbursing eight demonstration grants to pilot community-level action and innovation. Stakeholders reported in spring 2019 that the Healthy Neighborhoods program and its funding opportunities had increased community capacity to address population health issues (RTI International, 2019).

The community-level action and innovation pilots were small and time limited yet yielded long-term impact on partnerships catalyzed by the SIM funding sources (Delaware Health and Social Services, 2019). Importantly, contracted consultants provided coaching to grant recipients and their partners on approaches to secure sustainable funding over the course of their initiatives. Local councils and their partners tested new models and provided services and support to many community individuals. As examples, grant recipients designed pilot initiatives that addressed domestic violence and substance use prevention for at-risk middle school students, employed CHWs to engage people facing homelessness, and established a peer program that trained individuals with previous behavioral health issues to support others experiencing similar challenges. Another pilot connected clinicians with local police departments, to divert individuals experiencing behavioral health crises from the criminal justice system to treatment.

Overall, mini-grant recipients were positive about what they accomplished with the funds they received, but recognized that consistent funding and access to data were necessary to sustain their efforts long term. Insurer stakeholders saw value in population health investments and intended to continue to engage community-based organizations to identify potential program models. Based on such positive assessments, DHSS worked with its community partners to establish a sustainable model. All stakeholder groups agreed that access to granular data for evaluating new innovations was necessary to make the proper investments. As a consequence, one of the SIM Initiative's last acts was establishing a data portal, My Healthy Community, to make population metrics publicly available (see discussion in ***Section C.3***).

Plans developed early in the SIM Initiative to establish a certification program and curriculum for CHWs (Delaware Center for Health Innovation et al., 2017, June 30) did not manifest. Deployment of an expanded CHW workforce was intended to help lower health care costs by addressing non-clinical determinants of health. However, SIM leaders decided to re-direct funds to support practice transformation and payment reform.

C.3 Sustainability

Key Results
Payment reform
• Reporting and analysis for the Cost and Quality Benchmark continued under the Delaware Health Care Commission and the Delaware Economic and Financial Advisory Council, supported by state appropriations.
• An ACO program created by the Medicaid agency was set to begin in July 2021, while SEBO launched a Centers of Excellence model in 2020 that established risk-sharing and bundled payments with selected providers (Delaware Health and Social Services, 2017, December 19).
Practice transformation and health IT and data analytics
• HCCD was sustained for the short term with $2 million in state appropriations (Delaware Health Information Network [DHIN], n.d.-a).
Population health
• Building on lessons learned from the Healthy Neighborhoods program, stakeholders collaborated to establish a permanent program and entity, Healthy Communities Delaware, to convene potential funders, public health leaders, academia, local councils and community coalitions to continue piloting and scaling up population health interventions.

State officials believe the SIM Initiative fostered dialogue and provided a foundation, stimulus, and several tools (***Table C-4***) for a shift towards VBP among both payers and providers. SIM Initiative funding also provided state officials expert consulting and research about options to promote more system change. Notably, all insurer and provider interviewees expressed strong support for continuing work through collaborative stakeholder processes, investment in promoting VBP innovation, and commitment to assisting providers in undertaking transformation. State officials intended to invest in and promote stakeholder engagement moving forward, and to build on Delaware's accumulated experience and milestones achieved. Officials viewed promoting dialogue among providers, payers, and community partners as critical to future transformation success.

Table C-4. Sustainability of Delaware's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Payment reform	Support for VBP by state purchasers	Yes	Medicaid managed care contracts required MCOs to meet annual VBP thresholds. DMMA created a Medicaid ACO model to implement 2021. SEBO implemented new VBP products for state employees.
	Support for VBP in commercial markets	Yes	Legislation mandated commercial plans to increase payment for primary care and care coordination; mandate expires December 31, 2021. Medicaid formed guidance on collaborative care payment that other payers could follow.
	DCHI committees coordinated VBP alignment	Yes	Public-private funding continued. Committees continued work on BHI payer strategies.
	Cost and Quality Benchmark process established to control health care costs	Yes	HCC with DEFAC developed a mechanism to continue overseeing Cost and Quality Benchmark work.
Practice transformation	PTI	No	Webinars and tools available online.
	BHI Pilot	No	Webinars and tools available online.
	BH EMR program	No	Not applicable.
	Payment Reform Readiness mini-grants	No	Not applicable.
	PCRC established to strengthen primary care	Yes	PCRC continued to meet and release annual recommendations through 2020.
Health IT	HCCD operationalized by the DHIN	Yes	General Assembly appropriated $2 million for FY 2019. Agreements with stakeholders enabled use of the HCCD for research.
	Common Scorecard	Metrics only	Scorecard was terminated as a practice-level provider tool. DHSS released Common Scorecard metrics as state-level results, and used metrics to inform the Cost and Quality Benchmark.

(continued)

Table C-4. Sustainability of Delaware's SIM Initiative activities (continued)

Activity type	Activity	Plans to sustain	Sustainability mechanism
Population health	Healthy Neighborhoods	Yes	Healthy Communities Delaware created a backbone organization, fiscal entity, and public-private partnership.
			Delaware Community Foundation became a funding partner.
			Public portal, My Healthy Community, launched in May 2019 to supply population health metrics for neighborhoods and towns.

Note: ACO = accountable care organization; BH = behavioral health; BHI = behavioral health integration; DCHI = Delaware Center for Health Innovation; DEFAC = Delaware Economic and Financial Advisory Council (within the Department of Health and Social Services); DHIN = Delaware Health Information Network; DMMA = Division of Medicaid and Medical Assistance; EMR = electronic medical record; FY = fiscal year; HCC = Health Care Commission; HCCD = Health Care Claims Database; health IT = health information technology; MCO = managed care organization; PCRC = Primary Care Reform Collaborative; PTI = Practice Transformation Initiative; SB = Senate Bill; SEBO = State Employees Benefits Office; SIM = State Innovation Model; VBP = value-based payment.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

C.3.1 Payment reform

To promote sustainability, state officials prioritized initiatives, committees, and policy vehicles that continued to: (1) raise Delawareans' awareness of health care cost and quality issues; and (2) sustain momentum toward statewide policy solutions to contain health care costs, strengthen primary care, and support greater payment reform alignment among payers.

> "As we look to sustain our progress and efforts made in payment reform, the lessons learned from the multiple challenges in achieving alignment among payers highlight the critical need for providers and payers to move forward together in unison and supporting broad participation across provider types and communities."
>
> —Delaware state official

The Health Care Commission continued to operationalize the Cost and Quality Benchmark data collection, analysis, and public reporting process after the SIM Initiative (***Exhibit C-7***). In partnership with Delaware Economic and Financial Advisory Council (DEFAC) (within DHSS), and at the direction of DHSS, the HCC was given primary responsibility for measuring the performance of Delaware's providers and payers against cost and quality benchmarks going forward. The HCC continued to review and approve modifications to the Health Care Spending Benchmark and its methodology (Delaware Health Care Commission, 2019, June 11). Funding was allocated in the 2020 budget to the HCC for additional staff to assist with this benchmarking activity, which included conducting analysis, meetings, report creation, and publications.

Exhibit C-7. Delaware state officials prioritized initiatives, committees, and policy vehicles to sustain progress from Delaware's SIM Initiative

FINANCING

- $2M for DHIN to sustain the HCCD
- Commercial plans mandated to increase primary care payments

STRUCTURE

- DEFAC oversees Quality Benchmark.
- DCHI Payment Committee advises payment reform.
- Healthy Communities Delaware was established to further population health objectives.

ACTIVITIES

- Medicaid developed an ACO model.
- SEBO launched new VBP products.
- DHIN and DHSS facilitate CHR and ENS use.

Note: ACO = Accountable Care Organization; CHR = Community Health Record; DCHI = Delaware Center for Health Innovation; DEFAC = Delaware Economic and Financial Advisory Council; DHIN = Delaware Health Information Network; DHSS = Department of Health and Social Services; ENS = Event Notification System; HCCD = Health Care Claims Database; SEBO = State Employees Benefits Office; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Under requirements set forth by the benchmarking process, health insurers submitted data to the HCC in August 2019; the HCC presented its analysis of the data in June 2020 (Delaware Health Care Commission, 2020). In fall 2020, DEFAC reviewed the CY 2021 spending benchmark target percentage. HCC was set to report annually on performance relative to the spending benchmark statewide—for each insurance market, for individual large payers, and for large providers. HCC was set also to engage providers and community partners annually about how to reduce cost and quality variation, thus helping the state perform well relative to each benchmark.

Both DMMA and SEBO continued to develop and implement key initiatives in shifting towards VBP and creating a framework for collaboration. DMMA implemented several initiatives during or just after the SIM Initiative intended to promote alignment of VBP in Medicaid. Since imposing new VBP requirements in its contracts with managed care plans, DMMA monitored plan compliance with the requirements to begin shifting plan networks to VBP arrangements. In 2020, Medicaid began to analyze findings about plan compliance and impose penalties, as necessary, to incentivize plans' continual shift to VBP arrangements. In addition, since the end of its award period, DMMA created a Medicaid and CHIP ACO program to begin July 2021.[31] Finally, DMMA indicated its intention to create guidance on activating CoCM codes, although the changes had not yet been issued as of this writing. Two payers expressed their commitment to follow that guidance; another was already reimbursing for collaborative codes nationally (Delaware Center for Health Innovation [DCHI], 2014, October).

The State Employees Benefits Committee (SEBC) continued to actively monitor and explore cost containment strategies for state employees and retirees (Johns Hopkins Bloomberg School of Public Health, 2019, April 8). Through 2019, the SEBC continued to pursue cost containment strategies such as enhanced care management, reference-based pricing for drugs, and tiered pricing for laboratory and radiology (Willis Towers Watson, 2019).

The PCRC continued to seek input from stakeholders and make annual recommendations on primary care investment. PCRC also continued to focus on payment for care coordination, VBP approaches to increase and sustain primary care, and integrating women's health and behavioral health within primary care. In May 2020, the PCRC released its second annual report, in which it acknowledged continued disagreement about increased investment in primary care (Delaware General Assembly, 2020; Delaware Center for Health Innovation [DCHI], 2014, October).

DCHI continued to provide a forum for multi-stakeholder dialogue through the Clinical and Payments Monitoring committee and the BHI workgroup—sustained through private stakeholder contributions and in-kind services.

C.3.2 Practice transformation, health information technology, and data analytics

DHSS officials prioritized payment reform and used purchasing levers to support provider objectives for enhanced care coordination, collaborative care models, and BHI. At the same time, however, officials continued to look to the provider community to assume a leadership role in continued practice transformation. Payers were encouraged to support BHI commitment by providing resources and aiding in data sharing and analysis. In addition to its work on the Benchmark, DHSS continued to focus on data analytics and to improve and promote the HCCD.

Tools generated by contractors under the PTI and BHI Pilot Program were made available to all other Delaware practices on the DHSS *Choose Health Delaware* website. These tools included training webinars, the BHI registry template, and transformation toolkits.

The Delaware General Assembly appropriated $2 million in funds to provide a short-term source for sustaining the HCCD after the SIM Initiative. The DHIN maintained the HCCD and worked with DHSS on future opportunities for HCCD development. Representation on DHIN's board allowed DHSS leadership to remain informed on the effectiveness of the HCCD and other

[31] Delaware Department of Health and Social Services. Application. Report unavailable online.

health IT strategies. In the 2019 DHIN Annual Report, the Joint Legislative Oversight and Sunset Committee of the Delaware General Assembly recommended that the DHIN continue, and convened a task force to formulate DHIN-strengthening legislation. In addition to the $2 million appropriation in the fiscal year (FY) 2020 budget, the DHIN secured CMS funding to support the database through FY 2021. DHSS expressed hope for ongoing federal support (Delaware Health Information Network [DHIN], n.d.-a).

Other DHIN-managed health IT tools that supported transformation were to be self-sustaining through subscription fees, including the CHR and the ENS. The DHIN partnered with DHSS to promote CHR and ENS use, changing its fee structure for these services to maintain a self-sustaining business model (Delaware Health Information Network [DHIN], n.d.-a). As the value of the DHIN depends upon data submissions to the CHR, DHIN offered reduced fees to data senders for bundled service packages. Access to the CHR for consumers included an access fee, but providers agreeing to use the DHIN as their exclusive source for clinical results (e.g., lab tests and radiology reports) received them for free (Delaware Health information Network [DHIN], n.d.-b).

C.3.3 Population health

To identify and implement evidence-based population health interventions after the SIM Initiative, DHSS launched Healthy Communities Delaware (HCD), bringing together public health leaders, academia, private and nonprofit businesses, and community coalitions (Healthy Communities Delaware, n.d.). HCD is a consortium anchored by a backbone organization representing a partnership between the State of Delaware (DHHS), the University of Delaware, and the Delaware Community Foundation. The backbone organization provided organization support, TA for grantees, and evaluation support. Its infrastructure included a Leadership Council, consisting of 35 members from financial, investment, and banking organizations, co-chaired by the director of Delaware's Division of Public Health; and a new fiscal entity, the Community Investment Council (CIC), representing private businesses, banks, hospital systems, and local governments. Phase III of HCD's implementation started July 1, 2019 with support through the Delaware CIC and state funding.[32]

DPH launched a new software platform and data portal in May 2019, My Healthy Community, that made available public population health metrics for neighborhoods and towns. DPH continued to support the My Healthy Community platform and supply its data, while the DHIN promoted access to My Health Community at no cost through its provider subscription package. The HCC continued metric development and tracking metrics to support local planning for initiatives that address non-clinical determinants of health. HCC aimed to align the platform with cost and spending benchmark efforts (Delaware Department of Health and Social Services

[32] Overview of Health Communities Delaware Model. Presented by S. Peuquet and K. Rattay at the Aligning for Better Health Symposium, January 14, 2019. Report unavailable online.

& Delaware Health Care Commission, 2019). After the SIM Initiative ended, the public portal became live and a data dashboard dedicated to coronavirus disease 2019 (COVID-19) was added (My Healthy Community, 2020, September 9).

C.4 Implications and Lessons Learned

- Primary care practices supported by SIM-funded TA achieved milestones toward patient-centered care and demonstrated—relative to practices that did not receive SIM assistance—reductions in total health care expenditures, fewer hospital admissions for adults, fewer ER visits, and more follow-up after hospital discharge. This progress occurred in the absence of a statewide PCMH payment program or certification program to assure enhanced payments to providers.
- Delaware's voluntary framework for VBP adoption coupled with TA to providers increased payer commitment to VBP arrangements and uncovered provider challenges requiring payer collaboration to address.
- Delaware's SIM framework relied on voluntary action by payers and providers to make progress toward VBP adoption. In the context of Delaware's market factors, however, the voluntary design did little to align payment to primary care providers, or to assure predictable revenue streams providers could use make a business case for up-front practice investments.
- Despite slow progress, insurers, providers, and state officials continued to believe that a voluntary framework for payment reform was the right initial approach, because it encouraged a collaborative dialogue among all sectors of the health care market. Ultimately, strong leadership by policy makers and mandates on payers became necessary to increase the pace of the state's movement to payment reform.
- The Cost and Quality Benchmark added new state authority and procedures to move all stakeholders toward meaningful total cost-of-care solutions.
- The SIM Initiative's federal funding and framework enabled intensive stakeholder engagement and expert consultant research to promote mutual understanding of policy problems and solutions.
- Stakeholder engagement funded by the SIM Initiative facilitated a collaborative approach to address challenges with transitioning to VBP that continued after the end of the SIM award period—as reflected by: (1) ongoing efforts among Medicaid and commercial payers to identify common payer approaches to pay for BHI and address other provider concerns, and (2) DMMA's development of a Medicaid ACO payment model with extensive stakeholder input.

Addendum

Table C-5. Delaware's Practice Transformation Initiative had favorable impacts on spending, emergency department visits, follow-up visits, and inpatient admissions in its first three years

Selected outcomes	Change in outcome from baseline to implementation period: DE PTI	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)			**-73.37†** (-139.69, -7.05)	-7.6	0.07
Inpatient Admissions per 1,000 Population			-4.37 (-14.83, 6.09)	−2.7	0.49
ED Visits per 1,000 Population			**-169.40†** (-260.71, -78.10)	-10.1	0.002
Readmissions per 1,000 Discharges			9.02 (−5.28, 23.33)	6.5	0.30
Primary Care Provider Visits per 1,000 Population			89.40 (-156.52, 335.33)	1.6	0.55
Follow-up Visits within 14 days of Hospital Discharge (%)			**2.10†** (0.50, 3.70)	3.7	0.03
Inpatient Admissions per 1,000 Population [Adults]			**-15.15†** (-29.66, -0.64)	-6.4	0.09

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
Favorable increase
Unfavorable increase
Increase from baseline through implementation
Favorable decrease
Unfavorable decrease
Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

Appendix C-1: Delaware Practice Transformation Initiative Impact Results

C-1.1 Overview

Delaware implemented a model called the Practice Transformation Initiative (PTI), which aimed to prepare primary care practices to participate in value-based purchasing models. The state expected that payers would implement specific funding to primary care practices statewide for care coordination functions (e.g., per beneficiary per month [PBPM] payments to support care coordination). Accordingly, the motivation for the PTI model was to provide primary care practices in the state of Delaware with the support they would need to improve the care they deliver and to more strongly coordinate the care their patients receive. The model focused on achieving transformations around nine capabilities or content areas: (1) panel management, (2) access improvement, (3) care management, (4) team-based care coordination, (5) patient engagement, (6) performance management, (7) business process improvement, (8) referral network management, and (9) health information technology (health IT) enablement. These nine capabilities were patterned after the National Committee for Quality Assurance (NCQA) patient-centered medical home model.

Practices did not receive PBPM payments to support enhanced care delivery as part of the PTI. Rather, practices that voluntarily participated in the model received technical assistance (TA) and coaching from one of four vendors with which Delaware contracted using SIM Round 2 funds. TA curricula were tailored to each practice based on the vendor's assessments of each practice's baseline capabilities. The TA vendors worked with the practices to implement specific milestones tied to each of the nine capabilities, and practices were assessed monthly regarding their competency around each of the nine capabilities and their progress toward achieving the specific milestones. Just over 100 primary care practices chose to enroll in the PTI model, and stakeholders in Delaware indicated that most of these practices were affiliated with one or more of the Medicare or commercial accountable care organizations (ACOs) in the state. PTI practices were affiliated with one or more ACOs because ACO leadership required many of their primary care practices to participate. Thus, the context of the PTI model is one in which the nine capabilities were implemented in practices participating in an existing ACO payment model. Although the financial implications of ACO participation for practices participating in the PTI model were not captured in qualitative data collected for this evaluation, it is likely that the ACOs separately provided financial incentives for enhanced primary care services such as care coordination.

To assess the effects of Delaware's PTI model on care for Medicaid beneficiaries the analysis addressed the following research question:

- To what extent did PTI result in changes in health care spending, utilization, and quality of care?

The analysis hypothesized that implementing the nine PTI capabilities would result in better care coordination and quality of care; increased utilization of primary care services; reduced utilization of costly services, such as emergency department (ED) visits, inpatient admissions, and hospital readmissions; and slower total spending growth. ***Table C-1-1*** provides a snapshot of the study methods.

Table C-1-1. Methods snapshot

Method	Description
Participating providers	To be eligible for the PTI model, practices had to provide primary care services in the state of Delaware. In 2016, 110 practices joined the PTI model on a quarterly basis. There were three cohorts of practices. These cohorts joined the model in the first, second, and third quarters of 2016.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Delaware Medicaid claims data were provided by the Delaware Department of Health and Social Services Division of Medicaid & Medical Assistance.
Sample	The analytic sample included 161,841 unique Medicaid beneficiaries. The intervention group included Medicaid beneficiaries who were attributed to practices that participated in the PTI model (n=39,320). The comparison group included similar Delaware Medicaid beneficiaries who were attributed to practices that did not participate in the PTI model (n=122,521).
Timeframe	The timeframe for the impact analysis was January 2014 through June 2019. The study period was chosen to accommodate rolling entry at the practice level so that the analysis includes least two years of baseline data and three years of intervention period data for all practices. The baseline and intervention periods varied based on the practice cohort. Cohort 1 practices had a baseline period of January 2014–December 2015 and an intervention period of January 2016–December 2018. Cohort 2 had a baseline period of April 2014–March 2016 and an intervention period of April 2016–March 2019. Cohort 3 had a baseline period from July 2014–June 2016 and an intervention period of July 2016–June 2019.
Measures	The analysis assessed the effects of PTI on four core outcomes including total spending PBPM, inpatient admissions, outpatient ED visits, and readmissions. The analysis also examined impacts on additional outcomes, including inpatient, ED, professional, and prescription drug spending; visits to primary care providers, follow-up visits within 14-days of discharge, and comprehensive diabetes care measures.
Statistical analysis	The analysis used logistic regression for binary outcomes, Poisson regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the provider level to account for correlation in outcomes within providers. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

This chapter reports on the impact of PTI on spending, utilization, and quality for 39,320 unique beneficiaries who were attributed to 110 practices that participated in the PTI model.

A full description of the PTI program and a summary of the key impact analysis findings are available in ***Appendix C***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the PTI model's impact findings in tables and figures:

- ***Section C-1.2*** presents results of difference-in-differences (D-in-D) analyses for Delaware PTI Medicaid beneficiaries and their comparison group;
- ***Section C-1.3*** presents results of D-in-D analyses separately for children and adults for the core outcomes;
- ***Section C-1.4*** provides information on annual covariate balance between the PTI and comparison groups before and after propensity-score weighting;
- ***Section C-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section C-1.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for core outcomes change when PTI and comparison group trends are assumed to be on nonparallel paths beginning in the baseline period.

C-1.2 Estimates of Practice Transformation Initiative's Impact on Spending, Utilization, and Quality

Tables C-1-2 through ***C-1-5*** show annual and overall estimates of Delaware PTI's impact on health care spending, utilization, and quality for Delaware Medicaid beneficiaries. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the Delaware PTI's impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

C-1.2.1 Estimates of Practice Transformation Initiative's impact on core outcomes

Table C-1-2 shows the estimates of the PTI model on total spending PBPM, inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries attributed to PTI practices relative to comparison beneficiaries.[33] The findings are as follows:

- Total spending PBPM decreased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by $73.37 more for the PTI group during the first three years of PTI implementation (p=0.07).
- Changes to inpatient admissions did not differ between Medicaid beneficiaries attributed to PTI practices relative to comparison beneficiaries during the first three years of PTI implementation.
- ED visits decreased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by 169.4 more visits per 1,000 beneficiaries for the PTI group during the first three years of PTI implementation (p=0.002).
- Changes to readmissions within 30 days of discharge did not differ between Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries during the first three years of PTI implementation.

[33] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

Table C-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	971.34	1000.64	913.11	1032.23	−95.49 (−178.60, −12.38)	−9.8	0.06
Year 2	971.34	1000.64	855.48	956.59	−82.88 (−191.94, 26.18)	−8.5	0.21
Year 3	971.34	1000.64	892.72	961.99	−47.64 (−179.26, 83.97)	−4.9	0.55
Overall	971.34	1000.64	884.79	983.70	−73.37 (−139.69, −7.05)	−7.6	0.07
All-cause acute inpatient admissions per 1,000 population							
Year 1	160.92	165.47	121.52	126.66	−1.53 (−17.27, 14.21)	−1.0	0.87
Year 2	160.92	165.47	90.64	96.84	−3.69 (−21.20, 13.83)	−2.3	0.73
Year 3	160.92	165.47	85.83	94.63	−7.14 (−26.60, 12.32)	−4.4	0.55
Overall	160.92	165.47	97.25	106.14	−4.37 (−14.83, 6.09)	−2.7	0.49
ED visits per 1,000 population							
Year 1	1676.46	1670.17	1113.58	1256.83	−163.06 (−290.45, −35.68)	−9.7	0.04
Year 2	1676.46	1670.17	986.02	1111.82	−153.63 (−297.29, −9.97)	−9.2	0.08
Year 3	1676.46	1670.17	882.62	1031.95	−189.63 (−371.22, −8.03)	−11.3	0.09
Overall	1676.46	1670.17	982.67	1135.00	−169.40 (−260.71, −78.10)	−10.1	0.002

(continued)

Table C-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group (continued)

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	138.39	142.19	157.83	146.24	15.34 (−6.88, 37.55)	11.1	0.26
Year 2	138.39	142.19	171.32	178.68	−2.71 (−22.14, 16.71)	−2.0	0.82
Year 3	138.39	142.19	203.76	193.58	14.53 (−15.55, 44.61)	10.5	0.43
Overall	138.39	142.19	178.74	172.03	9.02 (−5.28, 23.33)	6.5	0.30

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a Poisson model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 294,429; the weighted N for the readmission outcome is 40,781. These numbers include all person-year (or discharge-year) observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.2.2 Estimates of Practice Transformation Initiative's impact on spending categories

Table C-1-3 shows the estimates of the PTI on inpatient spending PBPM, ED spending PBPM, professional spending PBPM, and prescription drug spending PBPM for Medicaid beneficiaries attributed to PTI practices relative to comparison beneficiaries. The findings are as follows:

- Inpatient spending PBPM increased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but increased by $70.29 less for the PTI group during the first three years of implementation (p=0.01).
- ED spending PBPM decreased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by $8.04 more for the PTI group during the first three years of implementation (p=0.04).
- Changes to professional spending did not differ between Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries during the first three years of implementation.
- Changes to prescription drug spending did not differ between Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries during the first three years of implementation.

Table C-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	135.08	128.72	222.22	250.81	−46.91 (−94.84, 1.02)	−34.7	0.11
Year 2	135.08	128.72	193.18	246.40	−83.75 (−154.29, −13.20)	−62.0	0.05
Year 3	135.08	128.72	219.28	259.77	−74.32 (−166.26, 17.61)	−55.0	0.18
Overall	135.08	128.72	210.64	252.15	−70.29 (−114.55, −26.03)	−52.0	0.01
ED spending PBPM ($)							
Year 1	69.51	64.57	56.70	61.29	−10.11 (−19.38, −0.84)	−14.5	0.07
Year 2	69.51	64.57	59.22	57.24	−2.87 (−13.86, 8.12)	−4.1	0.67
Year 3	69.51	64.57	52.11	57.11	−11.60 (−23.61, 0.41)	−16.7	0.11
Overall	69.51	64.57	55.92	58.56	−8.04 (−14.48, −1.59)	−11.6	0.04
Professional spending PBPM ($)							
Year 1	372.03	398.70	331.37	385.94	−30.45 (−56.60, −4.30)	−8.2	0.06
Year 2	372.03	398.70	303.19	341.96	−17.52 (−44.96, 9.91)	−4.7	0.29
Year 3	372.03	398.70	314.40	326.49	10.94 (−20.63, 42.52)	2.9	0.57
Overall	372.03	398.70	314.95	351.79	−10.58 (−27.41, 6.25)	−2.8	0.30

(continued)

Table C-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group (continued)

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Prescription drug spending PBPM ($)							
Year 1	146.20	133.60	114.58	119.06	−17.29 (−27.01, −7.57)	−11.8	0.003
Year 2	146.20	133.60	101.89	98.56	−6.84 (−16.45, 2.76)	−4.7	0.24
Year 3	146.20	133.60	124.78	103.29	13.50 (−4.19, 31.19)	9.2	0.21
Overall	146.20	133.60	113.73	106.95	−2.21 (−10.03, 5.61)	−1.5	0.64

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All spending outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 294,429. This number includes all person-year observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.2.3 Estimates of Practice Transformation Initiative's impact on utilization

Table C-1-4 shows the estimates of the PTI's impact on primary care physician visits and follow-up visits within 14 days of discharge for Medicaid beneficiaries attributed to PTI practices relative to comparison beneficiaries. The findings are as follows:

- The percentage of Medicaid beneficiaries with at least one primary care provider visit decreased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by 3.38 percentage points less for the PTI group during the first three years of implementation (p=0.02).
- Changes to primary care provider visits did not differ between Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries during the first three years of implementation.
- The percentage of hospital discharges with a follow-up visit within 14 days of discharge decreased for both Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by 2.1 percentage points less for the PTI group during the first three years of implementation (p=0.03).

Table C-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with at least one primary care provider visit during the year							
Year 1	90.70	86.81	93.56	80.42	6.98 (4.84, 9.12)	7.7	<0.001
Year 2	90.70	86.81	69.72	54.05	6.05 (1.17, 10.92)	6.7	0.04
Year 3	90.70	86.81	71.72	66.14	-1.90 (-6.24, 2.44)	−2.1	0.47
Overall	90.70	86.81	76.92	66.76	3.38 (0.94, 5.83)	3.7	0.02
Primary care provider visits per 1,000 beneficiaries							
Year 1	5,575.16	5,006.05	4,114.73	3,790.19	-111.51 (-307.09, 84.07)	-2.0	0.35
Year 2	5,575.16	5,006.05	2,878.38	2,339.81	304.77 (-30.19, 639.74)	5.5	0.13
Year 3	5,575.16	5,006.05	3,457.73	3,084.81	25.72 (-539.08, 590.53)	0.5	0.94
Overall	5,575.16	5,006.05	3,426.46	3,064.40	89.40 (-156.52, 335.33)	1.6	0.55
Percentage of hospital discharges with a follow-up provider visit within 14 days of discharge							
Year 1	56.13	50.35	57.02	47.07	4.09 (2.03, 6.15)	7.3	0.001
Year 2	56.13	50.35	50.84	42.96	2.17 (−0.56, 4.89)	3.9	0.19
Year 3	56.13	50.35	52.23	46.52	−0.07 (−3.49, 3.35)	−0.1	0.97
Overall	56.13	50.35	53.42	45.60	2.10 (0.50, 3.70)	3.7	0.03

(continued)

Table C-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge in Practice Transformation Initiative and the comparison group (continued)

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used a Poisson model to obtain D-in-D estimates for visits for primary care providers and logistic regression models for beneficiaries with at least one primary care visit and follow-up visits within 14-days of hospital discharge. The estimated primary care visit count was by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a follow-up provider visit within 14 days of discharge was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for any primary care provider visits is 294,429 and the total weighted N for follow-up visits within 14 days of hospital discharge is 51,049. These numbers include all person-year (or discharge-year) observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.2.4 Estimates of Practice Transformation Initiative's impact on quality

Table C-1-5 shows the estimates of the PTI on the rate of hemoglobin A1c (HbA1c) testing and retinal eye exams for Medicaid beneficiaries with diabetes attributed to PTI practices relative to comparison beneficiaries with diabetes. The finding is as follows:

- Changes in the percentage of beneficiaries with an HbA1c test and the percentage with a retinal eye exam did not differ between Medicaid beneficiaries with diabetes attributed to PTI practices and comparison beneficiaries with diabetes.

Table C-1-5. Differences in the pre–post change in hemoglobin A1c testing and retinal eye exams for Medicaid beneficiaries with diabetes in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of Medicaid beneficiaries with diabetes who received HbA1c testing							
Year 1	77.47	71.34	74.51	67.99	−0.07 (−2.76, 2.63)	−0.1	0.97
Year 2	77.47	71.34	71.75	64.09	0.61 (−3.13, 4.35)	0.8	0.79
Year 3	77.47	71.34	74.83	68.87	−0.50 (−3.69, 2.70)	−0.6	0.80
Overall	77.47	71.34	73.61	66.94	0.03 (−1.90, 1.95)	0.0	0.98
Percentage of Medicaid beneficiaries with diabetes who received a retinal eye exam							
Year 1	47.06	43.62	45.77	40.97	1.40 (−1.67, 4.47)	3.0	0.45
Year 2	47.06	43.62	38.76	36.63	−1.16 (−3.83, 1.52)	−2.5	0.48
Year 3	47.06	43.62	39.32	35.78	0.28 (−2.32, 2.88)	0.6	0.86
Overall	47.06	43.62	40.95	37.90	0.07 (−1.52, 1.67)	0.2	0.94

(continued)

Table C-1-5. Differences in the pre–post change in hemoglobin A1c testing and retinal eye exams for Medicaid beneficiaries with diabetes in Practice Transformation Initiative and the comparison group (continued)

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; HbA1c = hemoglobin A1c; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used a logistic model to obtain D-in-D estimates for the diabetes outcomes. The estimated probabilities for the HbA1c testing and retinal eye exam outcomes were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcomes is 19,602. This number includes all person-year observations for DE PTI and comparison group adult members with diabetes.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.3 Estimates of Practice Transformation Initiative's Impact on Adults and Children

The analysis assessed the Delaware PTI model's impacts on adults and children separately for a selected set of outcomes. Because the health care needs of adults and children differ, the PTI model could produce differential impacts on health care utilization and spending for these groups. Additionally, some of the participating practices were pediatric practices.

C-1.3.1 Estimates of Practice Transformation Initiative's impact on core outcomes for adults

Table C-1-6 shows the estimates of the PTI model's impacts on total spending PBPM, inpatient admissions, and ED visits for adult Medicaid beneficiaries attributed to PTI practices relative to adult comparison beneficiaries. The findings are as follows:

- Changes in total spending did not differ between adult Medicaid beneficiaries attributed to PTI practices and adult comparison beneficiaries during the first three years of implementation.
- Inpatient admissions decreased for both adult Medicaid beneficiaries attributed to PTI practices and adult comparison beneficiaries but decreased by 15.15 more admissions per 1,000 beneficiaries for the adult PTI group during the first three years of implementation (p=0.09).
- ED visits decreased for both adult Medicaid beneficiaries attributed to PTI practices and adult comparison beneficiaries but decreased by 172.92 more visits per 1,000 beneficiaries for the adult PTI group during the first three years of implementation (p=0.005).

Table C-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	1392.15	1336.03	1363.40	1447.61	−150.38 (−323.04, 22.28)	−10.8	0.15
Year 2	1392.15	1336.03	1337.78	1382.94	−115.47 (−323.29, 92.35)	−8.3	0.36
Year 3	1392.15	1336.03	1390.98	1416.79	−97.43 (−312.76, 117.91)	−7.0	0.46
Overall	1392.15	1336.03	1364.48	1415.68	−117.92 (−237.20, 1.36)	−8.5	0.10
All-cause acute inpatient admissions per 1,000 population							
Year 1	238.51	241.20	148.42	180.94	−32.02 (−59.00, −5.04)	−13.4	0.05
Year 2	238.51	241.20	119.47	131.39	−12.00 (−37.08, 13.07)	−5.0	0.43
Year 3	238.51	241.20	121.82	128.66	−6.31 (−29.83, 17.21)	−2.6	0.66
Overall	238.51	241.20	127.99	147.42	−15.15 (−29.66, −0.64)	−6.4	0.09
ED visits per 1,000 population							
Year 1	2293.47	2175.14	1547.95	1598.10	−147.14 (−326.04, 31.77)	−6.4	0.18
Year 2	2293.47	2175.14	1381.06	1451.03	−173.40 (−339.89, −6.91)	−7.6	0.09
Year 3	2293.47	2175.14	1236.87	1321.94	−190.61 (−365.35, −15.87)	−8.3	0.07
Overall	2293.47	2175.14	1371.06	1460.37	−172.92 (−273.60, −72.24)	−7.5	0.005

(continued)

Table C-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department for adult Medicaid beneficiaries in Practice Transformation Initiative and the comparison group (continued)

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model for the inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the estimated ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 163,059. This number includes all adult person-year observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.3.2 Estimates of Practice Transformation Initiative's impact on core outcomes for children

Table C-1-7 shows the estimates of the PTI model's impact on total spending PBPM, inpatient admissions, and ED visits for child Medicaid beneficiaries attributed to PTI practices relative to child comparison beneficiaries. The findings are as follows:

- Total spending decreased for both child Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by $44.48 more for the child PTI group during the first three years of implementation (p=0.003).
- Changes in inpatient admissions did not differ between child Medicaid beneficiaries attributed to practices and child comparison beneficiaries during the first three years of implementation.
- ED visits decreased for both child Medicaid beneficiaries attributed to PTI practices and comparison beneficiaries but decreased by 152.82 more visits per 1,000 beneficiaries for the child PTI group during the first three years of implementation (p<0.001).

Table C-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Practice Transformation Initiative and the comparison group

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	423.42	444.10	343.55	414.88	−57.52 (−89.36, −25.68)	−13.6	0.003
Year 2	423.42	444.10	303.41	368.21	−54.34 (−92.31, −16.37)	−12.8	0.02
Year 3	423.42	444.10	321.95	359.92	−24.30 (−74.48, 25.87)	−5.7	0.43
Overall	423.42	444.10	321.29	381.24	−44.48 (−68.79, −20.17)	−10.5	0.003
All-cause acute inpatient admissions per 1,000 population							
Year 1	73.44	80.04	68.71	72.77	2.44 (−6.33, 11.22)	3.3	0.65
Year 2	73.44	80.04	52.99	62.14	−4.14 (−15.70, 7.41)	−5.6	0.56
Year 3	73.44	80.04	56.78	69.77	−7.02 (−15.31, 1.27)	−9.6	0.16
Overall	73.44	80.04	58.75	68.13	−3.33 (−9.01, 2.36)	−4.5	0.34

(continued)

Table C-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Practice Transformation Initiative and the comparison group (continued)

Outcome	Baseline period adjusted mean, DE PTI	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, DE PTI	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
ED visits per 1,000 population							
Year 1	962.31	1027.37	583.11	836.97	−229.94 (−347.21, −112.68)	−23.9	0.001
Year 2	962.31	1027.37	519.06	672.64	−131.85 (−226.96, −36.73)	−13.7	0.02
Year 3	962.31	1027.37	498.34	635.44	−113.70 (−240.05, 12.65)	−11.8	0.14
Overall	962.31	1027.37	529.58	715.98	−152.82 (−218.46, −87.17)	−15.9	<0.001

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimate probability of any inpatient admission and the estimated ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that DE PTI and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 130,456. This number includes all child person-year observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.4 Annual Covariate Balance Between the Practice Transformation Initiative and Comparison Groups

As described in ***Appendix L**,* annual propensity scores were created for the overall comparison sample at the person-year level and at the inpatient discharge level and for any comparison subgroups. These subgroups included all adults, all children, and condition-specific subgroups created for quality outcomes.

Table C-1-8 shows covariate balance between the PTI and comparison groups in the last baseline year for the overall study sample. Covariate balance for the discharge-level and subgroup samples are not shown. The table includes the following:

- Covariate means for the PTI and comparison groups without propensity score weighting;
- Standardized difference between the PTI and comparison group means without propensity score weighting ("unweighted standardized differences");
- Propensity score-weighted means for the comparison group ("comparison weighted"); and
- Standardized difference between the PTI group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the PTI group. Although propensity scores were calculated in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included all covariates in ***Table C-1-8*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table C-1-8 shows balance between PTI and comparison group covariates before and after applying weights to person-year observations for Medicaid beneficiaries. Prior to propensity score weighting, standardized differences were above 0.10 for all practice characteristics and some of the area-level characteristics. After propensity score weighting, standardized differences decreased between the PTI and comparison groups, indicating that propensity score weighting improved covariate balance. In addition, for all covariates, standardized differences after propensity score weighting were below the 0.10 threshold, indicating an acceptable level of covariate balance. The only exception is for an indicator of ACO affiliation, which was not included in the propensity score model. Attempts to include this measure in the propensity score model were unsuccessful and led to worse balance on other covariates.

Table C-1-8. Covariate balance between Practice Transformation Initiative and comparison groups in the last baseline year, Medicaid beneficiaries

Variable	Unweighted mean or percentage, DE PTI	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	60.07%	59.22%	0.02	59.37%	0.01
Age in years	27.24	26.27	0.05	27.01	0.01
Age in years, squared	1,201.33	1,084.86	0.08	1,206.18	0.003
Percentage of people who are disabled	8.13%	7.06%	0.04	8.20%	0.003
Total months of enrollment during year	10.70	10.66	0.01	10.70	0.001
CDPS risk score[a]	1.59	1.50	0.04	1.66	0.03
Practice level					
Percentage of practices with two or three practitioners	27.11%	36.29%	0.20	24.99%	0.05
Percentage of practices with more than three practitioners	46.37%	41.67%	0.09	43.52%	0.06
Percentage of practices that are multispecialty	43.23%	25.68%	0.38	45.62%	0.05
Percentage of practices that are ACO-affiliated	90.21%	18.45%	2.08	22.37%	1.96
County level					
Percentage of people residing in a Metropolitan Statistical Area	100.00%	100.00%	Not applicable	100.00%	Not applicable
Percentage of people living in poverty	12.59	12.59	0.004	12.59	0.002
Hospital beds per 1,000 people	2.30	2.83	0.56	2.27	0.04
Median age in years	40.50	38.49	0.54	40.65	0.04
Percentage of people (under 65 years) without health insurance	7.63	6.85	0.57	7.69	0.04

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities. The CDPS score was logged in the propensity score and D-in-D models, but the unlogged version is reported in the table above.

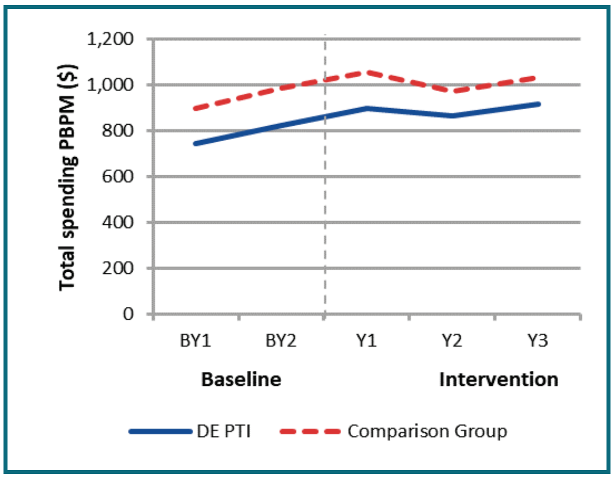
ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; DE = Delaware; D-in-D = difference in differences; ICD = International Classification of Diseases; PTI = Practice Transformation Initiative.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

C-1.5 Trends in Core Health Care Spending and Utilization Outcomes

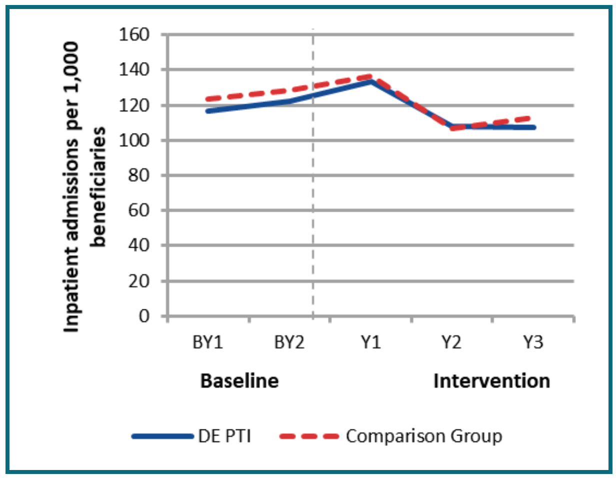
Figures C-1-1 through ***C-1-4*** show propensity score-weighted trends for all analysis years for the four core outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the PTI and comparison groups. As described in ***Appendix L***, the analysis examined outcome trends during baseline for the PTI and comparison groups to determine the specification of the D-in-D models. All outcomes appeared to exhibit parallel trends during the baseline period.

Figure C-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the Practice Transformation Initiative and comparison groups



Note: BY = baseline year; DE = Delaware; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative; Y = year.

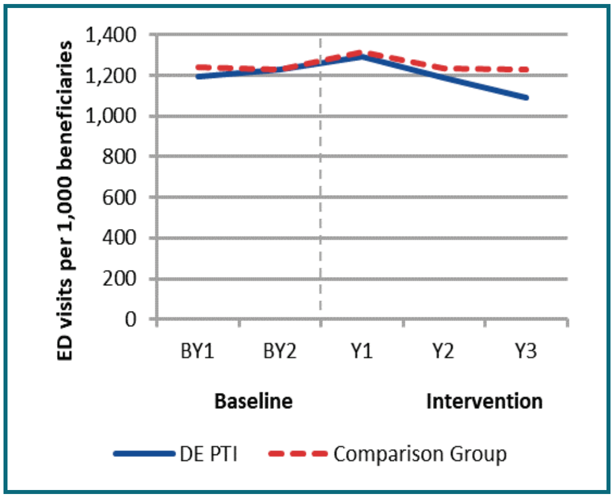
Figure C-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Practice Transformation Initiative and comparison groups



Note: BY = baseline year; DE = Delaware; IP = inpatient; PTI = Practice Transformation Initiative; Y = year.

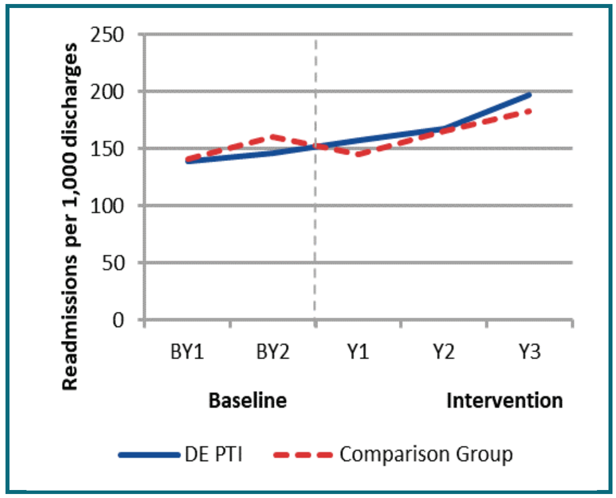
Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

Figure C-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Practice Transformation Initiative and comparison groups



Note: BY = baseline year; DE = Delaware; ED = emergency department; PTI = Practice Transformation Initiative; Y = year.

Figure C-1-4. Trends in readmissions per 1,000 discharges in the Practice Transformation Initiative and comparison groups



Note: BY = baseline year; DE = Delaware; PTI = Practice Transformation Initiative; Y = year.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

- Total spending PBPM increased during the baseline period, with a small decrease in the intervention period for both PTI and the comparison groups. The rate was consistently lower in the PTI group than in the comparison group (***Figure C-1-1***). The trends appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 beneficiaries increased slightly during the baseline period but decreased slightly during the intervention period for both the PTI and comparison groups. The PTI and comparison rates were similar (***Figure C-1-2***). The trends appear to be parallel during the baseline period.
- ED visits per 1,000 beneficiaries did not increase much during the baseline period, and the rate decreased a little more for the PTI group than for the comparison group during the intervention period. The PTI and comparison rates were similar (***Figure C-1-3***). The trends appear to be parallel during the baseline period.
- Readmissions within 30 days increased during the baseline period and intervention period for both PTI and the comparison groups, with a slight decline in readmission rates observed for the comparison group from baseline to the first intervention period. Otherwise, the rates were similar to each other (***Figure C-1-4***). The trends appear to be parallel during the baseline period.

C-1.6 Sensitivity Analysis

Table C-1-9 shows how the PTI model's impact estimates differ when D-in-D model specifications assume (1) parallel trends in outcomes between the PTI and comparison groups in baseline period (main analysis) and (2) non-parallel trends in the baseline period (sensitivity analysis). The estimates assuming baseline parallel trends are also reported in ***Table C-1-2***. The sign and statistical significance of the D-in-D models for total spending PBPM and ED visits were robust to the inclusion of a non-parallel, group-specific trend beginning the baseline period. On the other hand, the statistical significance of D-in-D estimates for inpatient admissions was sensitive to the inclusion of the non-parallel trend. The magnitudes of the D-in-D estimates for the models including non-parallel trends are so large that they lack face validity, suggesting that a model that assumes non-parallel trends is a poor fit for the data.

- The overall total spending PBPM D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming non-parallel trends, found a larger estimate (in absolute value).
- The overall inpatient admissions D-in-D estimate was not statistically significant in the main analysis, while the sensitivity analysis showed a statistically significant reduction in inpatient admissions.
- The overall ED visits D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming non-parallel trends, found a larger estimate (in absolute value).
- The overall readmissions D-in-D estimate was not statistically significant in the main analysis, while the sensitivity analysis showed a statistically significant reduction in readmissions.

Table C-1-9. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Total spending PBPM ($)		
Year 1	−95.49* (−178.60, −12.38)	−238.84*** (−346.87, −130.81)
Year 2	−82.88 (−191.94, 26.18)	−355.79*** (−514.35, −197.22)
Year 3	−47.64 (−179.26, 83.97)	−493.74*** (−723.33, −264.15)
Overall	−73.37* (−139.69, −7.05)	−374.70*** (−480.77, −268.64)
Inpatient admissions per 1,000 population		
Year 1	−1.53 (−17.27, 14.21)	−16.13 (−39.13, 6.87)
Year 2	−3.69 (−21.20, 13.83)	−26.73** (−46.70, −6.76)
Year 3	−7.14 (−26.60, 12.32)	−43.78*** (−70.76, −16.79)
Overall	−4.37 (−14.83, 6.09)	−30.11*** (−43.87, −16.35)
ED visits per 1,000 population		
Year 1	−163.06** (−290.45, −35.68)	−367.75*** (−544.12, −191.37)
Year 2	−153.63* (−297.29, −9.97)	−521.52*** (−717.84, −325.20)
Year 3	−189.63* (−371.22, −8.03)	−751.82*** (−1033.53, −470.11)
Overall	−169.40*** (−260.71, −78.10)	−564.35*** (−698.60, −430.09)
Readmissions within 30 days of discharge per 1,000 discharges		
Year 1	15.34 (−6.88, 37.55)	−7.40 (−36.47, 21.68)
Year 2	−2.71 (−22.14, 16.71)	−47.81 (−96.05, 0.42)
Year 3	14.53 (−15.55, 44.61)	−58.92 (−147.33, 29.50)
Overall	9.02 (−5.28, 23.33)	−39.29* (−75.87, −2.72)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; DE = Delaware; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PTI = Practice Transformation Initiative.

(continued)

Table C-1-9. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Practice Transformation Initiative and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a Poisson model to obtain D-in-D estimates for ED visits, and logistic regressions model to obtain D-in-D estimates for inpatient admissions and readmissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, a count of total months enrolled in the measurement year, and the logged CDPS score), practice-level variables (practice size, multispecialty practices, and ACO-affiliation status), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). As noted above, the main analysis assumed parallel trends during the baseline period. Assumptions about baseline parallel trends are included in the table above.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of DE PTI relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PTI group relative to the comparison group after PTI implementation. The relative difference is the D-in-D estimate as a percentage of the PTI baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 294,429; the weighted N for the readmission outcome is 40,781. These numbers include all person-year (or discharge-year) observations for both the DE PTI and comparison groups.

Source: Federal Evaluation Team analysis of DE Medicaid claims data from the DE Department of Health and Social Services.

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Appendix D: State Innovation Model in Model Test States: Idaho

Payment Model Development

- In 2016, independent of the SIM Initiative, Idaho Medicaid implemented a tiered per member per month payment model that rewarded practices with more advanced patient-centered medical home (PCMH) capabilities. Providers considered the PCMH model important to sustaining SIM-funded practice transformation.

Delivery Model Transformation

- Idaho succeeded in engaging 165 clinics in SIM-funded practice transformation to develop or enhance their PCMH capabilities, such as panel management and quality improvement.
- The state recognized 48 clinics as virtual PCMHs for improving service to rural and underserved areas.
- Thirteen community health emergency medical services (CHEMS) programs were established, and 107 community health workers (CHWs) trained.
- Eight clinics and one CHEMS agency added telehealth capacity.

Health IT and Data Analytics

- The SIM Initiative enabled 151 of the 165 clinics that received practice transformation support to exchange data via the Idaho Health Data Exchange (IHDE) and providers reported using that data to improve care.

Population Health

- Regional Collaboratives (RCs) (1) planned and conducted projects that addressed regional population health priorities and (2) supported all PCMHs in their region to develop new capacities and forge connections with other members of the medical-health neighborhood.

Sustainability

- The Healthcare Transformation Council of Idaho (HTCI) was formed to build on the transformation efforts begun under the SIM Initiative.

Implications

- Clinics located throughout the state and serving almost half of the state's population became PCMHs or increased their PCMH capabilities—and readied themselves to manage financial risk under value-based payment.

D.1 Key State Context and the Idaho State Innovation Model Initiative

D.1.1 Pre–State Innovation Model health care in Idaho

Before the state's SIM Initiative began in February 2015, Idaho had already developed a strong private/public partnership to advance the patient-centered medical home (PCMH) model as a means to improve care delivery and prepare for reimbursement models based on quality and value, rather than volume (***Exhibit D-1***). Much of this early work was funded by grants from the federal government and private foundations. Building on this early work, in 2010, the Governor established the Idaho Medical Home Collaborative (IMHC) by executive order to guide development, promotion, and implementation of a PCMH model statewide. The IMHC piloted a multi-payer PCMH model that ended in 2014, but the Medicaid agency and three of the four participating commercial payers continued to operate their individual PCMH programs. In addition, the state Medicaid agency had started to develop a payment model designed to reward practices that demonstrated more advanced PCMH capabilities.

Exhibit D-1. Idaho's health care landscape prior to the SIM Initiative included a strong private/public partnership to advance patient-centered medical home

Existing public/private partnership supportive of PCMH transformation, developed through prior grants and pilots

Close working relationship with Medicaid to align SIM Initiative to Medicaid's Healthy Connections PCMH payment model

Concentrated insurance market with many payers already engaged in VBP reform

Largely rural and frontier state with **widespread provider shortages**

Note: PCMH = patient-centered medical home; SIM = State Innovation Models; VBP = value-based payment.
Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Additionally, in 2013, the Idaho Department of Health and Welfare (IDHW) received a SIM Round One Model Design award from CMMI to design a plan for health care system transformation. The planners gathered input from the IMHC and other medical and behavioral health professionals, Public Health Districts (PHDs), private health insurance carriers, and Medicaid officials to identify needs and strengths of Idaho's primary care system. The resulting State Health Improvement Plan had a primary goal to, "redesign Idaho's health care delivery system from a fee-for-service, volume-based system to a value-based system of care that rewards improved health outcomes." It was the foundation for Idaho's SIM Initiative.

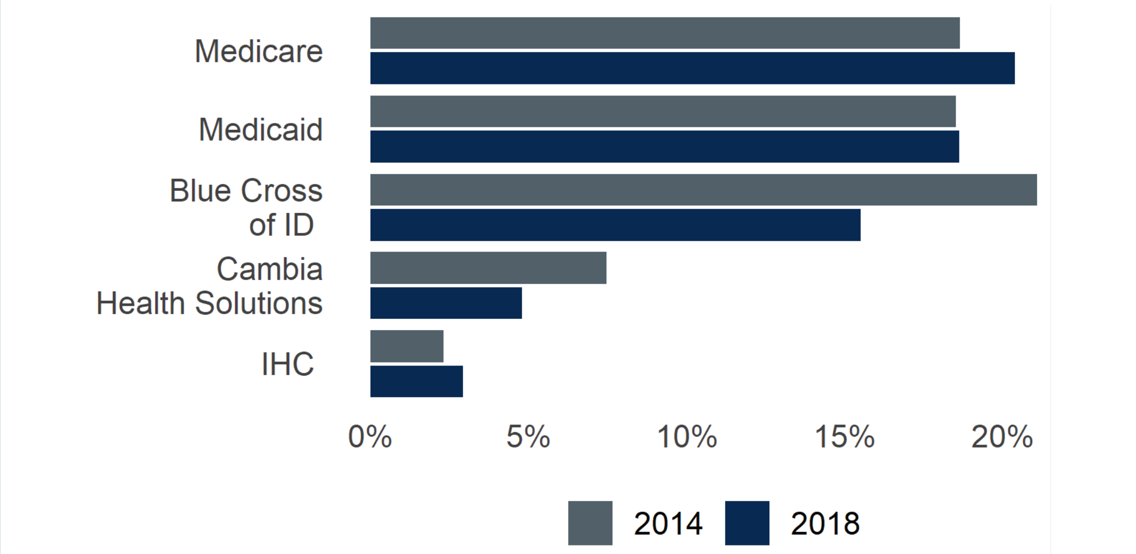
With the IMHC scheduled to sunset at the end of 2014, the Governor issued a new Executive Order establishing the Idaho Healthcare Coalition (IHC) to continue guiding the transformation of primary care to the medical home model. The IHC was co-chaired by a well-known physician leader and the deputy director of the IDHW, and it included a wide range of public and private stakeholders, many carrying over from the IMHC.

Idaho's SIM Initiative was implemented in a challenging environment. In 2015, 32 percent of primary care practices were located in rural areas and 54 percent had a single provider. Further, the state had widespread provider shortages. The state's largely rural nature combined with its health workforce shortages were major influences on the design of Idaho's SIM Initiative.

Before the award period Idaho had a high uninsured rate and a relatively concentrated insurance market. In 2014, the state's uninsured rate was 13.4 percent, 13th highest in the nation (Kaiser Family Foundation, 2021). Employer coverage was the dominant form of coverage and the largest commercial payer was the Blue Cross of Idaho Group, with over 20 percent market share—more than twice that of its largest commercial competitor. Medicare and Medicaid followed employer coverage, each serving roughly 18 percent of the state's population. By 2018, uninsurance remained high (11.1 percent) (Kaiser Family Foundation, 2021). Commercial health coverage was still dominant, with the largest insurers losing market share between 2014 and 2018. Medicaid covered essentially the same percentage of the population in 2018 as 2014. Voters passed a ballot initiative in November 2018 to expand Medicaid as allowed by the Affordable Care Act, but it did not take effect until January 2020. Medicare increased its share of covered lives, reflecting an aging population (see ***Exhibit D-2***). Fifteen percent of primary care practices had an existing involvement in a Medicare fee-for-service (FFS) alternative payment model (APM) (e.g., the Medicare Shared Savings Program).[34] This market structure may have influenced the design of Idaho's SIM Initiative, which focused on practice transformation to affect change in health care delivery across the state and did not rely on payer alignment.

[34] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit D-2. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Idaho are shown)



Notes: The health insurer, IHC Group, is not related to the IHC.

HIC ACS = Health Insurance Coverage from the American Community Survey; ID = Idaho; IHC = Idaho Healthcare Coalition; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

D.1.2 State Innovation Model Initiative in Idaho

The IDHW received the cooperative agreement that supported Idaho's SIM Initiative, but the IHC directed the program. The IHC formed topic-focused work groups and advisory groups as needed to support the work of the SIM Initiative. It disbanded when the SIM award ended on January 31, 2019.

The IHC identified seven high-level goals[35] to transform the state's health care system to one that delivered patient-centered care:

1. Transform primary care practices across the state into PCMHs;
2. Improve care coordination through electronic health records (EHRs) and health data connections among PCMHs and across the medical neighborhood;

[35] The Idaho State Health Improvement Plan Model website was taken offline in late 2020, but the State Health Improvement Plan goals are documented in the Idaho State Health Improvement Plan Final Report to CMMI and presentations (e.g., https://www.siphidaho.org/comhealth/ship/ISU-SHIP-and-PCMH-101.pdf) preserved on Idaho PHD websites.

3. Establish seven RCs to support the integration of each PCMH into the broader medical neighborhood;

4. Improve rural patient access to PCMHs by developing virtual PCMHs;

5. Build a statewide data analytics system to track progress on selected quality measures at the individual patient level, regional level, and statewide;

6. Align payment mechanisms across payers to transform payment methodology from volume to value; and

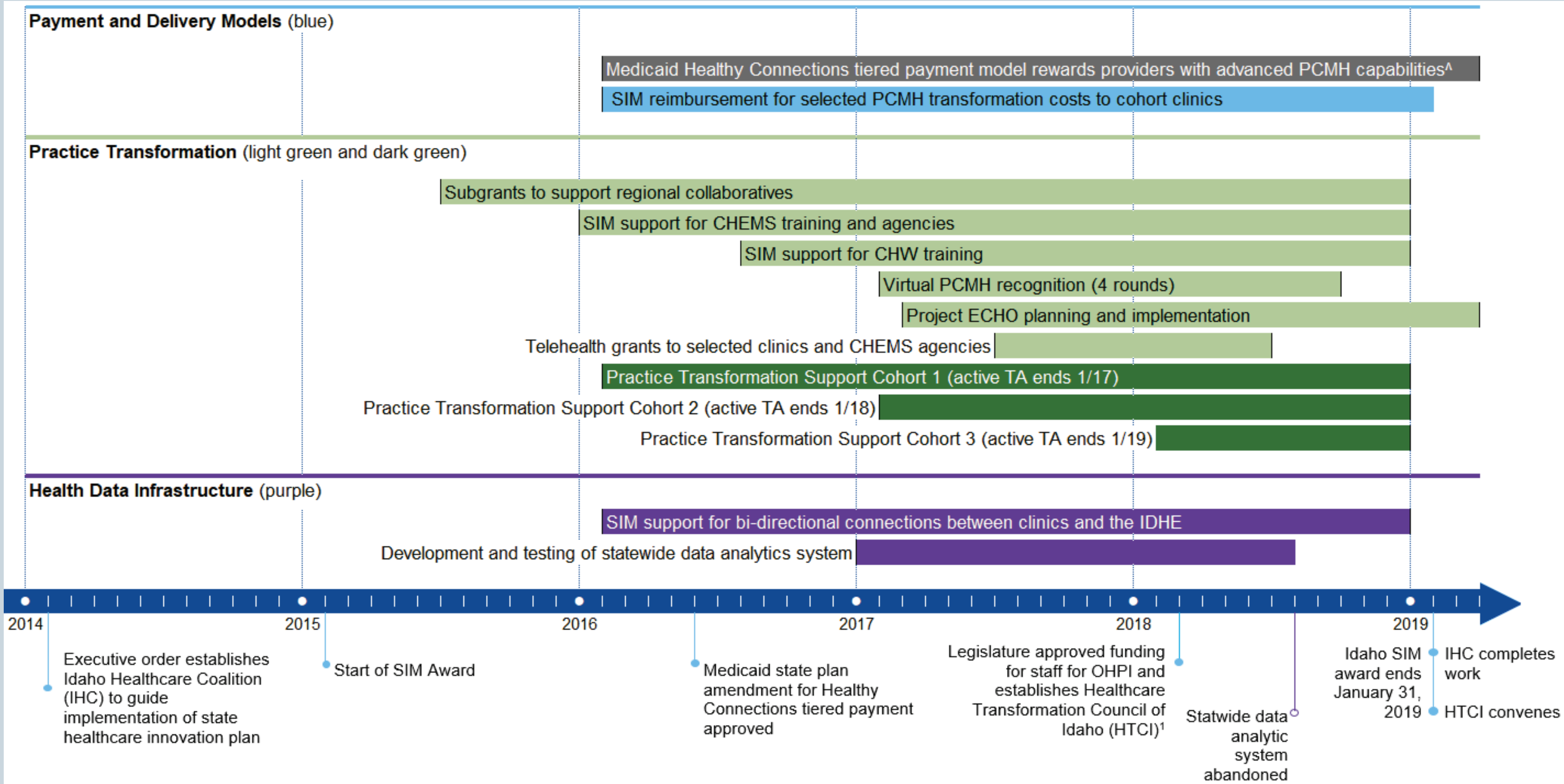
7. Reduce overall health care costs.

Although the SIM Initiative made minor adjustments to the initial implementation approach, no significant changes were made to the original goals.

Idaho's SIM Initiative, known in the state as the Idaho State Health Improvement Plan, concentrated mainly on practice transformation and health data infrastructure. Practice transformation activities included: (1) technical assistance (TA) and training for primary care practices, to help them to achieve recognition as PCMHs or to further enhance capabilities of established PCMH practices; (2) support for training and use of community health workers (CHWs) and community health emergency medical services (CHEMS); and (3) efforts to share best practices and expand care coordination through Regional Collaboratives (RCs), PHDs, and stakeholder engagement. Investments in health data infrastructure included financial support for bi-directional connections between participating clinics and the state's health information exchange (HIE), as well as efforts to develop a statewide system for reporting and tracking of a shared set of clinical quality measures.

Idaho's SIM Initiative did not implement a value-based payment model, although the IHC convened stakeholders to discuss alignment of payment mechanisms and methods across payers and promote value-based payments, particularly in its Multi-Payer Workgroup. The only direct financial incentives were lump-sum bonus payments paid to clinics for meeting certain milestones in the transition to becoming PCMHs. Although distinct from the SIM Initiative, Idaho Medicaid's Healthy Connections program provided tiered per member per month (PMPM) payments that rewarded practices with more advanced PCMH capabilities and further supported the state's practice transformation efforts. ***Exhibit D-3*** depicts the timeline of the major Idaho SIM Initiative and SIM-related activities.

Exhibit D-3. Timeline of Idaho SIM and SIM-related activities



Notes: [1] HTCI is not SIM funded but is meant to replace the IHC, which was the governing body of Idaho's SIM Initiative. Lighter shades (with [1]) of the same color bars denote similar activities or models. Gray bar (with ^) denotes that the item is not a SIM activity or policy but is important for context.

CHEMS = community health emergency medical services; CHW = community health worker; ECHO = Extension for Community Healthcare Outcomes; HTCI = Healthcare Transformation Council of Idaho; IHC = Idaho Healthcare Coalition; OHPI = Office of Healthcare Policy Initiatives; PCMH = patient-centered medical home; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

D.2 Accomplishments from Idaho's State Innovation Model Initiative

This section summarizes Idaho's SIM Initiative activities, accomplishments, and stakeholder feedback in three areas: delivery models and payment reform (***Section D.2.1***), enabling strategies to support health care delivery transformation (***Section D.2.2***), and population health (***Section D.2.3***). The chapter concludes by summarizing Idaho's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section D.3***), and a discussion of implications and lessons learned from Idaho's experience (***Section D.4***).

The federal evaluation of Idaho's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM Initiative officials;
- A total of 74 interviews with state officials, primary care providers (PCPs), Medicaid managed care organizations, and commercial plans and other stakeholders, over four annual interview rounds starting in 2016 and conducted most recently in spring 2019;
- Twelve focus groups with PCPs who accepted Medicaid and were affiliated with a practice that received SIM-funded TA, and Medicaid beneficiaries served by these practices; and
- Medicaid claims for calendar years (CYs) 2013–2019.

The quantitative analysis used Medicaid claims data to examine changes to program expenditures, service use, and quality measures for beneficiaries assigned to clinics participating in the SIM Initiative's practice transformation support program, compared to Medicaid beneficiaries assigned to clinics that did not participate. The state invested a substantial portion of SIM Initiative funds in the practice transformation support program, which involved a large number of providers and Medicaid beneficiaries—thus providing the best opportunity to quantitatively estimate program effects. The first two cohorts to receive practice transformation support started in 2016 and 2017, respectively, enabling two years of post-implementation Medicaid data for each group. Although the impacts of practice transformation might not be observed immediately, two years should be long enough to assess initial impacts.

D.2.1 Delivery models and payment reforms

Key Results
• Idaho met its goal of supporting 165 clinics (serving 43.6 percent of the population) to become PCMHs or further improve their performance as PCMHs. • Officials believed that clinic-reported improvements in workflow efficiency and data use prepared participating practices to succeed with VBP. • Forty-eight virtual PCMHs received recognition for better serving rural and underserved areas. In addition, 13 CHEMS programs were established, 107 CHWs were trained, and eight clinics and one CHEMS agency added telehealth capacity. • About 91 percent of insured people in the state received care reimbursed via a VBP model in 2019, but only 39 percent of total expenditures were paid through these models.

Delivery transformation framework

The SIM Initiative sought to transform Idaho's delivery system into one based on PCMHs operating within a medical-health neighborhood.[36] Three cohorts of competitively selected clinics participated in a SIM-supported one-year program that included both TA and financial assistance. The TA, discussed in ***Section D.2.2***, included group and individual assistance. In addition, each participating clinic was eligible for up to $17,500[37] in expense reimbursement to offset transformation costs, as well as a bidirectional connection to the Idaho Health Data Exchange (IHDE). Virtual PCMHs extended existing primary care resources in underserved and rural areas. ***Table D-1*** summarizes the state's progress on delivery system and payment reforms.

[36] Per page 132 of Idaho's AY4 Operational Plan: The medical-health neighborhood is "… is the clinical community partnership that includes the medical, social and public health supports necessary to enhance health and the prevention of disease, with the PCMH serving as the patient's primary "hub" and coordinator of healthcare delivery with a focus on prevention and wellness within the context of services available outside the clinic setting. The medical-health neighborhood can include medical specialists; community services such as food, housing and transportation; dietitians; behavioral health specialists; home health; dental professionals; community health workers, community health emergency medical services, education, social services, etc. that help provide wrap-around, community-level support for the PCMH and patient to achieve better health outcomes and wellness."

[37] Reimbursement was available to Cohort clinics that achieved specific milestones: up to $10,000 for PCMH transformation, $5,000 for national PCMH recognition, and $2,500 for becoming a virtual PCMH.

Table D-1. Idaho's delivery system and payment reforms

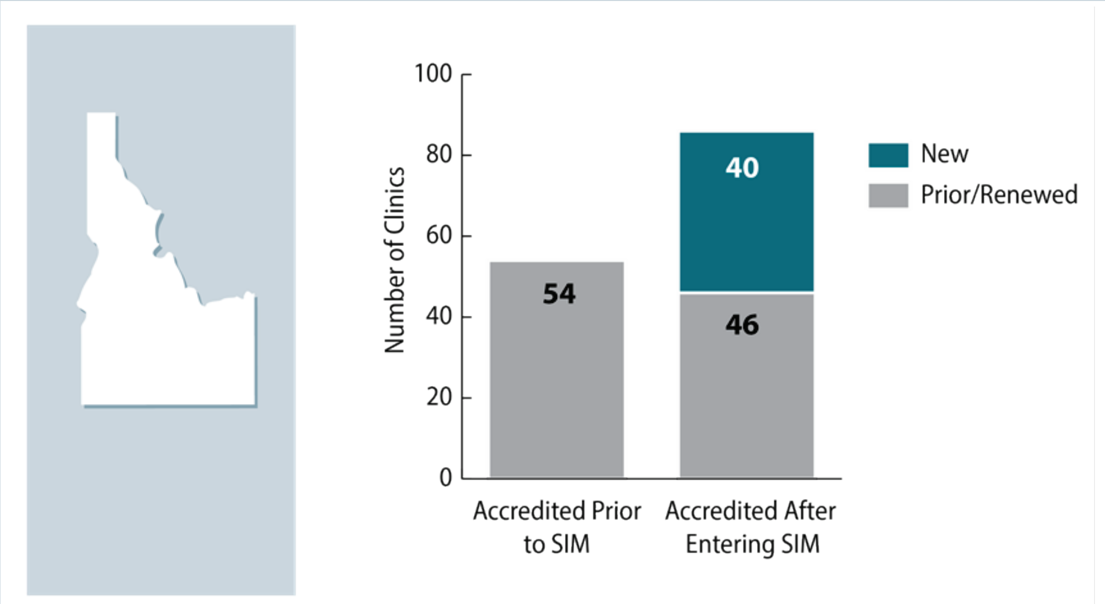
Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PCMH	Primary care clinics and their patients	• Provided TA and expense reimbursement to 165 clinics seeking to become PCMHs or improve performance. • As of January 2019, 86 of 165 participating clinics were nationally recognized as PCMHs. • The 165 clinics served 43.6% of the state's population.	• Participating clinics responsible for sustaining improved PCMH capabilities. • No new cohorts formed.
Virtual PCMH	PCMHs serving rural and underserved areas and their patients	• Idaho recognized 48 virtual PCMH clinics that added capabilities to serve patients in rural and underserved areas.	• Virtual PCMHs responsible for sustaining the new capabilities. • No new virtual PCMHs recognized.
Payment Reform	Providers and insured patients	• The SIM Initiative's practice transformation was aligned with Medicaid's Healthy Connections tiered PCMH payment model. • Medicaid was near to implementing two new voluntary payment models that built on the agency's existing PCMH model, both featuring shared savings and losses. • Commercial payers participated in the IHC, implemented VBP models, and showed increased interest in aligning measures.	• The Healthy Connections payment model continued as the base for new Medicaid VBP models. • Medicaid's new VBP models offered potential to reward efficient PCMHs that delivered quality care. • Commercial payers participated in HTCI, with a goal that 50% of all expenditures would be made via VBP by 2023.

Note: HTCI = Healthcare Transformation Council of Idaho; IHC = Idaho Healthcare Coalition; PCMH = patient-centered medical home; TA = technical assistance; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

The Idaho SIM Initiative award enabled 165 clinics to receive practice transformation support, meeting the state's goal set forth in 2015. These clinics, which were in all areas of the state, together served 712,433 people (43.6 percent of the state population).[38] As of January 2019, 86 of these 165 clinics were nationally recognized as PCMHs (***Exhibit D-4***).[39] An additional 24 clinics qualified for either Tier III or IV of Idaho Medicaid's Healthy Connections program, the highest tiers reflecting the most advanced PCMH capabilities.[40] Interviewees believed these achievements demonstrated the success of the PCMH effort—an opinion shared by every interviewees in all four of the site visits.

Exhibit D-4. Eighty-six of 165 clinics receiving practice transformation support received patient-centered medical home accreditation



Note: PCMH = patient-centered medical home; SIM = State Innovation Model.

Source: Idaho Statewide Healthcare Innovation Plan Final Report (4-30-2019): Statewide Healthcare Innovation Plan PCMH Transformation Team Closeout Report (Page 50).

[38] Idaho's Award Year 4, Quarter 4 Metrics report. Note: Because these data were not verified by CMMI, the RTI Team cannot attest to their accuracy. No data were provided about alternative payment or health care delivery models outside the SIM Initiative, and no payer-specific data were reported.
[39] Patient Centered Medical Home (PCMH) Transformation Team Contract AC057300 Closeout Report, p. 49.
[40] Healthy Connections is Idaho Medicaid's PCMH program. Under this program, providers qualify for one of four tiers depending on their PCMH capabilities—and tier level factors into the PMPM payments made to program participants. Source: https://healthandwelfare.idaho.gov/Default.aspx?TabId=216

Most providers interviewed believed the practice transformation they achieved with SIM Initiative support prepared them to engage in future delivery and payment system reforms. Most providers specifically mentioned improvements in workflow efficiency and use of data to improve the delivery of care as two of the most important enhancements needed to succeed with VBP. Two providers said they believed they would be able to sustain these transformations by participating in the VBP models already in place or under development, both in Medicaid and by commercial payers. Though these VBP models were not developed as part of the SIM Initiative, many were designed to support the PCMH model and most rewarded PCMHs for achieving outcomes of importance to the payers. The SIM Initiative enabled participating clinics to enhance their PCMH capabilities to participate successfully in VBP. Some providers mentioned that SIM Initiative participation enabled providers and other stakeholders to begin developing a common language and understanding of VBP.

> "… we know it's the new reality, and we also know it's a better way of providing health care. It's a more efficient way of providing health care, and it's a less costly way of providing health care."
>
> —Idaho provider

Idaho offered virtual PCMH recognition to incentivize cohort-participating practices to add one of three capabilities (CHWs, CHEMS, or telehealth) that extended PCMH reach into underserved areas. Idaho originally intended to recognize 50 virtual PCMHs by the end of the SIM award and, as of December 2018, had designated 48 virtual PCMHs. Each of these clinics received a reward of up to $2,500 to offset the cost of adding one of the required capabilities. But state officials administering the recognition process found that PCMHs frequently chose to incorporate one or more of these three capabilities without considering virtual PCMH recognition—finding that they had qualified for the payment reward only after the fact (see ***Section D.2.2*** for detail).

Payment reform framework

Idaho made significant progress in VBP uptake over the course of the SIM Initiative. In 2015, the state reported that, across all payers, 58.1 percent of covered lives were served by a provider paid via a VBP model and 24.1 percent of all payments were made via VBP (reflecting that Medicaid counted its beneficiaries in a VBP model but did not count its FFS payments as VBP, even if those payments were linked to quality in a VBP model). By 2019, those same numbers were 90.9 percent of all covered lives and 38.7 percent of all payments (Idaho Department of Health and Welfare, 2020, November 5). The large difference in VBP uptake when measured by beneficiaries versus by payment was due to the way the state

> "Changing your delivery of care is one of the key ingredients to achieving value-based payment. That's huge."
>
> —Idaho state official

Medicaid agency calculated VBP participation. All beneficiaries enrolled in Medicaid's Healthy Connections program (described in more detail later in this section) were considered to be receiving care through a VBP model, but only the PMPM care management fees were counted as VBP expenditures. The cost of the services enrolled beneficiaries received continued to be counted as FFS payments.

According to the state-reported data displayed in ***Table D-2***, there was little variation in VBP usage when measured by the percent of beneficiaries served by a provider participating in a VBP model—the numbers ranged from 89.1 percent in Medicaid to 93.4 percent in Medicare. There was, however, greater variation in VBP usage when measured by the percent of payments flowing through a VBP model. Commercial payers made the greatest percent of payments via VBP (54.4 percent) and Medicaid the least (16.8 percent).

Table D-2. Payer participation in a value-based payment model in Idaho by Alternative Payment Model framework category, 2019

Payer	Percentage of beneficiaries				Percentage of payments			
	Category 2: FFS linked to quality and value	Category 3: APMs built on FFS architecture	Category 4 Population-based payment	Total VBP by payer	Category 2: FFS linked to quality and value	Category 3: APMs built on FFS architecture	Category 4 Population-based payment	Total VBP by payer
Medicaid	83.6%	0.0%	5.5%	89.1%	0.9%	0.0%	15.9%	16.8%
Commercial	47.3%	27.6%	15.9%	89.8%	19.9%	28.7%	5.8%	54.4%
Medicare	84.0%	9.5%	0.0%	93.4%	42.9%	9.5%	0.0%	52.4%
All payers	65.1%	16.1%	9.7%	90.9%	17.1%	13.0%	8.6%	38.7%

Note: APM = alternative payment model; FFS = fee for service; VBP=value-based payment.

Source: https://publicdocuments.dhw.idaho.gov/WebLink/DocView.aspx?id=15993&dbid=0&repo=PUBLIC-DOCUMENTS (Idaho Department of Health and Welfare, 2020, November 5).

> "The future is essentially providing quality outcomes and good cost of care rather than generating income, and you generate income by providing those things."
>
> —Idaho provider focus group participant

The most significant change to VBP during this period was not designed or implemented as part of the SIM Initiative. In February 2016, Medicaid changed its Healthy Connections payment model to reward providers who had more advanced PCMH capabilities. This change was the culmination of a process undertaken by the Medicaid agency separate from the SIM Initiative. Specifically, Idaho Medicaid changed their payment structure from one that paid all PCPs the same PMPM case management payment to one that varied the PMPM payment based on the PCMH capabilities of the PCP. The agency did this by assigning participating providers to one of four Healthy Connections tiers and paying higher PMPM payments to providers belonging to higher tiers. Providers could move to higher tiers by adding PCMH capabilities such as an IHDE connection. The PMPM payments ranged from $2.50 to $10, based on beneficiary characteristics and provider tier. The tiered payment model met the Category 2 criteria of the Health Care Payment Learning & Action Network (HCPLAN) framework, which linked FFS to quality and value. Thus the percent of Medicaid beneficiaries served via a VBP model increased from 0 percent in 2015 to 81 percent in 2016, which, in turn, drove the increase in VBP usage across all payers from 58.1 percent of beneficiaries in 2015 to 85.4 percent in 2016 (Idaho Department of Health and Welfare, 2020, November 5). Although Healthy Connections was a distinct effort, the SIM Initiative's practice transformation support program helped clinics develop the PCMH capabilities needed to attain the highest tier levels (RTI International, 2017, December).

During the SIM award period, the Medicaid agency completed the initial design of the Healthy Connections Value Care program, which built on the PCMH model. The Healthy Connections Value Care program featured two new payment designs. The Accountable Primary Care Organization (APCO) payment model was designed for integrated networks of PCPs; the Accountable Hospital Care Organization (AHCO) payment model was designed for integrated networks that included at least one acute care hospital and a panel of PCPs. Because both models met the criteria of Category 3B of the HCPLAN framework, affiliating with networks in either model would automatically move PCPs into VBP Category 3. Both the APCO and AHCO models offered participating networks a share of any savings they generated and required them to share in any losses. Savings were shared between the Medicaid agency and the network based on network performance on specific quality measures—up to seven measures for the APCO payment model, and up to 10 for the AHCO model (Idaho Department of Health and Welfare, 2020, January 13a, 2020, January 13b)—as well as, importantly, the amount of financial risk the network selected. Contrary to the Medicaid agency's reported expectation that PCPs would be reluctant to accept risk, some PCPs showed eagerness to do so when allowed to choose their level of risk.

CMS approved the Medicaid state plan amendment implementing Healthy Connections Value Care in July 2020 (Centers for Medicare and Medicaid Services, 2020, July 14). As of August 2020, the agency had five networks under contract for the program. Three networks serving 20,709 beneficiaries at 25 service locations planned to participate in the APCO payment model. Two networks serving 72,449 beneficiaries at 95 locations planned to participate in the AHCO model (Idaho Department of Health and Welfare, 2020, July 16). In August 2020, however, the Medicaid agency announced the launch would be delayed until July 2021 because of the coronavirus pandemic.

Commercial payers became increasingly engaged in the SIM Initiative over the course of the Award, although they remained uninterested in developing a formal multi-payer alignment agreement. Interviewees representing payers, providers, and state officials reported that payers participated early in the SIM Initiative to learn about each other's activities. At first, payers were reluctant to even share information about their own payment models or spending, however, due to concerns that other payers would adopt their models—impeding their ability to differentiate themselves in the market. By the end of the SIM Initiative, however, payers and providers had become more willing to share some information about payment policies and the measures they used in their VBP models (see ***Section D.2.3)***. Payers also reported on their VBP use. Some interviewees attributed the increased information sharing to a change in the Multi-Payer Workgroup's leadership. Others described a growing understanding of the benefits of alignment to both providers and payers—and a growing realization that they could discuss their approaches without compromising their proprietary information.

> "What we've tried to do is align with what PCMH should be, the outcomes they should be driving."
>
> —Idaho payer

After the end of the SIM Initiative, Medicaid and commercial payers continued to work together to increase VBP use—adopting a goal of increasing the percentage of value-based payments in Idaho to 50 percent by July 1, 2023 (Idaho Department of Health and Welfare, 2020, July 16). The Healthy Connections Value Care program, payer and provider interest in VBP, and the work of the Healthcare Transformation Council of Idaho (HTCI) all contributed to continuing the drive to increase VBP in Idaho. Many payers were shifting toward ACO models, and one payer said they were working to lower the cost of care by implementing a model with attribution to community-based primary care practices instead of hospital-based primary care practices. One payer also noted that a future challenge for value-based expansion would be partnering with the self-insured employers, which were the largest payers in the market: "… working with [self-insured employers] and getting them to understand what fee-for-service was, what value-based [models] can be, and having them put their population pools into that, has been a key thing that's been important to us."

Value-based payment remained a particular challenge for providers in Idaho's rural communities and practices with small patient panels. Many payers required a minimum number of patients, typically about 1,000, before a provider could enter VBP contracts—a threshold many rural practices were too small to meet. In addition, some patients would travel to urban areas for specialty care, impeding care coordination. Despite these infrastructure and staffing challenges, Medicaid and private payers did develop methods to include rural practices in VBP. One payer reported incorporating rural communities into VBP models through a statewide Accountable Care Network. Another payer described developing value-based contracts with a network composed of community health centers including those serving rural areas.

Telehealth concerns continued through the end of the SIM award period. Providers reported that payers would not pay for telehealth. Payers said that provider perceptions were not true, and that payers were interested in increasing telehealth use. The Multi-Payer Workgroup prepared a matrix of payers' telehealth payment policies that was used in telehealth training, but despite this effort, as of April 2019 providers and payers, expressing increased frustration, still disagreed as to whether providers were being paid for telehealth services. Some providers described specific billing policies that prevented payment. One provider, for example, said they were required to take a patient's vitals (which could only be done in-person) to receive payment. Payers, in contrast, described the issue as providers still not billing using the correct codes. In July 2019, the HTCI created a telehealth taskforce to identify and address barriers to telehealth use in Idaho. In October 2020, the taskforce released its final report which included eight recommendations for increasing telehealth utilization, including items such as eliminating variation in terminology, policy and practice; supporting virtual care workforce development; and providing community education to promote consumer use (Idaho Department of Health and Welfare, 2020, October 15).

D.2.2 Enabling strategies to support health care delivery transformation

Key Results
• Direct TA and other supports were key in facilitating practice transformation efforts. • The state established 13 CHEMS programs trained 107 CHWs, and eight clinics and one CHEMS agency added telehealth capacity. • By the end of the SIM Initiative, most cohort clinics were connected to the IHDE, with provider focus group participants stating they were using the data in patient care. • Despite intensive efforts to improve data quality, the statewide data analytics system was unable to produce reports from the IHDE data that physicians could use. Efforts ceased in August 2018 to focus resources on getting more participating practices connected to the IHDE.

Idaho's delivery system and payment reform work through the SIM Initiative was supported by enabling strategies that included TA provided to clinics to support practice transformation, efforts to expand the rural health workforce, and facilitating health information technology (health IT) and quality measurement alignment. ***Table D-3*** describes Idaho's enabling strategies, the key accomplishments and challenges, as well as information on post–SIM Initiative sustainability for each strategy.

Table D-3. Idaho's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Practice transformation TA	PCMH clinics	• Provided access to webinars, learning collaboratives, individual coaching, an online portal, and a peer mentorship program.	• With no continued TA, PCMH sustainability relied on VBP models; some small, rural clinics might face financial challenges to PCMH sustainability.
Workforce development	PCMH clinics, community emergency medical services agencies, individuals receiving CHW training	• Over the course of the SIM Initiative, 107 CHWs were trained, 13 CHEMS programs established, and 12 telehealth sites established.	• The program's future depended on priorities identified by HTCI and possible opportunities with Medicaid's VBP models.
Health IT and data infrastructure	PCMH clinics	• Connecting cohort clinics to the IHDE took longer than anticipated. • As of January 31, 2019, 151 of the 165 cohort clinics were able to exchange some data via the IHDE; 111 of these clinics had full bi-directional connections. • Clinics were using the data in patient care.	• Cohort clinics responsible for ongoing IHDE fees. • Medicaid's Healthy Connections program encouraged ongoing IHDE connection as a qualification for a higher PMPM payment.
Measure alignment	PCMH clinics and their patients	• By November 2017, Idaho had built a statewide data analytics system that could produce reports on 10 clinical quality measures from IHDE data. • IHDE data quality was insufficient to produce accurate reports, so the state ended development in August 2018 to focus on connecting cohort clinics. • The SIM Initiative fostered a growing consensus among payers that some level of measure alignment would benefit both payers and providers.	• The HTCI adopted measure alignment as one of its priorities.

Note: CHW = community health worker; CHEMS = Community Health EMS; HTCI = Healthcare Transformation Council of Idaho; IHDE = Idaho Health Data Exchange; PCMH = patient-centered medical home; PMPM = per member per month; TA = technical assistance; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Practice transformation support

Providers could receive practice transformation support from three sources. First, as previously mentioned, over the course of the SIM Initiative, Idaho supported three cohorts of clinics seeking to become PCMH or enhance their PCMH capabilities. Cohort clinics received one year of active support which included group and individual TA provided by a contractor (TA contractor), as well as expense reimbursement (see ***Section D.2.1***) to offset transformation costs and a bidirectional connection to the IHDE. In addition, Idaho envisioned that the RCs (See ***Section D.2.3*** for a more complete discussion of RC responsibilities) would continue to help the cohort clinics continue their transformation journey after the end of the year of active support—and help other PCPs in the region enhance their PCMH capabilities. With SIM funding, each PHD hired both a Statewide Healthcare Innovation Plan manager and a quality improvement (QI) specialist to fulfill this aspect of their RC responsibilities. These staff helped cohort clinics collect and apply quality data; local PCPs select and conduct projects to enhance their PCMH capabilities; and PCPs and other providers in the local medical-health neighborhood to forge better connections. Finally, Medicaid Healthy Connections staff were available to help providers understand program policies, including how to qualify for a higher Healthy Connections tier.

These three organizations worked together to provide a coordinated set of supports that played a key role in facilitating clinics' practice transformation activities and advancing the state's practice transformation goals. The types of SIM-funded TA included information exchange through webinars, learning collaboratives, coaching calls, an online portal for clinics containing toolkits and other resources, and a peer mentorship program. Additionally, individualized coaching and practice transformation support was offered. Interviewees commented that having TA providers physically in the clinics was very important in supporting practice transformation work, particularly for small and rural clinics and for telehealth. Many interviewees identified the QI specialist as most effective in helping to advance the PCMH model.

The TA contractor hired a team of experienced coaches to work with the RC staff. These physicians, nurse practitioners, nurses, and public health professionals had expertise in helping primary care clinics transition to patient-centered care. In Cohort 1, the TA contractor's coaches were matched to clinics that best aligned with each coach's experience. In Cohort 2, coaches were assigned to each PHD and generally worked only with clinics in that region, which helped coaches build relationships with the RC's staff. In Cohort 3, coaches were primarily assigned to PHDs, but some adjustments were made to match a coach's expertise with a clinic's needs. At the end of each cohort, practices that had not yet achieved PCMH recognition or certification received guidance documents to help them continue their transformation efforts.

Training sessions and TA provided under Idaho's SIM Initiative primarily focused on standards for national PCMH recognition, patient-centered care principles, and practice transformation. Regular coaching calls typically covered such topics as managing new assignments among staff, staff engagement and team development, Plan-Do-Study-Act (PDSA) cycles, workflow improvement, and implementing and using new technology. Webinars covered such topics as population health, integration of behavioral health and primary care, oral health strategies, and chronic care management, not all of which were included in each cohort. Although most RC training focused on practice characteristics, some RCs held trainings on diabetes care, and individual clinics may have received targeted trainings for other health conditions.

Analysis of Medicaid claims for two data years for the first two cohorts indicated that practice transformation support under the SIM Initiative was associated with favorable changes in total spending and some beneficiary-level outcomes, largely for adult Medicaid beneficiaries (aged 18–64 years, excluding dually eligible Medicare and Medicaid beneficiaries) (***Exhibit D-5***). These findings reflect estimated changes to spending, service use, and quality measures for Medicaid beneficiaries assigned to clinics participating in the SIM Initiative's practice transformation support program, compared to beneficiaries assigned to clinics that did not participate. There were nationally certified PCMHs in the cohorts receiving practice transformation support and the comparison group, and both groups contained clinics with a range of PCMH capabilities. The results of the quantitative analysis are adjusted to account for the mix of Healthy Connections tier levels in each group. Results should not be interpreted as the impact from clinics becoming PCMHs or the Healthy Connections payment model. Instead, they are effects associated with receipt of the SIM Initiative's practice transformation support services, such as TA, coaching, and Idaho Health Data Exchange (IDHE) connectivity.

Claims-based analyses of Idaho's practice transformation

For more information, see ***Tables D-6*** and ***D-7*** in the Addendum at end of this chapter. For full results describing the impact of Idaho's practice transformation, see ***Appendix D-1***.

There were no changes in primary care use or well-child visits associated with Medicaid beneficiaries assigned to clinics receiving practice transformation support, compared to the comparison group. Although primary care visits might be expected to increase with the focus on routine and preventive care in the PCMH model, the SIM Initiative emphasis on efficiency and team-based care—combined with greater use of CHWs, CHEMS, and telehealth—might have reduced unnecessary primary care visits. The percentage of beneficiaries with follow-up visits after inpatient stays for those assigned to clinics receiving practice transformation support increased (2.8 percentage points) compared with the comparison group, which is consistent with expectations. The SIM Initiative facilitated bi-directional connections to the IHDE, enabling providers to track outside services; and some interviewees reported that their systems notified them of discharges and follow-up care needs. Despite the positive impact on follow-up care, readmissions following inpatient stays did not appear to change for beneficiaries assigned to clinics receiving practice transformation support compared to the comparison group, although the low frequency of inpatient stays in the generally young Medicaid population precluded precise estimates.

One goal of Idaho's SIM Initiative was to reduce overall health care spending. The claims-based analysis found that overall spending increased for both beneficiaries assigned to clinics receiving practice transformation support and those in the comparison group, but spending increased by $26.29 less per beneficiary per month (PBPM) for the practice transformation support recipients. This difference was driven by three factors. First, inpatient spending grew for both the practice transformation support group and the comparison group but increased by $12.99 less PBPM in the practice transformation support group. Second, health professional spending remained almost unchanged for the practice transformation group but increased for the comparison group, leading to a relative decrease of $7.37 PBPM for the practice transformation support group. Third, although prescription drug spending decreased for both the practice transformation support group and the comparison group, it decreased by $3.87 more PBPM in the practice transformation support group.

Exhibit D-5. Idaho's practice transformation support program had favorable impacts on spending in its first two years

39,320 Medicaid beneficiaries (112 primary care practices)

IDAHO PRACTICE TRANSFORMATION SUPPORT

	Medicaid	Medicaid – Adults
Spending	☑ Total spending PBPM: Smaller increase	☑ Total spending PBPM: Larger decrease
Utilization	☐ Inpatient admissions	☑ Inpatient admissions: Larger decrease
	☐ ED visits	☑ ED visits: Larger decrease

☑ Favorable, statistically significant ☒ Unfavorable, statistically significant ☐ Not statistically different

Notes: Changes are relative to a comparison group. A checkmark indicated a favorable impact.

ED = emergency department; ID = Idaho; PBPM = per beneficiary per month.

Source: Federal Evaluation Team analysis of ID claims data provided by the ID Department of Health and Welfare. See ***Appendix D-1*** for more detail.

The savings for beneficiaries assigned to clinics receiving practice transformation support relative to the comparison group were not associated with differential trends in key drivers of spending, such as emergency department (ED) use and inpatient stays. This apparent disconnect is explained by differences between outcomes for children and adults. Among adult Medicaid beneficiaries ages 19–64,[41] the number of ED visits per 1,000 beneficiaries decreased for those assigned to clinics receiving practice transformation support, but increased slightly for the comparison group (-107.96 ED visits per 1,000 adult beneficiaries). All-cause inpatient admissions per 1,000 adults decreased slightly in the practice transformation group but increased slightly for the comparison group, leading to a relative decrease in the inpatient admission rate in the practice transformation support group (-11.21 admissions per 1,000 adult beneficiaries). These differential impacts for adults are masked in the overall results because of the large volume of children relative to adults in Idaho Medicaid. Because Idaho did not expand Medicaid to non-disabled adults under the Affordable Care Act until January 1, 2020,[42] children made up 82 percent of the study sample. There were no significant differences in the trends for ED use, inpatient stays, or expenditures between children assigned to clinics receiving practice transformation support and comparison group children.

The lack of impacts for children may be due to relatively limited opportunities to streamline care and avoid hospitalizations for children, who are generally healthy and rarely hospitalized for preventable acute conditions. ED use might also have been difficult to curtail within the two-year follow up period, as changing patient behavior takes time and may be particularly difficult in rural and underserved areas with limited health care provider options. In addition, the clinics participating in the SIM Initiative also served adults covered by Medicare and commercial payers. All the commercial payers reported in interviews that they had a VBP model for PCPs that rewarded outcomes. Making improvements for adults was important to these payers because they covered more adults, so targeting adults might have made good financial sense for participating clinics because of commercial VBP rewards. (For more information, see ***Tables D-6*** and ***D-7*** in the Addendum at end of this chapter; for all results from analysis of Medicaid beneficiary-level effects, see ***Appendix D-1***.)

The clinics in Cohort 3 differed from earlier cohorts in their readiness to transform and their TA needs. Interviewees noted that Cohort 3 clinics were less familiar with the PCMH model compared to the prior two cohorts. Data from the state supported this perception—indicating that 31 clinics in Cohort 1 and 17 clinics in Cohort 2 were already accredited as PCMHs when their cohort began, compared to only six clinics in Cohort 3. The Cohort 3 clinics

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[41] Excluding adult beneficiaries eligible for Medicare, for whom Medicaid is not the primary payer and therefore not all use and expenditures could be tracked using Medicaid claims.
[42] During the SIM Initiative, the Medicaid income eligibility limit for non-disabled adults in Idaho was 26 percent of the federal poverty level (FPL)—an annual income of $5,241 for a family of three in 2016—and childless adults were not eligible. Children were eligible up to 138 percent of the FPL, which was an annual income of $27,820 for a family of three in 2016.

also were more likely to be independent, private practices rather than associated with larger health systems, and many were in rural areas. Even so, state officials reported that Cohort 3 clinics were very eager to be engaged in practice transformation. Many Cohort 3 clinics reported having been interested in participating earlier but lacking the capacity to do so in time for the first two cohorts. To address the clinic-specific needs of Cohort 3, state officials worked with the TA providers to tailor trainings, characterized as "back to basics," to focus on PCMH model fundamentals. Practice transformation does not happen overnight. Only 15 of the 53 clinics in Cohort 3 had received national PCMH accreditation by the end of the cohort in January 2019.

The claims-based analysis did not include Cohort 3, because two years of follow-up data were not available for the final cohort. Because the two cohorts that were included in the claims-based impact analysis included much higher representation of large urban clinics that had already achieved PCMH accreditation when they entered Cohorts 1 and 2, the results of the impact analysis may not be generalizable to less experienced, rural, or independent private practices.

Interviewee comments on PCMH implementation varied. Many interviewees appreciated the positive effects of the PCMH model on how clinics delivered care and maximized the value of staff resources—although they noted the heavy lift for smaller clinics with fewer overall resources, which might make it difficult for smaller and rural clinics to sustain the PCMH model over time. Some interviewees noted that each PHD received the same amount of funding to support their RC and each hired only one QI specialist. This might have resulted in rural areas, with fewer clinics and providers, having relatively more RC resources than more populous regions with more providers and clinics. This relative shortage of RC resources might have hampered practice transformation progress in the more populous districts, thus reducing the potential for stronger impacts.

Workforce development

Over the course of the SIM Initiative, 107 CHWs were trained (the original state goal was 125) and 13 CHEMS programs established (the original goal). Some interviewees commented that CHEMS was a useful model for many practices, and that counties were able to leverage the model to meet their local needs. One provider's practice prioritized financing CHWs with the practice's own funding, because they recognized the value of CHWs' role in promoting patients' health. Other practices used the SIM Initiative funding as an opportunity to train their existing staff to be CHWs, to enable them to better respond to patient needs. State officials noted that new and useful partnerships were developed with local universities through development of CHW training courses, and that Idaho State University would continue the CHW curriculum after the SIM Initiative ended. Many interviewees said CHW and CHEMS sustainability would depend on continued VBP growth.

State officials noted that the SIM Initiative was able to meet the goal of establishing 12 telehealth programs at eight clinics and one CHEMS site. However, some clinics were more successful implementing telehealth than others, due to different levels of experience as well as motivation to incorporate telehealth. Some state officials mentioned that having a telehealth consultant through the SIM Initiative was very helpful to clinics for implementation and navigating reimbursement. One provider noted that implementation of telehealth in rural and frontier areas could be improved if patients could have telehealth visits in their homes, rather than needing to travel to clinics. Overall, interviewees highlighted that telehealth was inherently challenging because it required investment in technology, workflow changes, and establishment of appropriate reimbursement mechanisms (see ***Section D.2.1***). Despite these challenges, one state official thought telehealth was already having a positive impact on care delivery in rural areas, particularly by increasing access to behavioral health services in remote regions of the state. The state's efforts to extend telehealth under the SIM Initiative contributed to rapid expansion of telehealth services during the coronavirus disease 2019 (COVID-19) public health emergency. The Department of Insurance reported 17,075 percent more telehealth visits for commercial insurers in Idaho between March and July 2020 (83,140 total visits) compared to the same period in 2019 (516 total visits) (Idaho Department of Health and Welfare, 2020, October 15).

> "The patients [had] to go to those rural and frontier clinics to be able to do telehealth, so [it] kind of defeated the whole purpose of telehealth."
>
> —Provider interview participant

Idaho continued work that began in March 2017 to establish a Project ECHO (Extension for Community Healthcare Outcomes) site to enhance health workforce capacity, using remaining funds from the telehealth grant program, which Project ECHO replaced. Cohort clinics were given priority to enroll as ECHO spokes in the sessions, which were offered bi-weekly for six months. Idaho launched two topic areas—one on opioid addiction and treatment in March 2018, and another on behavioral health in primary care in September 2018. Project ECHO was continued through funding from a three-year SAMHSA grant awarded in October 2018.

State officials commented that the practical components of the virtual PCMH model—CHWs, CHEMS, and telehealth—turned out to be more significant drivers for practices' engagement than the model concept as a whole. Some clinics that were already incorporating one of the virtual PCMH components, for example, chose not to apply for virtual PCMH designation. State officials had thought the virtual PCMH model incentive would be needed to encourage PCMHs to adopt and integrate telehealth, CHEMS, or CHWs, but found that clinics were more driven to selectively pursue the individual initiatives. State staff offered three reasons why clinics likely took this approach: (1) the reimbursement amount was insufficient to motivate pursuit of virtual PCMH status on its own; (2) the concept of implementing CHWs, CHEMS, or telehealth as individual programs was more immediately understandable; and (3) support for implementing CHW, CHEMS, and/or telehealth was sufficient in itself to incentivize their adoption (see ***Section D.2.1***).

Health information technology and data infrastructure

Idaho's SIM Initiative called for building a comprehensive health IT infrastructure based on connections to the IHDE to support care delivery improvement. As of January 31, 2019, 151 of the 165 cohort clinics were able to exchange data via the IHDE to some extent, and 111 of these clinics had full bi-directional connections (i.e., were able to both contribute and receive all data available through the IHDE).[43] Almost all clinics were connected by the end of the SIM Initiative, but full implementation suffered major delays. Idaho state officials anticipated that all 55 members of Cohort 1 would be exchanging data via the IHDE by January 31, 2017, but only 26 of these clinics were exchanging data by April 2017 and 37 by December 31, 2017, almost a full year past the expected date. Most stakeholders ascribed the delays to IHDE leadership turnover and management problems.

Once connected to the IHDE, access to data enabled clinics to improve the care delivered to patients. Providers in interviews and focus groups reported that they were, indeed, using the data. One interviewee indicated using information from the IHDE to help identify care needs in the practice. Most focus group providers reported that their EHRs were "auto-populating" with information about hospital admissions and discharges and other services, and the providers received alerts about admissions and ED visits. One participant noted sometimes receiving documentation from the hospital, including discharge summaries indicating changes in medications and needed appointments. Several focus group providers reported they were able to use their EHRs to help identify gaps in their patients' care, such as missed mammograms. Some providers used their own EHR data to generate reports, others received reports from payers. Still, payers reported being unable to use the IHDE data in their efforts to improve quality.

> "… as long as the patients are participating in the data exchange, which most patients do, and then the other practices, then you can get everything without having to go through a cumbersome request and faxing."
>
> —Idaho provider focus group participant

Quality measure alignment

The Idaho SIM Initiative planned to build a statewide data analytics system that would draw on the IHDE data to produce 16 clinical quality measures, and then produce reports of performance on these measures at the individual, clinic, regional, and statewide levels. The SIM Initiative hired a contractor to produce the data reporting system. By November 2017, that contractor had built and tested a system that could report performance on 10 clinical measures and planned to add the final six measures in July 2018. The IHDE also developed a tool to transfer its EHR data to the data analytics system. However, through the report production process, the SIM Initiative found sufficient gaps and inconsistencies in the EHR data to make the resulting reports unusable, and ultimately cancelled the contract for the statewide data analytic

[43] Idaho Statewide Healthcare Innovation Plan Award Year 4 CMMI Annual Report Addendums. Pp. 25–26.

system. This change freed up funding to continue to build clinic connections to the IHDE. But the lack of performance reports hindered the SIM Initiative's work to measure impacts on quality of care or to identify areas of need.

Interviewees expressed differing views about any future for a statewide data analytic system. Some held the view that Idaho still needed a statewide data analytic system. Others believed that even a "state-of- the-art" EHR simply could not support such a system at least at the time. One interviewee was hopeful that the HTCI would take up the charge of data standardization, enabling creation of a statewide data analytic system. Another interviewee felt Idaho was close to the goal of producing clinical quality measures, at least for Medicaid.

> "… there was a lot of momentum at the end in terms of aligning on quality measures and defining among the paying community what is it that we want to measure and how do we make it so that it's not onerous or have a huge provider burden?"
>
> —Idaho state official

Still other interviewees were optimistic that an effort to align payers on measure specifications might yet succeed. As of March 2018, payers were beginning to coalesce around the idea of developing a "menu" of measure specifications that payers could voluntarily draw on for their VBP and QI purposes, as noted earlier. But the SIM Initiative ended before payers reached agreement on a common set of measure specifications. Many stakeholders expressed optimism that the HTCI would take up this effort, building on the trust among stakeholders fostered by the SIM Initiative and lessons learned from the attempt to build the statewide data analytic system. In June 2019, the HTCI created a Payer-Provider Workgroup to continue the efforts of the Multi-Payer Workgroup, including alignment of quality measures (Idaho Department of Health and Welfare, 2019, July 16).

D.2.3 Population health

Key Results
• Most interviewees viewed the SIM Initiative as helping to increase communities' capacity to address population health issues. • The RCs had varied success, depending on leadership, and continued to face data challenges. • Development of the medical-health neighborhood concept varied by region.

Regional Collaboratives

The SIM Initiative established seven RCs, one in each of the state's seven PHDs. The RCs supported efforts to help PCPs, including cohort clinics, move forward in practice transformation. The RCs connected practices to the broader medical-health neighborhood to advance care coordination, and implemented regional population health initiatives. RCs also contributed to the SIM Initiative's development of a population health plan, *Get Healthy Idaho,* as part of the Division of Public Health's accreditation process. ***Table D-4*** provides a brief description of Idaho's population health activities, their respective accomplishments and challenges, and sustainability plans.

Table D-4. Idaho's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
RCs	PCMHs and PHD residents	Success depended on leadership; there were challenges with lack of actionable data.	Most RCs would go dormant, although RCs in two PHDs merged to continue their efforts.
Medical-health neighborhood	PCMHs and PHD residents	Development varied by region.	Sustainability would likely depend on the RC's status in each PHD.

Note: PCMH = patient-centered medical home; PHD = Public Health District; RC = Regional Collaborative; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

"I think one of the most important parts for developing the RCs and medical-health neighborhood has been having the right person for the right job."

—Idaho state official

Strong leadership at both the PHD and the RC physician leadership level was a key factor in relative RC effectiveness, according to many interviewees. Some RCs placed greater priority than others on population health initiatives. However, the lack of actionable data, which was to have been supplied by the statewide data analytics system hampered all RCs' population health work. Some RC staff worked directly with providers or cohort clinics to obtain data or used Medicaid or community health assessment data. One provider expressed disappointment that the SIM Initiative never realized the potential of the statewide data analytics system. Idaho's vision was that this system would produce regional reports from IHDE data to help stakeholders make data-driven decisions about where to focus their population health efforts and measure the impact of their efforts. The lack of the reports prevented RCs from demonstrating their cost-effectiveness, which in turn created RC sustainability challenges (see ***Section D.3*** for further discussion).

Most interviewees viewed the locally driven RC model as a successful structure to meet the state's diverse needs, although some commented that RCs might have benefited from more centralized guidance from the state. One state official commented that, with the PHDs being quasi-governmental and operating independently, some took greater control than others in guiding the RC work. Another state official reflected that the state possibly should have been more prescriptive in how the RCs functioned in terms of stakeholder involvement and areas of focus. One interviewee differed from this view, noting that a strongly government-led model would not have worked well in Idaho. This interviewee thought that the RC model was a good compromise for the state because it was a hybrid between a fully decentralized, community-driven model and a fully centralized one.

Each region took a different approach in creating its medical-health neighborhood, based on the guidance of its RC. One state official expressed that the overall vision for the neighborhoods ideally would have involved more than linking PCPs with specialists and health educators, but also possibly producing community-level policy changes to promote population health. A state official reflected that it might be easier to make inter-agency connections in small, rural communities, where all stakeholders knew one another. The same official noted that medical-health neighborhoods in some rural areas had great success with monthly meetings and implementation of localized efforts such as nutrition initiatives involving grocery stores. Although some interviewees felt there was a relatively clear vision of the medical-health neighborhood concept, one stakeholder described the concept as never clearly defined. And one provider group representative noted that the state could have provided more assistance in helping medical-health neighborhoods develop, especially given that the resources available for such an effort did not vary by the size of the community—disadvantaging more populous regions.

Overall impact of the State Innovation Model Initiative on population health

Many interviewees credited the SIM Initiative with helping advance the ability of communities to focus on population health issues, although the capacity to move forward on population health initiatives varied by region. One state official noted that the state's efforts increased awareness among providers about the importance of considering broader population health issues, and provided public health stakeholders with ideas for developing new partnerships that included non-traditional public health entities to promote population health goals. Overall, interviewees thought the SIM Initiative contributed to development of the *Get Healthy Idaho* population health improvement plan, improved communities' focus on and capacity to address population health, and helped initiate conversations around measuring population health outcomes.

> "When you have something like the SIM grant [i.e., award] that brings them [people] together to talk about the whole person care and focus and community focus, it was really beneficial."
>
> —Idaho state official

D.3 Sustainability

Key Results
• Idaho created the HTCI to build on the work of the SIM Initiative and continue health care transformation. • There was little state funding for staff in either the OHPI or the RCs; their success in obtaining future funding will be a critical factor for sustainability. • Idaho did not intend to recruit more primary care practices to participate in PCMH transformation, but will focus primarily on VBP expansion.

The HTCI was the primary driver for sustainability after the SIM Initiative, with a broad mandate to continue health care transformation (***Exhibit D-6***). Conceptualized by the IHC and created by the state legislature, the HTCI launched in February 2019 with a focus on promoting advancement of a "person-centered health care delivery system" through changes in both the delivery system and payment models in the state. Stakeholders involved in developing the HTCI recommendations indicated that they planned the 25-member HTCI to be large enough to include a broad-based group of stakeholders from around the state, but small enough to be an effective working body.

> "… the value of HTCI for me and this sustainability effort is to continue to have the people around the table so we can continue to talk and share data, because we will never get from point A to point B if we're not doing that together."
>
> —Idaho state official

The HTCI established two goals early on: (1) increase the percent of payments made via VBP models to 50 percent by 2023; and (2) improve the health care quality, access, and health of Idahoans. These goals built directly on the state's SIM Initiative experience and accomplishments. As of October 2020, the HTCI had been working toward those goals for almost two years. Their work sustained some of the efforts begun under the SIM Initiative, such as tracking VBP adoption across payers using the structure developed under the SIM Initiative. The HTCI also continued to work on some issues left unresolved at the end of the award period. For example, in July 2019, the HTCI created a telehealth taskforce to identify and address barriers to telehealth use in Idaho. In October 2020, the taskforce released its final report, which included eight recommendations for increasing telehealth utilization—including eliminating variation in terminology, policy, and practice; supporting virtual care workforce development; and providing community education to promote consumer use (Idaho Department of Health and Welfare, 2020, October 15).

Exhibit D-6. Key steps to sustaining progress from Idaho's SIM Initiative

FINANCING

- State funding to support the HTCI, which will guide health care transformation after SIM
- HTCI obtained additional funding from state, federal and private sources
- Regional Collaboratives funded by private and state dollars
- Healthy Connections payments enable clinics to sustain practice improvements

STRUCTURE

- HTCI promotion of person-centered health care delivery and increased VBP use
- HTCI workgroups:
  - Payer-Provider
  - Rural and Frontier Healthcare Solutions
  - Telehealth Task Force
  - Rural Nursing Loan Repayment Task Force
- Regional Collaboratives' continued operation in some parts of the state

ACTIVITIES

- Regular HTCI and workgroup meetings
- Tracking VBP use with tools developed under the SIM Initiative:
  - Goal: 50% of all payments through VBP by June 2023
- Practice transformation support through online portal, peer mentoring
- Continued investment in workforce development

Note: HTCI = Healthcare Transformation Council of Idaho; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

In 2019, the Governor approved Office of Healthcare Policy Initiatives (OHPI) funding for limited staffing and general state funds to support the HTCI, with the expectation of future dedicated revenue to come from private and public grants (Idaho Joint Senate Finance House Appropriations Committee, 2018). At that time, OHPI was seeking additional funding opportunities, which stakeholders emphasized would be necessary to support continued transformation work after the SIM Initiative. As of October 2020, the OHPI had secured substantial funding for the HTCI from the federal government, state legislature, and private foundations (Idaho Department of Health and Welfare Division of Public Health Office of Healthcare Policy Initiatives, 2020, October 26).

Idaho did not intend to continue the SIM Initiative's intense investment in practice transformation support. It was a one-time investment of resources to create changes in practices that could be supported by other means—like increased use of VBP. Still, the work in some RCs continued in select PHDs. Districts 3 and 4, which were leaders in developing the medical-health neighborhood, merged to continue beyond the SIM Initiative as a new entity called the Western Idaho Community Health Collaborative. The chairs and SIM Initiative managers of Districts 3 and 4 had been proactive in building relationships and had a history of involvement with IHC. In addition, the districts themselves had access to community resources (such as the Oral Health

Council and Diabetes Council) available in their relatively urban/populous regions. In District 6, the RC's suicide prevention efforts were continued through the hiring of a program manager. The RCs of Districts 1, 2, 5, and 7 had built relationships and created resources they could utilize after the SIM Initiative; but without further funding, most of their work became dormant. (For a brief description of Idaho's sustainability plans for each SIM Initiative activity, see ***Table D-5***).

Table D-5. Sustainability of Idaho's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/payment system	PCMH Transformation via cohorts	No	Not applicable.
	Virtual PCMH	No	Not applicable.
	VBP Convening	Yes	State Investment via HTCI.
	Quality measure alignment	Yes	State Investment via HTCI.
Population health	RCs	Limited	State investment for Districts 3 and 4.
	Medical-health neighborhood development	No	Not applicable.
Practice transformation	TA and coaching	No	Not applicable.
	Webinars and learning collaboratives	No	Not applicable.
	Reimbursement for transformation costs	No	Not applicable.
	Online portal with toolkits and resources	Yes	State investment.
	Peer mentoring program	Yes	Volunteer basis.
Workforce	CHW training	Yes	University funding.
	CHEMS training	No	Not applicable.
	Project ECHO	Yes	SAMHSA three-year grant awarded in 2018.
Health IT	Funding for connecting practices to IHDE	No	Not applicable.
Data analytics	Statewide data analytics system	No	Not applicable.

Note: CHEMS = Community Health Emergency Medical Services; CHW = community health worker; ECHO = Extension for Community Healthcare Outcomes; health IT = health information technology; HTCI = Healthcare Transformation Council of Idaho; IHDE = Idaho Health Data Exchange; PCMH = patient-centered medical home; RC = Regional Collaborative; SAMHSA = Substance Abuse and Mental Health Services Administration; SIM = State Innovation Model; TA = technical assistance; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

D.4 Implications of Findings/Lessons Learned

- Idaho, through the IHC and its workgroups, provided opportunities for multiple stakeholders to provide input and influence the SIM Initiative's work. The resulting widespread support for the SIM Initiative were a key factor in meeting program goals and building the foundation for continuing health care transformation in the state.

- By the close of the SIM Initiative Idaho had made major progress toward its goal of strengthening its primary care system by spreading the PCMH model statewide and arming PCMHs with the capabilities needed to succeed under VBP—almost half of the state's population was served by clinics that had undergone SIM-supported PCMH transformation.

- Medicaid's implementation of the tiered Healthy Connection payment model was the major factor in increasing VBP usage, as measured by percent of covered lives, from 58.1 percent in 2015 to 90.9 percent in 2019.

- Challenges with health IT persisted throughout the SIM Initiative. The quality of the IHDE data was ultimately judged insufficient to enable the statewide data analytics system to produce actionable data and Idaho abandoned that aspect of the SIM Initiative. However, most participating practices were connected to the IHDE by the end of the award period and PCPs were using that data to improve patient care.

- The RCs had a broad mandate to improve population health, build medical-health neighborhoods, and support practice transformation. Many providers, however, indicated that the most useful component of these organizations was the QI staff who provided onsite training to PCPs.

- The HTCI planned to continue promoting person-centered health care delivery, but no future PCMH cohorts were planned. SIM Initiative officials anticipated that PCMHs would be able to sustain the person-centered approach through participation in VBP models, such as Healthy Connections.

Addendum

Table D-6. Idaho's practice transformation support program had favorable impacts on spending and follow-up visits in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: ID Practice Transformation Support	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)	↑	↑	**-26.29†** (-35.51, -17.06)	-7.9	<0.001
Inpatient Admissions per 1,000 Population	↓	↓	0.53 (-3.85, 4.91)	0.8	0.84
ED Visits per 1,000 Population	↑	↑	12.61 (-12.59, 37.80)	2.1	0.41
Readmissions per 1,000 discharges	↑	↑	1.13 (-11.56, 13.81)	1.3	0.88
Inpatient Spending PBPM ($)	↑	↑	**-12.99†** (-18.81, -7.16)	-19.5	<0.001
Professional Spending PBPM ($)	⊖	↑	**-7.37†** **(-11.93, -2.82)**	-4.7	0.01
Prescription Drug Spending PBPM ($)	↓	↓	**-3.87†** (-7.48, -0.27)	-6.1	0.08
Primary Care Provider Visits per 1,000 Population	↓	↓	-29.42 (-160.06, 101.22)	-1.1	0.71
Follow-up Visits within 14 days of hospital discharge (%)	↑	↓	**2.81†** (1.58, 4.04)	5.0	<0.001
Children Aged 15 Months with At Least six Well-child Visits (%)	↑	↑	-2.23 (-11.71, 7.25)	-4.2	0.70
Children Aged 3 to 6 Years with At Least One Well-child Visit (%)	↓	↓	-1.76 (-5.54, 2.02)	-3.6	0.44
Adolescents Aged 12 to 17 Years with At Least One Adolescent Well-care Visit (%)	↓	↓	-1.14 (-3.97, 1.68)	-3.5	0.51

† Significant change in expected direction
‡ Significant change in unexpected direction
⊖ No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; PBPM = per beneficiary per month.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

Table D-7. Idaho's practice transformation support program had favorable impacts on spending and hospital use for adults in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: ID Practice Transformation Support	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($) [Adult]	↓	↓	**-109.91†** (-136.92, -82.91)	-11.1	<0.001
Inpatient Admissions per 1,000 Population [Adults]	↓	↑	**-11.21†** (-15.90, -6.53)	-7.3	<0.001
ED Visits per 1,000 Population [Adults]	↓	↑	**-107.96†** (-149.70, -66.21)	-8.1	<0.001
Total Spending PBPM ($) [Child]	↑	↑	-6.54 (-14.91, 1.83)	-3.6	0.20
Inpatient Admissions per 1,000 Population [Child]	↓	↓	-1.13 (-4.17, 1.92)	-2.7	0.54
ED Visits per 1,000 Population [Child]	↑	↑	10.07 (-8.17, 28.30)	2.3	0.36

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; PBPM = per beneficiary per month.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

Appendix D-1: Idaho Practice Transformation Initiative Impact Results

D-1.1 Overview

Idaho's SIM Initiative was one part of an ongoing statewide effort to redesign the state's health care delivery system to create a value-based system that rewards better health outcomes. Idaho sought to transform its delivery system into one in which patient-centered medical homes (PCMHs) operate within a "medical-health neighborhood" that includes medical, social, and public health supports. The Idaho Healthcare Coalition (IHC) envisioned the PCMH serving as the patient's primary care "hub" to coordinate care delivery with a focus on prevention and wellness, working in partnership with services available in the community to support the patient and achieve better health outcomes and wellness.[44] The state's aims were to strengthen its primary care system; improve care coordination and communication between providers, patients, and other entities across the health care system; and prepare primary care providers (PCPs) to succeed within value-based payment models.

Idaho's primary strategy was to provide practice transformation support to three cohorts of clinics seeking to become a PCMH or enhance their PCMH capabilities. Each participating clinic received one year of group and individual technical assistance (TA), up to $17,500[45] in expense reimbursement to offset transformation costs, and a bidirectional connection to the state's health information exchange (HIE). Idaho also established seven physician-led Regional Collaboratives (RCs), based in the state's seven Public Health Districts. The RCs provided additional transformation support to the participating clinics both during and after the year of TA. The RCs also helped the clinics connect to the broader medical-health neighborhood. Finally, Idaho offered participating clinics the opportunity to become recognized as a virtual PCMH by adding either community health workers (CHWs), community health emergency medical services (CHEMS), or telehealth capability. These services extended each clinic's reach into rural and underserved areas of the state by establishing links that connect patients to services without requiring an in-person clinic visit. Participating clinics received up to $2,500 for virtual PCMH recognition to offset their costs, part of the $17,500 total.

Participating clinics did not receive per beneficiary per month (PBPM) payments to support enhanced care delivery as PCMHs as part of the SIM Initiative. However, Idaho's Medicaid program created a primary care case management program outside of the SIM Initiative that offered PBPM payments to primary care practices that varied based on provider

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[44] Per the IHC definition, a medical-health neighborhood could include an extensive array of services, such as medical, dental, and behavioral health specialists; home health; community food, housing, and transportation programs; dietitians; CHWs, CHEMS, education, and social services.

[45] Reimbursement was available to Cohort clinics that achieved specific milestones: up to $10,000 for establishing a PCMH transformation plan, $5,000 for national PCMH recognition, and $2,500 for becoming a virtual PCMH.

capabilities. This program, called Healthy Connections, was open to all primary care clinics in Idaho serving Medicaid beneficiaries, including the clinics participating in the SIM-funded practice transformation initiative. Healthy Connections' PBPM payment structure rewarded many of the capabilities that a clinic could develop by participating in the SIM-funded practice transformation initiative because they qualified the provider for a higher payment from Idaho's Medicaid agency. For example, the connections to the HIE that participating clinics received as part of their SIM-funded support enabled them to send and receive electronic health data, which was one of the requirements for qualifying for the highest monthly amount. National PCMH recognition was another criterion for higher PBPM payments. Out of the 165 primary care practices that participated in the SIM-funded practice transformation initiative, 86 received or renewed national PCMH recognition. An additional 24 clinics qualified for either Tier III or IV (the two highest tiers) of the Medicaid agency's PBPM program (i.e., Healthy Connections).

To assess the effects of Idaho's practice transformation support program on care for Medicaid beneficiaries the analysis addressed the following research question:

- To what extent did health care spending, utilization, and quality of care change following implementation of the Idaho SIM Initiative's practice transformation support the program?

Because all primary care practices in Idaho that served Medicaid beneficiaries were eligible to receive PBPM payments from Healthy Connections, this analysis focused on the impact of the SIM-supported practice transformation program. It was expected that the practice transformation support program could lead to relative reductions in inpatient admissions and emergency department (ED) visits and savings under the model. If inpatient admissions and ED visit use decreased because of the initiative, spending would also likely decrease relative to practices not participating in the PCMH practice transformation support program. The PCMH practice transformation support program may have resulted in increases or decreases in PCP visits. On one hand, practice transformation may have led to more primary care as practices engaged with patients and encouraged them to use preventive and routine care. On the other hand, the increased emphasis on team-based care, prevention, wellness, and linkages to non-medical services and supports may have led to reductions in primary care visits. It was also hypothesized that the PCMH practice transformation support program would result in improved quality of care. ***Table D-1-1*** provides a snapshot of the study methods.

Table D-1-1. Methods snapshot

Method	Description
Participating practices	A total of 165 clinics joined the transformation support model in three cohorts starting in February 2016, 2017, and 2018. To be eligible for the practice transformation support program, clinics had to provide primary care services in the state of Idaho. This analysis focused only on the first two cohorts, which included 110 clinics (55 in each cohort).
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Idaho claims data provided by the Idaho Department of Health and Welfare, Division of Medicaid.
Sample	The intervention group included Medicaid beneficiaries who were assigned to clinics that participated in the practice transformation support program in Cohorts 1 and 2 (n=115,772). The comparison group comprised similar Idaho Medicaid beneficiaries assigned to providers who did not participate in practice transformation, although those practices may have been PCMHs (n=279,596). Beneficiaries in Cohort 3 are excluded from both the intervention and comparison groups because the analysis did not have data for a full two-year period after this cohort began. The analysis excludes all Medicare-Medicaid dual eligible beneficiaries because Medicare is the primary payer for these individuals and Medicaid data may not reflect their service use or spending.
Timeframe	The timeframe for the impact analysis was February 2013 through January 2019, which includes three baseline years (2013–2015 or 2014–2016) and two intervention years (2016–2017 or 2016–2018) for Cohorts 1 and 2.
Measures	The analysis assessed the effects of the practice transformation support program on four core outcomes including total spending PBPM, inpatient admissions, readmissions, and outpatient ED visits. The analysis examined these four main outcomes for the overall study population and adults and children, separately. The analysis also assessed other outcomes including inpatient, ED, professional, and prescription spending; visits to primary care providers; follow-up visits within 14 days of discharge; inpatient admissions for ambulatory care sensitive conditions; and well-child visits.
Statistical analysis	The analysis used logistic regression for binary outcomes, negative binomial regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the provider level to account for correlation in outcomes within providers. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH = patient-centered medical home.

A full description of the practice transformation support program and a summary of the key impact analysis findings are available in ***Appendix D***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on practice transformation impact findings in tables and figures:

- ***Section D-1.2*** presents results of difference-in-differences (D-in-D) analyses for beneficiaries assigned to clinics participating in the Idaho practice transformation support program and their comparison group;
- ***Section D-1.3*** presents results of D-in-D analyses separately for children and adults for the four core outcomes;
- ***Section D-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity-score weighting;
- ***Section D-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section D-1.6*** presents results from a sensitivity analysis that compares D-in-D estimates for core outcomes when trends in outcomes for the intervention and comparison groups are assumed parallel versus not parallel during the baseline period.

D-1.2 Estimates of the Practice Transformation Support Program's Impact on Spending, Utilization, and Quality

Tables D-1-2 through ***D-1-5*** show annual and overall estimates of the practice transformation support program's impact on health care spending, utilization, and quality for Medicaid beneficiaries. These impact estimates come from D-in-D models, described in ***Appendix L.*** For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the Idaho practice transformation support program's impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

D-1.2.1 Estimates of the practice transformation support program's impact on core outcomes

Table D-1-2 shows the estimates of the Idaho practice transformation support program's impact on total spending PBPM, inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries assigned to clinics receiving transformation support relative to comparison beneficiaries.[46] The findings are as follows:

[46] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

- Total spending PBPM increased for both Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries but increased by $26.29 less for the practice transformation support group during the first two years of implementation ($p<0.001$).
- Changes to inpatient admissions did not differ between Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries during the first two years of implementation.
- Changes to ED visits did not differ between Medicaid beneficiaries assigned to clinics receiving practice transformation support and comparison beneficiaries during the first two years of implementation.
- Changes to readmissions within 30 days of discharge did not differ between Medicaid beneficiaries assigned to clinics receiving practice transformation support and comparison beneficiaries during the first two years of implementation.

Table D-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in clinics receiving practice transformation support and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	334.32	319.29	334.66	344.78	-25.15 (-35.95, -14.36)	-7.5	<0.001
Year 2	334.32	319.29	349.84	362.17	-27.37 (-42.19, -12.55)	-8.2	0.002
Overall	334.32	319.29	342.41	353.33	-26.29 (-35.51, -17.06)	-7.9	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	63.23	67.23	61.24	62.34	2.69 (-3.11, 8.49)	4.3	0.45
Year 2	63.23	67.23	57.88	63.30	-1.54 (-8.07, 4.99)	-2.4	0.70
Overall	63.23	67.23	59.52	62.81	0.53 (-3.85, 4.91)	0.8	0.84
ED visits per 1,000 population							
Year 1	604.34	624.74	610.30	623.30	7.27 (-20.90, 35.44)	1.2	0.67
Year 2	604.34	624.74	633.57	635.40	17.72 (-23.60, 59.04)	2.9	0.48
Overall	604.34	624.74	622.17	629.24	12.61 (-12.59, 37.80)	2.1	0.41

(continued)

Table D-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in clinics receiving ID practice transformation support and the comparison group (continued)

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	87.62	87.82	130.72	112.43	16.80 (0.11, 33.49)	19.2	0.10
Year 2	87.62	87.82	121.30	137.09	-13.59 (-32.54, 5.37)	-15.5	0.24
Overall	87.62	87.82	125.86	124.34	1.13 (-11.56, 13.81)	1.3	0.88

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial regression model to obtain D-in-D estimates for the ED outcome, and logistic regression models to obtain D-in-D estimates for the inpatient admissions and readmissions outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). The total spending model includes a differential trend between the practice transformation support and comparison groups beginning in the baseline period; the inpatient admissions, ED, and readmissions models assume that the practice transformation support and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

Table D-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in clinics receiving ID practice transformation support and the comparison group (continued)

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 793,730; the weighted N for the readmission outcome is 26,385. These numbers include all person-year (or discharge-year) observations for both the ID practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.2.2 Estimates of the practice transformation support program's impact on spending categories

Table D-1-3 shows the estimates of the Idaho practice transformation support program's impact on inpatient, ED, professional, and prescription drug spending PBPM for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program relative to comparison beneficiaries. The findings are as follows:

- Inpatient spending PBPM increased for both Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries but increased by $12.99 less for the practice transformation support group during the first two years of implementation ($p<0.001$).

- Changes to ED spending PBPM did not differ between Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries during the first two years of implementation.

- Professional spending PBPM remained almost unchanged for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and increased in the comparison group, leading to a relative decrease of $7.37 among Medicaid beneficiaries in the practice transformation support group during the first two years of implementation ($p=0.01$).

- Prescription drug spending PBPM decreased for both Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries but decreased by $3.87 more for the practice transformation support group during the first two years of implementation ($p=0.08$).

Table D-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending in clinics participating in the Idaho practice transformation support program and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	66.59	57.72	71.80	77.52	-14.59 (-21.51, -7.67)	-21.9	<0.001
Year 2	66.59	57.72	68.29	70.87	-11.45 (-20.74, -2.16)	-17.2	0.04
Overall	66.59	57.72	70.01	74.25	-12.99 (-18.81, -7.16)	-19.5	<0.001
ED spending PBPM ($)							
Year 1	17.83	17.05	15.36	15.24	-0.65 (-1.53, 0.23)	-3.6	0.23
Year 2	17.83	17.05	17.28	16.95	-0.44 (-1.54, 0.67)	-2.4	0.52
Overall	17.83	17.05	16.34	16.08	-0.54 (-1.25, 0.17)	-3.0	0.21
Professional spending PBPM ($)							
Year 1	157.37	149.93	152.13	150.35	-5.65 (-11.00, -0.31)	-3.6	0.08
Year 2	157.37	149.93	161.26	162.85	-9.03 (-16.33, -1.72)	-5.7	0.04
Overall	157.37	149.93	156.79	156.49	-7.37 (-11.93, -2.82)	-4.7	0.01
Prescription drug spending PBPM ($)							
Year 1	63.54	53.23	45.74	40.45	-5.02 (-9.23, -0.81)	-7.9	0.05
Year 2	63.54	53.23	49.64	42.10	-2.77 (-8.57, 3.02)	-4.4	0.43
Overall	63.54	53.23	47.73	41.26	-3.87 (-7.48, -0.27)	-6.1	0.08

(continued)

Table D-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending in clinics participating in the Idaho practice transformation support program and the comparison group (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models outcomes include a differential trend between the practice transformation support and comparison groups during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 793,730. This number includes all person-year observations for both the ID practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.2.3 Estimates of the practice transformation support program's impact on utilization

Table D-1-4 shows the estimates of the practice transformation support program on PCP visits, follow-up visits within 14 days of discharge, and ambulatory care sensitive condition admissions for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program relative to comparison beneficiaries. The findings are as follows:

- Changes to the percentage of beneficiaries with at least one PCP visit did not differ between Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries during the first two years of implementation.

- Changes to the number of PCP visits per 1,000 beneficiaries did not differ between Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries during the first two years of implementation.

- The percentage of hospital discharges with a follow-up visit within 14 days of discharge increased for the practice transformation support group and decreased for the comparison group, leading to a relative increase of 2.8 percentage points for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program during the first two years of implementation ($p<0.01$).

Table D-1-4. Differences in the pre–post change in primary care provider visits, follow-up visits within 14 days of hospital discharge, and hospitalizations for ambulatory care sensitive conditions for Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with at least one primary care visit during the year							
Year 1	64.95	65.54	58.45	60.88	-1.85 (-3.93, 0.23)	-2.8	0.14
Year 2	64.95	65.54	58.26	61.04	-2.23 (-6.30, 1.85)	-3.4	0.37
Overall	64.95	65.54	58.35	60.96	-2.04 (-4.36, 0.27)	-3.1	0.15
PCP visits per 1,000 population							
Year 1	2,717.68	2,666.08	2,376.03	2,401.43	-61.57 (-190.73, 67.58)	-2.3	0.43
Year 2	2,717.68	2,666.08	2,492.55	2,443.50	1.44 (-222.58, 225.46)	0.1	0.99
Overall	2,717.68	2,666.08	2,435.48	2,422.10	-29.42 (-160.06, 101.22)	-1.1	0.71
Percentage of hospital discharges with a follow-up provider visit within 14 days of discharge							
Year 1	56.43	54.84	57.42	53.63	2.14 (0.96, 3.31)	3.8	<0.001
Year 2	56.43	54.84	59.64	54.58	3.46 (1.31, 5.60)	6.1	0.01
Overall	56.43	54.84	58.55	54.08	2.81 (1.58, 4.04)	5.0	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; PCP = primary care provider.

(continued)

Table D-1-4. Differences in the pre–post change in primary care provider visits, follow-up visits within 14 days of hospital discharge, and hospitalizations for ambulatory care sensitive conditions for Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group (continued)

Methods: The analysis used logistic regression models to obtain D-in-D estimates for the percentage of beneficiaries with a PCP visit and for the 14-day follow-up outcome and a negative binomial regression model to obtain D-in-D estimates for the count of PCP visits. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probabilities of any primary care visit during the year and a follow-up provider visit within 14 days of discharge were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). The primary care visit models include a differential trend between the practice transformation support and comparison groups during the baseline period; the 14-day follow-up model assumes that the practice transformation support and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for any PCP visits is 739,730; the total weighted N for follow-up visits within 14 days of hospital discharge is 50,344; and the total weighted N for any hospitalization for ambulatory care sensitive conditions is 169,497. These numbers include all person-year (or discharge-year) observations for both the ID practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.2.4 Estimates of the practice transformation support program's impact on quality

Table D-1-5 shows the estimates of the practice transformation support program's impact on well-child visits for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program relative to comparison beneficiaries. The findings are as follows:

- Changes to the percentage of beneficiaries with at least six well-child visits in the first 15 months of life did not differ between Medicaid beneficiaries assigned to clinics participating in the Idaho practice transformation support program and comparison beneficiaries.

- Changes to the percentage of beneficiaries in their third, fourth, fifth, and sixth years of life with a well-child visit in a year did not differ between Medicaid beneficiaries assigned to clinics participating in the Idaho practice transformation support program and comparison beneficiaries.

- Changes to the percentage of adolescent beneficiaries with a well-child visit did not differ between Medicaid beneficiaries assigned to clinics participating in the Idaho practice transformation support program and comparison beneficiaries.

Table D-1-5. Differences in the pre–post change in well-child visits for Medicaid child beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of eligible children with at least six well-child visits by 15 months of age							
Year 1	53.59	51.72	52.98	54.87	-3.74 (-12.02, 4.54)	-7.0	0.46
Year 2	53.59	51.72	55.08	53.95	-0.74 (-17.72, 16.24)	-1.4	0.94
Overall	53.59	51.72	54.04	54.42	-2.23 (-11.71, 7.25)	-4.2	0.70
Percentage of eligible children aged 3 to 6 years with at least one well-child visit during the year							
Year 1	48.24	46.35	42.95	43.64	-2.48 (-6.63, 1.66)	-5.1	0.32
Year 2	48.24	46.35	44.12	43.30	-1.02 (-7.37, 5.32)	-2.1	0.79
Overall	48.24	46.35	43.53	43.48	-1.76 (-5.54, 2.02)	-3.6	0.44
Percentage of eligible adolescents aged 12 to 21 years with at least one adolescent well-care visit during the year							
Year 1	32.70	30.11	28.14	27.04	-1.17 (-4.35, 2.01)	-3.6	0.54
Year 2	32.70	30.11	29.66	28.45	-1.11 (-5.81, 3.58)	-3.4	0.70
Overall	32.70	30.11	28.89	27.72	-1.14 (-3.97, 1.68)	-3.5	0.51

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ID = Idaho.

(continued)

Table D-1-5. Differences in the pre–post change in well-child visits for Medicaid child beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group (continued)

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all well-child visits were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models include a differential trend between the practice transformation support and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted Ns are 28,560 in the first 15 months model; 137,333 in the ages 3 to 6 years model; and 198,404 in the adolescent model. These numbers include all person-year observations for both the ID practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.3 Estimates of the Practice Transformation Support Program's Impact on Adults and Children

The analysis assessed the practice transformation support program's impacts on adults and children separately for the core outcomes. Most of the practice transformation support content focused on standards for national PCMH recognition and broad patient-centered care and practice transformation topics such as staffing, workflow, and technology. Some webinars and trainings touched on chronic care management and diabetes, and individual clinics may have received targeted trainings for other health conditions from their peer coaches, but the standard content did not differ between adult and child populations. Nevertheless, the practice transformation support program could have produced differential impacts on health care utilization and spending for these groups because of underlying differences in health needs or incentives offered by commercial payers or Medicare, which were not studied.

D-1.3.1 Estimates of the practice transformation support program's impact on core outcomes for adults

Table D-1-6 shows the estimates of the Idaho practice transformation support program on total spending PBPM, inpatient admissions, and ED visits for adult Medicaid beneficiaries assigned to clinics participating in the practice transformation support program relative to adult comparison beneficiaries. The findings are as follows:

- Total spending PBPM decreased for both adult Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and comparison beneficiaries but decreased by $109.91 more for adults in the practice transformation support group during the first two years of implementation ($p<0.001$).
- Inpatient admissions decreased for adult Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and increased in the comparison group, leading to a relative decrease of 11.21 admissions per 1,000 adult beneficiaries in the practice transformation support group during the first two years of implementation ($p<0.001$).
- ED visits decreased for adult Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and increased in the comparison group, leading to a relative decrease of 107.96 more visits per 1,000 adult beneficiaries in the practice transformation support group during the first two years of implementation ($p<0.001$).

Table D-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	986.79	944.21	864.88	922.65	-100.35 (-134.06, -66.65)	-10.2	<0.001
Year 2	986.79	944.21	883.58	959.75	-118.75 (-160.33, -77.17)	-12.0	<0.001
Overall	986.79	944.21	874.60	941.01	-109.91 (-136.92, -82.91)	-11.1	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	154.33	166.47	149.61	170.53	-7.90 (-14.25, -1.55)	-5.1	0.04
Year 2	154.33	166.47	147.42	176.14	-14.27 (-21.12, -7.43)	-9.2	<0.001
Overall	154.33	166.47	148.47	173.30	-11.21 (-15.90, -6.53)	-7.3	<0.001
ED visits per 1,000 population							
Year 1	1,332.22	1,290.94	1,238.88	1,290.95	-95.90 (-154.16, -37.64)	-7.2	0.01
Year 2	1,332.22	1,290.94	1,229.45	1,304.14	-119.10 (-178.71, -59.49)	-8.9	0.001
Overall	1,332.22	1,290.94	1,233.98	1,297.47	-107.96 (-149.70, -66.21)	-8.1	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; OLS = ordinary least squares; PBPM = per beneficiary per month.

(continued)

Table D-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial regression model to obtain D-in-D estimates for the ED visit outcome, and logistic regression models to obtain D-in-D estimates for the inpatient admissions and readmissions outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). The total spending model includes a differential trend between the practice transformation support and comparison groups beginning in the baseline period; the inpatient admissions, ED, and readmissions models assume that the practice transformation support and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 141,903. This number includes all person-year observations for both the practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.3.2 Estimates of the practice transformation support program's impact on core outcomes for children

Table D-1-7 shows the impacts of the Idaho practice transformation support program on total spending PBPM, inpatient admissions, and ED visits for child Medicaid beneficiaries assigned to clinics participating in the practice transformation support program relative to child comparison beneficiaries. The findings are as follows:

- Total spending PBPM did not differ between child Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and child comparison beneficiaries during the first two years of implementation.
- Inpatient admissions did not differ between child Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and child comparison beneficiaries during the first two years of implementation.
- ED visits did not differ between child Medicaid beneficiaries assigned to clinics participating in the practice transformation support program and child comparison beneficiaries during the first two years of implementation.

Table D-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group

Outcome	Baseline period adjusted mean, ID practice transformation	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, ID practice transformation	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	181.29	170.16	218.57	213.59	-6.15 (-16.45, 4.15)	-3.4	0.33
Year 2	181.29	170.16	229.83	225.62	-6.92 (-20.04, 6.20)	-3.8	0.39
Overall	181.29	170.16	224.28	219.48	-6.54 (-14.91, 1.83)	-3.6	0.20
All-cause acute inpatient admissions per 1,000 population							
Year 1	41.36	40.38	37.74	36.36	0.52 (-3.77, 4.82)	1.3	0.84
Year 2	41.36	40.38	37.38	39.17	-2.73 (-7.04, 1.59)	-6.6	0.30
Overall	41.36	40.38	37.56	37.74	-1.13 (-4.17, 1.92)	-2.7	0.54
ED visits per 1,000 population							
Year 1	441.04	456.40	461.87	472.08	5.37 (-17.18, 27.91)	1.2	0.70
Year 2	441.04	456.40	491.32	491.13	14.63 (-13.88, 43.13)	3.3	0.40
Overall	441.04	456.40	476.82	481.41	10.07 (-8.17, 28.30)	2.3	0.36

(continued)

Table D-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison group (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial regression model to obtain D-in-D estimates for the ED visit outcome, and logistic regression models to obtain D-in-D estimates for the inpatient admissions and readmissions outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). The total spending model includes a differential trend between the practice transformation support and comparison groups beginning in the baseline period; the inpatient admissions, ED, and readmissions models assume that the practice transformation support and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 647,762. This number includes all person-year observations for both the ID practice transformation support program and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.4 Annual Covariate Balance Between the Practice Transformation Support and Comparison Groups

As described in ***Appendix L**,* the analysis created annual propensity scores for the overall comparison sample at the person-year level and at the inpatient discharge level and for any comparison subgroups. These subgroups included all adults, all children, and condition-specific subgroups created for quality outcomes.

Table D-1-8 shows covariate balance between the practice transformation support and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown.) These tables include the following:

- The covariate means for the practice transformation support and comparison groups without propensity score weighting;
- The standardized difference between the practice transformation support and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the practice transformation support group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis using logistic regressions in which the dependent variable was an indicator of inclusion in the practice transformation support group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included all covariates in ***Table D-1-8*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table D-1-8 shows balance between practice transformation support and comparison group covariates for the overall sample before and after applying weights to person-year observations for Medicaid beneficiaries. Prior to propensity score weighting, standardized differences were above 0.10 for age and some of the area-level characteristics. After propensity score weighting, standardized differences after propensity score weighting were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Some covariates are included in D-in-D models that are not included in the propensity score models. These covariates, observed at the annual level, include indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice, an indicator for whether a beneficiary switched clinics, and an indicator for whether a practice switched to a different Healthy Connections tier. These indicators are not present in the baseline data reflected ***Table D-1-8*** because the tiered PBPM payments did not start until 2016—the same year the first practice transformation support cohort started. Thus, they were not used in the models used to estimate propensity scores. Instead, these indicator variables are used in the D-in-D models to control for differences between practices and beneficiaries that otherwise would be erroneously captured, at least partly, by the estimated D-in-D effect of the intervention because Healthy Connections and the SIM Initiative started at the same time. Both the practice transformation support group and comparison group contained practices on each Healthy Connections tier level, so adding the tier-level measure allows the D-in-D to isolate the effects of the practice transformation support while the tier indicators pick up the different underlying practice characteristics. Likewise, when the tier level changed during a year, the beneficiary either changed practices or the practice to which a beneficiary was assigned made a change that was substantial enough to be awarded a greater PBPM amount (e.g., added new technological capabilities). Controlling for beneficiary movement into and out of an assigned practice and practice changes that affect their Healthy Connections tier level during the year captures any systematic differences among beneficiaries when Healthy Connections tier levels change, limiting potential bias in the D-in-D estimates from differential enrollment patterns.

Table D-1-8. Covariate balance between intervention and comparison groups in the last baseline year, Medicaid beneficiaries

Variable	Unweighted mean or percentage, ID practice transformation support	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	51.92%	54.38%	0.05	51.92%	0.0001
Age in years	13.9	15.9	0.14	14.0	0.01
Percentage of people who are non-white race	2.95%	1.84%	0.07	3.09%	0.01
Percentage of people who are disabled	1.53%	1.32%	0.02	1.60%	0.01
Total months of enrollment during year	10.7	10.5	0.06	10.6	0.004
CDPS risk score, logged[a]	-0.5	-0.4	0.08	-0.5	0.001
Percentage of people in a "Basic" Medicaid plan	80.35%	79.55%	0.02	80.49%	0.004
County level					
Percentage of people residing in a Metropolitan Statistical Area	77.95%	74.28%	0.09	77.87%	0.002
Percentage of people living in poverty	15.50%	14.80%	0.22	15.40%	0.01
Hospital beds per 1,000 population	2.20%	2.40%	0.10	2.20%	0.01
Median age in years	35.00%	34.50%	0.10	35.10%	0.02
Percentage of people (aged under 65 years) without health insurance	13.60%	13.40%	0.04	13.60%	0.01

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; ID = Idaho.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures D-1-1 through ***D-1-4*** show propensity score-weighted trends for all analysis years for the core D-in-D outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the practice transformation and comparison groups. Trends for total spending PBPM and readmissions did not appear to be parallel between the practice transformation support and comparison groups during the baseline period. Inpatient admissions and ED use exhibit parallel trends during the baseline period. As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the practice transformation support and comparison groups to determine the specification of our D-in-D models. Models that were non-parallel were specified with a group-specific differential trend between the practice transformation support and comparison groups during the baseline period.

The findings are as follows:

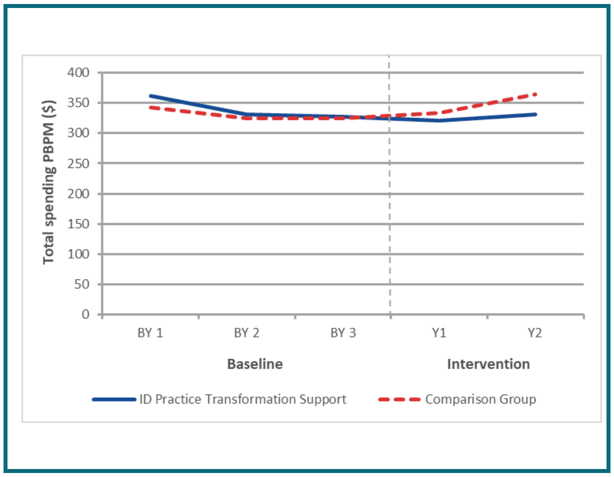
- Total spending PBPM declined for both the practice transformation support and the comparison groups at the beginning of the baseline period before flattening out. Total spending PBPM started out higher for the practice transformation support group than for the comparison group, but spending levels were similar across groups by the end of the baseline period (***Figure D-1-1***). During the intervention period, spending for the comparison group increased more than spending for the practice transformation support group. The trends do not appear to be parallel during the baseline period.

- Inpatient admissions per 1,000 beneficiaries decreased slightly during the baseline period for both the practice transformation support and comparison groups. Inpatient admissions then leveled off for the comparison group, while the rate for the practice transformation support group dropped in the second intervention year (***Figure D-1-2***). The trends appear to be parallel during the baseline period.

- ED visits per 1,000 beneficiaries dropped steadily for both groups during the baseline period. The downward trend continued for both groups in the first year after implementation of the practice transformation support program, but the comparison group leveled off in the second year after implementation while the practice transformation support group continued its downward trend (***Figure D-1-3***). The trends appear to be parallel during the baseline period.

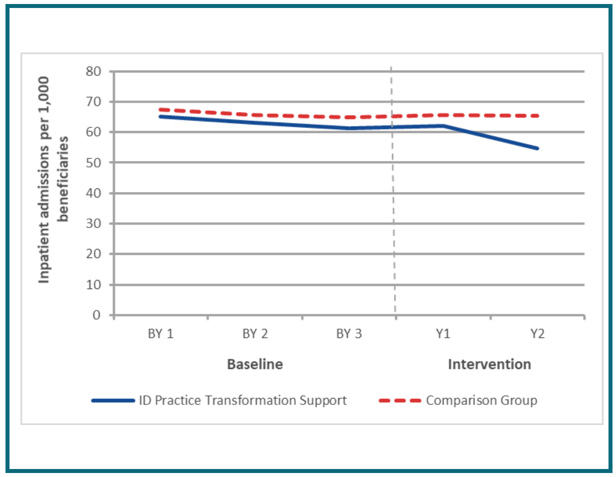
- Rates of readmissions within 30 days of discharge fluctuated during the baseline and intervention periods for both the practice transformation support and comparison groups (***Figure D-1-4***). The trends are not parallel during the baseline period, but they also do not exhibit differential linear trends. As a result, this analysis modeled readmissions with a D-in-D specification that assumed baseline parallel trends between the practice transformation support and comparison groups.

Figure D-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the practice transformation support and comparison groups



Note: BY = baseline year; ID = Idaho; PBPM = per beneficiary per month; Y = year.

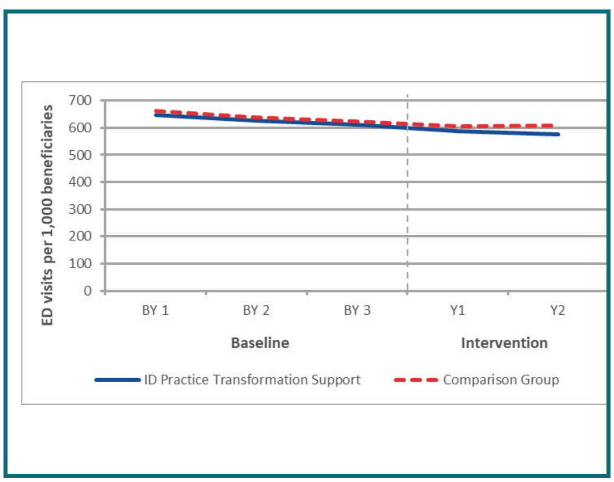
Figure D-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the practice transformation support and comparison groups



Note: BY = baseline year; ID = Idaho; Y = year.

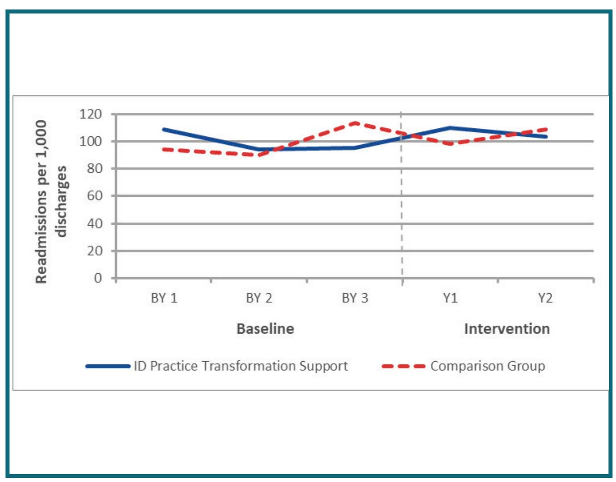
Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

Figure D-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the practice transformation support and comparison groups



Note: BY = baseline year; ED = emergency department; ID = Idaho; Y = year.

Figure D-1-4. Trends in readmissions per 1,000 discharges in the practice transformation support and comparison groups



Note: BY = baseline year; ID = Idaho; Y = year.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

D-1.6 Sensitivity Analysis

Table D-1-9 shows how impact estimates for the practice transformation support program differ when D-in-D models assume (1) parallel trends in outcomes between the practice transformation support and comparison groups beginning in baseline period and (2) non-parallel trends beginning in the baseline period. As described earlier in this appendix, some of the main models assume parallel trends and others assume non-parallel trends. Total spending PBPM was robust to differing model specifications. Although D-in-D estimates for inpatient admissions, ED visits, and readmissions were not robust to the inclusion of a linear differential trend, the models with the differential trends were a poor fit for the data. The findings are as follows:

- The overall total spending PBPM D-in-D estimates were in the same direction and significance across the two approaches, with very similar effect sizes.
- The overall inpatient admissions D-in-D estimate was not statistically significant in the main analysis that assumed parallel trends during the baseline period, while the sensitivity analysis showed a small but statistically significant increase in inpatient admissions for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program. The sensitivity analysis model assuming non-parallel trends was a poor fit for the observed data; the model's regression adjusted means did not resemble the descriptive means for inpatient admissions.
- The overall ED visits D-in-D estimate was not statistically significant in the main analysis that assumed parallel trends during the baseline period, while the sensitivity analysis showed a small but statistically significant increase in ED use for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program. The sensitivity analysis model assuming differential trends was a poor fit for the observed data.
- The overall readmissions D-in-D estimate was not statistically significant in the main analysis that assumed parallel trends during the baseline period. The sensitivity analysis assuming differential trends showed a statistically significant increase in readmissions for Medicaid beneficiaries assigned to clinics participating in the practice transformation support program. However, the erratic nature of the baseline trends for both groups led to extreme and unrealistic estimates in this model because it assumes differential *linear* trends. Because both groups fell within comparable ranges over time and neither group's baseline trends appeared to be linear over the short period observed, the main analysis assumed parallel trends in our modeling. The two-year average estimate is more reliable than estimates for specific follow-up years.

Table D-1-9. Differences in the pre–post change in total spending per beneficiary per month, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison groups

Outcome	Parallel trends assumption	Regression-adjusted D-in-D assuming parallel trends (90% CI)	Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Total spending PBPM ($)	Main analysis: Not parallel Sensitivity analysis: Parallel		
Year 1		-25.15*** (-35.95, -14.36)	-25.99*** (-33.22, -18.77)
Year 2		-27.37*** (-42.19, -12.55)	-29.15*** (-40.36, -17.94)
Overall		-26.29*** (-35.51, -17.06)	-27.60*** (-34.33, -20.88)
Inpatient admissions per 1,000	Main analysis: Parallel Sensitivity analysis: Not parallel		
Year 1		2.69 (-3.11, 8.49)	6.56* (0.40, 12.72)
Year 2		-1.54 (-8.07, 4.99)	4.89 (-1.34, 11.12)
Overall		0.53 (-3.85, 4.91)	5.71** (1.33, 10.09)
ED visits per 1,000	Main analysis: Parallel Sensitivity analysis: Not parallel		
Year 1		7.27 (-20.90, 35.44)	11.61 (-11.41, 34.62)
Year 2		17.72 (-23.60, 59.04)	25.17** (5.15, 45.18)
Overall		12.61 (-12.59, 37.80)	18.53** (3.32, 33.74)

(continued)

Table D-1-9. Differences in the pre–post change in total spending per beneficiary per month, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison groups (continued)

Outcome	Parallel trends assumption	Regression-adjusted D-in-D assuming parallel trends (90% CI)	Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Readmissions within 30-days of discharge per 1,000 discharges	Main analysis: Parallel Sensitivity analysis: Not parallel		
Year 1		16.80* (0.11, 33.49)	37.98*** (20.02, 55.94)
Year 2		-13.59 (-32.54, 5.37)	28.43*** (13.07, 43.78)
Overall		1.13 (-11.56, 13.81)	33.06*** (21.29, 44.82)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ID = Idaho; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial regression model to obtain D-in-D estimates for the ED outcome, and logistic regression models to obtain D-in-D estimates for the inpatient admissions and readmissions outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, race, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, the logged CDPS score, the beneficiary's plan type, indicators for whether the beneficiary switched clinics during the year or the practice switched to a different Healthy Connections tier, and indicators for the most common Healthy Connections tier level for the beneficiary's assigned practice during the year) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of ID practice transformation initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ID practice transformation initiative group relative to the comparison group after ID practice transformation initiative implementation. The relative difference is the D-in-D estimate as a percentage of the ID practice transformation initiative baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

(continued)

Table D-1-9. Differences in the pre–post change in total spending per beneficiary per month, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in clinics participating in the Idaho practice transformation support program and the comparison groups (continued)

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 294,429; the weighted N for the readmission outcome is 40,781. These numbers include all person-year (or discharge-year) observations for both the ID practice transformation support and comparison groups.

Source: Federal Evaluation Team analysis of ID claims from the ID Department of Health and Welfare.

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Appendix E: State Innovation Model in Model Test States: Iowa

Payment Model Development	• The SIM-funded Medicaid value-based purchasing program exceeded its goal of having 45 percent of Medicaid covered lives in SIM-aligned value-based purchasing contracts. • The state established seven county-based Community and Clinical Care (formerly Community Care Coalition) (C3) initiatives, using the Accountable Communities of Health (ACHs) model.
Delivery Model Transformation	• The state changed from using common performance metrics to allowing providers working within Medicaid managed care organization (MCO) contracts to select their own Healthcare Effectiveness Data and Information Set (HEDIS)–based performance measures. • The C3 initiative's major function was to provide TA to assist providers with achieving health care delivery transformation.
Health IT and Data Analytics	• The SIM-funded Statewide Alert Notification (SWAN) admission, discharge, and transfer (ADT) alert system, despite its reported deficiencies, was judged a success in persuading providers of the importance of sharing data to achieve effective care transformation.
Population Health	• Stakeholders praised the C3 initiatives as bringing social determinants of health (SDoH) to the forefront, and achieving close cooperation among the different actors in their counties' health care environments.
Sustainability	• The Governor's Healthcare Innovation and Visioning Roundtable committed to convening throughout 2019 and took responsibility for leading future efforts in health care delivery transformation in the state.
Implications	• Embedding value-based purchasing requirements in Medicaid contracts was an effective lever for promoting payment reform, though challenging in a MCO setting. • The "culture change" around value-based purchasing was effective in persuading many providers to become a compelling force motivating transformative change by the final award year.

E.1 Key State Context and the Iowa State Innovation Model Initiative

E.1.1 Pre-State Innovation Model health care in Iowa

Prior to the SIM award Iowa had a predominantly fee-for-service (FFS) Medicaid program and a strong culture of successful accountable care organizations (ACOs) that contracted with Medicare and Wellmark Blue Cross/Blue Shield, the dominant commercial insurer in the state. Iowa's health care market also had a history of productive collaborations and engagement in several large collaborative efforts to improve health and health care across payers, providers, and communities throughout the state. The state sought to build on these elements of its health care landscape when implementing the SIM Initiative.

Factors that impacted Iowa's population health and health care environment included: (1) a relatively small, largely non-metropolitan population; (2) a highly concentrated health care market, with only a few key health care systems and payers; and (3) Iowa's 2014 Medicaid expansion.

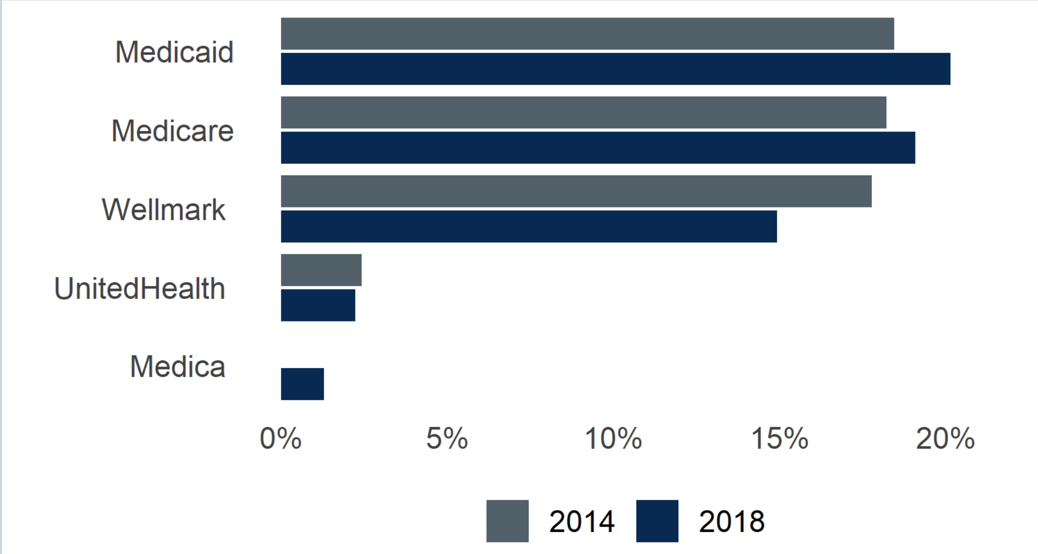
The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurance market in Iowa was fairly concentrated. Together, commercial insurance made up the largest share of the market in 2014, followed by Medicaid and then Medicare (see ***Exhibits 8-5*** and ***8-6***). By 2018, the market was relatively evenly divided between commercial payers, Medicaid and Medicare.

Both public payers also increased the percent of insured lives they covered between 2014 and 2018 (see ***Exhibit E-1***). In contrast, the percent of insured lives covered by the most prevalent commercial payer (Wellmark Inc. Group) shrank between 2014 and 2018, although Wellmark remained the dominant commercial payer in the state.

A majority of Iowa practices were located in urban areas. In 2015, 50 percent of primary care practices had a single provider and 38 percent of primary care practices were located in rural areas. Thirty percent of primary care practices had an existing involvement in a Medicare FFS alternative payment model (APM).[47]

[47] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit E-1. Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Iowa shown)



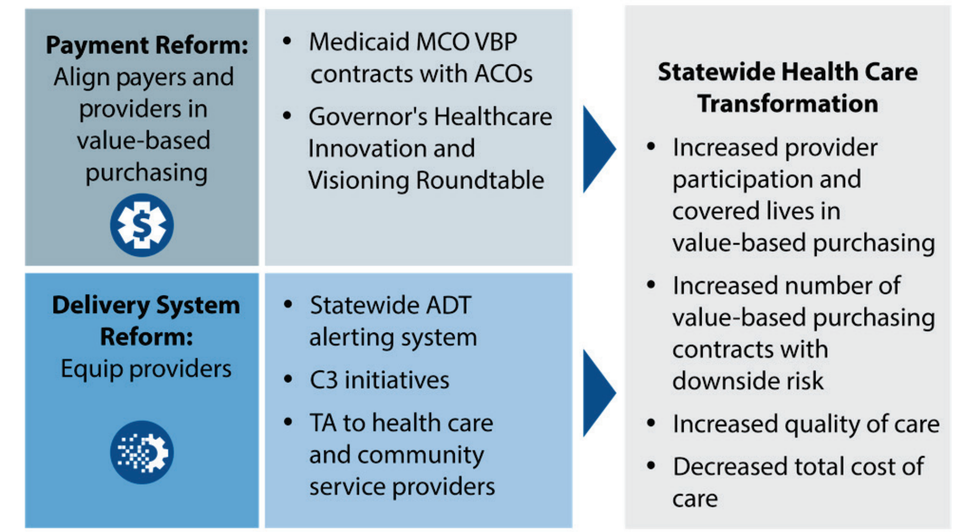
Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

E.1.2 State Innovation Model Initiative in Iowa

Iowa's SIM Initiative intended to achieve statewide health care transformation through two primary drivers: (1) value-based purchasing reform, focused on aligning payers and providers in value-based purchasing; and (2) delivery system reform, directed at equipping providers with tools to engage in population health with a focus on outcomes (***Exhibit E-2***). By combining these two efforts, Iowa sought to create an environment where providers were paid based on quality and value, and communities and health systems collaborated to improve the overall health of Iowans. SIM-funded activities included developing a Medicaid value-based purchasing program, deploying a statewide admission, discharge, and transfer (ADT) alerting system, establishing county-based Community and Clinical Care (C3) initiatives (formerly Community Care Coalition), and providing technical assistance (TA) to health care and community service providers.

Exhibit E-2. Iowa SIM Initiative used payment and delivery system reform to drive transformation



Note: ACO = accountable care organization; ADT = admission, discharge, and transfer; AY4 = Award Year 4; C3 = Community and Clinical Care; MCO = managed care organization; SIM = State Innovation Model; TA = technical assistance; VBP = value-based purchasing.

Source: Iowa SIM AY4 Operational Plan.

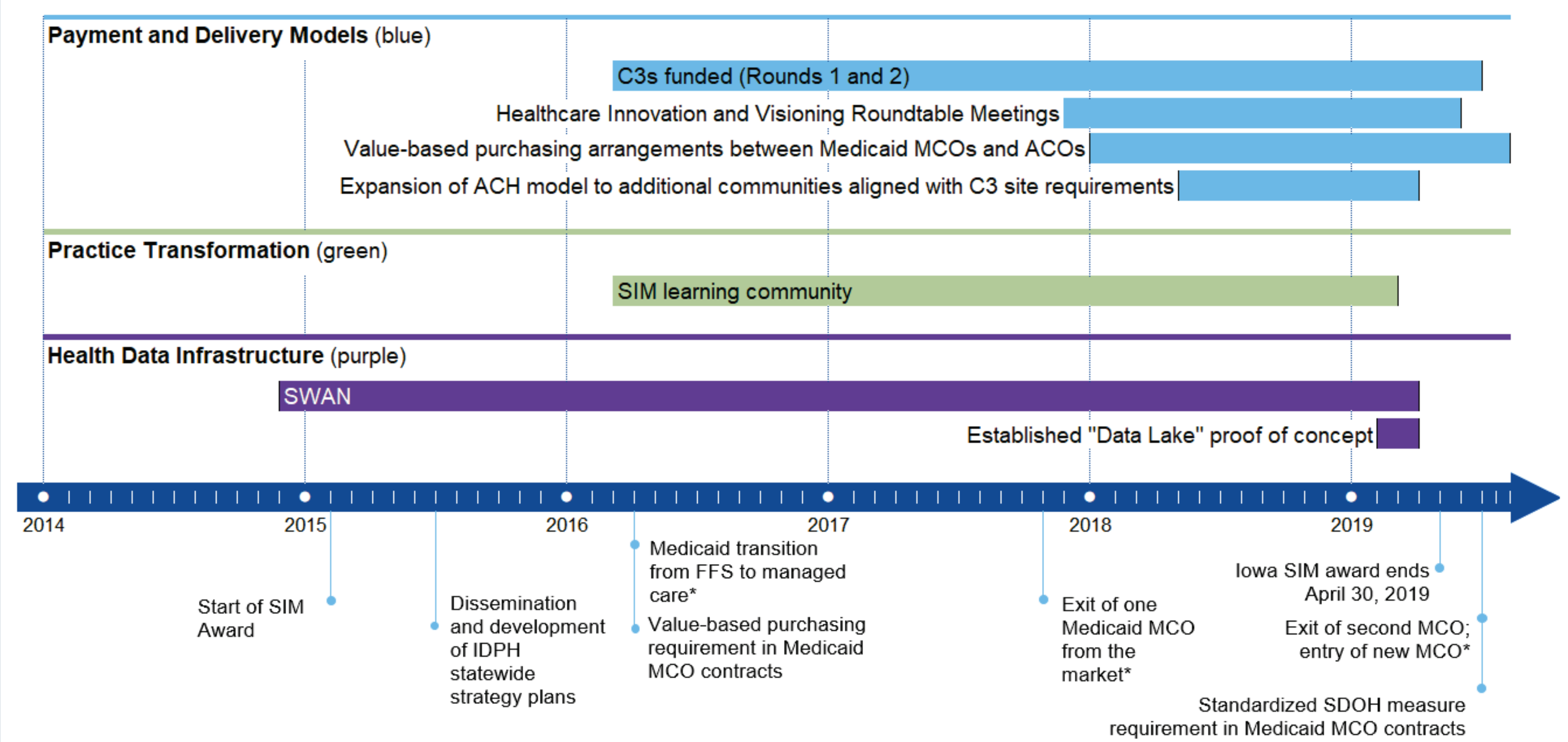
Iowa's SIM Initiative—which was housed within the Iowa Medicaid Enterprise (IME) division of the Iowa Department of Human Services (IDHS)—was a collaboration among IDHS, the Iowa Department of Public Health (IDPH), and the Iowa Healthcare Collaborative (IHC), with oversight from the Governor's Office. The SIM Initiative was guided by the Strategic Implementation Team (also known as the SIM Leadership Team), made up of leaders from the payer, provider, and public health communities and under the direction of the IDHS Executive Chair.

Iowa's primary goal for payment reform was to increase the prevalence of value-based contracts in the Medicaid program. In 2014, the newly insured Medicaid expansion population was enrolled in ACOs via the Healthy Iowans program. Under the SIM Initiative, the state planned to eventually use an ACO model of care for the entire Medicaid population, with performance metric alignment across Medicaid, Wellmark, and Medicare ACO arrangements. The state chose to use Wellmark's Value Index Score (VIS) as the performance metric on which Medicaid arrangements would be based, to align with Wellmark, the state's largest commercial payer. This SIM Initiative plan, which was designed in close collaboration with stakeholder groups, was widely seen in the state as the product of an inclusive and open process well-tailored to Iowa's health care environment.

In early 2015, Iowa's Department of Human Services announced that Medicaid would shift to a managed care system to stem Medicaid's rising costs. Iowa's original SIM Initiative plan, which assumed a direct relationship between the state and providers, was reworked to reflect the change in Medicaid financing. Value-based purchasing would now be implemented through contracts between MCOs and providers. Managed care was implemented on an ambitious timeline; three new MCOs entered the state and began serving the vast majority of Medicaid beneficiaries (including the disabled population and other populations receiving long-term services and supports) in April 2016.

Though the transition to Medicaid managed care was the most significant change influencing Iowa's SIM Initiative approach, during the first half of the award period the state also sought to align the SIM Initiative's value-based purchasing goals with those of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) Quality Payment Program (QPP), incorporating a strategy to build a Medicaid value-based purchasing program that would qualify as an Other-Payer Advanced APM, thus helping clinicians fulfill their requirements under MACRA. In late 2017, the Governor launched the Healthcare Innovation and Visioning Roundtable, separate from the SIM Initiative, to promote collaboration and alignment on broad issues of health care transformation. Iowa's SIM Initiative ended in April 2019. ***Exhibit E-3*** illustrates the state's emphasis on payment and delivery models that were supported by practice transformation and health data exchange under the SIM Initiative.

Exhibit E-3. Timeline of Iowa SIM and SIM-related activities



Note: ACO = accountable care organization; ACH = Accountable Community of Health; C3 = Community and Clinical Care; FFS = fee for service; IDPH = Iowa Department of Public Health; MCO = managed care organization; SDoH = social determinants of health; SIM = State Innovation Model; SWAN = Statewide Alert Notification.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

E.2 Accomplishments from Iowa's State Innovation Model Initiative

This chapter summarizes Iowa's SIM Initiative activities, accomplishments, and stakeholder feedback into three areas: delivery models and payment reform (***Section E.2.1***), enabling strategies to support health care delivery transformation (***Section E.2.2***), and population health (***Section E.2.3***). The chapter concludes by summarizing Iowa's efforts to sustain SIM Initiative activities and progress on reforms after the award period ended (***Section E.3***), and a discussion of implications and lessons learned from Iowa's experience (***Section E.4***).

The federal evaluation of Iowa's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM Initiative officials;
- A total of 69 interviews with state officials, primary care providers (PCPs), county-based community health coalitions, Medicaid MCOs, commercial plans and other stakeholders over four annual interview rounds conducted since 2016, most recently in summer 2019;
- Focus groups with Medicaid beneficiaries and the PCPs serving them, many of whom participated in value-based contracting arrangements with MCOs;
- Quarterly reports submitted by Medicaid MCOs to IME in 2018 and 2019 on value-based purchasing contracts in place; and
- Behavioral Risk Factor Surveillance System (BRFSS) data from 2013–2019.

BRFSS data were used for quantitative analysis to examine population-level diabetes-related outcomes for residents of counties served by the original seven C3 initiatives, as well as the 11 expansion sites, compared to residents of counties without C3 initiatives. The C3 model was evaluated because state officials and other stakeholders pointed to C3 initiatives as a success of Iowa's SIM Initiative, and because the C3 model would be sustained and expanded after the SIM Initiative ended.

E.2.1 Delivery models and payment reforms

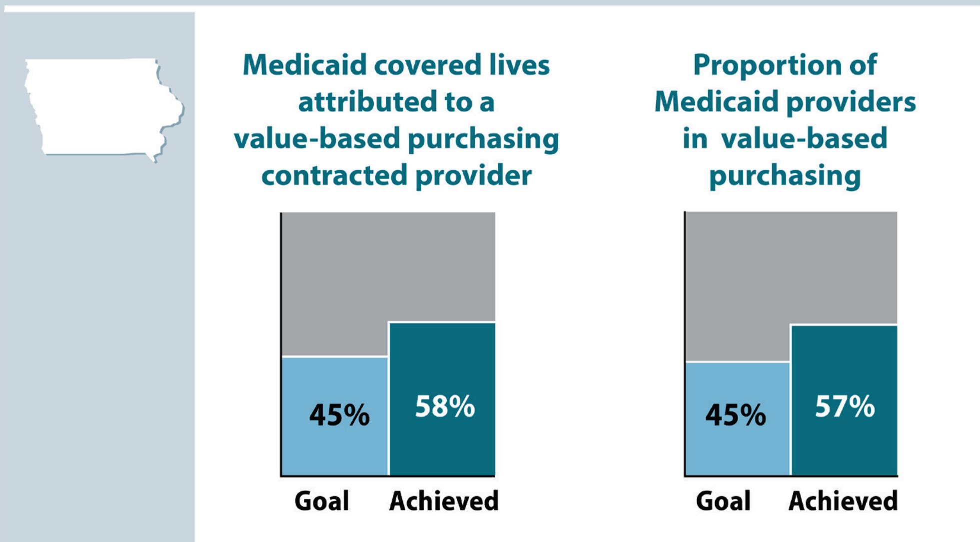
Key Results
• Iowa SIM Initiative surpassed its 45 percent goal of Medicaid covered lives in a SIM-aligned value-based purchasing contracts, though such contracts typically were not risk-based or sophisticated enough to meet Advanced APM criteria. • Stakeholders viewed turnover among the state's Medicaid MCOs as a setback for the value-based purchasing program.

Implementation of value-based purchasing in Medicaid

While Iowa's end goal was to promote value-based purchasing across all payers in the state, the SIM Initiative's value-based purchasing program focused on Medicaid—promoting value-based purchasing arrangements between MCOs and the five ACOs serving the Medicaid population. State officials sought to have 45 percent of Medicaid covered lives under a value-based purchasing arrangement by the end of the SIM Initiative, and leveraged the contracts between IME and the MCOs in pursuit of this goal—specifically requiring MCOs to have at least 40 percent of members in a SIM-aligned value-based purchasing arrangement by the end of calendar year (CY) 2018. To qualify as SIM-aligned value-based purchasing, the arrangement needed to include use of the VIS and total cost of care (TCC) or medical loss ratio (MLR), though use of the VIS was later replaced with more flexible measures. In October 2018, the MCO contracts were amended to include withhold risk (20 percent of the total withhold) tied to performance.

Iowa surpassed the SIM Initiative's value-based purchasing goal of 45 percent. At the end of the award period, the proportion of Medicaid providers participating in SIM-aligned value-based purchasing arrangements was close to 57 percent, and the proportion of covered lives in those arrangements was between 54 and 58 percent—percentages that continued to increase over 2019 (***Exhibit E-4***).

Exhibit E-4. Iowa surpassed SIM's value-based purchasing goal by the end of the SIM Initiative, 2018–2019



Note: IA = Iowa; SIM = State Innovation Model.

Source: Federal Evaluation Team interview with IA state officials.

The SIM Initiative made slow progress in establishing more mature value-based purchasing agreements that involved financial downside risk for providers. The value-based purchasing agreements that MCOs entered into with providers during the SIM Initiative, specifically between January 2018 and April 2019, typically featured a shared savings component, and in some cases, a per member per month (PMPM) payment for meeting quality measure targets. Both measures and targets varied by provider.

The SIM Initiative had an ultimate goal of value-based purchasing contracts between MCOs and providers that met the criteria of Health Care Payment Learning & Action Network (HCPLAN)[48] level 3B (i.e., APMs with shared savings and downside risk), but this was not achieved during the award period. State officials were only aware of one contract (of dozens) that had a downside risk component, and this was between an ACO and an MCO that exited the program in 2019. Most stakeholders felt that the 2016 transition to Medicaid managed care, and the subsequent churn of MCOs (for more information, see the section below titled *Value-based purchasing challenges*), had delayed the establishment of more mature value-based purchasing contracts, and that Medicaid value-based purchasing agreements would align more with the MACRA QPP measures over time. One MCO representative described a growing robustness around value-based purchasing contracts with the MCOs' Medicaid provider networks, saying that some providers were poised to transition from a shared-savings to a risk-based contract later in 2019.

ACO providers noted that, while their contracts with Medicaid MCOs were not very mature in terms of risk, these providers had more sophisticated risk-based contracts with both Wellmark and Medicare. On the continuum of risk-based value-based purchasing contracts, stakeholders described Medicaid (little to no risk) and Medicare (considerable risk) being on opposite ends, with Wellmark falling somewhere in the middle. One ACO, for instance, estimated that over 50 percent of their attributed Medicare lives were in contracts with downside risk.

Throughout the SIM Initiative, ACOs expressed some frustration that Medicaid did not engage them in the process of creating value-based purchasing standards. Instead, these decisions were made primarily by IME, which regularly met with the MCOs during the implementation process. The ACOs suggested that IME might have achieved more success with establishing more advanced value-based purchasing arrangements if they had solicited ACO input and worked more collaboratively with the providers.

[48] The four HCPLAN categories are (1) FFS with no link to quality and value, (2) FFS linked to quality and value, (3) APMs built on FFS architecture, and (4) population-based payment. Source: Alternative Payment Model Framework and Progress Tracking Work Group, HCPLAN. (2016, January 12). *Alternative payment model (APM) framework: Final white paper.* https://hcp-lan.org/workproducts/apm-whitepaper.pdf

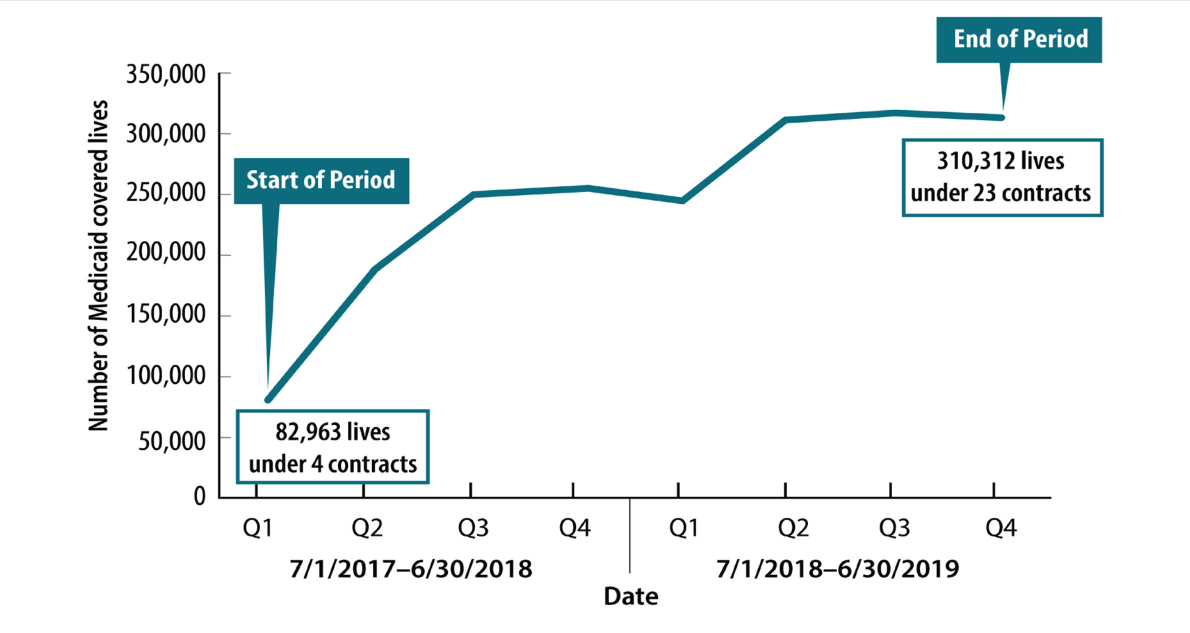
Some stakeholders questioned how health system consolidation might influence the spread of risk-based value-based purchasing moving forward. In June 2019, one of the Medicaid ACOs (UnityPoint) announced plans to merge with another large health system headquartered in Nebraska (Sanford). Stakeholders suggested that this planned merger (which would create one of the 15 largest nonprofit health systems in the country) and others would result in a significant increase in negotiating power among health systems, which could result in less willingness to change care practices and take on risk.

> "One of the messages we tried to send to the Medicaid office is that one size doesn't fit all. There's been a push to make these statewide programs and that can make a lot of sense from an efficiency perspective, but when you work with different provider types who work with different focus populations, we need some flexibility for which kind of programs will work and benefit the Medicaid program, the patients we serve, and ultimately our operations."
>
> —ACO representative

State officials ultimately abandoned their initial approach to measuring performance in its Medicaid value-based purchasing program through the VIS tool. Over the course of the award period, and particularly when it became clear that the VIS would not meet Medicaid's needs, IME worked to identify the tools and resources necessary to collect and measure value-based purchasing performance across the Medicaid program as a whole. SIM Initiative carryover funding was used to establish a proof-of-concept for a data analytic dashboard (a "Data Lake" in Iowa parlance) capable of collecting data from multiple sources and aggregating it to provide a picture of performance with regard to cost and quality. This work involved developing several use cases for the concept—for example, how it could be used to examine non-emergent use of the emergency department (ED), or spending on chronic conditions. State officials described the dashboard as critical to building "the analytic competence necessary for the Medicaid agency to have visibility into how our MCOs' [value-based purchasing] programs are performing, and what quality strategy adjustments we might want with respect to [value-based purchasing] (Heeren et al., 2019)." The state expected to include the Data Lake component in its plans for a modular Medicaid Management Information System (MMIS), but at the end of the SIM Initiative the dashboard was still only conceptual.

Several interviewees suggested that increased provider interest in value-based purchasing was motivated in part by the potential for additional revenue in a Medicaid program with very thin margins. One stakeholder explained that the state had not increased Medicaid provider rates for six years, and described the program as "chronically underfunded." One provider echoed the sentiment, saying "unless we go at-risk in our contracts, we will continue to lose money on Medicaid." State officials, provider representatives, and payers all noted that it was becoming much more common for health care providers to enter into value-based purchasing agreements (***Exhibit E-5***); and some suggested that providers were pushing for more sophisticated contracts with the MCOs, which had been more hesitant. One Medicaid ACO reported its plans to design its own Advanced APM with its contracted payers.

Exhibit E-5. Number of Medicaid managed care organization value-based purchasing contracts and covered lives in Iowa increased significantly between 2018 and 2019



Note: MCO = managed care organization; Q = quarter.

Source: Iowa MCO Quarterly Reports, 2018–2019.

As the Medicaid value-based purchasing program expanded, it began to reach smaller providers in rural areas, which were not part of the large ACOs. By July 2019 period, one of the MCOs—which had previously only operated a value-based purchasing program for providers who cared for 1,000 or more of its members—had created a separate value-based purchasing program for providers caring for between 250 and 1,000 of the plan's members. The MCO representative acknowledged that even this threshold was significant and meant the smallest health care providers were still excluded from value-based purchasing, but felt optimistic about the direction its program was headed.

Iowa began building a foundation for incorporating SDoH into value-based purchasing. The fiscal year 2020 contracts between IME and the MCOs included a new requirement for collecting SDoH data. Effective July 1, 2019, the MCOs were required to collect and report to IME a set of 13 standardized SDoH measures. The measures were selected by the SDoH Workgroup and piloted in IME's electronic health risk assessment tool, AssessMyHealth, earlier in the award period. State officials were enthusiastic about the potential to collect and aggregate data on the social needs of Iowa Medicaid members, and expected to incorporate this data into their planned Data Lake and tie these measures to payment as part of the Medicaid value-based purchasing program.

> There has been a real leap over the [award] period of developing [value-based purchasing] from nothing to past 40 percent [of covered lives in MCOs], and really now the providers are starting to drive the conversation. When you are doing something this big, identifiable culture change is more important than perfect measurement."
>
> —MCO representative

Focus group discussions with health care providers who treated Medicaid patients in Iowa suggested the growth of value-based purchasing affected health care delivery**.** The providers who participated in the July 2019 focus groups shared that their work and how they were paid had become increasingly tied to quality measures in recent years. Examples of changes these providers made included increasing access to care through expanded hours to prevent people from going to the ED; increased care coordination and case management, particularly around diabetes; and increased focus on SDoH, particularly transportation. While focus group participants felt that some of these changes were improving patient care, they also expressed concerns with the accuracy of quality measure data, added clinician burden, and having to screen for social determinants with no resources to address the needs that emerged.

Value-based purchasing challenges

The departure of one MCO and entry of another in Summer 2019 was viewed by stakeholders as a setback for the state's Medicaid value-based purchasing program. UnitedHealthcare announced its withdrawal from Iowa's Medicaid managed care plan in March 2019, effective at the end of June 2019. This marked the second MCO withdrawal since managed care began, as AmeriHealth Caritas left the program in late 2017. In response to these departures, the state contracted with another MCO, Iowa Total Care (a Centene subsidiary), which began serving Medicaid beneficiaries in July 2019.

MCO turnover presented challenges for the state. As a practical matter, an MCO departure required IDHS to transition hundreds of thousands of beneficiaries to another MCO, which was logistically challenging and a disruption for providers and patients. Stakeholders also noted that the withdrawal of UnitedHealthcare was a particular setback for the Medicaid program, since UnitedHealthcare's value-based purchasing contracting approach was more flexible and sophisticated when compared to other MCOs, and its contract negotiations were faster. Iowa Total Care, in contrast, would be starting from scratch when setting up new value-based purchasing arrangements with Medicaid providers, requiring time to collect enough data on attributed members to produce the performance metrics required in value-based purchasing. If an MCO transition resulted in changes to a member's assigned provider, the challenges would intensify. As a state official explained, "[For value-based purchasing to function,] [y]ou have to have continuity of care. Most shared savings or alternative payment is about effectuating change in those members' habits, and there needs to be time to coordinate care to see the change that would improve value."

Lack of a functional statewide infrastructure for sharing health information was another barrier to advancing value-based purchasing. Nearly every interviewee identified lack of a functional statewide clinical data-sharing platform as a key challenge to transforming from a volume- to a value-based health care system. The Iowa Health Information Network (IHIN), the state's official health information exchange platform, was described by interviewees as outdated and incapable of providing the necessary functions for facilitating broad adoption of value-based purchasing aligned with MACRA QPP. Some stakeholders noted that ACOs shared a lot of data within their systems, but that data sharing across large health systems was stymied by competition and the systems' desire to keep their information proprietary.

State officials recognized the significance of the data issue when it created the Data Sharing and Use Workgroup under the Roundtable. Stakeholders familiar with the Workgroup's efforts noted that it had come to general agreement on the need for a functional data-sharing infrastructure, but had not made progress on determining how this should be achieved (for more information, see the section below titled *Health information technology and data analytics*).

Despite a general feeling among interviewees that provider interest in value-based purchasing was increasing, some providers remained reluctant to participate. Interviewees noted several barriers to implementing value-based purchasing at the provider level. Some providers—particularly small practices—could not make the upfront investment in the administrative processes needed to be successful in value-based purchasing (e.g., resources for staff strategy meetings, quality improvement activities, regular performance reviews). Though one MCO reportedly provided a PMPM infrastructure payment in some contracts to offset provider costs, another MCO said it was unable to fund these costs through its value-based purchasing program, requiring providers to cover them upfront. Similarly, the length of time between the start of a value-based purchasing performance period and the payout could be a challenge since providers had to sustain the work for over a year before collecting payment. According to one MCO, for example, a provider typically would not receive value-based purchasing–related payments for CY 2018 until late spring 2019. The same MCO noted that even when providers had the capital for the required investments, providers sometimes lacked an understanding of what the program's payoff could be if they successfully met their performance goals: "Some providers walked away from our negotiations thinking it was a minor amount. We have to do the math for them, make it real."

Progress towards preponderance of care in value-based purchasing and alternative payment models

Iowa did not (nor had it expected to) achieve CMMI's preponderance of care goal of having 80 percent of the state's total population in a value-based purchasing arrangement by the end of the award period. However, interviewees felt that value-based purchasing was on a sustainable path and would become more advanced in the future (***Table E-1***). Iowa's SIM Initiative Team knew early on that the 80 percent preponderance of care goal was not realistic for the state, and instead focused on a goal of having 45 percent of Medicaid lives in a SIM-aligned value-based purchasing arrangement by the end of the award period. This goal was achieved, and some additional Medicaid providers were transitioning to risk-based contracts after the award period ended. In reflecting on the 80 percent CMMI goal, state officials said they needed more analytic capacity to ensure value-based purchasing was advancing the triple aim of "healthier communities, better care, and smarter spending." This recognition prompted Iowa's investment in the Data Lake proof of concept, which officials described as key for advancing their value-based strategy in the future. These officials also expected the spread of value-based purchasing to accelerate once the managed care program was more stable and MCO turnover decreased.

Table E-1. Iowa's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM sustainability
Require value-based purchasing in Medicaid MCO contracts	IA Medicaid beneficiaries	• Medicaid MCOs surpassed goal of 45 percent of covered Medicaid lives in value-based purchasing arrangements. • Turnover of MCOs in Medicaid's managed care program was a setback for the value-based purchasing program, because it disrupted contracts and took time and focus away from the state's value-based purchasing goals.	• Management and oversight of the program was integrated into IME's administration of Medicaid managed care and would therefore be sustained.

Note: IA = Iowa; IME = Iowa Medicaid Enterprise; MCO = managed care organization; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Medicare's MACRA QPP incentivized Iowa's value-based purchasing which, at least for the large ACOs, carried over to the commercial and Medicaid markets. Stakeholders continued to view the SIM Initiative goal of alignment with MACRA as an important facilitator for provider interest in value-based purchasing. Many of the Medicaid ACOs served a large share of Medicare members (one ACO estimated its patient population as split evenly among Medicaid, Medicare, and commercial coverage) and emphasized Medicare's role in spurring delivery system reforms.

> "Medicare drives the boat in terms of PCMH [the patient-centered medical home concept], quality, the data strategies. It definitely is keeping us the most focused on what we need to do to be successful. And then those benefits bleed over to different contracts … Medicaid and commercial."
>
> —ACO representative

E.2.2 Enabling Strategies to Support Health Care Delivery Transformation

Key Results
• Stakeholders stated that the use of VIS as the common performance metric did not enable health care delivery transformation, so IME instead allowed Medicaid MCOs' value-based purchasing contracts with providers to customize measures to match providers' priorities. • While there were efforts to build a statewide data sharing infrastructure through the IHIN and the Statewide Alert Notification (SWAN), the technology did not progress quickly enough to meet provider needs. • The non-governmental multi-stakeholder Roundtable would serve as a forum where health systems and other stakeholders could align transformation efforts.

Early on, the SIM Initiative contracted with the IHIN to provide Statewide Alert Notification (SWAN) ADT alerts (***Table E-2***). However, SWAN was discontinued as the award period ended in April 2019, and Iowa worked to rebuild a more advanced version of SWAN on the IHIN platform. In the meantime, providers began using a private vendor (PatientPing) to provide ADT alerts that better met their needs. Dropping SWAN, as well as discontinuing Wellmark's VIS, signaled a shift of the SIM Initiative's focus from state-driven quality measure alignment and health information technology (health IT) infrastructure for data sharing towards more provider-driven strategies. MCOs were able to customize their agreements with providers to focus on a few priority metrics—increasing their ability to incorporate value-based purchasing into contracts with a broader range of providers, including small and rural providers and specialists.

As the SIM Initiative ended, Iowa's primary strategy to support health care delivery transformation was to rely on the stakeholder-managed Roundtable as a forum where health systems and other stakeholders could meet to come to consensus on joint priorities, as well as to align efforts.

Table E-2. Iowa's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM sustainability
Revised approach to quality measure alignment for value-based purchasing	Medicaid beneficiaries	• Allowed more customized value-based purchasing agreements and no longer required contracts to include value-based purchasing.	• MCOs chose to use HEDIS measures that aligned with Medicaid adult and child core sets, resulting in more sustainable alignment with national standards for quality measurement.

(continued)

Table E-2. Iowa's enabling strategies to support health care delivery transformation (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM sustainability
SWAN	Medicaid providers	• SWAN alerts were discontinued at the end of the award period. • Providers coordinated among themselves to continue receiving alerts through a private vendor (PatientPing).	• ADT alerts shifted from being funded through the SIM Initiative to being paid for by the delivery system, making them sustainable.
Roundtable	Statewide health care delivery system	• Convened workgroups on data and community health. • Came to consensus on recommendations to the Governor.	• Was expected to continue beyond the SIM Initiative.

Note: ADT = admission, discharge, and transfer; HEDIS = Healthcare Effectiveness Data and Information Set; MCO = managed care organization; SIM = State Innovation Model; SWAN = Statewide Alert Notification.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Revised approach to quality measure alignment for value-based purchasing

While in 2018 and 2019 MCOs were required to include the VIS in their value-based purchasing contracts, IME removed this requirement for 2020 contracts. State officials said the decision to remove the requirement was made to strengthen the state's own analytic capability rather than having to rely on an outside vendor needed to calculate the proprietary VIS scores. As previously mentioned, IME was in the process of planning to build a modular Medicaid MMIS that would allow them to conduct more rigorous data analysis. Coupled with its efforts to build out its data analytics, the state also committed to reconvening the MCO Value-Based Purchasing Workgroup later in 2019, to establish a minimum Core Quality Measure Set for inclusion in MCO contracts for program year 2020/2021.

State officials and others described a number of challenges with using the VIS and two lessons they learned from the process—the cost of using the VIS score was high, and the VIS was difficult to incorporate into IME's work while simultaneously switching from FFS to encounter data during managed care implementation. Interviewees involved in the initial decision to use VIS had a number of reflections on lessons learned, in particular that they wished they had aligned with national rather than local standards. As one program implementer put it: "It was right to drive people to a common standard. I am not sure the VIS was the right standard. It should've been HEDIS [Healthcare Effectiveness Data and Information Set] … We should have focused on a national accepted standard." Another interviewee said, "What we are focusing on now … is not necessarily absolute alignment with Wellmark as we were going for before, but advancing maturity on the HCPLAN scale."

Payers and providers generally felt that flexibility to customize the measures in contracts was beneficial. MCOs were still required to incorporate some quality measurement into their contracts, but could select which ones they used, and were reported to be using HEDIS measures that aligned with the Medicaid adult and child core sets. MCO representatives and providers mentioned the value of selecting specialty-based measures that would be meaningful. One interviewee said, “You can’t do value-based in the LTSS [long-term services and supports] or behavioral health space and just measure physical outcomes. When I go into a behavioral health facility and measure if you got a flu shot, that’s not a meaningful driver of any kind of development clinically what they are doing in their programming.” The MCO represented by this interviewee was able to contract with smaller and rural providers, by allowing them to focus on fewer measures that were relevant to the care they provided. However, provider focus group discussions mentioned a challenge with customized measures. As one participant shared: “Some [MCOs] wanted you to focus on this, and others wanted you to focus on that.”

Although Iowa moved away from requiring VIS for quality measure alignment, MCOs were still required to include a measure of TCC in their contracts with providers, and would be required to include a Core Quality Measure Set in the future. Initially, MCO representatives pushed back on use of the TCC measure given they typically measured their costs through MLR, but state officials maintained that more granular cost data was available with the TCC measure. As part of the negotiations with MCOs, IME collected and compared both MLR and TCC, concluding that the TCC was appropriate to use, and that the MLR could be used to confirm it. IME planned to reconvene the IME/MCO Value-Based Purchasing Workgroup later in 2019 to develop a minimum Core Quality Measure Set that aligned with the electronic clinical quality measure (eCQM) requirements under MACRA/Merit-Based Incentive Payment System (MIPS) and Advanced APMs, and would be included in future MCO contracts.

Health information technology and data analytics

The state used SIM Initiative funding to contract with the IHIN to provide SWAN alerts, as noted, but these alerts were discontinued when the award period ended in April 2019. For some organizations that had relied on SWAN alerts, this resulted in a lapse in information about which of their patients had been in the hospital. One provider organization interviewee reported receiving little notice that these alerts would not continue.

Some of the major providers in the state also reportedly did not contribute data, making it less useful to those that did contribute. One ACO representative shared, “We already knew in [our electronical health record (EHR)] what was going on in our own facilities. I think there were only three other hospitals we were getting information on.” Another interviewee representing a C3 said there were concerns over missing data in the alerts: “I think there was pushback from larger health care systems that SWAN was not consistent in collecting data. Some [SWAN alerts] didn’t have a diagnosis, some used a number system—there was no continuity of data being pushed out by SWAN.”

One interviewee representing a provider organization reported additional issues with the timeliness of data uploaded and coming from providers into the SWAN, resulting in a few days' lag in finding out someone was an inpatient, which impeded managing care transitions. Providers also reportedly did not use the SWAN alerts because they did not integrate with EHRs. In addition, some organizations said they had their own more advanced alert systems.

Several other stakeholders outside the health care delivery system expressed they would have been interested in using the SWAN alerts, but the alerts had not been made available to them. For example, some C3 initiatives were interested in using SWAN alerts in a planned pilot, but the pilot was never implemented. Another interviewee representing behavioral health services had not heard about SWAN until later in the project, and thought receiving ADT alerts would have been very useful to behavioral health providers.

While the IHIN worked to build the next iteration of SWAN, stakeholders were skeptical it was the right platform to facilitate statewide data exchange. The IHIN, previously a state-run health information exchange, had recently been converted to a non-profit organization and was working to build technical capacity, including for more advanced ADT alerts. The new IHIN was funded through subscription fees, which the state required some organizations to pay (for example, to be a C3 grantee). Multiple interviewees representing provider organizations or C3 initiatives reported they had been required by the state to pay for membership but had never received IHIN services. A couple interviewees said they had stopped paying their IHIN fees because they did not see any value. While stakeholders generally agreed that some infrastructure for statewide health information exchange was necessary, stakeholders disagreed on whether the IHIN could provide that infrastructure. One stakeholder described the data exchange issue as "a thorn in our side. How do you move forward without the data?"

As health systems began accepting risk in their contracts with insurance companies, they increasingly recognized the need for information on patients who had been in a hospital outside their own system. Several began discussing this need for shared information, and found a widely available solution offered by PatientPing, a private vendor. As larger systems and ACOs decided to subscribe to PatientPing, other providers followed in order to access the PatientPing subscribers' data. Some providers we spoke to in July 2019 were already using PatientPing; others were investigating it or waiting to see how well it worked for their peers. But one payer described the system's relatively high cost as potentially preventing universal provider use.

Some stakeholders said health systems moved towards PatientPing in anticipation that SWAN would end and not wanting to wait for the IHIN to build a better solution. Others said the moving away was because of SWAN deficiencies. Despite efforts to build a more advanced version of SWAN on the IHIN platform, stakeholders viewed that platform as outdated given how quickly technology evolved. One program implementer expressed the challenge of trying to build an up-to-date statewide system: "The IT [information technology] world moves so fast.

States make investment and say I wish I bought it tomorrow." Compared to SWAN, as a private vendor PatientPing reportedly enabled providers to see more information about patients along with the ADT alert than SWAN would allow.

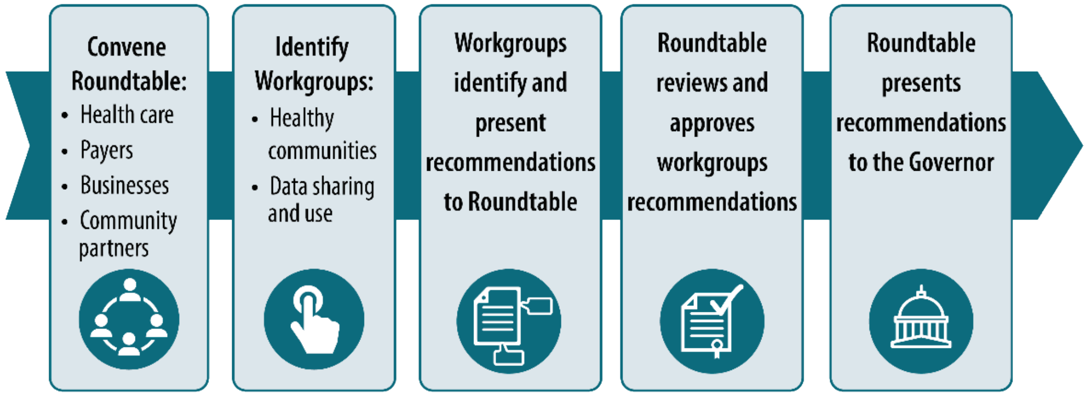
Despite moving away from SWAN, state officials and other program implementers viewed providers' use of PatientPing as a SIM Initiative success because of SWAN. State officials believed the combined growth in value-based contracts and the introduction to ADT alerts through SWAN demonstrated clearly to providers the value of sharing data. One state official said that, whereas previously they could not figure out a model for sustainable health information exchange, now providers are working together to "share some of that data, even if it is … very specific to the ADTs, which is enough at this point. That has been a huge leap from where we were."

> "What you got from SWAN was just an emailed list of patients. Whereas Ping has all this tracking, real time alerts, all kinds of stuff. That's the difference between a software company and a state-funded committee doing it in one state. Ping is across the country. It's just an [issue of] scale."
>
> —Iowa program implementer

Stakeholder engagement

Interviewees pointed to the Roundtable as an ongoing strategy to support health care delivery transformation by bringing together key stakeholders and decision-makers in what some described as a "safe space" for discussion and coming to consensus (***Exhibit E-6***). The Governor's office and its contractor coordinated and facilitated the Roundtable, which included leaders representing health care providers, payers, community partners, businesses, and other key stakeholders. The Roundtable convened seven times between 2017 and 2019. Two Roundtable workgroups were created around the priority topics of healthy communities and data sharing and use, respectively. The Healthy Communities Workgroup focused on issues related to C3 initiatives and SDoH; the Data Sharing and Use Workgroup focused on health information exchange. These workgroups developed a series of recommendations for the Governor, which the Governor endorsed in October 2018 (State of Iowa, Office of the Governor, 2018). A state official viewed the Roundtable as a step forward for the state, saying, "Previously we were in transition with managed care and balancing that with the SIM [Initiative] award, and making sure those two aligned. The Roundtable refocused energies to make sure the C3 initiatives and the data moved forward."

Exhibit E-6. Iowa SIM Initiative Roundtable process to develop recommendations



Note: SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Interviewees generally saw value in convening key stakeholders through the Roundtable workgroups, but varied on whether the Roundtable would result in anything tangible to support health care delivery. For example, while the Roundtable came to consensus on the need for data sharing in a value-based system, one participant said, "We are conscientious to not tell them how to do it … because if we start to [tell] them how to do it, the whole group would just run away." Another Roundtable participant said, "It is unrealistic to have very bold goals for that group—at end of the day, these are very different organizations."

E.2.3 Population health

Key Results
• State officials considered the C3 initiative to be one of the biggest successes of Iowa's SIM Initiative. • In addition to the seven existing C3 initiatives, Iowa added 11 new ACH expansion sites, all of which were aligned with C3 site requirements. • From mid-2018 to mid-2019, Iowa's SIM Initiative increased the focus on, and programming around, SDoH.

Table E-3 outlines three population health activities undertaken during Iowa's SIM Initiative.

Table E-3. Iowa's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM sustainability
C3	Community in each C3 county	• Maintained locally based teams of health and social service stakeholders for coordinating services across care settings.	• Several of the C3 initiatives sustained activities after the award period. C3 initiatives largely obtained funding internally, from the public health departments themselves.
Statewide Strategy Plans	Statewide population	• Continued to utilize plans that recommended evidence-based approaches and clinical indicators for improving quality related to various health conditions and areas of care.	• While no new plans were being developed, state officials included implementation of the Diabetes Strategy Plan as one of their recommendations for sustainability.
Community-based performance improvement strategies	C3 staff	• The IHC and its subcontractors provided TA to C3 initiatives around community-based performance improvement, focused on diabetes.	• The IHC will continue to provide TA to all C3 initiatives, through IHC funding. • After the end of the award period, relationships between the IHC's subcontractors and the C3 initiatives dissipated.

Note: C3 = Community and Clinical Care; IHC = Iowa Healthcare Collaborative; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Community and Clinical Care site requirements

Between early 2018 and mid-2019, the state expanded the ACH model (Haar and Cantor, 2016, February) to 11 additional communities (the ACH expansion sites), for a total of 18 C3 organizations, including the original C3 initiatives created and funded through two rounds of grants during the SIM Initiative. All 18 projects aligned with C3 site requirements. While most of the original C3 initiatives were set up through health departments, two of those C3 initiatives and all of the ACH expansion sites were organized through health systems. Of the stakeholders we spoke with, many identified the C3 initiative as one of Iowa's biggest successes

The Accountable Communities of Health Model and the Community and Clinical Care Program in Iowa

An ACH is a "structured, cross-sectoral alliance of health stakeholders dedicated to improving health, safety, and equity for all residents of a given community." The ACH model was inspired by similar models in Minnesota and Washington and served as the foundation for Iowa's C3 program. C3 initiatives are locally based coalitions of health and social service stakeholders funded by the SIM Initiative to coordinate services across care settings. Their primary functions were to: (1) address social determinants of health through care coordination, and (2) implement population-based, community-applied interventions related to the statewide strategies.

under the SIM Initiative, as this infrastructure had not previously existed and helped strengthen coordination across care settings.

From mid-2018 to mid-2019, the original C3 initiatives continued to target diabetes, as well as other social needs, through development of unique, community-based strategies. The state-issued a Request for Proposals for the second funding round specified that C3 initiatives must target individuals with diabetes. One C3 hosted a Mental Health and Diabetes Symposium with the goal of equipping partners with tools for patient engagement around these issues. As of July 2019, the same C3 had plans to sustain much of its community-based diabetes work after the award period, including the National Diabetes Prevention Program—a joint effort among the county's health care provider systems. In another C3, care coordinators made home visits focused on diabetes and SDoH, which were not sustained after the SIM Initiative ended.

In addition, several of the original C3 initiatives expanded care coordination or navigation services, developing cross-sector referral mechanisms to address patient needs. Since 2018, one C3 developed a high-touch care coordination program within the local public health department which involved ongoing and regular communication with patients with complex social and/or medical needs. Patients targeted by the program were identified through referrals from C3 clinic-based care coordinators and the county's home visiting program, as well as through patient self-referrals. As of July 2019, this C3 had been allocated funds within the county's public health budget to sustain these care coordination efforts.

In July 2018, another C3 began an initiative to use ambulance dispatch as a point of intervention for care coordination. This coordination between paramedicine and the public health department aimed to decrease ED utilization such that, when the same individual called for ambulance dispatch multiple times, paramedics would contact the public health department. The public health department could then conduct a needs assessment and help to address any identified social needs.

Stakeholders reported that the SIM Initiative helped strengthen cross-sector relationships among health systems, social service agencies, and other community-based organizations (CBOs). Stakeholders said they found these relationships to be very valuable, and anticipated they would last beyond the SIM Initiative. As a state official explained, "The C3 communities represented very organic opportunities for individual communities and health systems … to build better relationships and identify and better utilize resources in their communities to support health." Several individuals explained that, although these relationships had existed at a surface level prior to the SIM Initiative, the C3 initiatives facilitated the convening of a wide range of stakeholders that transformed these cursory relationships into working, action-based relationships. Several stakeholders reported beginning to make bidirectional referrals with health systems providers (e.g., hospitals and clinics), and that there was strong communication surrounding those referrals.

For more information, see ***Table E-5*** in the Addendum at end of this chapter. For full results describing the impact of the C3 initiatives on population-level measures related to diabetes, see ***Appendix E-1*** of this chapter.

The Federal Evaluation Team's analysis of BRFSS data compared residents of counties served by a C3 to those without one. It focused on population-level measures related to diabetes since individual-level data for Iowans served by a C3 are not available. The resulting analysis found the age at diabetes diagnosis decreased for both residents of C3 counties and for the comparison group but decreased more for residents of C3 counties (3.24 years). This statistically significant result aligned with the C3 initiatives' focus on patients at risk for diabetes, as C3 activities could presumably lead to earlier detection. In addition, while the percentage of all county residents reporting they were in fair or poor health increased for both C3 and comparison group counties, the increase was significantly smaller in counties served by a C3 (-4.26 percentage points). This finding could be associated with the C3 initiatives' focus on high-risk patients if C3 activities helped stabilize and prevent decreases in health status for its target population. There was also evidence that trends in diabetes management differed between residents of C3 counties with diabetes compared to the comparison group. For example, the percentage of residents with diabetes who were taking insulin increased in C3 counties but decreased in comparison counties (13.64 percentage points). The percentage of residents reporting a doctor has ever told them diabetes had affected their eyes decreased in both C3 and non-C3 counties but the decrease was less in C3 counties (12.67 percentage points). While there may be several explanations for these differences, they align with C3 efforts to encourage patients with diabetes to practice self-management and access recommended health care, as well as with the state evaluator's finding that Medicaid patients in C3 counties had significantly higher rates of completion for diabetes monitoring activities (eye exam, hemoglobin A1c [HbA1c] and medical attention for nephropathy) than in non-C3 counties in 2018.[49]

Although the C3 initiatives were seen generally as a SIM success and major accomplishment, the original C3 initiatives did continue to report challenges with the shift toward the more clinical focus mandated in 2017. Several officials within C3 initiatives that were set up through public health departments reported that they did not feel equipped to adopt this clinical focus. State officials reflected that this discord between the state's clinical focus and the public health–centric structure of many of the C3 initiatives translated into a lesson learned. Given the state's desire for a clinical focus, officials agreed that public health departments might not be best suited to lead C3 initiatives, and that health systems might be better suited for that role. As a result, the ACH expansion sites added between 2018 and 2019 were all implemented through health systems.

[49] University of Iowa Public Policy Center. (2019, July). *SIM Innovation Model goal evaluation report calendar year 2015–2018*. Draft version was shared with the Iowa State Evaluation Team, but it is not yet publicly available.

As of July 2019, several of the original C3 initiatives had been able to sustain their activities even though the SIM Initiative had ended. Those that sustained activities were able to do so largely by obtaining funding at a local level—typically from the county public health departments themselves. Various C3 officials said their Steering Committees (comprising health care stakeholders in the C3 initiatives' communities) intended to continue convening, and several said they had been able to sustain their care coordination activities thus far. However, one of the C3 officials said that C3 had not been able to procure a steady funding stream, and was unable to sustain any of its SIM-initiated activities.

Statewide Strategy Plans

Throughout the SIM Initiative, multi-stakeholder groups (e.g., health care providers, state agencies, social service providers, consumer advocates) convened to develop fourteen Statewide Strategy Plans intended to establish a statewide standard of care for addressing population health issues such as diabetes, tobacco use, care coordination, and SDoH. Various stakeholders said they found the statewide plans valuable for aligning best practices across providers and other actors in the health systems, as well as for the stakeholder engagement that occurred during the plan development process. State officials reported that the steering committee of one C3 used the Person and Family Engagement Statewide Strategy to align training with local provider and support staff. State officials also identified implementation of the Diabetes Strategy Plan as one of their sustainability recommendations (Heeren et al., 2019). The Diabetes Strategy Plan was updated after the award period, in May 2020, to identify strategies around primary prevention, early detection and diabetes management and treatment services, and use of data to outcome improvements related to quality and cost (Iowa Department of Public Health & the Iowa Healthcare Collaborative, 2017, May [updated May 2020]).

Community-based performance improvement strategies

Using SIM Initiative funds, the IHC connected all C3 communities with several TA subcontractors for information-sharing and assistance related to activities involving SDoH and referrals over the award period. One subcontractor began offering SIM-funded mental health first aid training to three of the original C3 initiatives around the beginning of the SIM Initiative. Another subcontractor provided TA—via written materials, podcasts, and webinars—to all C3 sites, centered on concepts such as leadership, data-driven approaches to care, and addressing SDoH. However, once the award period ended, these subcontractors reported they were no longer working closely with the C3 communities. Though the relationships between C3 initiatives and the IHC's subcontractors had dissipated, stakeholders reported that the IHC planned to continue providing and funding its own TA to the C3 initiatives. One element of community-based TA the IHC provided for the C3 communities was the Community Scorecards, a set of clinical quality measures generated under the SIM Initiative and disseminated to C3 initiatives and their partner health systems with the goal of promoting delivery system and value-based purchasing improvements.

Over the course of CY 2018 and early 2019, C3 initiatives were given the choice to continue utilizing AssessMyHealth, or to replace it with a screening tool developed from a set of 13 SDoH measures developed by the SIM-funded SDoH workgroup. Prior to 2018, C3 initiatives and Medicaid MCOs were required to implement the electronic AssessMyHealth health risk assessment and build systems to collect data and track their patients. However, many stakeholders reported difficulty implementing AssessMyHealth, and once given the option, replaced it with screening tools developed from the state's 13 standardized SDoH measures. The requirement to report on this set of measures was added to Medicaid health plans' 2019/2020 contracts.

Implementation of this screening tool, as well as referrals they received from health systems, social service agencies, and other CBOs, enabled the C3 initiatives to address more social needs in their communities. Stakeholders reported that, although C3 initiatives had emphasized SDoH from their inception, it was not until 2018 and 2019 that the SDoH focus had been brought to the forefront of the SIM initiative and had spread beyond the C3 initiatives to other parts of the health care system. Paired with the SIM Initiative's promotion of value-based purchasing, this more intense focus on SDoH in communities prompted a change in providers' mindset that one interviewee put this way: "As providers begin to realize that they will be assuming whole-dollar risk, and they can only affect 20 percent of it, they are much more interested in figuring out how to actually move the community."

To facilitate sustainability efforts, state officials also provided TA, tools, and resources to all the C3 initiatives. The IME hired a contractor, using SIM Initiative funds, to help C3 initiatives create messaging conveying the value of the work each C3 had done over the award period. The IME and stakeholders within C3 initiatives felt this TA was important for sustainability and spoke highly of its value to the C3 initiatives. In addition, in the year prior to the end of the award period, IHC officials used SIM Initiative funds to provide TA to support development of sustainability plans for each C3, including a staffing plan, budget, and TCC project. The TCC project involved a small pilot evaluation within the C3 initiatives, which assessed how implementation of care coordination impacted the TCC of a small cohort of patients. While the pilot and cohorts were quite small (8–10 patients per cohort), the study yielded positive results. The IHC and the C3 initiatives worked to individually tailor the other components of their sustainability plans, making each plan unique.

E.3 Sustainability

Key Results
• As of July 2019, Iowa planned to sustain most components of the SIM Initiative, including several of the C3 initiatives, which were intended to be self-sustained through leveraging existing funding streams. • The Governor’s Healthcare Innovation and Visioning Roundtable committed to reconvening regularly to continue advancing health care transformation efforts.

Most key pieces of the SIM Initiative were planned to continue beyond the award period. As outlined in its two-part Sustainability Plan, IDHS and other stakeholders recommended to the Roundtable nine SIM-funded activities to support Iowa’s future progress toward health care transformation (Iowa Department of Human Services [IDHS], 2018, August; 2018, December). Delivery and payment system reform activities, C3 initiatives, data sharing efforts, value-based purchasing strategies to providers, and the Healthcare Innovation and Visioning Roundtable were all central to sustainability discussions (summarized in ***Exhibit E-7*** and ***Table E-4***).

Exhibit E-7. Iowa established key elements to sustain progress in value-based purchasing after Iowa’s SIM Initiative

STAKEHOLDER ALIGNMENT	INCENTIVES	ACTIVITIES
• Governor's Healthcare Innovation and Visioning Roundtable	• Required provider incentives in Medicaid MCO contracts	• Continued TA to C3s • PatientPing ADT Alerts

Note: ADT = admission, discharge, and transfer; C3 = Community and Clinical Care; MCO = managed care organization; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Table E-4. Sustainability of Iowa's SIM activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	Health Risk Assessment Tool	Yes	Medicaid MCO contracts.
	Aligned value-based purchasing strategies	Yes	Medicaid MCO contracts.
	Community Scorecard	Yes	IHC.
	Provider and community TA	Yes	IHC.
	Diabetes and Strategy Plan implementation	Yes	Recommended to the Roundtable.
Population health	C3 initiatives	Yes	County health departments, IHC, and health systems.
Governance	Healthcare Innovation and Visioning Roundtable	Yes	Participant voluntary commitment.
	Data Sharing and Use and Healthy Communities Workgroups	Yes	Participant voluntary commitment.
Health IT	ADT alerts	Yes	Health systems.

Note: ADT = admission, discharge, and transfer; C3 = Community and Clinical Care; health IT = health information technology; IHC = Iowa Healthcare Cooperative; MCO = managed care organization; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents. Sustainability activities and funding mechanisms retrieved from the *SIM Grant Sustainability Plan—Part 2*.

By mid-2019, stakeholders were optimistic that some C3 initiatives would be sustained through leveraging existing funding streams. In prior years, stakeholders had expressed concern over obtaining long-term funding to sustain the population health work initiated by the C3 initiatives (RTI International, 2019). In July 2019, however, stakeholders noted that most C3 initiatives would be self-sustaining, as evidenced by the four C3 initiatives that had secured non-SIM Initiative–funding and other resources. One C3 official described county health department's general funds as allocated to support that C3's care coordinator. Additionally, community partners underscored that health systems would maintain sponsorship of the newer C3 initiatives with which they had existing partnerships since "they [the health systems] had the skin in the game and that's where the risk is." State officials expressed commitment to maintaining the work started under the C3 initiatives, and encouraged IDPH and the IHC to further support these efforts (Iowa Department of Human Services [IDHS], 2018, December). The IHC also made additional contributions towards sustaining C3 efforts, according to state officials and community partners. Lastly, as part of the Roundtable's recommendations to the Governor, in June 2019 the Healthy Communities Workgroup proposed development of a healthy community partnerships toolkit for interested communities to share among a wide range of stakeholders—including health care and social service providers, health plans, government agencies, and other CBOs. The Workgroup envisioned this toolkit as providing resources on key population health initiatives such as the ACH model, screening for SDoH, and links to care coordination (Governor's Healthcare Innovation and Visioning Roundtable, 2019, June 20).

Despite the numerous challenges data exchange efforts experienced, use of a statewide data exchange platform remained a shared priority among stakeholders. Between May 2017 and March 2018, stakeholders anticipated that SWAN would be phased out and replaced by a separate proprietary ADT tool, PatientPing (RTI International, 2019). By July 2019, state officials acknowledged that PatientPing had already "superseded" SWAN. Due to this shift, the Roundtable did not explicitly endorse adoption of a particular ADT tool or health information exchange platform. Instead, the group envisioned a shared commitment to "establishing a sustainable statewide shared platform to facilitate real time standardized notification at point of service (RTI International, 2019)." The Data Sharing Workgroup within the Roundtable was developing an operational and implementation plan for future data exchange, including creation of a formal governance infrastructure (Iowa Department of Human Services [IDHS], 2018, December).

Increased value-based purchasing will continue to be a future goal in Iowa—with performance measures aligning more closely with commonly used quality measure sets. By the end of the award period, the SIM initiative had met its state-set preponderance of care goals in terms of advancing value-based purchasing to providers. One provider interviewee credited the SIM Initiative with having "a real impact in planting the value-based concept on the map, [particularly] in the midst of the managed care transition." Although IME initially anticipated that requiring MCOs to use a common performance measurement tool would enable greater value-based purchasing adoption, the state lifted this requirement for 2020 contacts. State officials saw a sustainable pathway to advance value-based purchasing through aligning performance measurement with the Medicaid MCOs' existing quality measure sets. Accordingly, IME planned to reconvene a workgroup of MCOs in late 2019 to establish a minimum Core Quality Measure Set for future contacts, which would align with the requirements under MACRA and Advanced APMs. Ultimately, the state would look to IME and the IHC to further advance value-based purchasing strategies across Iowa, including creating APM-aligned quality measures and analytic tools to assess those strategies (Iowa Department of Public Health [IDPH], 2020, March 13).

Stakeholders viewed the Healthcare Innovation and Visioning Roundtable as a valuable entity; and participants continued meeting to lead efforts to advance health care transformation in Iowa going forward. The Governor's Roundtable met several times after the award period ended. In March 2020, IDPH updated the group on the agency's Community Health Needs Assessment process and the latest data related to Access to Care (Iowa Department of Public Health [IDPH], 2020, March 13). ACO representatives, providers, and state officials alike identified the Roundtable as a valuable entity and a good investment—specifically as having afforded the state a "safe space" to discuss health care reform. One state official pointed to the significance of "having the Roundtable as a way to contemplate multi-payer, multi-sector strategy in a more strategic way with the buy-in from the Governor … is a huge part of that legacy that moves across the last several years as an important, sustainable thing."

The Roundtable's Healthy Communities and Data Sharing and Use Workgroups also continued to meet after the SIM Initiative with support from IDHS, until meetings were halted in March 2020 due to the coronavirus disease 2019 (COVID-19) pandemic (Iowa Department of Human Services [IDHS], 2018, December). At the Data Sharing and Use Workgroup meeting in December 2019, for example, the group discussed data use cases and expected to finalize its charge and the role of IHIN as it moved forward into 2020.

E.4 Implications of Findings/Lessons Learned

State officials and stakeholders highlighted several positive impacts they associated with the SIM Initiative activities and funding:

- Including transparency and somewhat flexible measures in value-based purchasing promoted broad movement among payers and providers towards reform, and towards understanding the importance of tools and other resources to measure performance in a value-based environment.
- Demand for effective health data and analytic capacity, including a functional statewide infrastructure for health information exchange, grew with movement toward value-based purchasing implementation.
- Communities that participated in the C3 and ACH expansion initiatives demonstrated the value of cross-sector collaboration and community-based care coordination in working effectively toward health care transformation.
- Health care system stakeholders, particularly clinical providers, increasingly understood the role of SDoH, and how working with community partners could help clinicians address their patient populations' social needs.

Based on the SIM Initiative implementation experience, interviewees offered several opportunities, remaining challenges, and lessons learned for other states:

- Embedding value-based purchasing requirements in Medicaid MCO contracting was an effective lever for promoting payment reform, and key to achieving Iowa's value-based purchasing goals, but brought specific challenges in a Medicaid managed care environment.
- Implementing value-based purchasing in a Medicaid managed care environment, however, introduces specific challenges, particularly if managed care is just being established. Providers must negotiate contracts with each individual MCO, and each MCO has its own approach to value-based purchasing. MCO turnover disrupts value-based purchasing arrangements.
- Even though progress in establishing advanced value-based purchasing contracts that required providers to take on risk was slow, the "culture change" around value-based purchasing resulted in providers becoming a compelling force behind value-based purchasing.

- SIM's delivery system reform activities became more provider-driven over the award period. State-directed efforts to align quality measures and build a statewide health IT infrastructure for ADT alerts were not sustainable. Stakeholders found more value in having flexibility for providers to customize performance measure and select their own solution for ADT alerts.
- The state shifted implementation of the ACH expansion sites from public health departments to health systems, as the state recognized that provider-driven C3 initiatives were better equipped to move forward on value-based purchasing goals.
- The Governor's Healthcare Innovation and Visioning Roundtable provided a non-SIM–affiliated opportunity to sustain multi-sector conversations about issues that were raised and explored during the SIM Initiative but not addressed fully during the award period.

Addendum

Table E-5 Diabetes-related health status and health management improved in Community and Clinical Care counties relative to comparison counties in first three years of model

Selected outcomes	Change in outcome from baseline to implementation period: IA C3	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Percentage Reporting Fair/Poor Health	↑	↑	**-4.26†** (-8.1, -0.4)	-30.3	0.03
Age at Diabetes Diagnosis [County Residents with Diabetes]	↓	↓	**-3.24†** (-6.8, 0.3)	-6.4	0.07
Percentage Reporting a Doctor Has Ever Told Them Diabetes Has Affected Their Eyes [County Residents With Diabetes]	↓	↓	**12.67†** (2.4, 23.0)	70.5	0.02
Percentage Currently Taking Insulin [County Residents With Diabetes]	↑	↓	**13.64†** (0.3, 27.0)	42.0	0.05

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

BRFSS = Behavioral Risk Factor Surveillance System; C3 = Community and Clinical Care; CI = confidence interval; D-in-D = difference-in-differences; IA = Iowa.

Source: Federal Evaluation Team analysis of IA BRFSS data with a county-level identifier.

Appendix E-1: Iowa Community and Clinical Care Initiative Impact Results

E-1.1 Overview

Iowa's SIM Initiative was intended to facilitate community-based collaborations among payers, providers, and public health entities to address population health needs. This included improved care coordination via seven Community and Clinical Care (C3) initiative grantees that began in March 2016 and served 15 to 20 (out of 99) counties in Iowa each year. Between early 2018 and mid-2019, the state expanded the C3 model to include 11 additional organizations serving 14 counties (with some counties overlapping with the original C3 organizations), for a total of 18 C3 organizations serving 26 counties by the end of the Iowa SIM Initiative. Although the expansion sites did not receive the same level of SIM funding, they had access to the same technical assistance as the original C3 grantees.

Iowa's C3 organizations were multi-stakeholder coalitions that supported care coordination and emphasized addressing social determinants of health and population health, especially for high-cost patients at risk for or with diabetes. Specific activities included the use of care coordinators to improve diabetes care and refer patients to services to meet social needs and the provision of diabetes prevention and self-management education.

Although the C3 initiative was meant to support the goals of Medicaid value-based purchasing (i.e., to reduce emergency department use, readmissions, and health care spending), C3 clients also included individuals with other types of coverage and those who were uninsured. State officials and other stakeholders interviewed as part of the federal evaluation pointed to C3 organizations as a success of Iowa's SIM Initiative and reported that the C3 model is being sustained and has been expanded to 24 sites.

An analysis of the C3 initiative conducted by the state found that Medicaid patients in the original C3 counties had significantly higher rates of completion for diabetes monitoring activities (eye examinations, hemoglobin A1c [HbA1c] testing, and medical attention for nephropathy) than those in non-C3 counties in 2018.[50] The study also found reductions in hospital admissions for diabetes short-term complications between 2015 and 2017 but did not find the same reductions for long-term complications, uncontrolled diabetes, or lower-extremity amputation.[50] During interviews with the RTI Team, state officials reported that the quality of the Medicaid claims data used in the analysis may have been questionable because of the transition to managed care during this period. Therefore, analyzing data from an additional

[50] University of Iowa Public Policy Center. (2019, July). *SIM Innovation Model goal evaluation report calendar year 2015–2018*. Draft version was shared with the Iowa State Evaluation Team, but it is not yet publicly available.

source using a quasi-experimental design provided additional information on the effect of C3 organizations on diabetes-related outcomes.

To assess the effects of Iowa's C3 model on population-level outcomes related to diabetes prevention, management, and care, the analysis addressed the following research question:

- Did implementation of the full Iowa SIM Initiative model lead to better population health outcomes in Iowa counties with a C3 organization compared to Iowa counties without a C3 organization but exposed to other SIM efforts?

It was hypothesized that residents with diabetes in Iowa counties with a C3 organization would have better diabetes-related care, self-management, and health outcomes than residents in Iowa counties without a C3 organization, given the state evaluator's results for the Medicaid population and the focus of C3 organizations on diabetes prevention and management. There may be some reduction in health care utilization given the emphasis on care coordination, social determinants of health, and improved self-management.

Table E-1-1 provides a snapshot of the study methods.

Table E-1-1. Methods snapshot

Method	Description
Study design	D-in-D quasi-experimental design using data from a cross-sectional telephone survey designed to be representative at the state level.
Data	Iowa BRFSS data with a county-level identifier were analyzed. Iowa BRFSS data include three years before (2013–2015) and two years after (2018–2019) the original and expansion C3 organizations were implemented. Five-year ACS and AHRF data were used for propensity score weighting and control variables in the regressions.
Sample	The analytic sample included 41,375 adult participants in the Iowa BRFSS survey who were residents of either C3 counties (n=26) or non-C3 counties (n=73). The intervention group for the analysis included residents of 26 counties served by a C3 organization in 2018 and 2019 (out of a total of 99 counties). The data did not allow for the identification of individuals who used C3 services. The comparison group comprised similar residents of counties not served by a C3 organization.
Timeframe	The timeframe for the impact analysis was 2013 through 2019, which includes three baseline years (2013–2015) and two intervention years (2018–2019). Because of the small sample size and the cross-sectional design of the BRFSS, the data from the three baseline years were pooled into a single baseline period. Similarly, the data from the two intervention years were also pooled into a single intervention period. The years 2016 and 2017 were omitted because the counties served by C3 organizations differed between 2016–2017 and 2018–2019. This difference was because of changes between the first and second rounds of C3 grantees and because the C3 expansion sites were not added until 2018.

(continued)

Table E-1-1. Methods snapshot (continued)

Method	Description
Measures	The analysis assessed the effects of the C3 initiative on core outcomes related to pre-diabetes and diabetes prevalence, diabetes prevention and management, and diabetes-related health behavior and health status.
Statistical analysis	The analysis used OLS and logistic regression models. Analytic weights were created using propensity score reweighting on survey weights. Models included controls for demographic, health status, and socioeconomic county-level variables.

Note: ACS = American Community Survey; AHRF = Area Health Resource Files; BRFSS = Behavioral Risk Factor Surveillance System; C3 = Community and Clinical Care; D-in-D = difference-in-differences; OLS = ordinary least squares.

This chapter reports on the impact of the C3 initiative on population health measures related to diabetes, including health status, behavior, and diabetes management for Behavioral Risk Factor Surveillance System (BRFSS) survey participants (41,375) and for participants with diabetes (5,057) who resided in C3 or non-C3 counties in 2013–2015 and 2018–2019. A limitation of the data used in this analysis is the focus on impacts for individuals with access to C3 organizations, rather than individuals who used C3 services.

A full description of the C3 initiative and a summary of the key impact analysis findings are available in ***Appendix E***. The following sections provide detailed information on the C3 initiative impact findings in tables and figures:

- ***Section E-1.2*** presents the results of difference-in-differences (D-in-D) analyses for all residents in Iowa C3 counties and their comparison group;
- ***Section E-1.3*** presents results of D-in-D analyses separately for residents with diabetes in Iowa C3 counties and their comparison group;
- ***Section E-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity score weighting; and
- ***Section E-1.5*** describes trends in outcomes over the analysis timeframe.

E-1.2 Estimates of Iowa Community and Clinical Care Initiative's Impact on Population Health Outcomes

Table E-1-2 shows estimates of the Iowa C3 initiative's impact on population health outcomes related to diabetes, including health status, behavior, and diabetes management, for Iowa residents. These impact estimates come from D-in-D models, described in ***Appendix L***. ***Table E-1-2*** includes the following:

- Regression-adjusted means for the C3 and comparison groups during the baseline period and the intervention period;

- D-in-D estimates of the C3 initiative's impacts;
- Relative differences, which measure changes in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

E-1.2.1 Estimates of Iowa Community and Clinical Care initiative's impact on core outcomes for all county residents

Table E-1-2 shows the estimates of the Iowa C3 initiative's impact on population health measures related to diabetes, including health status and behavior, for Iowa residents of C3 counties relative to comparison counties. The findings are as follows:

- Changes in the percentages of people with diabetes, with pre-diabetes, or who had a test for high blood sugar in the past three years did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- The percentage of residents reporting fair or poor health increased for both residents of C3 counties and comparison counties but increased by 4.26 percentage points less for residents of C3 counties during the intervention period (p=0.03).
- Changes in the numbers of physical or mental health days that were not good did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- Changes in body mass index (BMI) or the percentages of overweight or obese people did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- The percentage of people who reported ever smoking 100 cigarettes total decreased for both residents of C3 and comparison counties but decreased by 5.23 percentage points less for C3 county residents during the intervention period (p=0.06).
- Changes in the percentages of people who were current smokers, had tried to quit in the past year, or had exercised in the last month did not differ between residents of C3 counties and residents of comparison counties during the intervention period.

Table E-1-2. Differences in the pre–post change in diabetes-related health status and behavior in the Iowa Community and Clinical Care initiative and comparison groups, all county residents

Outcome	Baseline period adjusted mean, IA C3 initiative	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, IA C3 initiative	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (95% CI)	Relative difference (%)	p-value
Diabetes prevalence (percentages of residents who ever had diabetes, had pre-diabetes, or had a test for high blood sugar in the past three years)							
Diabetes	9.57	5.86	10.56	6.95	-0.64 (-4.0, 2.7)	-6.8	0.70
Pre-diabetes	8.29	8.15	10.25	10.71	0.18 (-5.9, 6.3)	2.3	0.95
Blood test	56.41	51.32	54.85	54.32	-7.04 (-17.5, 3.4)	-12.5	0.19
Health status (percentage reporting fair/poor health, number of physical and mental health days that were not good)							
Fair/poor	14.08	7.31	15.00	10.61	-4.26 (-8.1,-0.4)	-30.3	0.03
Physical	3.31	2.56	3.45	2.78	-0.24 (-0.9, 0.4)	-7.3	0.46
Mental	3.09	2.68	3.74	3.98	-0.56 (-1.4, 0.2)	-18.2	0.16
Obesity (BMI, percentages of residents who were obese or overweight)							
BMI	28.20	26.68	28.72	27.03	-0.16 (-0.8, 0.5)	-0.6	0.64
Obese	29.08	20.79	31.93	23.10	-1.81 (-7.0, 3.4)	-6.2	0.49
Overweight	32.45	29.54	30.50	26.66	0.49 (-4.5, 5.5)	1.5	0.84

(continued)

Table E-1-2. Differences in the pre–post change in diabetes-related health status and behavior in the Iowa Community and Clinical Care initiative and comparison groups, all county residents (continued)

Outcome	Baseline period adjusted mean, IA C3 initiative	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, IA C3 initiative	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (95% CI)	Relative difference (%)	p-value
Health behavior (percentages of residents who were current smokers, had ever smoked 100 cigarettes total, had tried to quit in the past year, or had exercised in the past month)							
Smoker	19.10	16.30	17.26	12.24	1.54 (-3.1, 6.2)	8.1	0.52
100 cigarettes	45.10	39.52	42.66	29.74	5.23 (-0.1,10.6)	11.6	0.06
Tried to quit	53.88	54.73	51.00	51.65	-2.57 (-16.9,11.7)	-4.8	0.73
Exercised	74.49	79.40	74.90	80.38	-0.47 (-5.7, 4.8)	-0.6	0.86

Notes: BMI = body mass index; BRFSS = Behavioral Risk Factor Surveillance System; C3 = Community and Clinical Care; CI = confidence interval; D-in-D = difference-in-differences; IA = Iowa; OLS = ordinary least squares.

Methods: The analysis used an OLS model to obtain D-in-D estimates for continuous outcomes (BMI, numbers of physical and mental health days that were not good) and a logistic regression model for binary outcomes (all other outcomes). For binary outcomes, the estimated probabilities are multiplied by 100 to obtain a percentage. Models are adjusted for person-level variables (gender, age, race, education, marital status, number of children, number of adults in household, employment status, and income) and county-level variables (residence in a metropolitan area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, percentage homeowners, and educational attainment). Because data were pooled across years, there was only one baseline period and one intervention period, so all outcome models assume parallel trends during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the IA C3 initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IA C3 initiative group relative to the comparison group after IA C3 initiative implementation. The relative difference is the D-in-D estimate as a percentage of the IA C3 initiative baseline period adjusted mean.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 12,022,666. This number includes all observations for both the IA C3 county residents and residents of comparison counties. All outcome models assume that IA C3 and comparison group outcome trends are different during the baseline period.

Source: Federal Evaluation Team analysis of BRFSS data with county variable from the IA Department of Public Health.

E-1.3 Estimates of Iowa Community and Clinical Care Initiative's Impact on Core Outcomes for County Residents with Diabetes

This analysis assessed the specific impacts of C3 organizations on people with diabetes because the C3 organizations undertook activities such as using care coordinators to improve diabetes care and providing diabetes prevention and self-management education. People with diabetes were identified in the BRFSS data because they self-reported a diabetes diagnosis.

Table E-1-3 shows the estimates of the impact of Iowa C3 organizations on population health measures related to diabetes, including diabetes management, health status, and behavior, for Iowa residents of C3 counties who have diabetes relative to residents of comparison counties who have diabetes. The findings are as follows:

- Age at diabetes diagnosis decreased for both residents of C3 counties and residents of comparison counties but decreased by 3.24 years more for residents of C3 counties during the intervention period (p=0.07).
- Changes in the numbers of HbA1c tests in the last year did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- Changes in the number of times people were seen by health professionals for diabetes in the past year did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- The percentage of residents with diabetes reporting a doctor had ever told them diabetes had affected their eyes decreased for both residents of C3 counties and residents of comparison counties but decreased by 12.67 percentage points less for residents of C3 counties during the intervention period (p=0.02).
- The percentage of residents with diabetes currently taking insulin increased in C3 counties and decreased in comparison counties, leading to a relative increase of 13.64 percentage points for residents of C3 counties during the intervention period (p=0.05).
- Changes in the percentage of residents with diabetes who had taken a diabetes self-management course did not differ between residents of C3 counties and residents of comparison counties during the intervention period.
- Changes in the frequencies of non-professional blood tests over the last year did not differ between residents of C3 counties who had diabetes and residents of comparison counties who had diabetes during the intervention period.
- Changes in the frequencies of foot checks for sores over the last year did not differ between residents of C3 counties who had diabetes and residents of comparison counties who had diabetes during the intervention period.

- Changes in the number of physical or mental health days in the past 30 days that were not good did not differ between residents of C3 counties and residents of non-C3 counties during the intervention period.
- Changes in BMI, the percentage of overweight people, and the percentage of obese people did not differ between residents of C3 counties who had diabetes and residents of comparison counties who had diabetes during the intervention period.
- Changes in the percentages of people who were current smokers, had ever smoked 100 cigarettes total, had tried to quit in the past year, or had exercised in the last month did not differ between residents of C3 counties and residents of comparison counties during the intervention period.

Table E-1-3. Differences in the pre–post change in diabetes-related health management, health status, and behavior in the Iowa Community and Clinical Care initiative and comparison groups, county residents with diabetes

Outcome	Baseline period adjusted mean, IA C3 initiative	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, IA C3 initiative	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (95% CI)	Relative difference (%)	p-value
Diabetes-related health care (age at diabetes diagnosis, number of HbA1c tests in the last year, number of times seen by a health professional for diabetes in the past year, percentage reporting a doctor has ever told them diabetes has affected their eyes)							
Age	50.77	49.89	48.52	48.51	-3.24 (-6.8, 0.3)	-6.4	0.07
HbA1c tests	3.27	2.67	2.87	3.12	-0.47 (-1.1, 0.2)	-14.5	0.16
Times seen	3.77	4.00	3.45	4.62	0.21 (-1.8, 2.2)	5.7	0.84
Eyes	17.99	20.23	16.00	9.40	12.67 (2.4,23.0)	70.5	0.02
Self-management of diabetes (percentage currently taking insulin, percentage who had taken a course on DSME, frequency of non-professional blood test and foot checks for sores over the last year)							
Insulin	32.46	40.86	33.86	36.60	13.64 (0.3,27.0)	42.0	0.05
DSME course	64.93	64.91	63.08	64.40	-3.42 (-18.9,12.1)	-5.3	0.66
Blood test	58.59	50.69	57.98	50.85	9.07 (-2.6,20.7)	15.5	0.13
Foot check	47.48	49.85	45.84	30.38	3.87 (-7.0,14.7)	8.2	0.48
Health status (number of physical and mental health days in the past 30 days that were not good)							
Physical	7.72	5.53	7.12	7.89	-1.03 (-3.7, 1.6)	-13.4	0.45
Mental	3.93	2.52	4.96	5.90	0.21 (-2.2, 2.6)	5.2	0.87

(continued)

Table E-1-3. Differences in the pre–post change in diabetes-related health management, health status, and behavior in the Iowa Community and Clinical Care initiative and comparison groups, county residents with diabetes (continued)

Outcome	Baseline period adjusted mean, IA C3 initiative	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, IA C3 initiative	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (95% CI)	Relative difference (%)	p-value
Obesity (BMI, percentages of residents with diabetes who were obese or overweight)							
BMI	32.90	31.39	33.17	33.39	-1.84 (-4.5, 0.8)	-5.6	0.18
Obese	55.88	47.39	57.19	55.32	-7.39 (-22.3, 7.5)	-13.2	0.33
Overweight	22.04	27.06	21.89	17.35	7.43 (-4.0,18.9)	33.7	0.20
Health behaviors (percentages of residents with diabetes who were current smokers, had ever smoked 100 cigarettes total, had tried to quit in the past year, or had exercised in the last month)							
Smoker	25.98	23.14	25.31	17.49	6.93 (-3.2, 17.1)	26.7	0.18
100 cigarettes	45.10	39.52	42.66	29.74	-3.62 (-20.0, 12.8)	-8.0	0.67
Tried to quit	53.88	54.73	51.00	51.65	7.74 (-12.5, 28.0)	14.4	0.45
Exercised	74.49	79.40	74.90	80.38	-2.73 (-19.2, 13.8)	-3.7	0.75

Notes: BMI = body mass index; BRFSS = Behavioral Risk Factor Surveillance System; C3 = Community and Clinical Care; CI = confidence interval; DSME = diabetes self-management and education; D-in-D = difference-in-differences; HbA1c = hemoglobin A1c; IA = Iowa; OLS = ordinary least squares.

Methods: The analysis used an OLS model to obtain D-in-D estimates for continuous outcomes (age at diabetes diagnosis, number of HbA1c tests, number of times seen by a health professional, frequencies of blood tests and foot checks, BMI, numbers of physical and mental health days that were not good) and a logistic regression model for binary outcomes. For binary outcomes, the estimated probabilities are multiplied by 100 to obtain a percentage. Models are adjusted for person-level variables (gender, age, race, education, marital status, number of children, number of adults in household, employment status, and income) and county-level variables (residence in a metropolitan area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, percentage homeowners, and educational attainment). Because data were pooled across years, there was only one baseline period and one intervention period, so all outcome models assume parallel trends during the baseline period.

(continued)

Table E-1-3. Differences in the pre–post change in diabetes-related health management, health status, and behavior in the Iowa Community and Clinical Care initiative and comparison groups, county residents with diabetes (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the IA C3 initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IA C3 initiative group relative to the comparison group after IA C3 initiative implementation. The relative difference is the D-in-D estimate as a percentage of the IA C3 initiative baseline period adjusted mean.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 1,149,075. This number includes all observations for both the IA C3 county residents and residents of comparison counties.

Source: Federal Evaluation Team analysis of BRFSS data with county variable from the IA Department of Public Health.

E-1.4 Covariate Balance Between the Community and Clinical Care and Comparison Groups

As described in ***Appendix L**,* the analysis created annual propensity scores for the overall comparison sample at the person–year level for the overall sample and the sample of people with diabetes.

Table E-1-4 shows the covariate balance between residents of C3 counties and residents of comparison counties in the last baseline year for the overall sample of county residents. (Covariate balance for the sample with diabetes is not shown.) Each table includes the following:

- The covariate means for residents of C3 and comparison counties without propensity score weighting;
- The standardized difference between the C3 and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score–weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the C3 group means and the propensity score–weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores using logistic regressions in which the dependent variable was an indicator of inclusion in the C3 group. Although propensity scores were calculated in both the baseline period and the intervention period, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included all covariates in ***Table E-1-4*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table E-1-4 shows the balance between C3 and comparison group covariates before and after applying weights to observations for all BRFSS participants in C3 and non-C3 counties. Prior to propensity score weighting, residents of C3 counties were less likely to be non-Hispanic white, were more educated, had higher incomes, and were much more likely to reside in a Metropolitan Statistical Area. These differences are likely driven by the C3 counties, including Des Moines, the main urban center in Iowa. After propensity score weighting, most standardized differences were below the 0.10 threshold, indicating an acceptable level of covariate balance.

Patterns in standardized differences before and after propensity score weighting for individuals with diabetes were similar to those for all county residents.

Table E-1-4. Covariate balance between the Community and Clinical Care and comparison groups in the last baseline year, all county residents

Variable	Unweighted mean or percentage, IA C3 initiative	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are male	49.28	49.66	0.01	49.25	0.001
Percentage of people in each age group					
18 to 24 years (referent category)	12.80	8.80	0.13	21.10	0.23
25 to 34 years	15.30	13.20	0.06	16.30	0.03
35 to 44 years	14.80	14.20	0.02	14.60	0.004
45 to 54 years	18.10	18.40	0.01	15.80	0.06
55 to 64 years	17.20	18.70	0.04	14.40	0.08
65 years or older	21.80	26.70	0.12	17.70	0.10
Percentage of people who are non-Hispanic white	88.20	95.36	0.16	81.29	0.19
Percentage of people by educational attainment					
Up to high school graduate	43.60	50.40	0.14	32.10	0.24
Associates/technical degree or some college	35.60	34.70	0.02	37.80	0.05
College graduate or higher	20.80	14.90	0.16	30.00	0.21
Percentage of people by marital status					
Married (referent category)	54.20	59.70	0.11	43.90	0.21
Widowed, separated, or divorced	18.90	19.50	0.02	18.70	0.01
Never married	26.80	20.80	0.14	37.40	0.23

(continued)

Table E-1-4. Covariate balance between the Community and Clinical Care and comparison groups in the last baseline year, all county residents (continued)

Variable	Unweighted mean or percentage, IA C3 initiative	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level (continued)					
Percentage of people with children					
0 children (referent category)	66.30	67.60	0.03	70.20	0.09
One child	13.00	12.10	0.03	13.30	0.01
Two children	12.00	10.60	0.04	10.60	0.04
Three or more children	8.70	9.70	0.03	5.90	0.11
Percentage of people with one, two, or three or more adults in their household					
One adult (referent category)	21.80	22.70	0.02	23.20	0.03
Two adults	57.10	59.80	0.06	56.50	0.01
Three or more adults	21.10	17.50	0.09	20.30	0.02
Percentage of people who are unemployed	60.77	61.17	0.01	56.97	0.08
Percentage of people in each income category					
<$15,000 (referent category)	11.70	11.20	0.02	17.20	0.16
$15,000 to <$25,000	11.20	12.30	0.03	10.70	0.02
$25,000 to <$35,000	11.20	12.00	0.03	11.00	0.01
$35,000 to <$50,000	15.30	16.70	0.04	11.00	0.13
More than $50,000	50.60	47.80	0.06	50.10	0.01

(continued)

Table E-1-4. Covariate balance between the Community and Clinical Care and comparison groups in the last baseline year, all county residents (continued)

Variable	Unweighted mean or percentage, IA C3 initiative	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
County level					
Percentage of people residing in a Metropolitan Statistical Area	71.30	20.00	1.20	90.18	0.49
Percentage of people living in poverty [2015]	12.17	11.62	0.19	17.23	0.18
Hospital beds per 1,000 people [2015]	3.25	2.87	0.17	6.40	0.15
Median age in years [2010]	36.63	42.46	0.14	31.06	0.14
Percentage of people (aged under 65 years) without health insurance [2015]	5.87	6.29	0.27	6.31	0.28
Percentage of people who own a home	74.16	80.41	0.15	65.19	0.20

Notes: Referent category in the table above refers to a category for a categorical variable that is excluded from the propensity score and D-in-D models.

C3 = Community and Clinical Care; D-in-D = difference-in-differences; IA = Iowa.

Source: Federal Evaluation Team analysis of IA BRFSS data with a county-level identifier from the IA Department of Public Health.

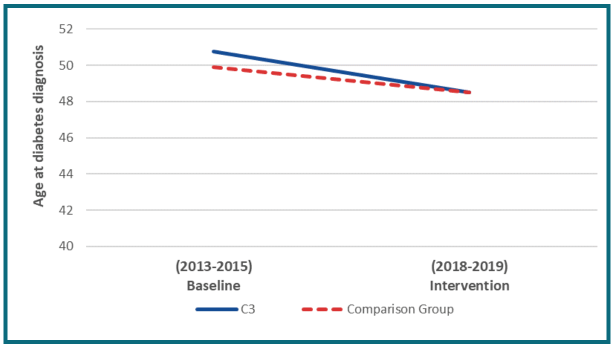
E-1.5 Trends in Population-Level Diabetes Management Outcomes

Figures E-1-1 through ***E-1-4*** show propensity score–weighted trends between the baseline and intervention periods for selected D-in-D outcomes (age at diabetes diagnosis, percentage who reported a doctor has ever told them diabetes has affected their eyes, percentage currently taking insulin, and number of HbA1c tests in the past year) for residents of C3 counties who had diabetes and residents of comparison counties who had diabetes.

E-1.5.1 Trends in core outcomes, people with diabetes

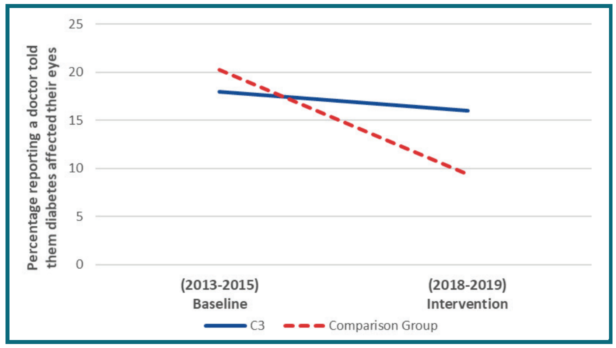
Figures E-1-1 through ***E-1-4*** present trends for four selected core outcomes (age at diabetes diagnosis, percentage who reported a doctor has ever told them diabetes has affected their eyes, percentage currently taking insulin, and number of HbA1c tests in the past year) for people with diabetes in the C3 and comparison groups.

Figure E-1-1. Trends in age at diabetes diagnosis in the Community and Clinical Care and comparison groups.



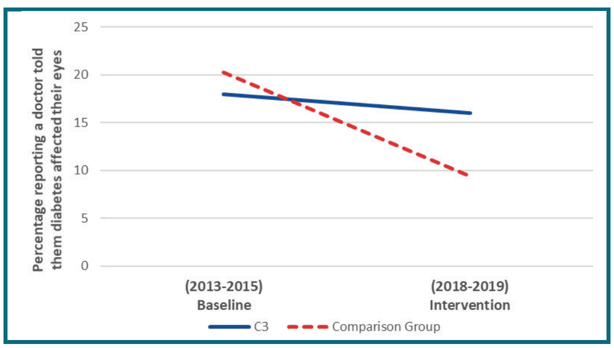
Note: C3 = Community and Clinical Care.

Figure E-1-2. Trends in percentage reporting a doctor ever told them diabetes affected their eyes in the Community and Clinical Care and comparison groups.



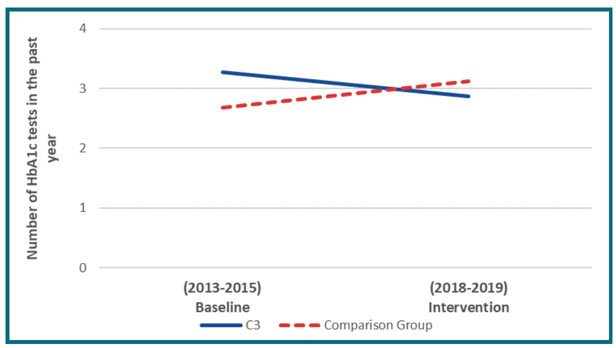
Note: C3 = Community and Clinical Care.

Figure E-1-3. Trends in percentage currently taking insulin in the Community and Clinical Care and comparison groups.



Note: C3 = Community and Clinical Care.

Figure E-1-4. Trends in number of hemoglobin A1c tests in the past year in the Community and Clinical Care and comparison groups.



Note: C3 = Community and Clinical Care; HbA1c = hemoglobin A1c.

Source: Federal Evaluation Team analysis of Iowa Behavioral Risk Factor Surveillance System data from the Iowa Department of Public Health.

The findings are as follows:

- The age at diabetes diagnosis decreased more between the baseline period and the intervention period for the C3 group than for the comparison group (***Figure E-1-1***).
- The percentage of people with diabetes who reported a doctor had ever told them diabetes affected their eyes decreased more between the baseline and intervention periods in the comparison group than in the C3 group (***Figure E-1-2***).

- The percentage of residents with diabetes who reported they were currently taking insulin increased in C3 counties but decreased in the comparison group between the baseline and intervention periods (***Figure E-1-3***).

- The average number of HbA1c tests in the past year decreased for residents of C3 counties between the baseline period and the intervention period but increased for the comparison group. While the average number of HbA1c tests in the past year was lower in the comparison group at baseline, it was lower in the C3 group during the intervention period (***Figure E-1-4***).

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Appendix F: State Innovation Model in Model Test States: Michigan

Payment Model Development	• The state designed the SIM Patient-Centered Medical Home (PCMH) initiative, building on the Michigan Primary Care Transformation (MiPCT) project in which participating primary care practices received per member per month (PMPM) payments, and later, incentives to meet quality and utilization benchmarks. • Medicaid Health Plans established their baseline use of alternative payment models (APMs) and complied with contractual mandates to move to more advanced APMs.
Delivery Model Transformation	• PCMHs and community-based organizations (CBOs) deployed a social determinants of health (SDoH) screening tool. • PCMHs were proponents of the screening tool, and either addressed referrals in house or referred them out to CBOs.
Health IT and Data Analytics	• With SIM-funded one-time investments, the Michigan Health Information Network (MiHIN) integrated the operations of several regional health information exchanges (HIEs) to facilitate data collection, data reporting, and admission, discharge, and transfer (ADT) notifications and to track active patient–provider relationships.
Population Health	• SIM funding established five Community Health Innovation Regions (CHIRs) in which CBOs administered the SDoH screening tool, addressed patients' social needs, and received referrals from PCMH practices.
Sustainability	• Medicaid Health Plans had contractual incentives to continue payments to PCMHs and move toward APMs. • Additional state funds will sustain core staffing and CHIR infrastructure, as CHIRs pursued funding from other sources.
Implications	• Organizing regional systems of stakeholders, as was achieved with Michigan's CHIRs, was an effective way to promote screening for SDoH needs—with patient and provider acceptance and support.

F.1 Key State Context and the Michigan State Innovation Model Initiative

F.1.1 Pre-State Innovation Model health care in Michigan

Michigan's health care environment was characterized by large integrated health systems and provider organizations. The Medicaid managed care market was reasonably competitive at the start of the SIM Initiative. Eleven Medicaid managed care plans operated throughout the state; although none had a majority market share statewide, some had significant market share in particular counties. Michigan had an ongoing history of participating in many federal health care demonstrations—including Health Care Innovation Awards, the Multi-Payer Advanced Primary Care Practice (MAPCP) Demonstration, Comprehensive Primary Care Plus (CPC+), and the Pioneer Accountable Care Organization Model. Stakeholders described the state as innovative in health care delivery and value-based payment (VBP) mechanisms generally, and pointed to the demonstrations preceding the SIM Initiative as setting a foundation for the SIM Initiative.

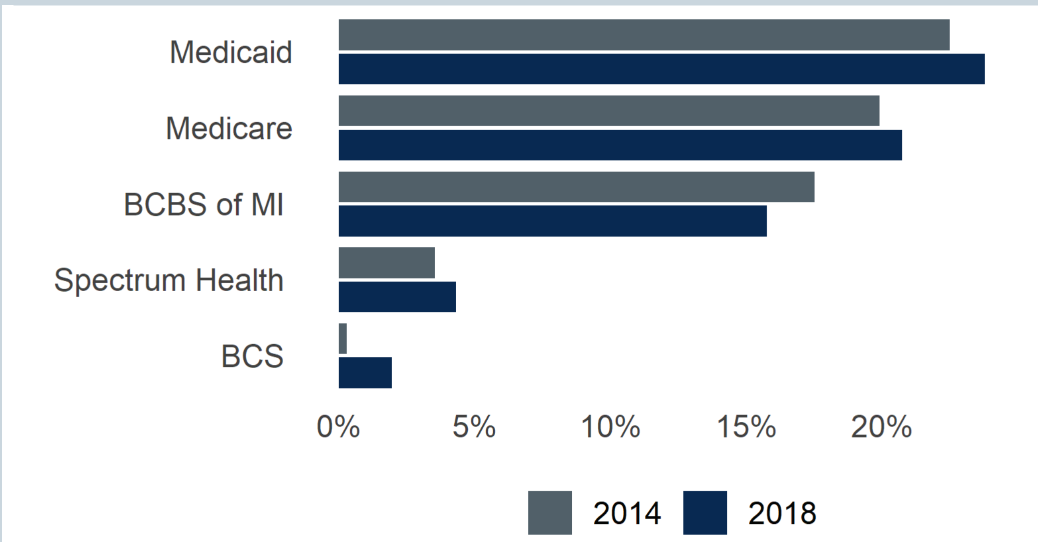
The Michigan Primary Care Transformation (MiPCT) project was particularly critical in laying the groundwork for the SIM Initiative. The MiPCT was part of the MAPCP Demonstration that operated from 2012 to 2014, which promoted increased patient-centered medical home (PCMH) adoption throughout the state. MiPCT included Medicare, Medicaid managed care plans, and three private payers—Blue Cross Blue Shield (BCBS) of Michigan, Blue Care Network, and Priority Health. Other programs that helped build the SIM Initiative's foundation in the state included: (1) the Michigan Children's Health Access Program (Michigan Association of United Ways, 2016), a community-based pediatric medical home model launched in 2008 and implemented in nine counties, several of which overlapped with counties in regions where initial SIM Initiative implementation got under way; (2) the Physician Group Incentive Program (Blue Cross Blue Shield Blue Care Network of Michigan, 2016), a medical home practice transformation program BCBS of Michigan supported; and (3) Michigan Health Information Network (MiHIN), the state's umbrella health information exchange (HIE), established in 2010 to integrate the protocols and operations of multiple existing regional HIEs.

The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Michigan was relatively competitive. Together, commercial insurers had the greatest share of market, followed by Medicaid, then Medicare, in percent of insured lives, in both 2014 and 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percentage of insured lives they covered between 2014 and 2018 (see ***Exhibit F-1***). In contrast, the percent of insured lives covered by the third most common insurer (BCBS of Michigan) shrank slightly between 2014 and 2018, although it remained the dominant commercial health insurer in the state.

A majority of Michigan practices were small and located in urban areas. In 2015, approximately 55 percent of primary care practices had a single provider and 16 percent were located in rural areas. Nineteen percent of primary care practices had an existing involvement in Medicare a fee-for-service (FFS) alternative payment model (APM [e.g., CPC+, the Medicare Shared Savings Program]).[51]

Exhibit F-1. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Michigan shown)



Note: BCBS = Blue Cross Blue Shield; BCS = BCS Financial Corporation; HIC ACS = Health Insurance Coverage from the American Community Survey; MI = Michigan; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

F.1.2 State Innovation Model Initiative in Michigan

Michigan's approach to its SIM Initiative was based directly on the state's 2014 "Reinventing Michigan's Health Care System: Blueprint for Health Innovation" produced under the state's Model Design award through SIM Round 1 funding. The guiding principle for this blueprint, and a priority for the state, was to improve the health of all Michiganders through better quality at lower cost than the existing system. Broadly, the SIM Initiative, through development of five Community Health Innovation Regions (CHIRs) across the state, aimed to achieve this improvement by strengthening relationships between clinical care providers and

[51] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

community-based organizations (CBOs) addressing social determinants of health (SDoH). The state intended to use SIM funding to support three strategies:

- **Population Health:** Improving population health in the five CHIRs by developing and supporting “clinical-community linkages”;
- **Care Delivery:** Transforming the care delivery system by supporting PCMH principles and incentivizing adoption of VBP arrangements; and
- **Technology:** Using health information technology (health IT) to support care management and coordination.

The *population health strategy* was built on the creation of five CHIRs designed to improve well-being and reduce unnecessary medical costs through community-wide systems change. At the beginning of the SIM Initiative, the state selected five CHIRs that varied geographically, and based on applications submitted by potential CHIRs, proposed different approaches to making connections between clinicians and social service agencies. The five CHIRs selected were also at different stages in developing the proposed approaches. Some were just getting started under the SIM Initiative; others felt they had been making connections between clinicians and social service agencies for several years. (See ***Section F.2.3*** for details about establishing the CHIRs.)

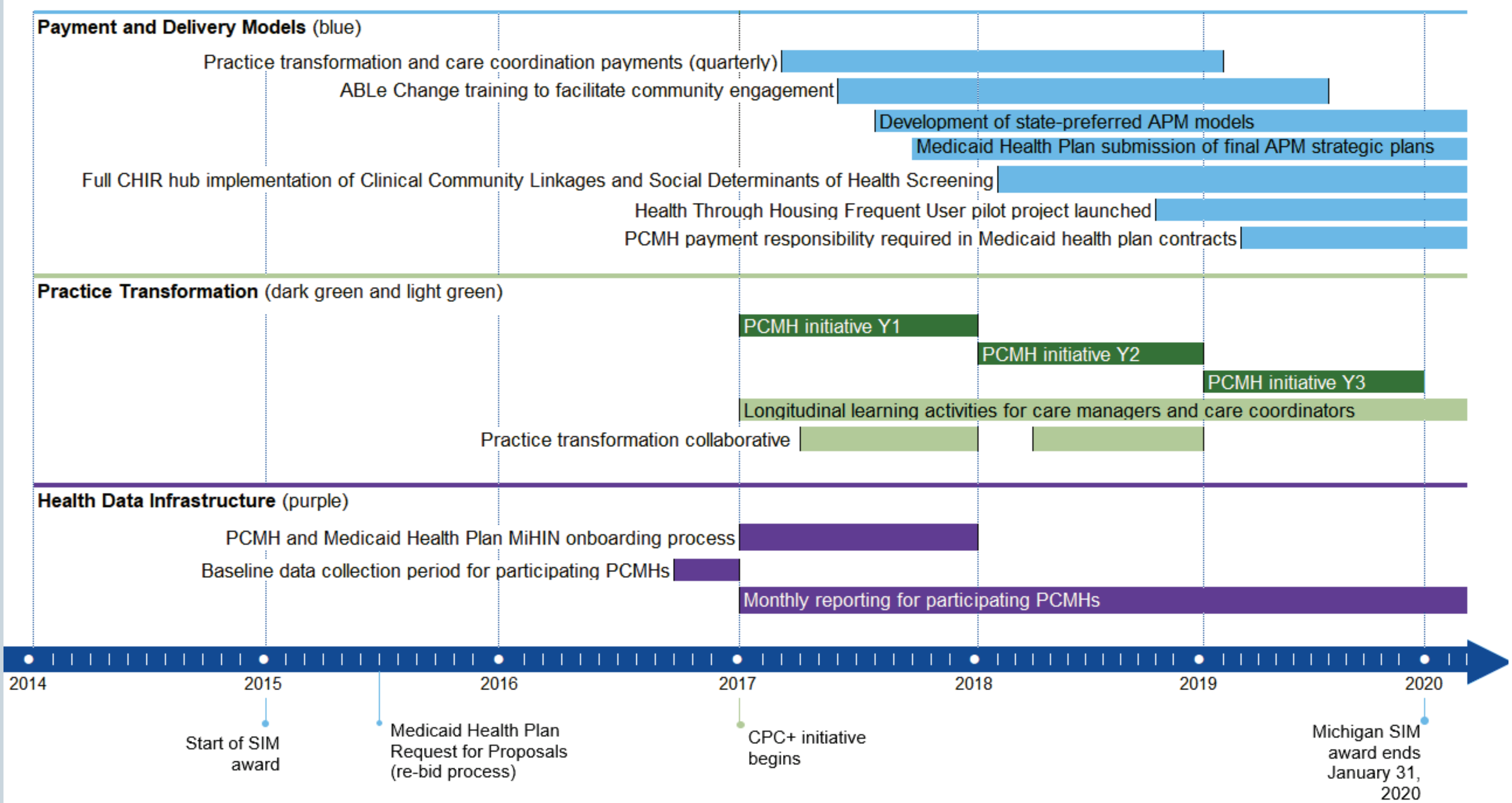
The *care delivery strategy* consisted of two major components: (1) launching a new PCMH Initiative on January 1, 2017 that initially included 325 practices; and (2) encouraging use of APMs that incentivized high-quality and cost-efficient care. Participating practices, which were required to apply to join the PCMH Initiative, had to submit an intent annually to continue participation. Practices participating in the PCMH Initiative received per member per month (PMPM) payments from the state Medicaid program, which were distributed to practices through Medicaid managed care plans to support care coordination and practice transformation, as well as in-person and virtual technical assistance (TA) from the state and other contracted organizations. Medicaid managed care plans were contractually obligated to participate in the SIM Initiative, including requirements related to developing a plan for APM adoption and expansion.

Initially, the care delivery strategy included Accountable Systems of Care (ASC) to facilitate quality improvements and reductions in unnecessary medical expenditures through payment incentive alignment and improved care coordination. By 2017, however, Michigan had phased out this component of the SIM Initiative, primarily in response to stakeholder feedback that ASC would duplicate the risk-bearing role Medicaid managed care plans were already playing.

The *technology strategy* consisted of engaging practices and payers in MiHIN, to support care management and coordination. Through the SIM Initiative, PCMHs and Medicaid managed care plans were required to join the MiHIN to support performance measurement and reporting, active care relationship tracking, and the sending and receiving of admission, discharge, and transfer (ADT) notifications. MiHIN was instrumental in supporting these core SIM components. Further, health IT tools helped PCMHs track patient–provider relationships and quality metrics.

Michigan's SIM award ended in January 2020. ***Exhibit F-2*** depicts the timeline of major Michigan SIM Initiative and SIM-related activities.

Exhibit F-2. Timeline of Michigan SIM and SIM-related activities



Notes: Lighter shades (with [1]) of the same color bars denote similar activities or models.

APM = alternative payment model; CHIR = Community Health Innovative Region; CPC+ = Comprehensive Primary Care Plus; MiHIN = Michigan Health Information Network; PCMH = patient-centered medical home; SIM = State Innovation Model; Y = year.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

F.2 Accomplishments from Michigan's State Innovation Model Initiative

This section summarizes Michigan's SIM award activities, accomplishments, and stakeholder feedback in three areas: delivery models and payment reforms (***Section F.2.1***), enabling strategies to support health care delivery transformation (***Section F.2.2***), and population health (***Section F.2.3***). The chapter concludes by summarizing Michigan's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section F.3***), and a discussion of implications and lessons learned from Michigan's experience (***Section F.4***).

The federal evaluation of Michigan's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM officials;
- A total of 83 interviews with state officials, primary care and behavioral health providers, commercial payers, and other stakeholders over four annual interview rounds conducted since 2016, most recently in winter 2020;
- Focus groups with primary care providers and Medicaid beneficiaries served by SIM PCMHs and CHIRs over four annual rounds conducted since 2016, most recently in winter 2020; and
- Medicaid claims data and PCMH attribution data.

Although each of the five CHIRs was at a different stage of development by the end of the SIM Initiative, all were central to Michigan's efforts to link clinicians with social services agencies to achieve such goals as reducing inappropriate emergency department (ED) use. Thus, Medicaid claims data combined with PCMH attribution data provided by the Michigan Department of Health and Human Services (MDHHS) were used to evaluate the presence of CHIRs on health care utilization, controlling for attribution to a provider in the SIM-related PCMH Initiative. This is important insofar as the PCMH Initiative may have directly influenced the outcomes, and the interest here is to isolate any potential effects of the CHIRs. Because data limitations prevented identifying which beneficiaries received CHIR services, the quantitative analysis compared outcomes for Medicaid beneficiaries aged under 65 years and resided in CHIR counties with their counterparts who resided in non-CHIR counties, before and during the CHIR implementation period.

F.2.1 Delivery models and payment reforms

Key Results
Health care delivery system transformation strategies
• The state designed the SIM PCMH Initiative, building on the MiPCT project, in which participating practices received PMPM payments for care management and practice transformation activities, and later incentives for meeting quality and utilization benchmarks.
• PCMH practices implemented SDoH screening. PCMH care coordinators were to continue addressing patients' social needs at the practice or—for those located within CHIRs—refer patients to CHIR "hubs" to enable community organizations to address patient needs.
Payment reform strategies
• During the SIM Initiative, all 11 Medicaid managed care plans provided baseline APM data and worked with MDHHS to establish goals for increasing APM activity.
• New state contracts with Medicaid managed care plans gave them incentives to design APMs that would support PCMHs in continuing to provide care coordination and management services.

Described in ***Table F-1***, Michigan's two primary strategies related to care delivery were the PCMH Initiative and APMs.

By the end of the SIM Initiative, the statewide PCMH Initiative represented approximately 300 practices and 2000 providers throughout the state, serving approximately 320,000 beneficiaries to support PCMH model adoption and ongoing implementation. An important component of the PCMH effort was universal screening of Michiganders to identify and begin to address SDoH. Development of the five CHIRs led to strengthened relationships between clinical care entities and CBOs, as PCMHs in the CHIRs were given a new pathway to work with social service and other community agencies to meet patients' social needs. The state also offered training opportunities for community health workers (CHWs), care managers, and care coordinators. At the end of the SIM Initiative, about half the participating PCMHs were located in CHIRs (146 practices) and approximately half (152 practices) outside CHIRs.

In 2019, the state's 11 Medicaid managed care plans were required to develop and implement plans for adopting progressively advanced APM strategies. Throughout the final years of the SIM Initiative, Michigan state officials worked with Medicaid managed care plans to set APM adoption goals, and added a quality component to the payments for practices participating in the PCMH Initiative.

Table F-1. Michigan's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PCMH Initiative	All MI residents, with a focus on Medicaid beneficiaries	• All care managers and care coordinators at participating PCMH practices completed the required 12 education hours. • PMPM payments were distributed to participating practices via Medicaid managed care plans.	• MDHHS increased capitation rates to enable Medicaid managed care plans to continue paying PCMHs for care management and care coordination.
APMs	Medicaid Health Plan enrollees	• Managed care plans defined goals for increased APM activity and began operationalizing those plans.	• Medicaid managed care plans will be required to continue adopting increasingly advanced APMs to sustain post-SIM PCMH services.

Note: APM = alternative payment model; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; PMPM = per member per month; SIM = State Innovation Model.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

Patient-Centered Medical Home Initiative

During the last year of the SIM award period, PCMH Initiative participants (provider organizations, Federally Qualified Health Centers, and independent practices) received Performance Incentive Plan (PIP) payments based on meeting quality and utilization benchmark measures. Prior to that, participating practices only received PMPMs for care management and practice transformation; they were also required to submit the appropriate tracking codes to receive those initial payments, which were distributed through the state's 11 Medicaid managed care plans. The PIP payments were designed to prepare the practices for entering into contracts with, and providing data to, Medicaid managed care plans and were not continued after the SIM Initiative ended.

Participating practices were required to submit an "Intent to Continue Participation" application annually to remain enrolled in the PCMH Initiative. According to data provided by state officials, almost 41,000 patients attributed to SIM PCMHs had received care management or care coordination services from 2017 to September 2019—about 57 services per 1,000 attributed beneficiaries. Although patients not attributed to a SIM PCMH also received care management or care coordination services, the state did not have comparable data for these patients during the same time period. Data from prior years showed much lower rates.

The PCMH Initiative included workforce development activities for care managers and care coordinators in participating PCMH practices, who were required to complete at least 12 hours of "longitudinal learning activity." At least six of these hours had to be completed in a PCMH program–led activity (e.g., webinar or in-person training activity); the remaining six hours could be completed through another qualifying learning activity. Trainings for care coordinators and care managers were delivered via the Michigan Care Management Resource Center. The state also worked to make more trainings available to CHWs, who could serve as SIM care coordinators, through the Michigan Community Health Worker Alliance. Post-SIM Initiative, the contract with Medicaid managed care plans included incentives for plans to require provider networks to train care managers and CHWs with similar curriculums.

Development of alternative payment models in Medicaid Managed Care Plans

The SIM Initiative promoted APM use among Medicaid managed care plans by collaborating with the plans to develop goals and strategies for APM adoption. By May 2018, Michigan's 11 Medicaid managed care plans had worked with MDHHS to collect and report data on the baseline percentage of payments they were making in each of four Health Care Payment-Learning & Action Network (HCPLAN) framework categories.[52] Given these baseline data, the state required each Medicaid managed care plan to develop a strategic plan related to APM development that would lead to adoption of progressively more advanced APMs within the HCPLAN hierarchy. Baseline data indicated that, although the amount of care delivered under APMs varied across health plans and categories, Medicaid managed care plan payment strategies were concentrated in Categories 2C (pay for performance) and 3 (shared savings/downside risk), as of the end of fiscal year (FY) 2018—with no managed care plan having a majority of payments in Category 3 or higher.

State officials—who described the state's relationship with Medicaid managed care plans as collaborative—felt that, with proper guidance focusing on quality and payment strategy, the state could ask the plans to develop their APM strategy and implementation plans for 2018, 2019, and 2020. State staff met with the Medicaid managed care plans to review their strategies, learn more about how the APM process was playing out, and what barriers Medicaid managed care plans might have encountered. Interviewees from the Medicaid managed care plans said they were pleased with the plans' level of communication with the state about APM development, and were optimistic about continuing to move toward having a higher percentage of payments in HCPLAN Category 3 and above.

MDHHS developed performance incentives to reward plans that moved into progressively more advanced HCPLAN framework categories. The incentives were set up to avoid being prescriptive with respect to expanding APMs—because managed care plans located in different areas of the state worked with different types and numbers of enrollees and providers. For example, in developing an APM with a pay-for-quality component, the state allowed Medicaid managed care plans to select a single quality metric *within a CHIR*, as a way

[52] The four HCPLAN categories are (1) FFS with no link to quality and value, (2) FFS linked to quality and value, (3) APMs built on FFS architecture, and (4) population-based payment.

to simplify the process for providers to earn potential quality bonuses, without ignoring the enrollee and provider variation across the state as a whole.

The state used Medicaid managed care contracting as a policy lever to require its plans to develop strategies for moving toward more APM development, but not to require a minimum percentage of payments or providers involved in an APM. State officials reported that some plans did not want to commit to large increases in their APM shares, because they did not want to be in a position of having to forgo bonus payments when they did not meet their goal. Even so, by the fourth quarter 2018, Medicaid managed care plans had developed explicit APM strategies for moving up the Learning & Action Network (LAN) categories. Across all plans, the share of payments in Category 3 was projected to grow from 8 percent to 18 percent between 2017 and 2020. By 2019, Medicaid managed care plan interviewees indicated they were willing to engage in downside risk arrangements and be accountable for total cost of care. No one expected the state to approach the goal of having 80 percent of care delivered under APM arrangements, however. And plans indicated that progress could be slow because some providers remained unwilling to take the financial risk APMs would require. As one health plan representative said: “[providers] just aren’t interested in taking on risk and are looking for fee for service or capitated payments.”

Part of the state’s multi-payer alignment strategy had been to extend to commercial plans the same push toward APMs the state used with Medicaid managed care plans; but no commercial plans were participating as of January 2020. State officials conceded that requiring commercial plans to use APMs was beyond what they could accomplish during the SIM Initiative, because commercial plans had to deal with more heterogeneous patient populations and providers than did the Medicaid plans. But the same officials held out some hope that commercial plans could be convinced that they would reduce the reporting burden on providers participating in APMs if commercial plans used similar quality metrics to those used by Medicaid managed care plans when developing their own incentive payment programs.

F.2.2 Enabling strategies to support health care delivery transformation

Key Results
• To strengthen community-clinical linkages, the Practice Transformation Collaborative trained care coordinators, care managers, and CHWs at PCMHs in care coordination, as well as in use of the SDoH screening tool. • Over the course of the SIM Initiative, providers and other practice staff became strong proponents of assessing patients’ social needs, saying they felt addressing SDoH was an important part of health care. • All 11 Medicaid managed care plans and 43 provider organizations were onboarded to MiHIN. PCMHs were required to engage with MiHIN to support performance measurement and reporting, ADT notifications, and patient–provider relationships.

The two main SIM strategies to support health care delivery transformation in Michigan (described in ***Table F-2***) were: (1) facilitating SDoH screening and referral to treatment through care coordinators and care managers (including CHWs) trained in the Practice Transformation Collaborative; and (2) making health IT available through MiHIN an integral component of participating PCMHs' care delivery.

Table F-2. Michigan's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Practice Transformation Collaborative	SIM-participating PCMH practices	• SIM-participating practices received a range of TA via webinars, newsletters, and in-person and virtual summits as part of the Practice Transformation Collaborative.	• The Practice Transformation Collaborative would conclude at the end of the SIM Initiative.
MiHIN	Medicaid managed care plans and PCMH Initiative practices	• PCMH Initiative participants used MiHIN and its Relationship Attribution Management Platform to support measurement, reporting, and care management.	• MiHIN would remain operational after the end of the SIM Initiative.

Note: MiHIN = Michigan Health Information Network; PCMH = patient-centered medical home; SIM = State Innovation Model; TA = technical assistance.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

Practice transformation

Providers and other stakeholders reported that hiring new staff or repurposing existing staff for care coordination—specifically in care coordinator, care manager, and CHW roles—helped drive practice transformation. According to practice staff and provider focus group participants, the new and repurposed staff facilitated SDoH screening (described in more detail in ***Section F.2.3***)—helping patients manage chronic disease, facilitating referrals, and following up with patients with recent hospital visits. Providers reported their practices' care managers, care coordinators, and/or CHWs were an integral part of the care team. Some practices utilized the three types of staff to serve different functions. For example, one practice used registered nurse–prepared care managers to help patients manage chronic diseases, and CHWs to help address needs the SDoH screening identified.

Beginning in September 2019, Michigan encouraged CHW use, by contractually obligating Medicaid managed care plans to either provide, or contract to provide, CHWs at a ratio of 1 per 15,000 plan enrollees. State officials planned to gradually increase the CHW requirement over a 12-month period to a ratio of 1 per 5,000 enrollees, effectively tripling the number of CHWs provided by Medicaid managed care plans in the state. Plans were incentivized to contract with local agencies to help them meet this requirement—receiving enhanced credit for contracting instead of providing CHWs internally. State officials reported that Medicaid managed care plans had moved toward contracting arrangements with local agencies, and that this was increasing collaboration between plans and CHIRs. As of January 2020, the state planned to require managed care plans to maintain the volume of care coordination services practices had been providing under the SIM Initiative, for which practices that complied would receive, as a bonus, payments previously withheld by the state from the practices' base contracts. Anecdotally, practice staff reported having confidence that state reimbursement for care coordination and care management under the SIM Initiative did reduce unnecessary health spending by preventing or diverting unnecessary ED use.

Providers and other practice staff generally came to agree that assessing patients' social needs through an SDoH screening tool was an important part of health care. Providers reported some initial resistance to screening for non-health needs because some providers were uncomfortable screening for issues they could not resolve. By spring 2019, however, providers in focus groups generally reported that learning more about their patients' social needs helped them better understand a patient's overall health status. Practice staff acknowledged that screening for social needs required culture change for both providers and patients (who were generally not accustomed to discussing non-medical needs with their health care providers).

Health information technology

Health IT tools helped PCMHs track patient–provider relationships and quality metrics. Though established prior to the SIM Initiative, MiHIN was an important component of the state's health IT strategy, creating an organizing umbrella over the state's many pre-existing regional HIEs. During the SIM Initiative, all 11 Medicaid managed care plans and 43 provider organizations were onboarded to the network. PCMHs were required to engage with MiHIN to support performance measurement and reporting, active care relationship tracking, and the sending and receiving of ADT notifications. MDHHS also implemented the "Quality Measure Information" use case to enable providers to submit quality metrics and share data with payers, although practice interviewees did not seem very aware of this functionality.

> "We have a care manager that's in our office around four days a week to help with those [non-medical] patient needs. With implementing the Social Determinants of Health screening form, we've been able to identify more and get more people the assistance they need. I think a lot of patients don't realize that those things can be provided or that we can direct them to a route where they can get assistance."
>
> —Michigan PCMH provider

F.2.3 Population health

Key Results
• By spring 2019, all patients at SIM-participating PCMHs and social services agencies were screened for social needs at least once per year, regardless of insurance type, and were operating established referral mechanisms through CHIR hubs.
• Through its Health Through Housing program, the state matched Medicaid data with Homeless Management Information System (HMIS) data to identify individuals who were frequently both utilizing the ED and facing homelessness. Related efforts were aimed at improving housing-related case management and homeless response systems at the community level.
• The state finalized its Plan for Improving Population Health in January 2020.

Under the SIM Initiative, Michigan established five CHIRs to focus attention and energy on addressing SDoH; developed the Health Through Housing program, designed to identify and assist individuals with high ED utilization who were also struggling with housing insecurity; and developed the Plan for Improving Population Health.

Establishment of five Community Health Innovation Regions

The cornerstone of the state's population health strategy—development and implementation of five CHIRs across the state—made significant progress in 2018 and 2019, with widespread implementation of an SDoH screening tool in PCMHs and CBOs in their regions. As part of the SIM Initiative, each CHIR developed clinical-community linkages, to increase coordination between medical providers and community social service providers through enhanced coordination and communication via one or more "hubs." ***Table F-3*** lists each CHIR's backbone organization and organization type, with descriptions of their respective approaches and status as of the end of the SIM award period.

Table F-3. Community Health Innovations Regions' backbone, organization type, and hub structure and community linkages

CHIR	Backbone organization	Organization type	Description of hub and clinical community linkages
Genesee	Greater Flint Health Coalition	Nonprofit health care coalition	• **Hub structure:** Central hub and four "specialty" hubs—including the Genesee Children's Healthcare Access Program, the Genesee Health Plan, the Genesee Health System (community mental health agency), and New Pass (peer recovery and opioid use agency). • **SDoH screening tool:** Delivered by health care providers, provider organizations, CBOs, and CHIR-affiliated social services agencies. Scaled up from 10 participating PCMHs (pilot phase) to all 67 in the greater Flint region by the end of 2019. Completed more than 40,000 screenings by January 2020. • **Other details:** Genesee Health Plan and Genesee Health System will no longer operate as specialty hubs post-SIM.
Jackson	Jackson Health Improvement Organization	Improvement organization founded by local health system	• **Hub structure:** Central hub with social service agencies serving as "hublets." • **SDoH screening tool:** Delivered by PCMHs and social service agencies ("no wrong door" entry model). Completed more than 70,000 screenings by January 2020. • **Other details:** Jackson launched a crisis intervention service to divert unnecessary ED use for individuals with mental health concerns, and also launched a "community living room" to provide a neutral space for elderly individuals to socialize and access community resources. This program will continue after the SIM Initiative.
Livingston-Washtenaw	Center for Healthcare Research and Transformation	Nonprofit research organization housed within the University of Michigan	• **Hub structure:** Central hub and 11 community "hublets," which included local health systems, health plans, housing agencies, community mental health agencies, and aid organizations. • **SDoH screening tool:** Delivered by PCMHs (primarily) and social service agencies. Completed more than 70,000 screenings by January 2020. Added a locally developed question to capture issues related to social isolation. • **Other details:** Livingston-Washtenaw developed a predictive model to identify community members who could benefit from intensive care coordination services through the hub and its hublets; the model will not be sustained post-SIM.

(continued)

Table F-3. Community Health Innovations Regions' backbone, organization type, and hub structure and community linkages (continued)

CHIR	Backbone organization	Organization type	Description of hub and clinical community linkages
Muskegon	Health Project (Mercy Health)	Community health project of a local health system	• **Hub structure:** Central hub created under a previous CMS grant. • **SDoH screening tool:** Delivered by health care providers, the Muskegon health department, and CBOs (e.g., faith-based groups, schools). The number of screenings completed is unknown. • **Other details:** In its effort to address childhood trauma, CHIR began working with local school district to administer the SDoH screen to K–12 students and offer training on trauma-informed care in the community.
Northern	Northern Michigan Public Health Alliance	Coalition of health care agencies across 25 counties	• **Hub structure:** Three regionally based hubs; the CHIR initially included 10 of the counties in the Alliance, but has since expanded to include all 31. • **SDoH screening tool:** Delivered by all 36 PCMHs in the CHIR and CBOs. Completed more than 50,000 screenings by the end of 2019. • **Other details:** The CHIR contracted with two Medicaid managed care plans to reimburse CHW activities. Completed training series for community assistance change (ABLe Change).

Note: CBO = community-based organization; CHIR = Community Health Innovations Region; CHW = community health worker; CMS = Centers for Medicare & Medicaid Services; ED = emergency department; K–12 = kindergarten through 12th grade; PCMH = patient-centered medical home; SDoH = social determinants of health.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

> I think it's nice that they do ask because a lot of people are afraid. But for instance, just to have that opportunity to be asked that question and if you really needed help, that's great. I think that's wonderful."
>
> —Michigan focus group participant

From March 2017 to March 2018, CHIRs established referral mechanisms and electronic systems to track service use for patients who identified a need. Care managers and care coordinators in participating PCMHs and CBOs administered the screen. PCMHs reported they were able to address a large portion of their patients' identified needs in house, but for those they could not address, they sent referrals to the centralized "hub." Across CHIRs, referrals made to the hubs were either addressed by hub staff or sent to a CBO (or hublet) (***Exhibit F-3***). As of April 2018, only the Northern CHIR was screening all patients at all SIM PCMHs in the CHIR. Over 2018 and 2019, Genesee scaled up from 10 participating PCMHs implementing the screen (pilot phase) to all 67 PCMHs in the region. Muskegon scaled up from only screening Medicaid patients to screening the full universe of patients.

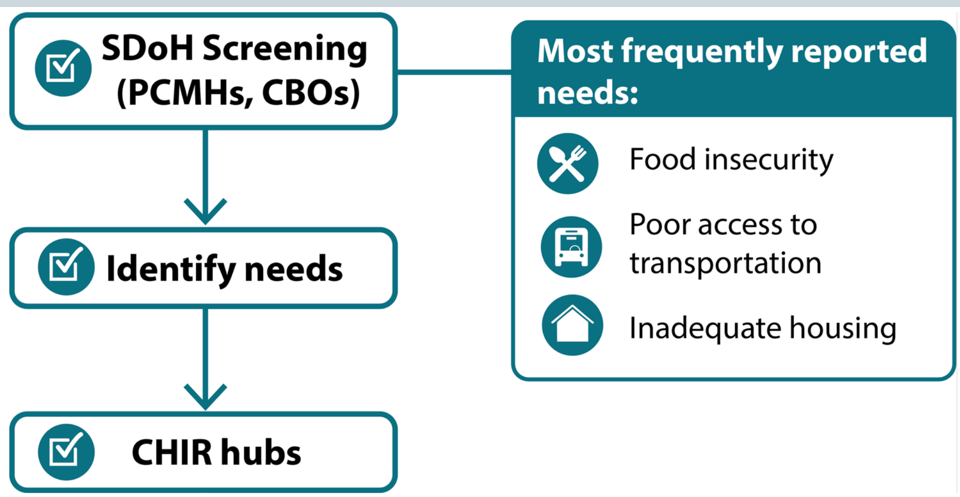
By April 2019, hubs were fully operational in all five CHIRs, and would be sustained after the SIM Initiative. During focus groups held in 2020, patients served by a CHIR generally indicated a greater degree of openness to answering questions related to SDoH, and to accepting assistance with identified needs, than did similar patients in 2019 focus groups.

> "I feel uncomfortable when my doctor's office asks me that…Just because I never know who I am really answering this to. Who's going to be reading these, or who's going to think what?"
>
> —Michigan focus group participant (2019)

> "It is good to have somebody in your corner with all the battles in being a mother and everything you have to go through on a daily basis. It's good to come in contact with somebody who just wants to take some of that stress off of you."
>
> —Michigan focus group participant (2020)

Through the SIM Initiative, CHIRs facilitated development of multi-sector relationships by bringing representatives from community stakeholders—such as health systems, payers, housing agencies, and other social services—together within the CHIR governance structures. These relationships enabled care managers, care coordinators, and hub staff to ensure individuals were successfully connected to the resources to which they were referred. As of spring 2020, CHIR staff attested that this collaboration would not have occurred in the absence of the SIM Initiative, and believed these conversations would continue after the end of the SIM award period.

Exhibit F-3. Michigan Community Health Innovations Regions facilitated multi-sector relationships



Note: CBO = community-based organization; CHIR = Community Health Innovation Region; PCMH = patient-centered medical home; SDoH = social determinants of health.

Source: Federal Evaluation Team review of interviews, focus groups, and state documents.

According to CHIR leadership and state officials, the top patient needs identified in all CHIRs were food insecurity, poor access to transportation, and inadequate housing (Michigan Public Health Institute, 2020). As referrals came into the hubs, all five CHIRs collected data and completed early analyses to identify high-need domains to inform development of community needs assessments. Hubs often received referrals for transportation, education, and employment needs, because primary care practices were not equipped to address those issues directly.

According to officials in several CHIRs, not all patients wanted assistance with needs identified through the SDoH screen. Patients may have refused services due to privacy concerns or prior experiences accessing social services. In other cases, patients turned down assistance because the needs identified were no longer a problem. For example, in the Northern CHIR, the original screening tool asked if patients faced needs during the past year. When many patients said they no longer needed help, staff revised their screening tool to focus on patient needs in the past three months. After that change, a larger portion of patients who identified a need also indicated they wanted assistance—suggesting that, in the past, clients had been identifying needs that were no longer pressing.

In some instances when patients did express a specific need and wanted assistance, communities did not have the resource capacity to address the needs identified. As CHIR hubs collected data on referrals and follow up, the hubs monitored instances when patient needs could not be met. For example, Genesee CHIR staff reported insufficient behavioral health resources in the county to fully meet identified needs. Northern CHIR staff noted that lack of affordable housing and waitlists for homeless shelters often precluded them from addressing housing-related referrals. During focus groups, several individuals served by CHIRs reported receiving referrals but ultimately being told they were not eligible for the services to which they had been referred. Other individuals who had been referred to services by a CHIR reported receiving less follow up than they desired.

> "It is a big relief when you have somebody to help you. I made a big step from being homeless to a house owner."
>
> —Michigan focus group participant

Some practices and CBOs also faced challenges related to data-sharing and integrating the tool into EHRs or other digital solutions. CBOs, in particular, seemed less prepared than PCMHs to integrate SDoH screening into their existing procedures and data collection processes. Stakeholders reported that it could be difficult for health clinics and social service agencies to communicate, because they did not typically share IT platforms. Across regions, CHIR officials reported that hubs were struggling to aggregate SDoH data from different agencies, because of lack of standardized data collection and reporting formats. Privacy was also a concern for some interviewees. PCMH providers said that, when they asked their patients to opt in to having their SDoH screen information shared across different types of agencies and the hub, some patients declined the opt-in alternative.

The ABLe Change framework was another project designed to help communities identify and address significant social issues affecting children, youth, and families (Michigan State University, n.d.). Four of five CHIRs completed ABLe Change training and engaged in community-level transformation, such as coordinating social services within sectors and implementing interventions to address community needs. CHIRs also added components to existing community health needs assessments to reflect specific needs in their communities identified by SDoH screen data, and coordinated social services within sectors to better meet those needs. Where there were system gaps, CHIRs designed specific interventions. For example, Jackson identified a gap in behavioral health services and implemented Crisis R&R, an ED alternative for individuals experiencing a behavioral health crisis.

Claims-based analyses of Michigan's Community Health Innovations Regions

For more information, see ***Table F-5*** in the Addendum at end of this chapter. For full results describing the impact of the CHIR implementation, see ***Appendix F-1***.

Policymakers expected that screening and coordination with social services, by helping patients with nonmedical needs, could lead to improved health and ultimately changes in medical care use, such as reducing inappropriate ED use. The state's evaluation of the SIM Initiative found a direct relationship between number of social needs detected in SDoH screening among Medicaid beneficiaries, and rates of ED use in the year *prior* to their screening, as evidence that beneficiaries reporting more social needs are more likely to have had higher numbers of ED visits and higher medical spending in the 12 months before reporting social needs (Michigan Public Health Institute, 2020). The quantitative analysis presented here sought to examine the relationship between CHIRs, which were intended address social needs identified by primary care providers and community organizations, and medical care utilization such as ED visits. This analysis found no significant difference in ED visit rate between the beneficiaries in the CHIR counties and their counterparts in the non-CHIR counties. Inpatient admissions decreased for both Medicaid beneficiaries in CHIR counties and comparison beneficiaries but decreased less in the CHIR counties. This led to a relative increase of 1.96 inpatient admissions per 1,000 population for Medicaid beneficiaries in CHIR counties. Changes to readmissions did not differ for between Medicaid beneficiaries in CHIR counties and comparison beneficiaries across the first two years of CHIR implementation.

Several limitations of the analysis that are important to consider when interpreting the results. Many of the five CHIRs were still scaling up their screening and coordination operations in 2018, the first of two post-implementation years analyzed, and thus the estimated take-up of CHIR services was very low. The state's evaluation report indicates that 3,422 Medicaid enrollees were served by four CHIRs (of five total) during a 12-month period, roughly spanning July 2018 through June 2019 (Michigan Public Health Institute, 2020). This suggests that approximately one percent of the intervention group in this study was served by the CHIRs, but they could not be identified. This lack of data prevented the quantitative analysis from identifying individuals served directly by CHIRs. Further, the receipt of CHIR services may not immediately and directly affect health care utilization. For example, the state evaluation report cites that transportation and food were among the most commonly served needs (Michigan Public Health Institute, 2020), and it is unclear how receiving assistance with either should result in direct changes in the outcomes studied here. A longer period after implementation may also be necessary to detect any impacts.

> "SIM and the [SDoH screening tool] have helped all of us across the care spectrum identify where the needs really are in this community. Say it's housing, okay, so what are we going to do about it? Those conversations are really starting to happen for the first time."
>
> —Michigan PCMH provider

Overall, CHIR stakeholders agreed the SIM Initiative had been instrumental in facilitating conversations across different types of agencies, and in highlighting unmet community needs. The backbone organizations and workgroups in each of the five CHIRs provided convening opportunities for diverse stakeholders—including consumer groups and nonmedical organizations—to discuss the well-being of their communities. Stakeholders reported that the effort to develop CHIRs provided a space for representatives from different organizations to identify the region's most pressing social needs, and discuss what resources communities lacked to address these needs. Stakeholders felt that the support of SIM funding enabled them to forge the cross-sector conversations and relationships that enabled alignment between and across systems.

Health Through Housing

To address pervasive housing needs identified by the SDoH screens in all five CHIRs, Michigan developed and implemented "Health Through Housing" during 2018 and 2019. Health Through Housing encompassed three components: a Frequent User Pilot, a 1915(i) Medicaid waiver to support housing-related case management, and the Improving Homeless Response System project.

The Frequent User Pilot, which involved three of the five CHIRs, was designed to test the feasibility of using data matches to connect individuals with housing assistance. Beginning in 2018, Michigan matched Medicaid data with HMIS data to identify Medicaid beneficiaries identified as frequent ED utilizers who were also experiencing homelessness. MDHHS defined frequent ER utilizers as individuals who had visited the ED at least once and whose overall health care expenditures totaled over $10,000 in a one-year period. The state then used a prioritization system to select Medicaid beneficiaries from the data matches (i.e., identified as homeless and frequent ED utilizers). Within the three CHIRs involved, four agencies connected these selected high-utilizer homeless individuals with housing. Between August 2018 and January 2020, the pilot program housed 43 families. In September 2019, state officials reached their goal of creating a data system, updated monthly, of matched Medicaid and HMIS data to identify frequent utilizers. The Health Through Housing Team planned to begin sending lists of these individuals to local health care systems so they could be integrated into local prioritization systems, instead of conducting the data gathering process at the state level. The program continued after the SIM Initiative, but shifted its focus to monitoring outcomes, such as Medicaid expenditures and ED utilization, for clients who were successfully housed.

The state's 1915(i) Medicaid waiver to support housing-related case management services for community mental health center clients was received in September 2019. The waiver aimed to augment capacity among housing providers by making tenancy support services billable under the Medicaid behavioral health carve out. Such tenancy support would consist of case management services provided by behavioral health agencies to help individuals find and maintain housing.

The state's Improving Homeless Response System project allowed each of the five CHIRs to develop a plan to align local health care systems and homeless response systems. In preparation, several communities completed process mapping exercises to understand how individuals engaged with both systems. State officials reported that approaches to the project varied across communities—with some engaging stakeholders through high-level systems change conversations, and others developing basic cross-system referral processes. The state planned to continue supporting and monitoring this work through the end of FY 2020.

Plan for improving population health

Unlike many other SIM Initiative states, Michigan did not have existing statewide needs assessments or state health improvement plans to build on. Instead, MDHHS collaborated with a contractor to develop a Plan for Improving Population Health. The Plan, which was finalized in January 2020, was under departmental review as of March 2020. While many other SIM Initiative states chose to focus their plans on specific diseases and conditions, Michigan focused their population health efforts on SDoH and health equity issues that aligned with the SDoH screening tool. To develop the Plan for Improving Population Health, Michigan formed a work group composed of representatives from a range of disciplines, including behavioral health, health equity, and Medicaid.

F.3 Sustainability

Key Results
• MDHHS increased capitation rates to enable Medicaid managed care plans to meet the requirement to continue paying PCMHs for care management and care coordination after the end of the SIM Initiative.
• The Governor’s office approved a proposal to support CHIR funding for an additional year. MDHHS initially requested $7 million but was ultimately granted $3 million by the state legislature.
• Activities piloted under the SIM Initiative, such as requiring ongoing care coordination and management and the use of CHWs, were intended to become permanent aspects of Medicaid managed care plan contracts.
• MDHHS will continue working with Medicaid managed care plans to increase APM activity.
• MiHIN will continue to operate. While the bulk of associated expenses were one-time SIM-funded costs, the state expected payers to support ongoing maintenance costs.

At the end of the SIM award period, Michigan identified funding to sustain the PCMH Initiative and the CHIR activities to integrate community-based SDoH care with PCMH health care services. In addition, MiHIN continued to operate, with payers covering ongoing maintenance costs; many of the SIM-funded enhancements to MiHIN were one-time costs, not requiring further investment.

F.3.1 Patient-Centered Medical Home Initiative

In FY 2020, the state increased capitation rates paid to Medicaid managed care plans to enable them to continue making care management/care coordination payments to PCMHs. The size of the capitation rate increase was based on state historical data on the numbers and types of services (e.g., in-person assessments and telephone contacts) PCMHs submitted under SIM. As an additional financial incentive, starting in January 2020, plans that showed improvement as measured by particular care management/care coordination metrics, would receive bonus payments from funds the state had withheld from their base contracts. The reasoning behind making these bonus payments was that, while state officials anticipated that financial incentives under the APMs developed by managed care plans would provide incentive payments large enough to replace care management/care coordination payments to PCMHs that participated in the SIM Initiative, they also expected PCMH participation to ebb and flow going forward such that some SIM PCMHs would not have enough patients to participate in some managed care plans and would lose out on opportunities to replace SIM PMPM payments for care management/care coordination, while some non-SIM PCMHs could benefit from the new APMs going forward.

F.3.2 Community Health Innovation Regions

State officials reported that sustainability efforts were initiated at both the state and CHIR levels throughout the final years of the SIM Initiative and were yielding promising results**.** At the state level, $3 million was granted by the state legislature. This sustainability funding was to support staffing and infrastructure needs in each CHIR—an aspect of CHIR operations that state officials judged would likely have been difficult for CHIRs to otherwise support. While CHIR leadership viewed this legislative appropriation as a promising funding source, they did not believe state funding would be sufficient to fully support the same level of activity as during the SIM award period.

As a consequence, CHIR staff actively pursued sustainability strategies at the local level during the final years of SIM implementation. By the end of the Initiative, the Northern CHIR had secured funding from local funders and was awaiting further updates. The Northern CHIR had contacted the Pathways Community HUB in Ohio about ongoing funding strategies, and was pursuing official Pathways certification in hopes of leveraging it to secure additional funding. Other CHIRs similarly engaged with local philanthropic foundations, Medicaid managed care plans, and other entities in efforts to obtain ongoing funding (***Exhibit F-4***).

Exhibit F-4. Sustainability efforts were initiated at both the state and Community Health Innovation Region levels

FINANCING

- CHIRs sustained by a combination of state and private funds
- MDHHS utilized enhanced MCO capitation payments to continue supporting PCMH activities
- PCMHs supported through managed care payments for care coordination and care management
- 1915(i) Medicaid waiver reimbursed some housing-related case management activities

STRUCTURE

- CHIR backbone organizations created under SIM continue to provide organizing regional framework for population health activities
- Medicaid managed care plan performance metrics continued to emphasize PCMH activities
- MiHIN continued to coordinate regional HIE activity

ACTIVITIES

- Medicaid managed care plan contracts contained care coordination and care management benchmarks and required an increased ratio of CHWs to enrollees
- Managed care plans continued to expand APMs
- SDoH screening continued to be delivered in PCMH practices
- The Frequent User Pilot and Improving Homeless Response System project continued to operate

Note: APM = alternative payment model; CHIR = Community Health Innovation Region; CHW = community health worker; HIE = health information exchange; MCO = managed care organization; MDHHS = Michigan Department of Health and Human Services; MiHIN = Michigan Health Information Network; PCMH = patient-centered medical home; SDoH = social determinants of health; SIM = State Innovation Model.

Source: Federal Evaluation Team review of interviews, focus groups, and state documents.

F.3.3 Michigan Health Information Network

MiHIN pre-dated the SIM Initiative and would continue to operate after the SIM award period. As the SIM Initiative came to an end, MDHHS continued to monitor the quality metrics that payers and providers submitted to MiHIN, and made plans for integrating HIE activity into departmental activities in post-SIM period. However, PCMHs were no longer required to report performance data directly to the state when the SIM Initiative ended, as PCMHs began submitting data to the Medicaid managed care plans. Many MiHIN-related expenses under the SIM Initiative, such as training and onboarding, were one-time investments that would not require ongoing financial support. In the event of any ongoing maintenance costs, the state expected payers to assist.

Table F-4. Sustainability of Michigan's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery and payment reform	PCMH Initiative	Yes	To increase Medicaid managed care plan capitation rates and require plans to meet standards that require having PCMHs in their networks.
Health IT	MiHIN	Partial	The state's HIE will continue to operate with support from payers, although some SIM-specific activities will not be sustained (e.g., reporting systems for PCMH Initiative participants).
Population health	CHIRs	Yes	State general funds/local support.
	Health Through Housing	Yes	State and philanthropic support.

Note: CHIR = Community Health Innovation Region; health IT = health information technology; HIE = health information exchange; MiHIN = Michigan Health Information Network; PCMH = patient-centered medical home; SIM = State Innovation Model.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

F.4 Implications of Findings/Lessons Learned

- States implementing major payment and delivery reforms should carefully consider the roles of health plans and provider organizations. In Michigan, there was disagreement among stakeholders about which of the two groups was better able to bear risk in APMs, and which should be responsible for care management and care coordination.
- Screening for SDoH was critical in enabling providers to holistically understand patients' overall risks and health. Most stakeholders agreed that screening for SDoH needs was a positive development in Michigan. The process also highlighted the inadequacy of resources in several areas of social needs—useful information in developing statewide and community-level needs assessments.

- HIE improvements are central to system-wide innovations, but can prove challenging. In Michigan, although health plans and providers were able to exchange information through existing networks, using the HIE to connect health care providers or health plans with CBOs that needed information on SDoH screenings was still problematic at the end of the SIM Initiative.
- There is potential benefit in organizing regional stakeholders to focus on the goal of improving population health. Michigan's CHIRs brought together diverse health and social service organizations and providers with the common mission of coordinating activities aimed at identifying and addressing patient needs. CHIRs encountered a range of challenges, but made progress overall at screening for SDoH needs and referring patients to community organizations for services.
- System innovations designed to reform payment and service delivery, as well as to improve population health, take time. Stakeholders in Michigan felt the SIM Initiative's timeframe was insufficient to design and fully implement their SIM Initiative plans, or to observe and fully analyze potential effects.

Addendum

Table F-5. Inpatient admissions decreased for both Medicaid beneficiaries in Community Health Innovations Region counties and comparison beneficiaries, but decreased less in the Community Health Innovations Region counties in the first two years of the model

Selected outcomes	Change in outcome from baseline to implementation period: MI CHIR	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Inpatient Admissions per 1,000 Population	↓	↓	**1.96‡** (0.03, 3.89)	2.6	0.09
ED Visits per 1,000 Population	↓	↓	-12.49 (-31.51, 6.54)	-1.0	0.28
Readmissions per 1,000 Discharges	↑	↑	3.75 (-2.95, 10.46)	2.7	0.36

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; MI = Michigan.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

Appendix F-1: Michigan Community Health Innovation Regions Impact Results

F-1.1 Overview

The Michigan SIM Initiative drew on several strategies to improve the health of state residents, increase health care quality, improve patient experiences of care, screen patients for non-health social needs, refer patients to community organizations that could meet those needs, and reduce health care spending. The initial focus of the interventions was on Medicaid beneficiaries and included a patient-centered medical home model, a health information network, and Community Health Innovation Regions (CHIRs). This quantitative evaluation focuses exclusively on the CHIRs, a central component of Michigan's SIM Initiative.

Michigan's five CHIRs aimed to improve population health by and facilitate coordination between health care and community organizations. The geographic areas chosen for initial CHIR implementation were (1) Genesee County, (2) Jackson County, (3) Muskegon County, (4) Washtenaw and Livingston Counties, and (5) Northern Michigan (a group of 10 counties below the Upper Peninsula). The state identified these five areas through an assessment of their readiness to implement the SIM Initiative, seeking to achieve diversity in readiness (i.e., some regions that were well equipped to set up successful CHIRs and other regions that needed additional support).

CHIRs helped a diverse group of organizations develop shared measures, create effective strategies for community engagement, and address the community health needs outlined by the state and the specific needs determined by each CHIR. All five CHIRs focused on reducing emergency department (ED) use.

To assess the effects of the Michigan CHIR model for Medicaid beneficiaries the analysis addressed the following research question:

- Did the CHIRs influence health care utilization, including inpatient admissions, outpatient ED visits, readmissions, primary care provider visits, and follow-up visits after hospitalizations?

The CHIRs were intended to utilize both the health care system and community organizations to identify and address social needs, ultimately producing better health outcomes than would be possible via the health care system alone. The hypothesis was that the CHIRs will produce better health outcomes by addressing some social needs that influence health, ultimately decreasing the demand for costly medical care.

Table F-1-1 provides a snapshot of the study methods.

Table F-1-1. Methods snapshot

Method	Description
Participating providers	Primary care practices and community organizations focused on screening for social needs.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Michigan administrative enrollment and claims data from the TAF, combined with data provided by the MDHHS. These data include two years before (2016–2017) and two years after (2018–2019) the start of the CHIR intervention.
Sample	The intervention group included non-dual, non-elderly Medicaid enrollees who resided in the 15 counties where the five CHIRs operated. The analysis included all individuals in a CHIR county, whether or not they were screened for or received CHIR services, because it was not possible to identify specific individuals who received CHIR services in claims data. Available statistics suggest that the number of Medicaid beneficiaries served by four of the five CHIRs represents 1 percent of the total Medicaid population in the counties served by those CHIRs.[53] As a result, it is likely that most intervention group beneficiaries did not receive CHIR services. The comparison group included similar Michigan Medicaid beneficiaries who resided in non-CHIR counties.
Timeframe	The timeframe for the impact analysis was January 2016 through December 2019, which includes two baseline years (2016–2017) and two intervention years (2018–2019).
Measures	The analysis assessed the effects of CHIRs on three core outcomes including inpatient admissions, outpatient ED visits, and readmissions.[54] The analysis also examined impacts on additional outcomes, including primary care provider visits and follow-up visits within 14 days after hospitalization.
Statistical analysis	The analysis used both logistic regression models for readmissions and follow-up visits within 14 days of a hospital discharge, two discharge-level outcomes. The analysis used a linear probability model for admissions because a logistic regression model did not converge. Poisson models were used for count outcomes because negative binomial models did not converge. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the county level to account for correlation in outcomes within intervention and non-intervention geographies across time. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: CHIR = Community Health Innovation Region; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; TAF = Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files.

This chapter reports on the impact of the CHIR model on health care utilization among approximately 346,000 unique beneficiaries in each year during the intervention period who resided in CHIR counties.

[53] The state's evaluation report indicates that 3,422 individuals were served by four of the five CHIRs between July 2018 and June 2019. (Data on individuals served by the fifth CHIR were not available.) Approximately 282,000 Medicaid beneficiaries aged 64 years and under reside in the counties associated with those CHIRs. Dividing the number of individuals served by the CHIRs by the total number of non-elderly Medicaid beneficiaries in the CHIR counties produces the estimate of 1 percent of the Medicaid population of those counties served by the CHIRs.
[54] Because of data quality issues, spending outcomes were not calculated.

A full description of the CHIR intervention and a summary of the key impact analysis findings are available in ***Appendix F***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix F*** provide detailed information on the CHIR model impact findings in tables and figures:

- ***Section F-1.2*** presents results of difference-in-differences (D-in-D) analyses for CHIR Medicaid beneficiaries and their comparison group;
- ***Section F-1.3*** presents results of D-in-D analyses separately for children and adults for two core outcomes;
- ***Section F-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity-score weighting;
- ***Section F-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section F-1.6*** presents results from sensitivity analysis that compared D-in-D estimates for the core outcomes change when the CHIR and comparison group trends include a differential trend beginning in the baseline period.

F-1.2 Estimates of Community Health Innovation Region's Impact on Utilization

Tables F-1-2 through ***F-1-6*** show annual and overall estimates of CHIR's impact on health care utilization for Michigan Medicaid beneficiaries. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for CHIR and comparison groups during the baseline period and the intervention period,
- D-in-D estimates of CHIR's impacts,
- Relative differences, which measure change in the outcome from the baseline period, and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

F-1.2.1 Estimates of Community Health Innovation Region's impact on core outcomes

Table F-1-2 shows the estimates of the CHIR intervention on inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries who resided in CHIR counties relative to comparison beneficiaries.[55] The findings are as follows:

- Inpatient admissions decreased for both Medicaid beneficiaries in CHIR counties and comparison beneficiaries but decreased by 1.96 fewer inpatient admissions per 1,000

[55] Inpatient admissions and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

population for Medicaid beneficiaries in CHIR counties during the first two years of CHIR implementation (p=0.09).

- Changes to ED visits did not differ between Medicaid beneficiaries in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.
- Changes to readmissions did not differ between Medicaid beneficiaries in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.

Table F-1-2. Differences in the pre–post change in inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group

Outcome	Baseline period adjusted mean, MI CHIR	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, MI CHIR	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
All-cause acute inpatient admissions per 1,000 population							
Year 1	74.53	73.39	69.61	66.66	1.80 (-1.34, 4.94)	2.4	0.34
Year 2	74.53	73.39	71.30	68.04	2.12 (-0.13, 4.36)	2.8	0.12
Overall	74.53	73.39	70.45	67.35	1.96 (0.03, 3.89)	2.6	0.09
ED visits per 1,000 population							
Year 1	1231.37	1199.98	780.63	768.88	-9.63 (-28.79, 9.53)	-0.8	0.41
Year 2	1231.37	1199.98	757.35	751.22	-15.35 (-48.27, 17.56)	-1.2	0.44
Overall	1231.37	1199.98	769.01	760.06	-12.49 (-31.51, 6.54)	-1.0	0.28
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	139.74	143.74	185.67	181.10	8.78 (2.63, 14.94)	6.3	0.02
Year 2	139.74	143.74	183.45	189.74	-1.21 (-13.07, 10.64)	-0.9	0.87
Overall	139.74	143.74	184.55	185.45	3.75 (-2.95, 10.46)	2.7	0.36

Notes: CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

(continued)

Table F-1-2. Differences in the pre–post change in inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group (continued)

Methods: The analysis used a linear probability model to obtain D-in-D estimates for inpatient admissions and a Poisson model for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, CDPS score, attribution to a SIM PCMH), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, median age, and percentage uninsured and in poverty). The core outcome models assume that CHIR and comparison group outcome trends are parallel beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CHIR relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the CHIR group relative to the comparison group after CHIR implementation. The relative difference is the D-in-D estimate as a percentage of the CHIR baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmissions outcome is 2,339,371; the weighted N for the readmission outcome is 197,279. These numbers include all person-year (or discharge-year) observations for both the MI CHIR and comparison groups.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

F-1.2.2 Estimates of Community Health Innovation Region's impact on utilization

Table F-1-3 shows the estimates of CHIR on primary care provider visits and follow-up visits within 14 days of discharge for Medicaid beneficiaries who resided in CHIR counties relative to comparison beneficiaries. The findings are as follows:

- Changes to primary care provider visits did not differ between Medicaid beneficiaries in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.
- Changes to follow-up visits within 14 days of hospital discharge did not differ between Medicaid beneficiaries in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.

F-1.3 Estimates of Community Health Innovation Region's Impact on Adults and Children

The analysis assessed CHIR's impacts on adults and children for inpatient admissions and ED visits. Because the health care and social needs of adults and children differ, CHIRs could produce differential impacts on health care utilization for these groups.

F-1.3.1 Estimates of Community Health Innovation Region's impact on core outcomes for adults

Table F-1-4 shows the estimates of the CHIR intervention on inpatient admissions and ED visits for Medicaid beneficiaries aged 19 to 64 years who resided in CHIR counties relative to comparison beneficiaries. The findings are as follows:

- Inpatient admissions decreased for both adult Medicaid beneficiaries in CHIR counties and comparison beneficiaries but decreased by 2.58 fewer inpatient admissions per 1,000 population in adult Medicaid beneficiaries in CHIR counties during the first two years of CHIR implementation (p=0.01).
- Changes to ED visits did not differ between adult Medicaid beneficiaries in CHIR counties and adult comparison beneficiaries during the first two years of CHIR implementation.

Table F-1-3. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group

Outcome	Baseline period adjusted mean, MI CHIR	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, MI CHIR	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Primary care provider visits per 1,000 beneficiaries							
Year 1	398.23	375.76	238.93	226.32	-1.10 (-22.61, 20.42)	-0.3	0.93
Year 2	398.23	375.76	234.34	225.78	-5.64 (-22.65, 11.38)	-1.4	0.59
Overall	398.23	375.76	236.64	226.05	-3.37 (-17.09, 10.36)	-0.8	0.69
Percentage of hospital discharges with a follow-up provider visit within 14 days of discharge							
Year 1	52.93	50.95	52.04	49.07	0.98 (-0.27, 2.23)	1.9	0.20
Year 2	52.93	50.95	52.19	49.91	0.29 (-1.33, 1.90)	0.5	0.77
Overall	52.93	50.95	52.12	49.49	0.63 (-0.39, 1.65)	1.2	0.31

Notes: CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

Methods: The analysis used a Poisson model to obtain D-in-D estimates for primary care provider visits and a logit model for follow-up visits. The estimated count of primary care provider visits was multiplied by 1,000 to produce a rate. The estimated probability of a follow-up provider visit within 14 days of discharge was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, CDPS score, and attribution to a SIM PCMH), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, median age, percentage uninsured and in poverty). The utilization outcome models assume that CHIR and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of MI CHIR relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the MI CHIR group relative to the comparison group after MI CHIR implementation. The relative difference is the D-in-D estimate as a percentage of the MI CHIR baseline period adjusted mean.

(continued)

Table F-1-3. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group (continued)

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the primary care visit outcome model is 2,339,371; the weighted N for the follow-up after hospitalization outcome is 230,627. These numbers include all person-year (or discharge-year) observations for both the MI CHIR and comparison groups.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

Table F-1-4. Differences in the pre–post change in inpatient admissions, emergency department visits, and readmissions for adult Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group, aged 19 to 64 years

Outcome	Baseline period adjusted mean, MI CHIR	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, MI CHIR	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
All-cause acute inpatient admissions per 1,000 population							
Year 1	87.00	89.41	80.87	81.30	1.98 (0.05, 3.92)	2.3	0.09
Year 2	87.00	89.41	84.07	83.31	3.17 (0.50, 5.84)	3.6	0.05
Overall	87.00	89.41	82.47	82.31	2.58 (0.93, 4.23)	3.0	0.01
ED visits per 1,000 population							
Year 1	1543.53	1540.25	970.58	961.90	7.41 (-26.68, 41.50)	0.5	0.72
Year 2	1543.53	1540.25	947.31	959.48	-16.06 (-51.51, 19.38)	-1.0	0.46
Overall	1543.53	1540.25	958.92	960.69	-4.36 (-28.94, 20.23)	-0.3	0.77

Notes: CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

Methods: The analysis used a count model to obtain D-in-D estimates for utilization outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, CDPS score, and attribution to a SIM PCMH), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, median age, percentage uninsured and in poverty). The outcome models assume that MI CHIR and comparison group outcome trends are parallel beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of MI CHIR relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the MI CHIR group relative to the comparison group after MI CHIR implementation. The relative difference is the D-in-D estimate as a percentage of the MI CHIR baseline period adjusted mean.

(continued)

Table F-1-4. Differences in the pre–post change in inpatient admissions, emergency department visits, and readmissions for adult Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group, aged 19 to 64 years (continued)

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmissions outcome is 1,701,029; the weighted N for the readmission outcome is 1,347,712. These numbers include all person-year (or discharge-year) observations for both the MI CHIR and comparison groups.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

F-1.3.2 Estimates of Community Health Innovation Region's impact on core outcomes for children

Table F-1-5 shows the estimates of the CHIR model on inpatient admissions and ED visits for child Medicaid beneficiaries who resided in CHIR counties relative to comparison children (aged up to 18 years). The findings are as follows:

- Changes to inpatient admissions did not differ between child Medicaid beneficiaries who reside in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.
- Changes to ED visits did not differ between child Medicaid beneficiaries who reside in CHIR counties and comparison beneficiaries during the first two years of CHIR implementation.

Table F-1-5. Difference in the pre–post change in inpatient admissions and emergency department visits for child Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group

Outcome	Baseline period adjusted mean, MI CHIR	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, MI CHIR	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
All-cause acute inpatient admissions per 1,000 population							
Year 1	53.34	50.07	56.88	53.55	-0.14 (-4.20, 3.91)	-0.3	0.95
Year 2	53.34	50.07	56.97	55.99	-2.69 (-5.74, 0.37)	-5.0	0.15
Overall	53.34	50.07	56.93	54.77	-1.41 (-3.95, 1.13)	-2.6	0.36
ED visits per 1,000 population							
Year 1	776.28	781.47	527.94	530.29	1.30 (-16.79, 19.39)	0.2	0.91
Year 2	776.28	781.47	505.77	509.94	-0.88 (-37.74, 35.97)	-0.1	0.97
Overall	776.28	781.47	516.94	520.18	0.22 (-20.22, 20.65)	0.0	0.99

Notes: CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for inpatient admissions and a Poisson model for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, CDPS score, and attribution to a SIM PCMH), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, median age, and percentage uninsured). The outcome models assume that MI CHIR and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of MI CHIR relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the MI CHIR group relative to the comparison group after MI CHIR implementation. The relative difference is the D-in-D estimate as a percentage of the MI CHIR baseline period adjusted mean.

(continued)

Table F-1-5. Difference in the pre–post change in inpatient admissions and emergency department visits for child Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group (continued)

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 992,146. These numbers include all person-year observations for both the MI CHIR and comparison groups.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

F-1.4 Annual Covariate Balance Between the Community Health Innovation Region and Comparison Groups

As described in ***Appendix L***, annual propensity scores for the overall comparison sample were created at the person-year and inpatient discharge level, and for children and adult subgroups.

Table F-1-6 shows covariate balance between the intervention and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The table includes the following:

- The covariate means for the CHIR and comparison groups without propensity score weighting,
- The standardized difference between the CHIR and comparison group means without propensity score weighting ("unweighted standardized differences"),
- The propensity score-weighted means for the comparison group ("comparison weighted"), and
- The standardized difference between the CHIR group means the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores were estimated in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the CHIR group. Although propensity scores were calculated in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

All covariates in ***Table F-1-6*** were included in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table F-1-6 shows balance between CHIR and comparison group covariates before and after applying weights to person-year observations for all Medicaid beneficiaries aged 0 to 64 years. Prior to propensity score weighting, standardized differences were less than 0.10 for all covariates except for three of the county-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table F-1-6. Covariate balance between Community Health Innovations Region and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, MI CHIR	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of persons that are female	53.0	52.9	0.001	53.0	<0.001
Age in years	25.1	23.8	0.07	25.2	0.009
Percentage of persons that are disabled	7.0	7.0	0.002	7.1	0.003
Total months of enrollment during year	9.7	9.9	0.05	9.7	<0.001
CDPS risk score[a]	1.0	1.0	0.02	1.0	0.005
Percentage of people attributed to a SIM PCMH	79.3	79.5	0.005	79.3	0.001
County level					
Percentage of people residing in a Metropolitan Statistical Area	80.2	82.8	0.07	79.1	0.03
Percentage of people living in poverty	14.3	15.9	0.33	14.3	0.007
Hospital beds per 1,000 people [2017]	3.2	2.8	0.25	3.2	0.001
Median age in years [2010]	39	38.5	0.15	39.4	0.10
Percentage of persons without health insurance (under age 65 years) [2017]	6.0	6.4	0.45	6.0	0.02

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; ICD = International Classification of Diseases; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

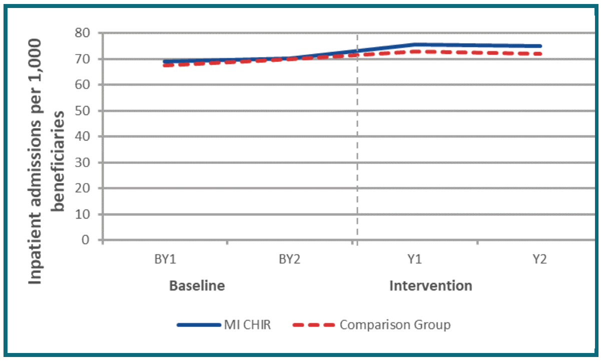
F-1.5 Trends in Core Health Care Spending and Utilization

Figures F-1-1 through ***F-1-3*** show propensity score-weighted trends for all analysis years for the core D-in-D outcomes (inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the CHIR counties and the comparison group. Because there were only two baseline years for this analysis, the analysis modeled all outcomes assuming a parallel trend during the baseline period. Furthermore, all outcomes appeared to exhibit parallel trends during the baseline period.

Figures F-1-1 through ***F-1-3*** present trends for the three core outcomes (inpatient admissions, ED visits, and readmissions) for Medicaid beneficiaries in the CHIR counties and comparison groups.

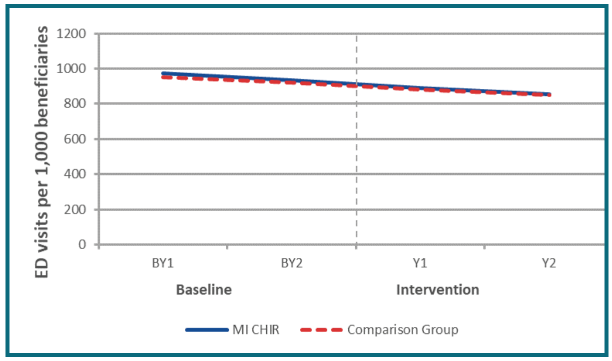
- Inpatient admissions increased from the first baseline year (2016) to first intervention year (2018) and then decreased slightly from the first intervention year (2018) to the second intervention year (2019) for beneficiaries in both CHIR and non-CHIR counties (***Figure F-1-1***).
- ED visits decreased through the entire study period in both CHIR and non-CHIR counties. The ED visit rate for beneficiaries in CHIR counties was marginally higher than that for beneficiaries in non-CHIR counties, 2017 to 2019 (***Figure F-1-2***).
- The rate of readmissions for beneficiaries aged 18 to 64 years in both CHIR and non-CHIR counties increased marginally during the baseline period (2016 to 2017). In 2018, the first intervention year, readmissions increased markedly in CHIR counties relative to non-CHIR counties. In 2019, the second intervention year, readmissions decreased in non-CHIR counties and increased in CHIR counties (***Figure F-1-3***).

Figure F-1-1. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Community Health Innovation Region and comparison groups



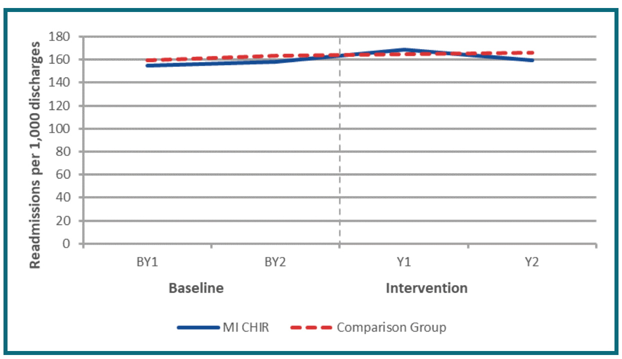
Note: BY = baseline year; CHIR = Community Health Innovation Region; MI = Michigan; Y = year.

Figure F-1-2. Trends in emergency department visits per 1,000 Medicaid beneficiaries in the Community Health Innovation Region and comparison groups



Note: BY = baseline year; CHIR = Community Health Innovation Region; ED = emergency department; MI = Michigan; Y = year.

Figure F-1-3. Trends in readmissions per 1,000 discharges in the Community Health Innovation Region and comparison groups



Note: BY = baseline year; CHIR = Community Health Innovation Region; MI = Michigan; Y = year.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the Michigan Department of Health and Human Services.

F-1.6 Sensitivity Analysis

Table F-1-7 shows how the impact estimates for the core outcomes for the CHIR model differ when the D-in-D models assume (1) parallel trends in outcomes between the CHIR and comparison groups beginning in the baseline period or (2) non-parallel trends beginning in the baseline period (sensitivity analysis). The findings are as follows:

- D-in-D estimates for inpatient admissions are larger in magnitude (approximately double) in the model that includes a linear group-specific trend beginning in the baseline period.
- Overall ED visit and readmissions D-in-D estimates are not statistically significant in models with or without a linear group-specific trend.

Table F-1-7. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Inpatient admissions per 1,000		
Year 1	1.80 (-1.34, 4.94)	3.20* (0.34, 6.06)
Year 2	2.12 (-0.13, 4.36)	4.44** (1.36, 7.52)
Overall	1.96* (0.03, 3.89)	3.82*** (1.72, 5.92)
ED visits per 1,000		
Year 1	-9.63 (-28.79, 9.53)	3.78 (-35.52, 43.07)
Year 2	-15.35 (-48.27, 17.56)	6.08 (-54.08, 66.24)
Overall	-12.49 (-31.51, 6.54)	4.93 (-30.98, 40.83)
Readmissions per 1,000 discharges		
Year 1	8.78** (2.63, 14.94)	10.48 (-2.32, 23.28)
Year 2	-1.21 (-13.07, 10.64)	1.66 (-13.73, 17.04)
Overall	3.75 (-2.95, 10.46)	6.04 (-3.97, 16.06)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CHIR = Community Health Innovation Region; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MDHHS = Michigan Department of Health and Human Services; MI = Michigan; PCMH = patient-centered medical home; SIM = State Innovation Model.

(continued)

Table F-1-7. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and total readmissions for Medicaid beneficiaries in Community Health Innovations Region counties and the comparison group (continued)

Methods: The analysis used a linear probability model to obtain D-in-D estimates for inpatient admissions and a Poisson model for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid entitlement based on disability, a count of total months enrolled in the measurement year, CDPS score, attribution to a SIM PCMH), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, median age, and percentage uninsured and in poverty).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of CHIR relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the CHIR group relative to the comparison group after CHIR implementation. The relative difference is the D-in-D estimate as a percentage of the CHIR baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmissions outcome is 2,339,371; the weighted N for the readmission outcome is 197,279. These numbers include all person-year (or discharge-year) observations for both the MI CHIR and comparison groups.

Sources: Federal Evaluation Team analysis of MI administrative claims data from the Transformed Medicaid Statistical Information System Analytic Files, combined with data provided by the MDHHS.

References for Appendix F

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Appendix G: State Innovation Model in Model Test States: New York

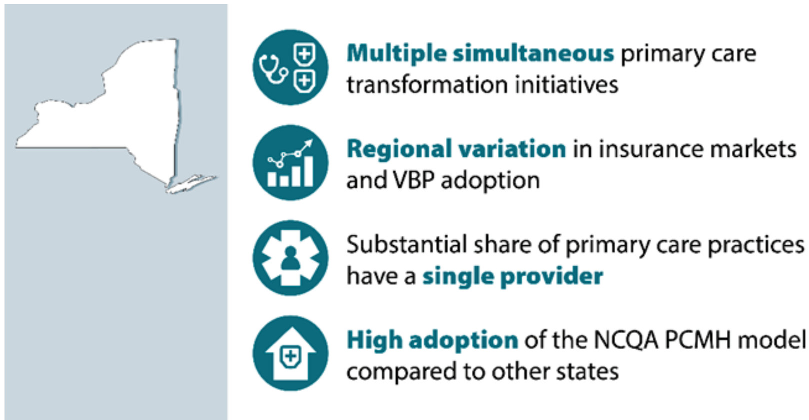
Payment Model Development	• State officials and commercial payers regarded the Regional Oversight Management Committees (ROMCs) as successful in generating multi-payer agreements. Payers in most ROMCs agreed to design value-based payments (VBPs) models. • Multi-payer supplemental payments were available to targeted practices to achieve New York State (NYS) patient-centered medical home (PCMH) certification, but few of these targeted practices enrolled in New York's PCMH program.
Delivery Model Transformation	• New York developed its own NYS PCMH model based on the NCQA 2017 PCMH model. • Providers reported SIM-funded practice transformation assistance as instrumental in helping them obtain NYS PCMH certification. However, stakeholders said limited practice capacity and resources were major reasons some primary care practices did not enroll in the NYS PCMH program. • Rural residency programs and a distance learning program, which sought to enhance primary care in under-resourced areas, will be sustained. • Compared to patients in other practices, commercially insured patients in practices that adopted the NYS PCMH model sought less inpatient care and had lower spending.
Health IT and Data Analytics	• Health information technology (health IT) initiatives to support practice transformation and VBP models advanced moderately.
Population Health	• Six population health (Project Linking Interventions for Total Population Health [Project LIFT]) efforts began in December 2018, with some intended to be self-sustaining.
Sustainability	• Practice transformation assistance supported by the SIM Initiative was never intended to be sustained. • Going forward, stakeholders hoped payers would fund ROMCs but that was uncertain.
Implications	• The ROMC regional approach shows promise in improving payer engagement and cooperation. • Primary care practices not already transformed need support, financial and otherwise, to change the way they deliver care.

G.1 Key State Context and the New York State Innovation Model Initiative

G.1.1 Pre-State Innovation Model health care in New York

New York's history of pursuing care delivery and payment transformation efforts was strongly shaped by two efforts: (1) the multi-payer Adirondack Medical Home Demonstration (New York State Department of Health [NYSDOH], 2014, June), which eventually integrated Medicare as part of CMS's Multi-Payer Advanced Primary Care Practice Demonstration; and (2) a multi-payer initiative in the Capital District–Hudson Valley Region area that included Medicare through CMS's Comprehensive Primary Care (CPC) initiative (***Exhibit G-1***) (Centers for Medicare & Medicaid Services (CMS), 2016). New York had also promoted the PCMH model through other initiatives, such as making Medicaid per member per month (PMPM) payments available to practices that became recognized as PCMHs by the National Committee for Quality Assurance (NCQA) (New York State Department of Health [NYSDOH], 2013). At the same time, New York sought to transform primary care delivery and payment through the Medicaid Delivery System Reform Incentive Payment (DSRIP) Program, a major effort that offered technical assistance (TA) to primary care practices—specifically, those participating with provider systems that developed DSRIP projects—to attain PCMH designation (New York State Department of Health [NYSDOH], 2020, July). New York also sponsored learning collaboratives for primary care and specialty practices (with a focus on larger practices) as part of the CMS Transforming Clinical Practice Initiative (TCPI) (New York State Department of Health [NYSDOH], New York eHealth Collaborative, & Common Ground Health, n.d.). Finally, several commercial payers in New York sponsored their own delivery and payment initiatives aimed at transforming primary care.

Exhibit G-1. New York's SIM Initiative landscape shaped by multiple care delivery and payment transformation efforts



Note: NCQA = National Committee for Quality Assurance; PCMH = patient-centered medical home; SIM = State Innovation Model; VBP = value-based payment.
Source: NYS PCMH Quarterly Report (September 2019).

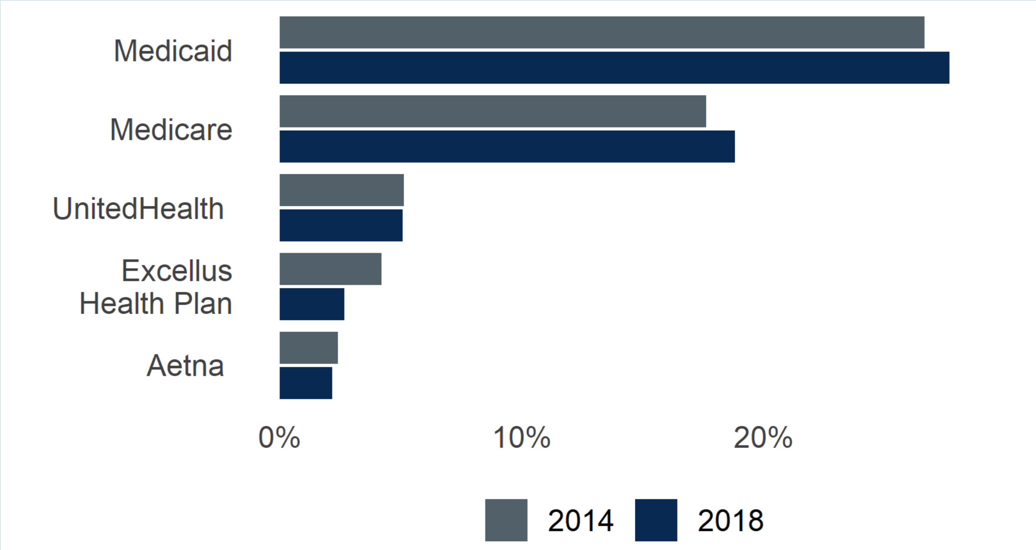
The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in New York was relatively competitive. Together, commercial health insurers make up the largest share of the market, followed by Medicaid and then Medicare, in both 2014 and 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percentage of insured lives they covered between 2014 and 2018. (***Exhibit G-2***). In contrast, the percent of insured lives covered by the third most common insurer (UnitedHealth) remained stable between 2014 and 2018, although it remained the dominant commercial health insurer in the state.

A majority of New York practices were small and located in urban areas. In 2015, approximately 62 percent of primary care practice locations had a single provider and 6 percent were located in rural areas. Twenty percent had existing involvement in an alternative payment model under Medicare fee-for-service programs (e.g., CPC, the Medicare Shared Savings Program).[56]

[56] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit G-2. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in New York shown)



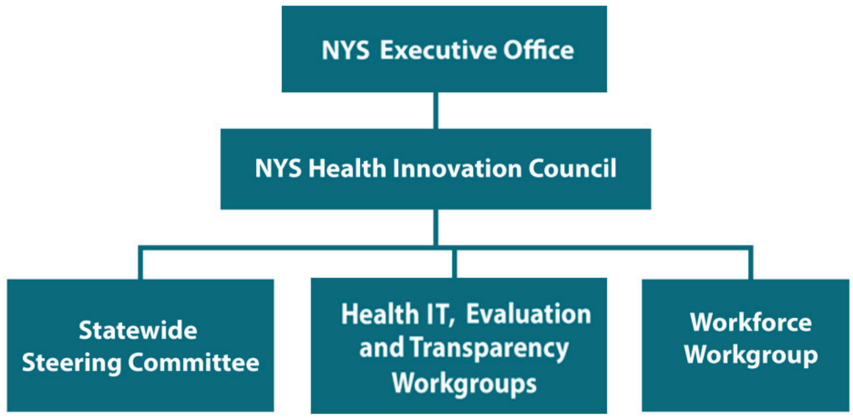
Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

G.1.2 State Innovation Model Initiative in New York

The New York SIM Initiative began on February 1, 2015, with the primary goal of encouraging small primary care practices to adopt the PCMH model of care. The SIM Initiative was directed and staffed by a state office within the New York State Department of Health's (NYSDOH's) Office of Quality and Patient Safety (OQPS) (***Exhibit G-3***). The SIM Initiative also involved individuals working in other NYSDOH offices, divisions, and advisory boards—including the Office of Public Health, Office of Primary Care and Health Systems Management, Office of Health Insurance Programs, Office of Rural Health, and State Council on Graduate Medical Education.

Exhibit G-3. New York SIM Initiative involved multiple offices, divisions, and advisory boards within the New York State Department of Health



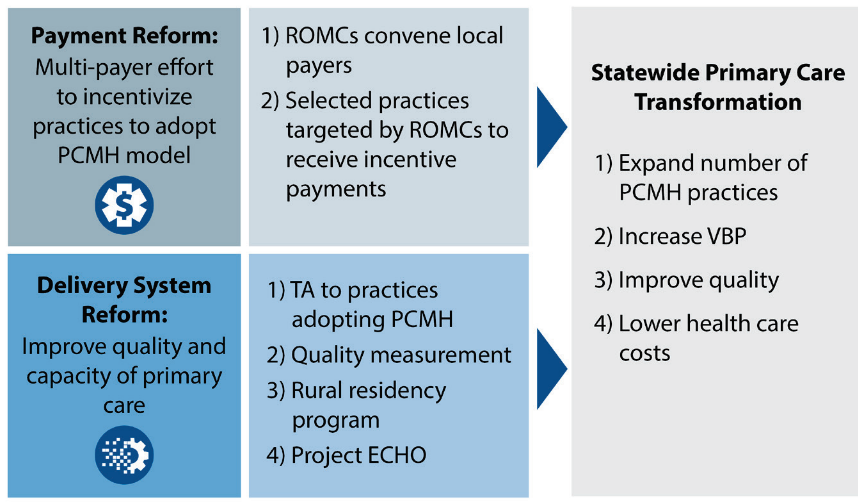
Note: health IT = health information technology; NY = New York; NYS = New York State; SIM = State Innovation Model.

Source: NY SIM Round 2 Final Report.

At the core of New York's SIM Initiative was incentivizing primary care practices—particularly small, under-resourced clinics not yet recognized as medical homes—to adopt a PCMH model of care and enter into value-based payment (VBP) contracts with commercial payers. To this end, New York initially designed its own PCMH model, the Advanced Primary Care (APC) model. Due to difficulties in engaging both providers and payers, the state abandoned the APC model three years into the SIM Initiative Test period. Instead, in April 2018 the state transitioned to the NCQA's 2017 PCMH model customized for New York, called the New York State Patient-Centered Medical Home (NYS PCMH) model.

To support primary care providers in adopting a state-specific PCMH model (APC and later NYS PCMH), New York initially planned a statewide effort that would engage commercial payers to voluntarily make incentive payments to help primary care practices—either as practices went through transformation or once they achieved transformation. In late 2016, because New York struggled to get payers to commit to a single multi-payer model statewide, the state shifted to implementing regionally based multi-payer efforts, akin to the state's longstanding Adirondack Medical Home Demonstration (New York State Department of Health [NYSDOH], 2014, June). With this shift, the state established Regional Oversight Management Committees (ROMCs) in four different regions across the state. The ROMCs were tasked with convening payers in their regions to develop and implement local multi-payer payment approaches to incentivize primary care practices to adopt the APC model, and eventually the NYS PCMH model (***Exhibit G-4***).

Exhibit G-4. New York SIM Initiative focused on regionally based multi-payer efforts and primary care transformation

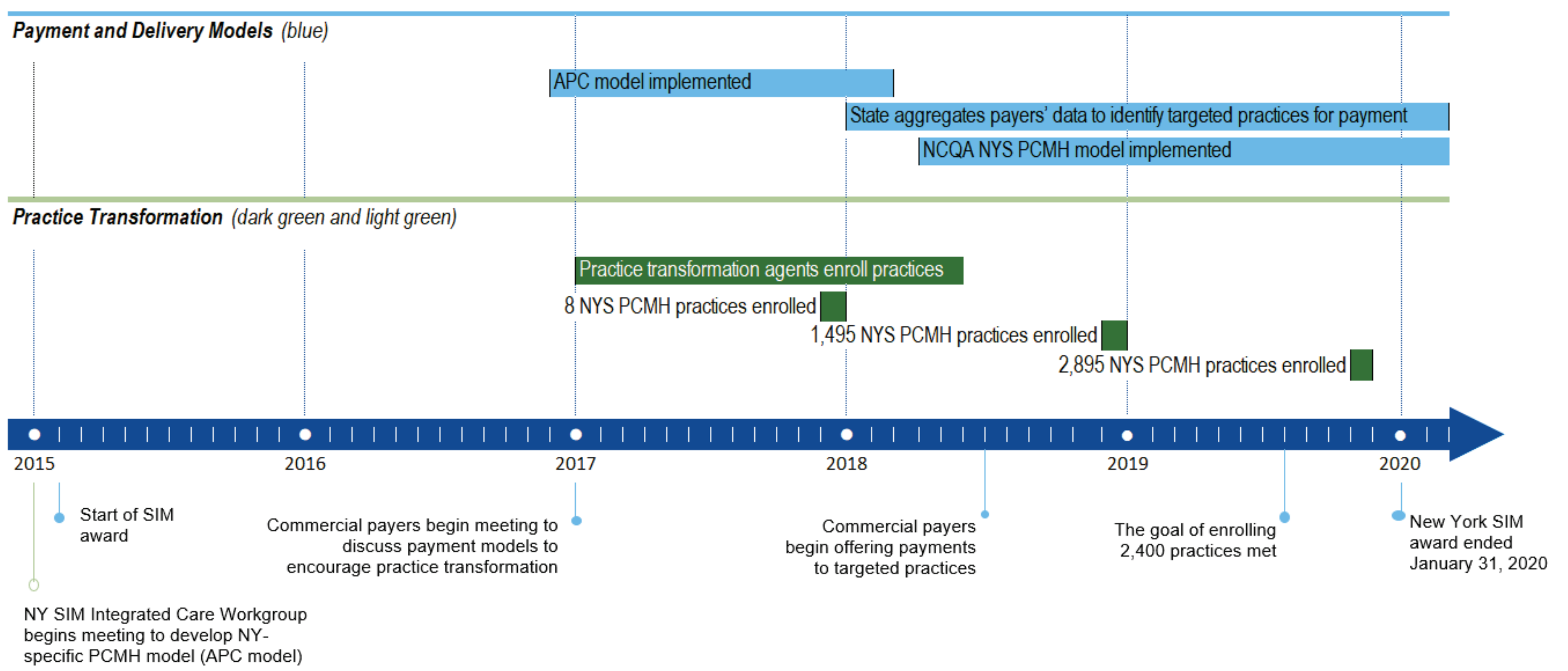


Note: PCMH = patient-centered medical home; Project ECHO = Project Extension for Community Healthcare Outcomes; ROMC = Regional Oversight Management Committee; SIM = State Innovation Model; TA = technical assistance; VBP = value-based payment.

Simultaneously, New York launched the Practice Transformation Agent (PTA) program that: (1) recruited primary care practices to adopt the NYS PCMH, and (2) provided TA to help participating practices achieve PCMH certification. The PTA program targeted small primary practices not eligible for TA from the DSRIP demonstration (see above) or from other practice transformation programs (e.g., Comprehensive Primary Care Plus [CPC+]) operating in New York. In addition, the state developed a multi-payer quality measure report, the scorecard, designed to help practices adopting NYS PCMH assess their performance and implement quality improvements. Smaller initiatives implemented under New York's SIM Initiative included population health improvement, workforce development, and health information technology (health IT) efforts.

New York's SIM award ended in January 2020. The state's SIM Initiative involved a range of activities pertaining to transformation with many interrelated (e.g., launch of ROMCs and introduction of PTA) but some standalone efforts (e.g. the five rural residency programs), as seen in ***Exhibit G-5***.

Exhibit G-5. Timeline of New York SIM and SIM-related activities



Notes: Lighter shades (with [1]) of the same color bars denote similar activities or models.

APC = Advanced Primary Care; NCQA = National Committee for Quality Assurance; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; SIM = State Innovation Model.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

G.2 Accomplishments from New York's State Innovation Model Initiative

This section summarizes New York's SIM award activities, accomplishments, and stakeholder feedback into three topic areas: delivery models and payment reform (***Section G.2.1***), enabling strategies to support health care delivery transformation (***Section G.2.2***), and population health (***Section G.2.3***). The chapter concludes by summarizing New York's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section G.3***) and a discussion of implications and lessons learned from New York's experience (***Section G.4***).

The federal evaluation of New York's SIM Initiative is based on the following data sources:

- Monthly conference calls with New York State (NYS) SIM officials;
- A total of 96 interviews with state officials, payers and purchasers, commercial health plans, representatives from provider associations, SIM vendors, and other stakeholders over four annual interview rounds conducted since 2016, most recently in winter 2020;
- Twelve focus groups with primary care practices that had received SIM-funded TA;
- NYS SIM Initiative documents; and
- Commercial claims data provided by FAIR Health for calendar years 2016 and 2019.

Because the state invested the bulk of its SIM funds in developing and supporting the NYS PCMH model, and New York's SIM effort focused on engaging commercial insurers to help promote NYS PCMH among small primary care practices, provider claims data were used to assess quantitatively the effects of New York's PCMH model on care for commercially insured patients. Commercially insured patients attributed to primary care providers that *had achieved* NYS PCMH recognition by 2019 were compared to similarly insured patients attributed to providers who *had not achieved* such recognition by 2019. Also examined was whether any particular practice characteristic predicted success in delivering high quality, coordinated care.

G.2.1 Delivery models and payment reforms

Key Results
• New York found more success with NYS PCMH, a state-specific adaptation of an established PCMH model, than with its initial state-developed version, which faced payer and provider pushback. • Practice enrollment in PCMH transformation accelerated following transition to NYS PCMH, with 2,879 practices (representing over 13,000 clinicians) enrolled by the end of the SIM Initiative in January 2020, two-thirds of which were small, often under-resourced clinics. • ROMCs, in which commercial payers regularly met and discussed how to transform primary care in their local area, were universally viewed by stakeholders as a major success in convening payers; but their strategies to make payments to a select group of targeted practices to help achieve NYS PCMH certification did not result in these targeted practices' awareness or uptake of the model.

Delivery reform

New York's original vision for its SIM Initiative was to develop and implement its own medical home model, the APC model, and to have commercial payers statewide support that model. The APC model had a slow rollout, however, due in part to the state's existing complex delivery and payment system reform landscape, with multiple transformation efforts competing for providers. Primary care providers complained about the many practice transformation initiatives already in place before the SIM Initiative, and reported difficulties distinguishing among programs when making the choice (RTI International, 2019). Another reason stakeholders cited for slow APC model implementation was the reluctance of small primary care practices to take on transformation due to capacity and resource limitations (RTI International, 2018). The state also struggled to get commercial payers to participate for two main reasons. First, many payers already had their own VBP arrangements. Second, payers were concerned about how the state would validate that providers were truly implementing the APC model (RTI International, 2018).

Because of these and other challenges, beginning April 1, 2018 New York switched from its state-designed and state-administered APC model to NYS PCMH—which was based on NCQA's 2017 PCMH model with additional state-specific criteria around behavioral health integration, VBP, case management, and health IT (RTI International, 2018). ***Exhibit G-6*** summarizes state-specific requirements of the NYS PCMH model.

Exhibit G-6. State-specific recognition criteria of the New York State Patient-Centered Medical Home model

Team-Based Care and Practice Organization	• Certified EHR system
Knowing and Managing Your Patients	• Behavioral health screenings • Target population health management on disparities in care • Health literacy and cultural competence of practice staff
Patient-Centered Access	• Two-way electronic communication • Continuity of medical record information
Care Management and Support	• Comprehensive Risk- Stratification Process • Care plan is integrated and accessible across settings of care
Care Coordination and Care Transitions	• Specialist referral expectations • Behavioral health referral expectations • Patient discharge summaries • External electronic exchange of information
Performance Measurement and Quality Improvement	• Value-based contract agreements

Note: EHR = electronic health record; NYS PCMH = New York State Patient-Centered Medical Home.

Source: NYS PCMH Recognition Program.

Nearly all stakeholders agreed the switch to NYS PCMH was a key SIM Initiative accomplishment—with some commenting that the shift to the NYS PCMH model essentially launched the SIM Initiative's delivery system transformation efforts in earnest, by improving provider adoption of NYS PCMH. State officials and other stakeholders noted that better alignment of NYS PCMH with other practice transformation initiatives that recognized NCQA certification—such as DSRIP, CPC+, and Merit-Based Incentive Payment System (MIPS)—made the model worthwhile for many practices. Indeed, in focus groups with NYS primary care providers working in practices that achieved NYS PCMH recognition by January 2020, financial incentives (in particular, Medicaid incentive payments for PCMH-recognized practices) were the most frequently cited reason for participating in the program. Furthermore, several stakeholders thought NYS PCMH sustainability was heavily dependent on continued availability of the Medicaid incentive payments. ***Table G-1*** summarizes the state's progress on delivery system and payment reforms.

Table G-1. New York's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
NYS PCMH	Primary care practices	• Developed and launched state-specific APC model, but payer and provider pushback led the state to transition to NYS PCMH in 2018. • Enrolled more than 2,800 practices in NYS PCMH, exceeding the state's enrollment goal of 2,400 practices. • Only one in five enrolled practices were first time transforming practices. • Achieving VBP and health IT standards required by NYS PCMH proved challenging for many practices.	• The NYS PCMH model will continue. Any NYS primary care practice that seeks NCQA PCMH recognition is now required to meet NCQA's NYS PCMH standards. • The NYSDOH had hoped to secure state appropriations to further support and develop the NYS PCMH standard, but did not secure these funds int the state's 2021 budget.
Payer financial support of primary care practice transformation/ transformation achievement	Selected targeted primary care groups that adopted the NYS PCMH model—specifically, small practices not already in VBP arrangements with participating payers	• Established four ROMCs comprising local payers and state officials, among other groups, across the state. • In three of the ROMCs, commercial payers agreed to voluntarily offer new supplemental payments to targeted primary care practices that adopt the NYS PCMH model; a different payment model was used in each region. • Recruitment of practices targeted for supplemental payments to seek NYS PCMH certification was limited, and few, if any, payments were made. • In the fourth ROMC, no multi-payer agreement was reached during the SIM Initiative.	• Will not be sustained with state investment, and it is unknown whether ROMCs will continue to meet.

Note: APC= advanced primary care; health IT= health information technology; NCQA = National Committee for Quality Assurance; NYS = New York State; NYSDOH = New York State Department of Health; NYS PCMH = New York State Patient-Centered Medical Home; PCMH = patient-centered medical home; PTA = Practice Transformation Agent; ROMC = Regional Oversight and Management Committee; SIM = State Innovation Model; VBP = value-based payment.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

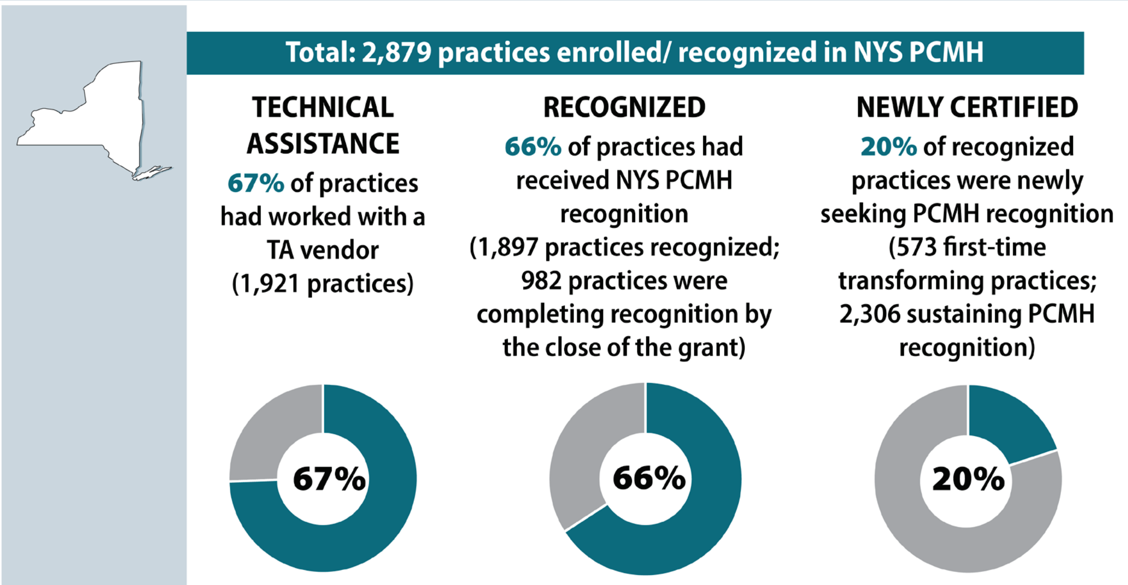
ROMC facilitators, as well as some state officials, reported that payers supported the switch to the NYS PCMH model, and that some hesitant payers became more willing to support practices working toward or achieving the NYS PCMH certification. However, in the Western region of the state, where PCMH penetration among primary care practices was already substantial, a commercial payer representative felt that "initiating a project where your success metrics is the number of certified practices" was a waste of time, and that the focus of the SIM Initiative should have been on practice quality improvement. Another commercial payer representative was similarly skeptical about whether the model would affect quality of care, remarking that "PCMH certification is not translating into health care improvement." State officials pointed out, however, that early evaluation results suggested that the 2014 PCMH standard model, relative to a comparison group reduced total health care spending and utilization of emergency and hospital services in Medicaid (New York State Department of Health [NYSDOH], 2019a).

SIM-funded (PTAs) tasked with assisting practices in adopting the PCMH model (see ***Section G.2.2***) welcomed the transition from the APC to a more structured NCQA program, with an established national organization to verify that practices met the standards. One PTA stated that it would have been difficult for the state to establish and sustain its own processes and staffing to administer APC certification and verification. Another PTA felt, however, that the transition to a model based on the NCQA's PCMH model undermined the ability of small, independent practices to participate in the program precisely because it was more structured and rigid. The APC model, in contrast, had been designed to be more flexible—presented as a model that under-resourced and inexperienced practices not able to achieve formal PCMH recognition would be able to adopt at their own pace.

> "We heard anecdotes that there were practices that had PCMH Level 3 and found this [NYS PCMH certification] to be very daunting, which gives me a better sense that we really were raising a bar in a significant way, but yet it was achievable for that 500 [practices] even when they didn't have anything before. I think that to me, that's the most significant transformation story."
>
> —New York State official, January 2020

Surpassing the state's goal of enrolling 2,400 practices, 2,879 practices had enrolled in the NYS PCMH program by January 2020, representing 13,309 individual clinicians (***Exhibit G-7***). State officials and other stakeholders highlighted this strong enrollment as one of the New York SIM Initiative's biggest successes. Among the practices enrolled in January 2020, 1,897 had obtained NYS PCMH certification, with 982 still pursuing transformation or awaiting verification of checkpoint completion. Notably, 80 percent (2,306) of enrolled practices were simply updating their 2014 NCQA PCMH certification ("sustaining practices"). Only one of five enrolled practices (573) were seeking PCMH recognition for the first time ("newly seeking"), which was the primary target of the practice transformation initiative. Even so, one state official highlighted that getting more than 500 practices brand new to the PCMH program to achieve NYS PCMH certification was a significant achievement.

Exhibit G-7. A total of 2,879 practices enrolled/recognized in New York State Patient-Centered Medical Home, January 2020



Note: NYSDOH = New York State Department of Health; NYS PCMH = New York State Patient-Centered Medical Home; PCMH = patient-centered medical home; TA = technical assistance.

Source: NYS PCMH January 2020 Status Report Generated by NYSDOH's Practice Transformation Tracking System.

A few stakeholders noted that the imbalance between sustaining and newly transforming practices was in part created by the transition to the NCQA NYS PCMH standard—which opened up the program to a broader set of practices already recognized under an earlier version of the NCQA PCMH standard. Some PTAs were said to have rushed to enroll sustaining practices to capitalize on available SIM-funded resources to help them achieve NYS PCMH recognition (e.g., free technical assistance and first year recognition fee waiver). One stakeholder felt that PTAs had perverse incentives to enroll sustaining practices, because PTAs received an incentive payment for each practice that received its NYS PCMH certification, which sustaining practices could do faster. As described later in this chapter, NCQA was expecting a steady flow of practices newly seeking recognition, as well as those transitioning from the APC model. Instead, the large influx of sustaining practices renewing their certification early clogged up NCQA's system, which contributed to delays in NCQA's processing times.

State officials and PTAs agreed that, although some NYS PCMH requirements that went beyond the national core standards were easy for practices to meet, others were sticking points for many practices seeking recognition. In particular, state officials and PTAs felt that the NYS PCMH requirements around behavioral health screening, referrals, and patient risk stratification were fairly easy for providers to meet, because the requirements did not include having a behavioral health specialist or social worker on staff, or involve robust analytics. Instead, these requirements focused on having workflows and processes in place to systematically screen and refer patients, and used existing electronic health records (EHRs) to stratify patients based on risk. According to stakeholders, however, many practices struggled to meet NYS PCMH requirements on health information exchange (HIE) connectivity and VBP participation.

To meet HIE connectivity certification requirements, practices had to execute a participation agreement with one of New York's qualified entities (QEs)[57] and share data between their EHRs and QEs in a specific format. Negotiating partnership agreements was pretty straightforward. But many practices found exchanging information with QEs difficult to achieve—facing both technical and financial difficulties because practices' EHRs simply lacked interoperability capabilities. According to PTAs, successfully figuring out how to effectively and efficiently share data with QEs averaged nine to 12 months for practices. In 2020, many participants in focus groups with small practice providers not previously recognized as PCMHs agreed that connection to, and exchange of information with, QEs remained one of the biggest challenges they faced in achieving and maintaining NYS PCMH recognition.

Meeting the NYS PCMH VBP criterion was similarly challenging for many practices. To meet this standard, a practice had to have at least one VBP contract with a payer. But deciding whether a contract was a good idea for a small practice proved difficult. Small independent practices reportedly often lacked the financial acumen to figure out whether participation in certain programs or contracting arrangements was beneficial to them: "Whether it is costing us or rewarding us," as one focus group provider put it. Further, a few providers who participated in the January 2020 focus groups reported meeting or exceeding quality targets to qualify for VBP contracts from commercial payers, but said that payers were not interested in contracting with them. One provider said their practice "made attempts [to get a VBP contract], but they [commercial payers] won't offer value-based payments to groups of our size." One PTA noted that some practices joined an Independent Physician Association (IPA) to satisfy the VBP contract. But even practices already associated with an IPA or an accountable care organization (ACO)—and by virtue of this affiliation already had a VBP contract—reportedly faced difficulties. In particular, practices that were part of IPAs or ACOs lacked sufficient documentation to prove they were engaged in a VBP arrangement, because insurers typically negotiated contracts with IPA or ACO management as opposed to individual practices.

[57] QEs had been formerly referred to as regional health information organizations (RHIOs).

After the state came to recognize provider problems with meeting the HIE and VBP standards, New York officials devised a plan to temporarily overcome these challenges – allow practices to attest that they were working toward these standards (New York State Department of Health [NYSDOH], n.d.). However, one state official acknowledged that, in retrospect, it would have been prudent to assess risks for each of the NYS PCMH components ahead of the model launch and make adjustments accordingly—rather than having to come up with fixes after the fact. By 2020, when attestation for HIE and VBP standards was no longer available, some PTAs remained concerned that some practices that had previously attested to these standards might no longer qualify for recertification by their next annual review.

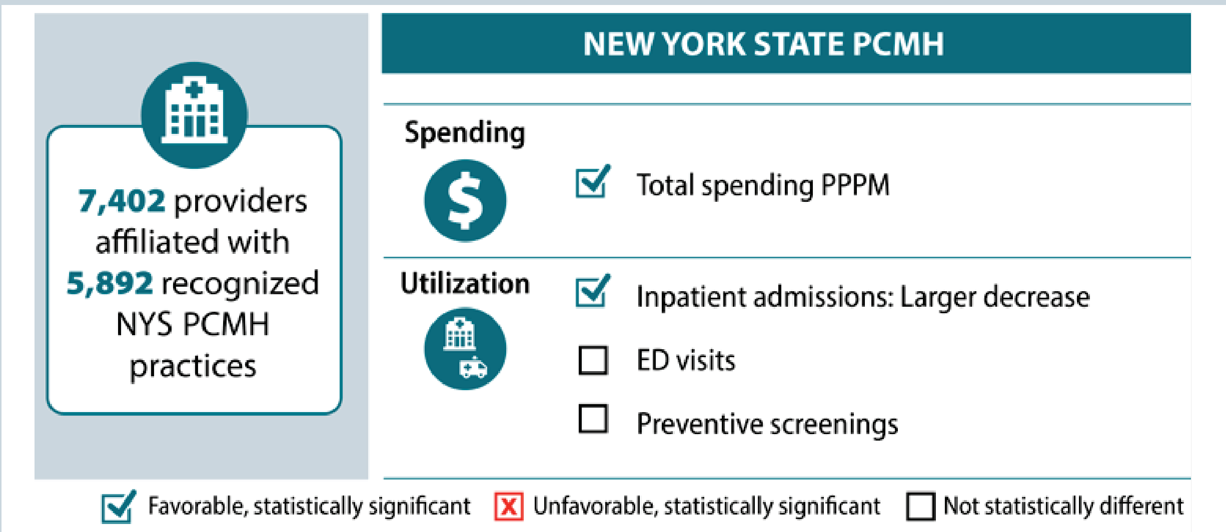
> “Looking back, we should’ve created a risk per component or per criterion of the [NYS PCMH] model to look at those things [HIE and VBP criteria]. If I would’ve done something differently, I would’ve created a risk register to see each of those components to see the trouble areas and try to get in front of those versus dealing with it like QI19 [VBP contract requirement] and attestation.”
>
> —New York state official

Providers in focus groups held in both April 2019 and January 2020, including providers from small practices not previously recognized as PCMHs, gave mixed reviews on the impact the generic PCMH certification had on care delivery. Among the benefits of obtaining the PCMH certification, focus group participants appreciated the greater structure in care delivery the model afforded, the streamlined workflows and processes (e.g., finding a way to accommodate same-day appointments), and the improved ability to follow-up with patients after specialist referrals or emergency department (ED) visits (e.g., through EHR products and better hospital alerts). But on the downside, other focus group participants argued they were already functioning as medical homes and providing patient-centered care (e.g., coordinating care for patients)—and that the PCMH certification simply added a documentation burden, which many characterized as challenging and time consuming. One provider described the increasing demands of the documenting process as: “Now we have to scan, we have to go through the EHR, enter templates.” Several felt the emphasis on coding and documenting was taking their attention away from patient care: “You’re spending more time on the computer than seeing your patient.” Several providers felt the PCMH model was designed for bigger practices and that certain processes, such as team huddles, were not practical or needed in practices with few staff.

When considering the impacts on health outcomes of practicing as a PCMH, providers participating in focus groups cited higher rates of preventive care, improved access to care through same-day appointments, and improved care coordination and care transitions. Several providers said that, under the PCMH model, they could routinely administer depression screenings and diagnose patients more rapidly, uncovering and treating mental health conditions that previously might have gone unnoticed. Although one provider felt that face-to-face oral screenings took less time and were more personal, other providers reported that using paper questionnaires enabled them to identify more patients with depression and other mental health concerns than doing the diagnosis face to face. As one provider said, “There’s a subpopulation of the practice that seem to be a bit more honest when they have a piece of paper and are answering it on that, as opposed to answering questions in the room from the provider directly.”

A quantitative analysis of commercial claims data on patients in NYS PCMH showed favorable results for total health care spending and smaller but still favorable results for inpatient admissions, which would be expected from the improved care coordination and care transitions that providers reported.[58] There were limited changes for other outcomes.

Exhibit G-8. New York State’s Patient-Centered Medical Home had more favorable impacts on spending and inpatient admissions in the first year



Notes: A checkmark indicates a favorable impact. Changes are relative to a comparison group.

ED = emergency department; NYS PCMH = New York State Patient-Centered Medical Home; PCMH = patient-centered medical home; PCP = primary care provider; PPPM = per person per month.

Sources: Federal Evaluation Team analysis of New York commercial claims from FAIR Health, Inc. See ***Appendix G-1*** for more detail.

Claims-based analyses of NYS PCMH

For more information, see ***Tables G-5*** and ***G-6*** in the Addendum at end of this chapter. For full results describing the impact of NYS PCMH, see ***Appendix G-1***.

Total spending per person per month (PPPM) decreased for commercially insured patients of NYS PCMH providers and increased for commercially insured patients of non-PCMH comparison providers, leading to $53.86 PPPM decline in spending for NYS PCMH providers. The decline in total spending was accompanied by declines in inpatient admissions. Inpatient admissions declined for both the

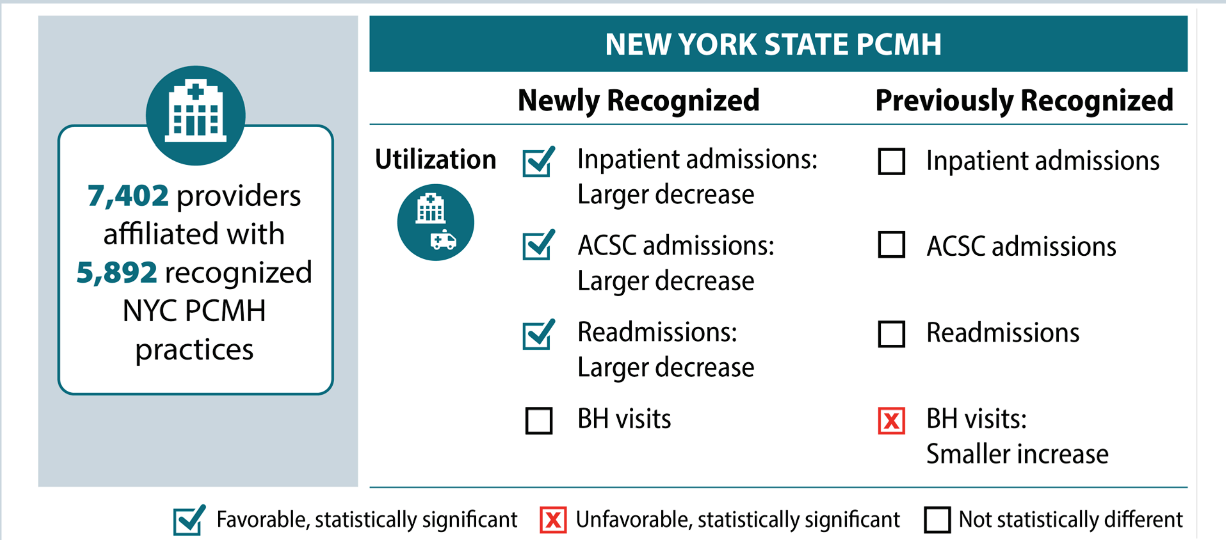
[58] Because the data used for this analysis do not identify the two-thirds of recognized NYS PCMH practices that received practice transformation assistance (PTA) under SIM, it is not possible to determine whether the observed effects are a result of PTA or simply NYS PCMH recognition.

NYS PCMH and comparison groups but declined slightly more among commercially insured patients of NYS PCMH providers than among patients of comparison providers (-0.55 inpatient admissions per 1,000 patient months). Despite reports of increased provision of preventive care from provider focus groups, the quantitative analysis did not show changes to the NYS PCMH group that were significantly different from those in the comparison group, indicating that providing extended hours did not result in increased preventive screening or primary care visit use. Behavioral health visits increased for both patients of NYS PCMH providers and comparison providers but increased slightly less in the NYS PCMH group than in the comparison group (-2.55 behavioral health visits per 1,000 patient months). The lower rate of increase in the behavioral health visits in the NYS PCMH group was in spite of provider reports that the PCMH model facilitated mental health screening, diagnosis, and treatment.

Findings for specific subgroups of practices differed somewhat from findings for all NYS PCMH practices taken together. We expected NYS PCMH to produce larger changes to patient outcomes in practices with no prior PCMH recognition than in practices that already had NCQA PCMH recognition. All-cause inpatient admissions and admissions for ambulatory care sensitive conditions (ACSCs) decreased for both patients of newly recognized NYS PCMH providers and patients of comparison providers but decreased more for the newly recognized NYS PCMH group (inpatient admissions: -0.80 inpatient admissions per 1,000 patient months, ACSC admissions: -0.37 admissions per 1,000 patient months). Readmissions decreased for patients of newly recognized PCMH providers and increased for patients of comparison providers, leading to a relative decrease in readmissions for the newly recognized NYS PCMH group (readmissions: -10.49 readmissions per 1,000 admissions). In contrast, changes to inpatient admissions, ACSC admissions, and readmissions did not differ between patients of previously recognized PCMH providers and patients of comparison providers. Behavioral health visits increased for both patients of previously recognized NYS PCMH providers and patients of comparison providers (-2.80 behavioral visits per 1,000 patient months), just like for NYS PCMH providers as a whole. In contrast, changes to behavioral health visits did not differ between patients of newly recognized NYS PCMH providers and patients of comparison providers (see ***Exhibit G-9***) (see ***Appendix G-1*** for detail on this and other analyses).

Analyses that divided providers by their specialty (internal medicine, pediatrics, family medicine, hospital/clinic, and other) found few significant changes among patients of NYS PCMH providers relative to patients of comparison providers (see ***Table G-1-7***). Notable exceptions were for patients of NYS PCMH providers specializing in family medicine, who saw significant decreases in PPPM spending 30-day readmissions, and behavioral health visits and significant increases in preventive care visits.

Exhibit G-9. New York State Patient-Centered Medical Homes had favorable impacts on admissions and readmissions and no changes for behavioral health visits for newly recognized Patient-Centered Medical Homes, and an unfavorable impact on behavioral health visits and no changes for admissions and readmissions for previously recognized Patient-Centered Medical Homes in its first full year



Notes: A checkmark indicates a favorable impact. Changes are relative to a comparison group.

ACSC = ambulatory care sensitive condition; BH = behavioral health; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; PCP = primary care provider.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc. See ***Appendix G-1*** for more detail.

Payment reform

Early in its SIM Initiative, New York had planned to launch its homegrown APC model on a statewide basis, as noted in the previous section, and also to get commercial health insurers and large, self-insured employers to voluntarily make new payments to primary care practices that adopted the model (RTI International, 2017). But the state struggled to secure payers to sign on. Interviewees offered various reasons, including the large number of payers in New York's health care market, and different levels of competitiveness across regions in the state—with some areas (e.g., New York City) having a highly competitive market with many payers while others (e.g., Rochester) having a single payer dominate the local market. The diversity of payer size, which ranged from large national insurers to small regional insurers, was also said to be a factor—as was the state's election not to use its full regulatory authority to incentivize payers to participate, because "it was politically unfeasible and there was no willingness," according to one state official.

In late 2016, New York introduced a new approach to get payers to engage. Instead of trying to launch a statewide multi-payer model, the state moved to the regional implementation strategy discussed earlier. In particular, ROMCs were created and charged with convincing regional payers to voluntarily make payments to primary care practices that enrolled in the APC model (RTI International, 2018). Toward that end, in early 2017 New York contracted with several organizations and individuals to staff three ROMCs. The first ROMC was established in the Hudson Valley and Capital District (Capital), followed by New York City and Long Island (Metro), and Finger Lakes (Finger Lakes). In February 2019, a fourth ROMC was established near Buffalo in New York's western regions.

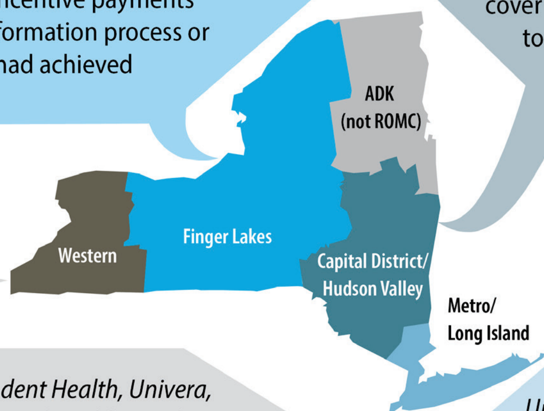
Exhibit G-10. Regional Oversight Management Committees created to convince regional payers to voluntarily make payments to primary care practices that enrolled in the Advanced Primary Care model, and later New York State Patient-Centered Medical Home

Finger Lakes: *Aetna, United Healthcare the Empire Plan, Excellus, and MVP*

Payers targeted those practices that 1) had no VBP arrangements with any of the participating payers, and 2) were located within 5 counties designated with the lowest penetration of providers with VBP arrangements. Payers did not agree on a uniform payment approach and offered practices incentive payments through the transformation process or after the practice had achieved recognition.

Capital District/Hudson Valley: *Capital District Physicians' Health Plan (CDPHP), MVP, Anthem Blue Cross Blue Shield, and United Healthcare's Empire Plan*

Payers targeted those practices that: (1) had no VBP arrangements with any of the participating payers, and (2) had too few patients in any of the four payers' plans for any single payer to cover enough of a practice's patient panel to compel the practice to transform. Payers decided to offer payments to practices after they achieved recognition.



Western: *Independent Health, Univera, HealthNow, and United Healthcare the Empire Plan*

Payers targeted those practices that were already certified as NCQA Level 3 practices. No payment approach was agreed upon by the end of the award period.

Metro/Long Island: *Metro-Anthem Blue Cross Blue Shield, United Healthcare, United Healthcare the Empire Plan, and Aetna*

Payers targeted practices that had no VBP arrangements with any of the participating payers. Payers decided to offer a PMPM to support practices through the transformation process.

Notes: The ADK region has long participated in a multi-payer initiative, Adirondack Medical Home Demonstration (New York State Department of Health [NYSDOH], 2014, June), and thus was excluded for the most part in the ROMC effort launched under SIM.

ADK = Adirondack; NCQA = National Committee for Quality Assurance; PMPM = per member per month; ROMC = Regional Oversight Management Committee; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

With the switch to a regionally based multi-payer model, New York also shifted its payment approach from one that incentivized payers to one that incentivized *practices*—small primary care practices specifically, which had been largely untouched by participating payers' existing VBP initiatives. Beginning in early 2017, New York worked to align local payers with one another to incentivize a targeted group of small primary care practices that had not been previously involved in practice transformation to adopt the APC model (RTI International, 2018). Payers were amenable to this strategy, at least in principle.

After considerable negotiation, in April 2018 the four payers participating in the Capital ROMC were the first to reach a payment agreement (RTI International, 2019). Capital payers agreed to focus their multi-payer model on making enhanced payments to 180 provider groups each payer contracted with, encouraging them to enroll in the SIM-funded PTA program and adopt the APC model (later replaced with NYS PCMH) (see ***Exhibit G-10***). Targeted practices were those that: (1) had been largely untouched by any of the participating payers' existing VBP arrangements, and (2) had too few patients in any of the four payers' plans for any single payer to cover enough of a practice's patient panel to compel the practice to transform. New York hoped a coordinated effort across payers might make sufficient money available to convince targeted practices to enroll in the SIM-sponsored PTA program and begin transformation to becoming a NYS PCMH–certified practice. Capital ROMC payers agreed to make enhanced payments using their own VBP programs, and only made payments after a practice achieved a certain level of transformation.[59] In addition, no uniform payment model was used among Capital ROMC payers. Instead, each payer used its own VBP program (e.g., retrospective risk-adjusted payments or a flat add-on payment for achieving a certain performance level) to make enhanced payments to targeted practices that achieved a specified transformation level. Each payer also determined its own payment level. These enhanced payments became available to targeted practices in the Capital area during summer 2018.

Starting in early 2017, the Metro ROMC met consistently, and like its Capital counterpart agreed to target small primary care practices that had no existing VBP arrangements with any of the participating payers. In late 2018, the four payers participating in the Metro ROMC agreed to target 480 provider groups—offering providers enhanced payments, unlike the Capital ROMC decision, for at least one year as they went through transformation. On January 1, 2019, participating payers started offering roughly $3 PMPM once a targeted practice reached its first "check in" with NCQA.[60] In addition, Metro payers agreed to pay participating practices a PMPM amount retroactive to the date the practice enrolled in the SIM-sponsored PTA program.

The Finger Lakes ROMC had limited success in getting participating payers to agree on a multi-payer model until 2019. Interviewees noted several reasons for the slow pace. State officials said the Finger Lakes ROMC's catchment area was already fairly saturated with VBP arrangements, which limited the opportunity to engage new providers under the SIM Initiative. Other interviewees said area payers were only willing to make enhanced payments if they could realize an immediate return on their investment. Another roadblock interviewees identified was

[59] A couple of the plans were offering a small management fee to practices on the front end, according to interviewees.
[60] While the four payers agreed to pay a PMPM payment, the payment approaches were not identical among individual payers, but interviewees said the payment was about $3 PMPM.

payers' concern about the sustainability of the effort beyond the SIM Initiative. To help advance the effort, the Finger Lakes ROMC territory was expanded in summer 2018 to include the Central New York and Western Adirondacks regions of the state—a move that brought two additional payers into the ROMC and made market shares among plans more equal. The expanded Finger Lakes ROMC covered 30 counties and had four payers. Stakeholders said this change shifted the dynamic among payers. Like the Capital and Metro ROMCs, payers in the Finger Lakes ROMC decided to offer targeted supplemental payments to about 50 primary care practices that had no VBP arrangements with any of the participating payers (see ***Exhibit G-10***).

The Western ROMC, covering Buffalo and western areas of New York, was established in February 2019, at which point ROMCs became operational in all regions of the state.[61] The Western ROMC took a different approach from its counterparts, in part due to the limited time left under the SIM Initiative (just 11 months) from when it first convened, but also because there was already high penetration of PCMH certification among primary care practices in the area (see ***Exhibit G-10***).

By the end of the SIM Initiative in January 2020, only a handful of primary care groups targeted by ROMC-driven multi-payer efforts had participated in the NYS PCMH program. State officials reported that about 50 of the approximately 700 groups targeted statewide had achieved NYS PCMH recognition and executed VBP contracts with a participating payer, with about half of these groups in the Metro ROMC area. Further, all the payers interviewed in 2020 said they had not paid any supplemental payments through the ROMC multi-payer effort. Similarly, PTA interviewees were not aware that any of the targeted groups eligible for incentives from ROMC payers had received any payment. At the same time, a couple of PTA interviewees shared that some targeted practices they had provided TA to had trouble contacting the right person at the health plans to get payment. State officials could not confirm whether plans had made any supplemental payments to participating targeted provider groups.

Interviewees attributed the less-than-robust participation of targeted practices in the ROMC multi-payer efforts to several factors. At the most basic level, the actual implementation time of the delivery and payment models was condensed. Since New York's switch from the APC to NYS PCMH was a fundamental change from its initial approach that did not come until April 1, 2018—following ROMC implementation in late 2016—the full SIM Initiative's payment reform component began in earnest only 18 months before New York's award period ended.

Some interviewees noted that the marketing campaign the state spearheaded in collaboration with NCQA, to inform practices about the multi-payer effort and availability of

[61] State SIM staff considered another multi-stakeholder group in the Adirondacks that pre-dated SIM as a de facto ROMC.

enhanced payments, could have been launched earlier and done more effectively. As one interviewee said, the campaign "didn't get much traction."

More broadly, the limited health plan participation in the multi-payer effort was seen as a constraining factor. One interviewee stated, "The disappointment is that there was never the commercial uptake on this [SIM Initiative] in terms of a payment model that I think was envisioned at the start …." Others observed that the payment level offered was limited, particularly if payment only came once transformation was achieved, as the payment was structured in the Capital ROMC. According to a state official, "for a small provider practice, that [transformation] is a lot of work besides your normal work … not being reimbursed. That could be a burden." Along the same lines, a ROMC facilitator observed that the value-based contracts offered by the commercial plans participating in the ROMCs were not adequate to support the added costs the targeted practices would need to incur to become a PCMH. The targeted practices by design were small, without a high enough patient volume from any one insurer for the added revenue from a VBP contract to sustain the PCMH-associated costs.

The following factors influence lower participation of targeted practices:

- A change in PCMH model made for the state having a condensed implementation period;
- Limited plan interest in effort;
- Payment offered not sufficient enough and/or lack of interest to move reluctant practices to transform; and
- Considerable penetration of the PCMH pre SIM.

Others felt the effort languished because much of the primary care transformation had already occurred before the SIM Initiative, leaving the remaining untransformed practices typically the most resistant to change how they practiced. As one interviewee observed: For the "first movers [in transformation] and even the middle movers for primary care transformation … a lot has already been accomplished. So, when it came to SIM, we've been trying to get to the reluctant ones. The late movers." Another interviewee commented, "… if health plans took the $5 to $10 [PMPM] and doubled it, tripled, quadrupled it, you might get more movement … more attention from the laggards."

> "I think the biggest challenge is that the vision was that the value-based contracts would pay for the added costs of the services that practices that are doing PCMH would take on. My sense of the commercial value-based contracts is that I don't see them as viably supporting the added service uptake that's required for PCMH."
>
> —ROMC facilitator

Multiple stakeholders, including ROMC facilitators and PTAs, also acknowledged that first-time transforming practices—the primary target of the ROMC multi-payer effort—were not only among the least interested in participating, but also the most difficult to engage in the NYS PCMH program. One PTA interviewee said, for example, that none of the 30 targeted practices on its assigned list agreed to participate in the program. Several PTAs complained that the initial lists of targeted practices they had received from ROMCs were outdated, incomplete, and inaccurate (e.g., missing contact information, listing specialty practices), and that a lot of effort had to go into cleaning up those lists and finding appropriate contacts at each practice. A ROMC facilitator commented that it was very disheartening to see such "an incredibly low yield" of targeted practices agreeing to adopt the NYS PCMH model, considering the time and effort that went into identifying the practices and working out a multi-payer agreement. Stakeholders cited multiple reasons why small practices might not want to engage—including transformation fatigue, staffing changes (e.g., providers retiring, high provider turnover), limited health IT in place (e.g., no EHRs, patient portals, or HIE connection), indifference toward VBP (e.g., being comfortable with fee for service, not wanting to accept risk), and not wanting to bring in outside assistance. As in past years, stakeholders characterized these uninterested practices as "mom and pop shops" or "onesies, twosies"—small, independent practices typically not affiliated with an IPA or a hospital.

> "It was clear to me from beginning that there was no way of achieving that [CMS's preponderance of care goal] with a small grant of $100 million, but I think we moved the needle significantly."
>
> —New York state official

In April 2019, some state officials and other stakeholders were optimistic that New York was getting close to achieving CMS's goal to have 80 percent of all care delivered in VBP models, but by January 2020, most stakeholders believed the 80 percent goal was not yet met. Several stakeholders estimated the state was at only approximately 50 percent of VBP penetration overall, though particular payers and areas in the state might be higher (e.g., some thought Medicaid had reached the 80 percent mark; some commercial markets such as Buffalo had very high VBP model penetration). Almost universally, stakeholders felt that New York's Medicaid program push on PCMH, whereby certified PCMH practices could earn $6 PMPM in incentive payments, played a more pivotal role than commercial payers in moving the state closer to CMS's goal.

Although New York did not reach CMS's goal for 80 percent of payments delivered in VBP models, several interviewees suggested the SIM Initiative moved the state in the right direction. State officials, for example, felt the SIM Initiative encouraged commercial payers to engage small practices that would typically not otherwise be on a payer's radar as qualifying for VBPs. Officials also felt the SIM Initiative helped transform small practices to where they could engage with payers in VBP—that the SIM Initiative "open[ed] up opportunities for … [targeted practices]" in the future, as one state official observed. Echoing this sentiment, a payer interviewee said SIM-related activities have been "very educational" in how the payer perceived smaller practices, and how payers might engage with them in the future on VBP and other transformation activities.

Focus group evidence suggests a less rosy picture, however. Focus group participants—providers from small practices not previously recognized as PCMHs—said they were not aware of the ROMC-related multi-payer effort to incentivize practices with no VBP contracts or transformation experience to adopt the NYS PCMH model.

G.2.2 Enabling strategies to support health care delivery transformation

Key Results
• PTAs experienced challenges engaging practices, even as they overcame early technical problems. Many practices eligible for targeted commercial payer payments remained unwilling to seek NYS PCMH recognition. • Three new rural residency programs launched to address primary care shortages in underserved areas of the state. • Four Extension for Community Health Outcomes (Project ECHO) programs supported continuing education through virtual clinical sessions. Primary care providers participated at 171 sites in areas where specialty care providers were not readily available. • Payers participating in the two most advanced ROMCs (Capital and Metro) agreed to choose from among a common core of primary care quality metrics to define their VBP methodologies.

New York's delivery system and payment reform work through the SIM Initiative was supported by enabling strategies to encourage health care delivery transformation. ***Table G-2*** describes New York's enabling strategies, the key accomplishments and strategies, as well as information on post–SIM Initiative sustainability.

Table G-2. New York's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PTA	Small primary care practices never recognized as PCMH certified or renewing their PCMH certification	• Nearly two-thirds of enrolled primary care practices in NYS PCMH had worked with a SIM-funded PTA. • PTAs had difficulty engaging first-time transforming practices. • Technical problems with NCQA processing, including limited capacity to conduct check-ins, were addressed. • Time was insufficient to achieve NYS PCMH certification for a third of participating practices within the SIM Initiative funding period.	• Not sustained after the SIM Initiative.
Workforce development	Primary care practices in rural areas of the state	• Three out of five rural residency programs were fully up and running and training residents before the end of the SIM Initiative. • Four Project ECHO programs reached 171 primary care sites to facilitate specialty care training.	• Rural residency and Project ECHO were designed to be self-sustaining once launched. NYSDOH helped Project ECHO sites make a business case to attract private sector financing.
Health IT	Not applicable (claims data from Medicare, Medicaid, and commercial plans)	• Received data from various payers to be included in the APD, with the exception of data from commercial and state employee plans. • A delayed request that commercial plans submit claims to the APD hindered the state's ability to use the database to populate the scorecard.	• APD funding was not dependent on SIM funds, and post-SIM plans for continued development were in place.

(continued)

Table G-2. New York's enabling strategies to support health care delivery transformation (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Quality measurement	Commercial payers contracting in New York	• Participating payers in two ROMCs agreed to use a common core of 27 quality metrics for VBP contracting.	• Agreements to align quality measurement across payers were in place. • Once APD included commercial data, NYSDOH staff was set to produce scorecards in-house. Until then, this effort would rely on voluntary submission of data by payers and continuation of contracts with a third-party firm that assembled the data.
Stakeholder engagement	Regional and national commercial payers contracting in NYS	• The state primarily focused on engaging commercial payers through leveraging ROMC activities. • The state's approach did not include providers and consumer advocates.	• Not sustained with state investment. (Some stakeholder engagements might continue, should the state and participating payers operate the ROMC voluntarily.)

Note: APD = All Payer Database; health IT = health information technology; NCQA = National Committee for Quality Assurance; NYS = New York State; NYSDOH = New York State Department of Health; NYS PCMH = New York State Patient-Centered Medical Home; PCMH = patient-centered medical home; Project ECHO = Project Extension for Community Health Outcomes; PTA = Practice Transformation Agent; ROMC = Regional Oversight and Management Committee; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Practice transformation

The most significant SIM-supported enabling strategy was providing practice transformation assistance, which accounted for 80 percent of the SIM Initiative's funding. Over the course of the SIM Initiative, New York contracted with 15 PTAs (New York State Department of Health [NYSDOH], 2019d) across the state, to perform outreach and provide coaching to help practices undergoing transformation to become certified—initially as APCs and later as NYS PCMHs. Most PTAs were independent organizations that also provided TA to providers in other transformation efforts (e.g., EHR adoption). The SIM Initiative covered NCQA's first year recognition fee for newly participating practices, but not subsequent annual reporting fees.

PTAs were responsible for enrolling practices in the NYS PCMH program, as well as providing TA to a subset of enrolled practices. Subject to state approval, PTAs could recruit any primary care practice to help it become a NYS PCMH (including those already PCMH-certified).

According to state data, however, about one-third of enrolled practices did not receive any PTA help (New York State Department of Health [NYSDOH], New York eHealth Collaborative, & Common Ground Health, n.d.). State officials noted that some enrolled practices, particularly those renewing their recognition as medical homes, did not need or want TA to obtain NYS PCMH certification.

PTA interviewees said they used their existing provider contacts to conduct outreach about the NYS PCMH program, including reaching out to hospitals and IPAs—because, as one PTA representative explained, not all primary care practices affiliated with these institutions had PCMH certification. In addition, PTAs were assigned to reach out to those targeted practices identified by ROMCs as eligible to receive multi-payer support to become NYS PCMH–certified. Some PTA capacity issues were reported in the New York City area, but most providers who participated in focus groups, including those located in New York City and upstate, reported no delays in getting SIM-funded practice transformation assistance.

PTAs reported meeting with enrolled practices bi-weekly on average, mostly in virtual encounters (e.g., videoconferencing, email, phone). In addition to helping practices meet NYS PCH requirements, PTAs were responsible for distributing and reviewing with individual practices their SIM-provided performance scorecard reports (for more about scorecards, please see the Quality Measure Alignment Section below). PTAs stated that practices typically had not hired additional staff to fulfill NYS PCMH requirements, though one PTA representative noticed that some practices used mid-level practitioners to accommodate same-day appointments. At least one primary care provider participating in the January 2020 focus groups noted that the provider's existing staff assumed additional roles and responsibilities as a result of PCMH certification. According to PTAs, the transformation process for a small practice with no prior experience with a medical home model, quality improvement activities, team-based care, or EMRs averaged 12 to 15 months. In contrast, more experienced practices could achieve NYS PCMH recognition in as few as nine months.

For the 1,921 enrolled practices that received PTA TA as of January 2020 (New York State Department of Health [NYSDOH], New York eHealth Collaborative, & Common Ground Health, n.d.), several stakeholders described the TA as hands-on coaching to help practices become high functioning medical homes. One PTA interviewee described teaching practices how to be more proactive in providing patient care; another said developing leadership and team-based care was necessary to engage in meaningful practice change: "[NYS PCMH is] more than check-the-box-transformation, it's real transformation." Yet another stakeholder emphasized that small primary care practices typically lacked internal capacity to work on documentation and process improvement, and that PTAs provided real value by keeping these practices on schedule and offering tailored guidance through the transformation process—which sometimes included interacting with NCQA reviewers on a practice's behalf.

In summary, most stakeholders agreed that: (1) PTAs had deep expertise in TA, and (2) many practices benefited greatly from coaching available under the SIM Initiative. Indeed, nearly all primary care providers who participated in January 2020 focus groups reported positive experiences working with a SIM-funded practice transformation coach. The focus group providers, all of which had achieved NYS PCMH certification by the January 2020 discussion, noted that practice transformation assistance was instrumental in their recognition process. Most providers rated their satisfaction with PTA coaches very high or excellent. Some cited examples of coaches helping them negotiate EHR upgrades with vendors and navigate NCQA recognition process. Several reported that they would not have been able to get their NYS PCMH certification without professional assistance.

> "Our coach was amazing. She was great. We couldn't—no way I could have done it. I consider myself a relatively smart guy. There's no way I could have done it without a PCMH coach. In fact, we have to pay her for a recertification, start with a recertification, our annual, and we will pay them to help us recertify because there's just no way we could do it on our own."
>
> —Focus group participant

Although free TA was recognized across the board as a critical piece in achieving robust provider participation in the NYS PCMH program, several stakeholders expressed some concerns about the PTA program—for example, wondering if PTA funds could have been better used by providing direct financial support to practices (which was not an allowable expense under the SIM Initiative cooperative agreement, according to New York officials). One payer felt that SIM PTA had not brought anything "materially different" from this payer's TA to contracted providers. However, this interviewee did acknowledge that SIM-funded PTAs were helpful to payers that did not have their own transformation teams, and could be especially useful in reaching out to very small practices that might not have otherwise been touched by payer transformation assistance efforts. Another stakeholder reported that in some instances, "hands on" assistance went too far—as when PTAs stepped in to answer NCQA reviewers' questions during virtual check-ins. In response, NCQA worked with NYSDOH to clearly communicate that practice representatives, not PTAs, should lead the virtual reviews.

Workforce development

The overarching theme of SIM-related workforce strategies was to improve and extend the reach of high-quality primary care in underserved rural areas of the state. After exploring a variety of strategies to encourage newly trained primary care physicians to locate in rural areas, in June 2016, New York issued a competitive solicitation for proposals to develop primary care residency programs in these areas. The state selected five awardees, and in December 2017 issued contracts to programs covering 19 counties. As part of a 50-50 match arrangement—with SIM Initiative funds providing half and the host institution (e.g., a hospital) the other half—awardees developed training curricula, worked through the residency accreditation process with the Accreditation Council on Graduate Medical Education, and recruited hospitals and clinics where primary care medical residents would be placed. As of July 2019, three of the five awardees had achieved accreditation, enabling them to participate in the National Residency Matching Program in spring 2019. While not all available slots were filled in 2019, estimates indicated that, if all five awardee sites were up and running, 76 new residents per year would be available. By January 2020, a fourth program was nearing accreditation, but the fifth was indefinitely on hold awaiting the construction of a facility.

Another workforce effort New York undertook as part of its SIM Initiative was to learn more about the number and geographic distribution of practicing clinicians at all levels. In 2015, a new state law mandated that nurse practitioners reply to a survey at the time of re-licensure, which provided rich data on the distribution of these types of providers throughout the state. While the Workforce Workgroup found these data useful and discussed strategies to collect similar data for other professionals in the state, no new requirement had been enacted as of January 2020 (New York State Department of Health [NYSDOH], 2020, January 28).

Another SIM-supported rural area–focused workforce development strategy trained current primary care providers in specific areas of disease care when specialists were not available in the community (RTI International, 2019). Organized in a hub-spoke format, beginning in spring 2018, Project ECHO contractors (hubs) began recruiting primary care providers (spokes) to participate in virtual clinical sessions, on topics that included both didactic presentations and case discussions primary care providers provided. In summer 2018, the state issued a call for proposals from additional hubs, but declined to fund any new projects. By the end of the SIM Initiative, 171 spoke sites from four hubs participated in Project ECHO, with each hub conducting regular sessions.

Finally, in an early SIM-related workforce strategy, a joint SIM/DSRIP Workforce Workgroup developed a care coordination curriculum. In June 2016, the Workgroup published a curriculum designed for practicing providers. The curriculum covered nine core competencies, including modules on understanding new models of care, interdisciplinary teams, person-centered care, social determinants of health, and health IT (New York State Department of Health [NYSDOH], 2019c). This curriculum, and another developed for use with students in health professions, were part of a broader compendium of best practices (the New York State Workforce Transformation Compendium)—which also included models of community health workers in team-based care, and approaches to expanding access to data on the active workforce in a variety of professions. As of January 2020, the guidelines developed by the SIM/DSRIP Workforce Workgroup were being implemented by Northwell Health, the largest health care network in the state; and Monroe Community College had developed a massive open online course (MOOC) based on a curriculum that was nearing approval for a care coordination certificate program (New York State Department of Health [NYSDOH], 2020, January 28).

Health information technology and data analytics

New York began integrating new sources of data into its All Payer Database (APD) with SIM funds, but the APD's potential to support primary care transformation was not realized during the SIM award period. The regulations governing the APD and enabling data collection became effective in September 2017. Between March 2018 and April 2019, Medicare and Medicaid fee-for-service claims were added to the database, as well as hospital discharge data and data from mandated surveillance systems tracking influenza, suicide, and student weight. As of October 2018, Qualified Health Plans, Medicaid Managed Care plans, Essential Plans, and Child Health Plus plans were also required to submit encounter claims (New York State Department of Health [NYSDOH], 2019e). The state anticipated the APD would be ready to accept medical, pharmacy, and dental encounter data from off-exchange commercial plans in May 2020, covering services dating back to January 2018. While self-insured employers were not required to submit data to the APD, the state employee system—New York's largest self-insurer—expressed willingness to submit its data to the APD. But the timeline meant that APD data were not available to calculate practice-level quality metrics and populate practice performance scorecards as originally envisioned. As of January 2020, state officials predicted 2021 would be the earliest date the full APD could be used in quality reporting.

In another SIM-related health IT activity, New York continued to increase provider participation in the Statewide Health Information Network for New York (SHIN-NY), although many primary care providers faced barriers to participation. The state envisioned SHIN-NY as a key tool for primary care clinicians to seamlessly incorporate into care decisions their patients' medical histories, test results, prescription fills, and other provider interactions. As of April 2019, participation rates varied by type of provider, ranging from 100 percent among hospitals down to 53 percent among primary care physicians (New York State Department of Health [NYSDOH], 2019b). To some degree, the relatively low participation rate among physicians was due to lack of interest on the part of clinicians, some of whom viewed the information available on SHIN-NY as incomplete and of little clinical value to them. For others, the cost of purchasing an EHR system capable of connecting to the SHIN-NY was prohibitive. To help increase primary care participation in NYS PCMH, in 2018, the state started to use SIM Initiative funds to offer one-time grants of $13,000 each as an offset to the costs of connecting, but a state official estimated that, because a total of only $400,000 to $500,000 was spent on these grants, fewer than 40 practices took grant support. For small practices especially, this offset might not have been a sufficient incentive to make the effort worthwhile. In addition to having high setup costs, SHIN-NY-compatible systems also had higher annual fees that would continue long after the initial offset.

To support future efforts in primary care transformation and payment reform, in early 2019 New York began work on two new SIM-supported health IT projects. One such project was to build a comprehensive provider directory, including information such as licensure and accreditation and linking individual clinicians to practice sites, provider organizations, and insurance plans. Another health IT project was to develop quality measurement pilots with regional HIEs (New York State Department of Health [NYSDOH], 2019f). To develop a statewide provider directory that could support VBP initiatives, the state sought to incorporate data from commercial payer rosters and Medicare and Medicaid claims. In 2018, the directory effort began with stakeholder engagement to identify data sources and demonstrate the use case for the directory; as of April 2019, the state had started collecting data. In 2019, the state also began a series of quality measurement pilot programs the regional HIEs executed. Although the SHIN-NY was originally envisioned as the preferred source for practice performance measurement—because it was to be more updated and specific than existing quality reporting tools, including the scorecard—an initial review by the state found SHIN-NY lacking in both quality and completeness. The goal of the pilots was to demonstrate the value of sharing clinical data through the SHIN-NY for the purpose of quality measurement. Common complaints among providers about existing quality reporting tools, including the state's new Primary Care Scorecard, were that the data being used were old and often not specific to an individual practice or provider. By contrast, the pilots aimed to give both providers and payers nearly real-time feedback on quality metrics. Stakeholder feedback on the pilots was positive, but interviewees said that continuation would require investment by both the HIEs and providers. The state planned to use Health Information Technology for Economic and Clinical Health Act (HITECH) funds to support HIEs, but provider willingness and ability to continue paying for compatible EHR systems might depend on continuation of Medicaid financial incentives for NYS PCMH (New York State Department of Health [NYSDOH], 2019a).

> "One of the biggest successes I have seen, which has occurred under SIM, in a small amount of practices in central NY, is they are working with RHIOs [regional health information organizations] using 'My Data'—real time data from their EHR… Practices have to pay to participate in the RHIO and don't get anything back—they have to contribute data. This tool [My Data] gives them something back they can use for quality improvement and they love it."
>
> —Practice Transformation Agent

Quality measure alignment

From the beginning of the SIM Initiative, a common concern raised by primary care providers in focus groups was the burden created by a multiplicity of measures and variable specifications on measures ostensibly measuring the same outcome—making it difficult for providers to know how to improve practice styles in the face of targets that were unclear and unaligned. SIM Initiative funds helped address these concerns by improving alignment across multiple payers. First, based on input from a variety of stakeholders participating in statewide and regional work groups during the early years of the SIM Initiative, the state developed specifications for a set of 27 core performance metrics for primary care, and created the Common Scorecard for reporting those results to practices. In 2018, payer participants in Capital and Metro ROMCs agreed to limit the metrics used for their VBP contracts with primary care providers to those on the state's list. While stopping short of requiring perfect agreement on the measures chosen, there was a fair amount of overlap—with five or six common measures across all payers, and only two or three used by only one payer. As of January 2020, however, metric alignment in the other two ROMCs remained elusive.

> "I think another major achievement that we've had in New York … is the advancements we've made in quality measurement. Most of that has to do with alignment, whether or not anybody would call that an advancement or not, I'm not sure. But to be able to get to a place where we have a primary care course set that's being used. It's being understood by commercial insurers, it's being used within the Medicaid VBP arrangements, and what we work with Medicaid plans on, there's some commonality to try to get ahead some of the reporting burden that we were hearing from practices."
>
> —New York State official

In another quality effort, SIM funds were used to develop the Scorecard for practices enrolled in the NYS PCMH. Originally, the state planned to use claims data from the APD to populate the Scorecard, but delays in bringing the APD to production made that impossible. As a workaround, in 2018 (Capital) and 2019 (Metro) ROMC payers submitted their own reports of the Scorecard metrics for individual primary care practices to the state, which then aggregated data across payers to produce a single Scorecard for each practice group participating in the NYS PCMH program. The PTA presented Scorecard reports in person to each practice group representative. Stakeholders broadly supported the concept of a single comprehensive scorecard that measured practice performance with the metrics most relevant to plans' VBP systems; but as of April 2019, the Scorecard's implementation had not garnered universal praise. Representatives of provider associations, as well as providers participating in the 2018 focus groups, complained about both the accuracy and timeliness of the Scorecard reports—because the reports were at the practice group level, not the individual provider or even the practice site level. None of the participants at the 2019 focus groups for providers enrolled in the NYS PCMH program was familiar with the Scorecard or had ever seen one. But by 2020, a few focus group participants recognized the report. Development of the APD and the provider directory, along with success of the HIE-enabled quality measurement pilots, might hold promise for improving the usefulness of the Scorecard, but it was unclear when those efforts would bear fruit.

Stakeholder engagement

Early in New York's SIM Initiative, state officials and many external stakeholders described broad and meaningful stakeholder involvement, with most external stakeholders commending the state's receptiveness to stakeholder input (New York State Department of Health [NYSDOH], n.d.). Consumer advocates, however, felt consumers were under-represented on the Integrated Care Workgroup—the group tasked with developing New York's delivery and payment reform under the SIM Initiative. Advocates also complained that the state disregarded consumer input on how to design the delivery model to include features that addressed consumer needs.

As the SIM Initiative progressed, some stakeholders expressed frustration about a perceived narrowing of state-sponsored stakeholder engagement. Other stakeholders voiced concern about the direction the SIM Initiative was taking more generally. During the second year (December 2016) of the SIM award, New York started to recruit primary care practices, through PTA vendors, to take up the APC model. But provider representatives expressed frustration that the state had not been responsive to their feedback on the APC model, particularly concerning the cost challenges to small practices of undertaking changes the model called for.

> "One thing that is problematic—is the physician voice, which has become a cliché. It has been really hard to get that in a meaningful and productive way. We had physicians at the table, at one point it became clear that it was going to be the payers were going to drive that rather than physicians. I don't know what anybody does about that. It's a sticky wicket and very confusing way to involve physicians in the decision making of this."
>
> —ROMC facilitator

While PTA vendors took on recruiting practices to take up the APC model, state officials put the bulk of their stakeholder engagement efforts into getting commercial payers to agree to make new payments to primary care practices that adopted the APC model through a voluntary multi-payer effort—even though this effort had yet to be designed. Though many payers thought the APC model was less sophisticated than delivery reform efforts payers already had in place, many payers also continued to participate, which was attributed in part to the state insurance regulator, the New York State Department of Financial Services (NYSDFS). NYSDFS attended many of the SIM Initiative meetings—including ROMC meetings, as well as NYSDFS one-on-one meetings with individual payers to talk about primary care transformation. Payers that participated in the SIM Initiative universally viewed the ROMCs very favorably, with one Metro payer representative describing the ROMC as "one of the best collaborations we have had with the state and our competitors." One payer shared that "just getting five payers in a room is enough, but to start thinking about what to do with the state and move in that way is a major accomplishment." State officials agreed with one official's statement that, through the SIM Initiative, "we [the state] built so much goodwill between the payers. Now any additional model building is 10 times easier."

Provider representatives were less confident than the payers that the ROMC effort was worthwhile. One provider representative voiced that the state needed to have more "meaningful engagement of payers and providers to address issues creatively," particularly around developing appropriate incentive measures providers could consider meaningful enough to support. Providers that participated in focus groups echoed this sentiment. As one focus group participant put it: “There’s a lot. After I did PCMH, it’s extra documentation. A lot more that’s really not necessary.” Another participant commented that more needed to be done to “explain why we are doing it [trying to become a PCMH practice] and what’s the outcome of why we are doing it.”

G.2.3 Population health

Key Results
• Six Project Linking Interventions for Total Population Health (Project LIFT) awards began in December 2018, with some efforts expected to be self-sustaining beyond the SIM Initiative.

As part of the SIM Initiative, the state allocated funding towards Project Linking Interventions for Total Population Health (Project LIFT) to bring community stakeholders together to design and implement interventions to address chronic diseases. New York expected these projects to be multi-year interventions under the SIM award, but the state experienced serious delays in contract agreements throughout Year 3 (April 2017 to March 2018) of the SIM Initiative. In Year 4 (April 2018 to March 2019), however, NYS executed six Project LIFT awards, with the last approved in September 2018. Setting up these awards and collecting early project data over the first six months of 2019 was considered “a huge win,” according to one state official. Five of the six awardee projects focused on preventing and managing obesity and diabetes; the sixth concentrated on preventing cardiovascular disease and controlling high blood pressure.[62] State officials said Project LIFT activities were designed to be self-sustaining. Accordingly, through employing a “train-the-trainer” approach, as one state official noted, these projects equipped their communities with the capacity to continue on with these clinical preventive activities after the SIM award period. (***Table G-3***).

Table G-3. New York’s population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Project LIFT	Primary care practices, public health and community partners in NYS	• Experienced serious contractual delays through Year 3 (April 2017 to March 2018). • By September 2018, executed six Project LIFT initiatives statewide, focused on obesity and diabetes, and cardiovascular disease interventions.	• Some components of Project LIFT might be sustained after the SIM Initiative, if local initiatives were able to find new sources of funding.

Note: Project LIFT = Project Linking Interventions for Total Population Health; NYS = New York State; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

[62] LIFT Population Health Project Status Report provided by NYSDOH on January 1, 2019.

G.3 Sustainability

Key Results
• New York planned to sustain the NYS PCMH, the SIM Initiative centerpiece, but without the significant investment it had made in hiring PTAs to help practices achieve certification. • The workforce development initiatives supported by SIM Initiative resources (e.g., rural residency programs and Project ECHO sites) were expected to continue as self-sustaining programs. • The coronavirus disease 2019 (COVID-19) pandemic caused budget shortfalls that led to removal from New York's fiscal year 2021 budget of sustaining state investments in many SIM activities, including the NYS PCMH program.

As the end of the SIM award period approached, NYSDOH began pursuing future appropriations to continue some of the work started under the SIM Initiative. First among these was ongoing support of the NYS PCMH standard. This support would require, not only a renewed contract with NCQA to perform reviews of practices applying for recognition, but also regular review and modification of the NYS PCMH requirements by state officials and non-state stakeholders (such as payers and provider organizations). If a group such as the Statewide Steering Committee the state established as part of the SIM Initiative were to continue, ongoing support of the NYS PCMH standard would be a natural function for that group. However, NYSDOH staff time necessary to support such a committee, and the cost of a new contract with NCQA, would require additional state funding that was not available because of the $6 billion deficit New York faced in the 2020 fiscal year, even before the COVID-19 outbreak. By the time New York's 2021 fiscal year budget passed in April 2020, the state's projected shortfall had reached over $13 billion (State of New York Division of the Budget, 2020, April 25). In the end, NYSDOH's request for funding to support the NYS PCMH once the SIM award ended was not secured.

Another SIM Initiative effort New York sought to continue after the SIM Initiative was some form of the ROMC structure for ongoing multi-payer engagement, in which both state officials and payers saw value. For payers to meet and discuss payment policy, however, state anti-trust law required that a representative of the state government be present, if only as an observer. This would require NYSDOH staff time, but state officials indicated that they could find the necessary time. Some payers were interested in continuing a ROMC-like facilitator role, and at least some payers expressed willingness to fund such a role. And some, but not all, ROMC facilitators said they were optimistic, citing the precedent of ongoing payer-funded engagement on CPC+, and the leverage the state had to convince payers to continue ROMC activities.

The state was also interested in continuing the Scorecard if lack of funding did not make this difficult. Development of the APD was set to continue after SIM Initiative funding ended, and state officials hoped that eventually NYSDOH would be able to use the APD to populate the Scorecard with regular department funds. In the meantime, the state planned to rely on contracts with United Hospital Fund (UHF) and Ipro to create the Scorecard by assembling data voluntarily provided by payers. However, because continued production of the Scorecard until the APD was ready depended on both payer willingness and potentially an extension of the UHF and Ipro contracts, funding cuts might make continuing this effort unsustainable.

Other SIM-supported activities expected to continue after the SIM Initiative included, most notably, the rural residency programs, which were designed to be self-sustaining once they went live. Funding for program administration, ongoing accreditation, and the training of residents came in large part from Medicare Graduate Medical Education payments. The state also envisioned that other workforce efforts would continue, such as the New York State Workforce Transformation Compendium. At the end of the SIM Initiative, state officials were working with the Project ECHO awardees on developing sustainability plans, which were to include performance data analysis to support the business case pitch for sustained program funding with private sector resources. It was unknown how the COVID-19 pandemic would affect these plans. The state had planned to release entries for the New York State Workforce Transformation Compendium in March 2020, for example, but as of August 2020 this had not been done.

New York hoped to sustain a range of efforts developed under its SIM Initiative, but several were not, in fact, going to be continued. Most notably, funding for PTAs was discontinued when the SIM award period expired. Eighty percent of SIM Initiative funds in New York were used to pay PTAs—which, as discussed above, recruited practices to the APC (and later NYS PCMH) models and also guided enrolled practices through checkpoints in the recognition processes. Recruiting and guiding new practices to pursue transformation without free TA[63] will likely depend on payer incentives to adopt the NYS PCMH model, and on evidence demonstrating to practices and payers the benefits of transformation. Such evidence potentially could be developed in the HIE-enabled quality measurement pilot projects the state continued to work on. Possibly, the only other incentive for practices to continue to pursue NYS PCMH recognition once the SIM Initiative ended was that such recognition was the only medical home standard available in the state. So, as practices' current recognitions continued to expire, the only option for PCMH accreditation renewal would be NYS PCMH—a monopoly that might dissipate, however, should payers begin to recognize other standards available through NCQA or elsewhere. ***Table G-4*** summarizes New York's sustainability plans for each SIM Initiative activity.

[63] In addition to the ending of the free practice transformation assistance funded by the SIM Initiative, the DSRIP program, which also offered free TA to primary care providers, expired in March 2020. Source: CMS. (2020, February 21). *CMS amendment request response to New York's Delivery System Reform Incentive Payment (DSRIP) Program*. https://www.health.ny.gov/health_care/medicaid/redesign/dsrip/2020/docs/2020-02-21_amend_req_response.pdf

Table G-4. Sustainability of New York's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	NYS PCMH recognition	Yes	NCQA.
	ROMC	Yes	Voluntary stakeholder investments.
Population health	Project LIFT population health	Yes	Local sources.
Practice transformation	PTA TA and coaching for primary care providers	No	Not applicable.
	Waiver for NCQA reporting fee	No	Not applicable.
Workforce	Rural residency program	Yes	Partner organization investment.
	Project ECHO	Yes	Partner organization investment.
	New York State Workforce Transformation Compendium	Yes	State investment.
Health IT	APD	Yes	State investment.
	Grants for connecting primary care practices to the HIE	No	Not applicable.
	Statewide provider directory	Yes	State investment.
	Quality measurement pilot programs	Yes	Unknown.
Data analytics	Multi-payer Primary Care Scorecard	Yes	Unknown.

Note: APD = All Payer Database; health IT = health information technology; HIE = health information exchange; NCQA = National Committee for Quality Assurance; NYS PCMH = New York State Patient-Centered Medical Home; Project ECHO = Project Extension for Community Health Outcomes; Project LIFT = Project Linking Interventions for Total Population Health; PTA = Practice Transformation Agent; ROMC = Regional Oversight and Management Committee; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

G.4 Implications of Findings/Lessons Learned

- Rather than designing a new delivery model from scratch, as New York initially did under its SIM Initiative with its APC model, tweaking an established model may hasten health care transformation by stimulating more positive provider interest and engagement in the transformation effort.

- Health care is local. After trying unsuccessfully to implement a statewide payment model, New York's shift to a set of smaller, regional committees (the ROMCs) contributed to successfully establishing multi-payer agreements on primary care transformation payments.

- Multi-payer engagement can be a key factor to support continued progress toward the goal of having a preponderance of care delivered under VBP models.

- Small practices often need considerable support, financial and otherwise, to change the way they deliver care, including support for upfront investments.

- Performance measurement targeted to small primary care providers may be essential to sustain and advance primary care transformation in a way that successfully improves the quality of primary care delivered.

- In any time-limited endeavor, states need to plan early for ongoing financial commitment to support newly developed delivery models through TA, provider incentives, and model maintenance.

Addendum

Table G-5. New York State Patient-Centered Medical Home had favorable impacts on spending and inpatient admissions, and no changes on emergency department use and screening in its first full year

Selected outcomes	Change in outcome from baseline to implementation period: NYS PCMH	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PPPM ($)	↓	↑	**-53.86†** (-97.49, -10.23)	-10.2	0.04
Inpatient Admissions per 1,000 Patient-Months	↓	↓	**-0.55†** (-1.08, -0.02)	-7.6	0.09
ED Visits per 1,000 Patient-Months	↓	↓	-0.65 (-1.80, 0.50)	-3.0	0.35
Readmissions per 1,000 Admissions	↑	↑	-4.44 (-9.68, 0.80)	-7.2	0.17
Preventive Primary Care Visits per 1,000 Patient-Months	↓	↓	-1.11 (-2.41, 0.20)	-2.2	0.16
Preventive Screenings per 1,000 Patient-Months	↓	↓	-19.99 (-43.82, 3.83)	-3.9	0.17
Behavioral Health Visits per 1,000 Patient-Months	↑	↑	**-2.55‡** (-4.90, -0.20)	-6.6	0.07

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; PPPM = per person per month.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

Table G-6. New York State Patient-Centered Medical Home had favorable impacts on spending for practices that gained recognition for the first time and practices the renewed recognition under a prior Patient-Centered Medical Home standard in its first full year

Selected outcomes	Change in outcome from baseline to implementation period: NYS PCMH	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PPPM ($) [Newly Recognized PCMHs]	↓	↑	**-48.56†** (-92.21,-4.91)	-9.0	0.07
Total Spending PPPM ($) [Previously Recognized PCMHs]	↓	↑	**-54.82†** (-100.93,-8.71)	-10.4	0.05
ED Visits per 1,000 Patient-Months [Newly Recognized PCMHs]	↓	↓	-0.46 (-1.35,0.43)	-2.4	0.39
ED Visits per 1,000 Patient-Months [Previously Recognized PCMHs]	↓	↓	-0.68 (-1.99,0.62)	-3.1	0.39
Preventive Screenings per 1,000 Patient-Months [Newly Recognized PCMHs]	↓	↓	2.33 (-10.90,15.56)	0.5	0.77
Preventive Screenings per 1,000 Patient-Months [Previously Recognized PCMHs]	↓	↓	-24.03‡ (-50.95,2.89)	-4.6	0.14
Behavioral Health Visits per 1,000 Patient-Months [Newly Recognized PCMHs]	↑	↑	**-1.16‡** (-3.59,1.26)	-3.2	0.43
Behavioral Health Visits per 1,000 Patient-Months [Previously Recognized PCMHs]	↑	↑	**-2.80‡** (-5.22,-0.38)	-7.1	0.06

† Significant change in expected direction	↑ Favorable increase	↓ Favorable decrease
‡ Significant change in unexpected direction	↑ Unfavorable increase	↓ Unfavorable decrease
No change	↑ Increase from baseline through implementation	↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; PCMH = patient-centered medical home; PPPM = per person per month.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

Appendix G-1: New York State Patient-Centered Medical Home Impact Results

G-1.1 Overview

A focus of the New York SIM Initiative was to provide technical assistance to primary care practices to adopt a new delivery model. After designing and attempting to promote its own model, called Advanced Primary Care, New York changed course in 2018 and began promoting a state version of the National Committee for Quality Assurance's (NCQA's) patient-centered medical home (PCMH) model. Recognition by NCQA as a PCMH requires practices to submit evidence that their policies and procedures align with NCQA-defined criteria across six program concept areas (National Committee for Quality Assurance [NCQA], n.d.). The New York State Patient-Centered Medical Home (NYS PCMH) model adds several requirements beyond the national NCQA standard, such as having a certified electronic health record system and a comprehensive risk-stratification process. Because the additional elements required by the state were already optional elements in the standard PCMH model, NCQA serves as the entity certifying compliance with the New York standard. To help practices become recognized under the NYS PCMH standard, New York used the bulk of its SIM funds to provide technical assistance to participating primary care practices through contractors located across the state. Anecdotal evidence suggested that practices new to the PCMH process were more likely than experienced practices to take advantage of the technical assistance.

In addition to providing technical assistance to practices seeking to become recognized as NYS PCMHs, New York's SIM Initiative worked with the dominant commercial payers in five regional committees to develop voluntary multi-payer alternative reimbursement approaches that directly support the NYS PCMH model's adoption. While the payers agreed to incentivize a small number of practices with no existing value-based payment contract and sufficient patient populations from all participating payers, the number of targeted practices that achieved recognition was too small to separately examine the impacts of these financial arrangements.

To assess the NYS PCMH model's effects on care for commercially insured patients, the analysis addressed the following research questions:

- Does the NYS PCMH model reduce spending growth, increase use of primary and preventive care, and reduce use of hospital-based care for patients attributed to participating practices?
- Does prior PCMH experience or practice specialty predict success in reducing spending growth, increasing use of primary and preventive care, and reducing use of hospital-based care for patients?

The analysis hypothesized that patients in practices that adopt the NYS PCMH model will receive more primary, preventive, and behavioral health care services and have less-frequent emergency department (ED) visits and inpatient admissions, especially for ambulatory care sensitive conditions (ACSCs). These declines in hospital-based utilization will result in slower growth in total spending.

The analysis also hypothesized that practices with prior PCMH experience will have smaller changes in patient outcomes than those that had never been recognized as a PCMH.

Table G-1-1 provides a snapshot of the study methods.

Table G-1-1. Methods snapshot

Method	Description
Participating practices	The NYS PCMH model was a practice-based intervention in which practices received PCMH recognition on a rolling basis beginning in spring 2018.
Study design	D-in-D quasi-experimental design using a balanced longitudinal panel of providers and provider-level fixed effects. The analysis was conducted at the individual provider–month level.
Data	Provider–month-level data created from aggregated commercial claims were provided by FAIR Health, Inc. Source data include claims for services in calendar years 2016 and 2019.
Sample	The analytic sample included 10,968 unique providers with any months of reported data in both 2016 and 2019. The treatment group included 7,402 providers affiliated with practices recognized as NYS PCMHs by 2019. The comparison group included 3,566 similar providers who were not affiliated with NYS PCMH practices by 2019. Comparison providers were selected to match three-digit ZIP codes and primary specialties for NYS PCMH providers.
Timeframe	Because of data availability, the timeframe for the impact analysis was two years: 2016 (baseline period) and 2019 (intervention period).
Measures	The analysis assessed the NYS PCMH model's impacts on core outcomes including total spending (per person per month in dollars), inpatient admissions, outpatient ED visits, and readmissions. Additional outcomes examined were preventive primary care provider visits, preventive screenings, behavioral health visits, and admissions for ACSCs. Utilization outcomes were presented as rates per 1,000 patient–months. Readmissions were presented as rates per 1,000 admissions in the same month.
Statistical analysis	The analysis used ordinary least squares models for all outcomes. Analytic weights were created by multiplying the propensity score weights times the number of attributed patients in the provider's practice in the year. Models included provider-level fixed effects to control for time-invariant practice characteristics. Standard errors were clustered at the provider level to account for correlation in outcomes within providers. All models included controls for the percentage of attributed patients covered by a payer participating in SIM multi-payer VBP negotiations.

Note: ACSC = ambulatory care sensitive condition; D-in-D = difference-in-differences; ED = emergency department; NYS PCMH = New York State Patient-Centered Medical Home; SIM = State Innovation Model; VBP = value-based payment.

This chapter reports on the NYS PCMH model's impacts on spending and utilization for approximately 1.5 million unique patients who were attributed to 7,402 primary care providers that participated in the NYS PCMH model.

Individual providers participating in NYS PCMH received no payments related to the SIM Initiative but were offered free transformation assistance to help them meet model requirements. The New York Medicaid program made per Medicaid beneficiary per month payments to recognized PCMH practices before the creation of the NYS PCMH model, and the program made those payments available to NYS PCMH practices as well.

A full description of the NYS PCMH model and a summary of the key impact analysis findings are available in ***Appendix G***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the NYS PCMH model's impact findings in tables and figures:

- ***Section G-1.2*** presents results of difference-in-differences (D-in-D) analyses for providers affiliated with NYS PCMH practices and their comparison group;
- ***Section G-1.3*** presents results of analyses separately for providers at practices newly certified as PCMHs and providers at practices that had been previously certified as PCMHs for selected outcomes;
- ***Section G-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity score weighting;
- ***Section G-1.5*** describes trends in outcomes over the analysis timeframe; and
- ***Section G-1.6*** presents results from a sensitivity analysis in which interaction terms were used to estimate individual provider specialty–specific D-in-D effects.[64]

G-1.2 Estimates of the New York State Patient-Centered Medical Home Model's Impact on Spending and Utilization

Tables G-1-2 through ***G-1-3*** show estimates of the NYS PCMH model's impact on health care spending, utilization, and quality for commercially insured patients. These impact estimates come from D-in-D models with provider-level fixed effects, described in ***Appendix L***. For each outcome, the following are presented:

[64] Unlike other model-specific analyses for the SIM Round 2 federal evaluation, the NYS PCMH analysis does not include a sensitivity analysis that assesses the robustness of the D-in-D estimates to the inclusion or exclusion of a differential time trend. The approach for the NYS PCMH analysis differs from other model-specific analyses because the NYS PCMH analysis includes only one baseline year and one intervention year.

- Regression-adjusted means for the NYS PCMH and comparison groups during the baseline period and the intervention period;

- D-in-D estimates of the NYS PCMH model's impacts;

- Relative differences, which measure change in the outcome from the baseline period; and

- p-values, which indicate whether the D-in-D estimates are statistically significant.

G-1.2.1 Estimates of the New York State Patient-Centered Medical Home model's impact on core outcomes

Table G-1-2 shows the provider–month-level estimates of the NYS PCMH model's impact on total spending per person per month (PPPM), inpatient admissions, ED visits, and readmissions for providers affiliated with NYS PCMH practices relative to comparison providers. These outcomes are constructed by aggregating commercially insured patients' claims to the provider–month level. The findings are as follows:

- Total spending PPPM decreased for NYS PCMH providers and increased for comparison providers, leading to a $53.86 PPPM decline for NYS PCMH providers between 2016 and 2019 (p=0.04).

- Inpatient admissions decreased for both NYS PCMH providers and comparison providers but decreased by 0.55 more admissions per 1,000 patient–months for NYS PCMH providers between 2016 and 2019 (p=0.09).

- Changes in ED visits did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.

- Changes in readmissions within 30 days of discharge did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.

Table G-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for New York State Patient-Centered Medical Home and comparison providers

Outcome	Baseline period adjusted mean, NYS PCMH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, NYS PCMH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)	529.29	531.42	495.37	551.36	-53.86 (-97.49,-10.23)	-10.2	0.04
All-cause acute inpatient admissions per 1,000 patient–months	7.24	7.35	5.84	6.50	-0.55 (-1.08, -0.02)	-7.6	0.09
ED visits per 1,000 patient–months	21.53	23.07	17.96	20.14	-0.65 (-1.80, 0.50)	-3.0	0.35
Readmissions within 30 days of discharge per 1,000 admissions	61.33	59.85	61.74	64.71	-4.44 (-9.68, 0.80)	-7.2	0.17

Notes: CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model with provider-level fixed effects to obtain D-in-D estimates for all outcomes. Models are also adjusted for the percentage of a provider's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations. All outcome models assume that NYS PCMH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome after the implementation of the NYS PCMH model relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the NYS PCMH group relative to the comparison group after NYS PCMH model implementation. The relative difference is the D-in-D estimate as a percentage of the NYS PCMH baseline period adjusted mean.

The total weighted N for all models except the readmissions model is 224,679. The total weighted N for the readmissions model is 205,960. (Because of data limitations, the readmissions model excludes observations from January 2016 and January 2019.) These numbers include all provider–month observations for both the NYS PCMH and comparison groups.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

G-1.2.3 Estimates of the New York State Patient-Centered Medical Home model's impact on utilization

Table G-1-3 shows the provider–month-level estimates of the NYS PCMH model's effects on preventive primary care visits, preventive screening services, behavioral health visits, and ACSC admissions for providers affiliated with NYS PCMH practices relative to comparison providers. These outcomes are constructed by aggregating commercially insured patients' claims to the provider–month level. The findings are as follows:

- Changes in preventive primary care provider visits did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.
- Preventive screenings did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.
- Behavioral health visits increased for both NYS PCMH providers and comparison providers but increased by 2.55 fewer visits per 1,000 patient–months for NYS PCMH providers than for comparison providers between 2016 and 2019 (p=0.07).
- Changes in inpatient admissions for ACSCs did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.

Table G-1-3. Differences in the pre–post change in preventive primary care visits, number of preventive screenings, behavioral health visits, and hospitalizations for ambulatory care sensitive conditions for New York State Patient-Centered Medical Home and comparison providers

Outcome	Baseline period adjusted mean, NYS PCMH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, NYS PCMH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Preventive primary care visits per 1,000 patient–months	50.64	46.66	47.41	44.54	-1.11 (-2.41, 0.20)	-2.2	0.16
Preventive screenings per 1,000 patient–months	515.84	499.36	468.46	471.97	-19.99 (-43.82, 3.83)	-3.9	0.17
BH visits per 1,000 patient–months	38.86	38.74	39.60	42.03	-2.55 (-4.90, -0.20)	-6.6	0.07
Hospitalizations for ACSCs per 1,000 patient–months	2.65	2.69	2.24	2.46	-0.17 (-0.38, 0.04)	-6.4	0.19

Notes: ACSC = ambulatory care sensitive condition; BH = behavioral health; CI = confidence interval; D-in-D = difference-in-differences; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; OLS = ordinary least squares; SIM = State Innovation Model.

Methods: The analysis used an OLS model with provider-level fixed effects to obtain D-in-D estimates for all outcomes. Models are adjusted for the percentage of a provider's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations. All outcome models assume that NYS PCMH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the NYS PCMH model relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the NYS PCMH group relative to the comparison group after NYS PCMH model implementation. The relative difference is the D-in-D estimate as a percentage of the NYS PCMH baseline period adjusted mean.

The total weighted N for all models is 224,679. This number includes all provider–month observations for both the NYS PCMH and comparison groups.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

G-1.3 Estimates of the New York State Patient-Centered Medical Home model's impact on practices that gained recognition for the first time versus practices that received recognition under a prior Patient-Centered Medical Home standard

This analysis assessed NYS PCMH model's impacts separately for providers affiliated with practices with prior PCMH experience and providers in practices that had never been recognized as a PCMH. Because practices with prior PCMH recognition likely already engaged in activities that are required in the NYS PCMH model, it is possible that practices with prior PCMH experience ("previously recognized PCMHs") had smaller changes in patient outcomes than those that had not been previously recognized as a PCMH ("newly recognized PCMHs").

G-1.3.1 Estimates of the New York State Patient-Centered Medical Home model's impact on core outcomes for newly recognized Patient-Centered Medical Homes versus previously recognized Patient-Centered Medical Homes

Table G-1-4 shows the D-in-D estimates of the NYS PCMH model's impacts on core outcomes (total spending, inpatient admissions, ED visits and readmissions) for previously recognized PCMHs and for newly recognized PCMHs. Most NYS PCMH practices (approximately 75%) had prior recognition. The analysis used the same comparison group for both providers from newly recognized PCMHs and providers from previously recognized PCMHs. The findings are as follows:

- Total spending PPPM decreased for providers at both newly recognized and previously recognized PCMH practices and increased for comparison providers, leading to relative decreases of \$48.56 PPPM for newly recognized PCMHs (p=0.07) and \$54.82 PPPM for previously recognized PCMHs (p=0.05) between 2016 and 2019.
- Inpatient admissions decreased for both providers at newly recognized NYS PCMH providers and comparison providers between 2016 and 2019. However, inpatient admissions decreased by 0.80 more admissions per 1,000 patient–months for providers at newly recognized PCMHs (p=0.01). Changes in admissions did not differ between previously recognized NYS PCMH providers and comparison providers between 2016 and 2019.
- For both newly recognized and previously recognized PCMH providers, changes in ED visits did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.
- Readmissions within 30 days of discharge decreased for providers at newly recognized PCMHs and increased for comparison providers, leading to a relative decrease of 10.49 readmissions per 1,000 admissions for providers at newly recognized PCMHs between 2016 and 2019 (p=0.04). Changes in readmissions did not differ between previously recognized PCMHs and comparison providers between 2016 and 2019.

Table G-1-4. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for New York State Patient-Centered Medical Home providers and comparison providers, by prior experience with Patient-Centered Medical Home model

Outcome	Baseline period adjusted mean, NYS PCMH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, NYS PCMH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Newly recognized PCMHs	536.71	531.42	508.09	551.36	-48.56 (-92.21, -4.91)	-9.0	0.07
Previously recognized PCMHs	527.94	531.42	493.06	551.36	-54.82 (-100.93, -8.71)	-10.4	0.05
All-cause acute inpatient admissions per 1,000 patient–months							
Newly recognized PCMHs	6.88	7.35	5.24	6.50	-0.80 (-1.30, -0.29)	-11.6	0.01
Previously recognized PCMHs	7.31	7.35	5.95	6.50	-0.50 (-1.09, 0.08)	-6.9	0.16
ED visits per 1,000 patient–months							
Newly recognized PCMHs	19.02	23.07	15.62	20.14	-0.46 (-1.35, 0.43)	-2.4	0.39
Previously recognized PCMHs	21.99	23.07	18.38	20.14	-0.68 (-1.99, 0.62)	-3.1	0.39
Readmissions within 30 days of discharge per 1,000 admissions							
Newly recognized PCMHs	58.40	59.85	52.77	64.70	-10.49 (-18.68, -2.30)	-18.0	0.04
Previously recognized PCMHs	61.82	59.85	63.22	64.70	-3.45 (-8.79, 1.89)	-5.6	0.29

Notes: CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; OLS = ordinary least squares; PCMH = patient-centered medical home; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model with provider-level fixed effects to obtain D-in-D estimates for all outcomes. Models are adjusted for the percentage of a provider's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations. All outcome models assume that NYS PCMH and comparison group outcome trends are parallel during the baseline period.

(continued)

Table G-1-4. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for New York State Patient-Centered Medical Home providers and comparison providers, by prior experience with Patient-Centered Medical Home model (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the NYS PCMH model relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the NYS PCMH group relative to the comparison group after NYS PCMH model implementation. The relative difference is the D-in-D estimate as a percentage of the NYS PCMH baseline period adjusted mean.

For all models except the readmissions model, the total weighted N is 101,620 for newly recognized PCMHs and 195,268 for previously recognized PCMHs. For the readmissions model, the total weighted N is 93,161 for newly recognized PCMHs and 178,979 for previously recognized PCMHs. (Because of data limitations, the readmissions model excludes observations from January 2016 and January 2019.) These numbers include all provider–month observations for both the NYS PCMH and comparison groups.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

G-1.3.2 Estimates of the New York State Patient-Centered Medical Home model's impact on utilization for newly recognized Patient-Centered Medical Homes versus previously recognized Patient-Centered Medical Homes

Table G-1-5 shows the D-in-D estimates of the impacts of the NYS PCMH model on preventive primary care visits, preventive screening services, behavioral health visits, and ACSC admissions for newly recognized PCMHs and previously recognized PCMHs. The findings are as follows:

- For both newly recognized and previously recognized PCMH providers, changes in preventive primary care provider visits did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.
- For both newly recognized and previously recognized PCMH providers, changes in preventive screenings did not differ between NYS PCMH providers and comparison providers between 2016 and 2019.
- Changes in behavioral health visits did not differ between newly recognized PCMH providers and comparison providers between 2016 and 2019. However, behavioral health visits increased for both providers at previously recognized PCMHs and comparison providers, but increased by 2.80 fewer visits per 1,000 patient–months for providers at previously recognized PCMHs between 2016 and 2019 (p=0.06).
- Inpatient admissions for ACSCs decreased for both providers at newly recognized PCMHs and comparison providers between 2016 and 2019. However, inpatient admissions for ACSCs decreased by 0.37 more admissions per 1,000 patient–months for providers at newly recognized PCMHs between 2016 and 2019 (p=0.01). Changes in admissions for ACSCs did not differ between previously recognized PCMH providers and comparison providers between 2016 and 2019.

Table G-1-5. Differences in the pre–post change in preventive care visits, number of preventive screenings, behavioral health visits, and hospitalizations for ambulatory care sensitive conditions for commercially insured patients in the New York State Patient-Centered Medical Home and comparison groups by prior experience with the Patient-Centered Medical Home model

Outcome	Baseline period adjusted mean, NYS PCMH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, NYS PCMH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Preventive primary care visits per 1,000 patient–months							
Newly recognized PCMHs	52.42	46.66	49.27	44.54	-1.03 (-2.22, 0.16)	-2.0	0.16
Previously recognized PCMHs	50.31	46.66	47.07	44.54	-1.12 (-2.57, 0.32)	-2.2	0.20
Preventive screenings per 1,000 patient–months							
Newly recognized PCMHs	483.21	499.36	458.15	471.97	2.33 (-10.90, 15.56)	0.5	0.77
Previously recognized PCMHs	521.76	499.36	470.34	471.97	-24.03 (-50.96, 2.89)	-4.6	0.14
Behavioral health visits per 1,000 patient–months							
Newly recognized PCMHs	36.35	38.74	38.47	42.03	-1.16 (-3.59,1.26)	-3.2	0.43
Previously recognized PCMHs	39.32	38.74	39.81	42.03	-2.80 (-5.22, -0.38)	-7.1	0.06
Inpatient admissions for ACSCs per 1,000 patient–months							
Newly recognized PCMHs	2.41	2.69	1.80	2.46	-0.37 (-0.61, -0.13)	-15.4	0.01
Previously recognized PCMHs	2.69	2.69	2.32	2.46	-0.13 (-0.36, 0.10)	-4.9	0.35

Notes: ACSC = ambulatory care sensitive condition; CI = confidence interval; D-in-D = difference-in-differences; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; OLS = ordinary least squares; PCMH = patient-centered medical home; SIM = State Innovation Model.

(continued)

Table G-1-5. Differences in the pre–post change in preventive care visits, number of preventive screenings, behavioral health visits, and hospitalizations for ambulatory care sensitive conditions for commercially insured patients in the New York State Patient-Centered Medical Home and comparison groups by prior experience with the Patient-Centered Medical Home model (continued)

Methods: The analysis used an OLS model with provider-level fixed effects to obtain D-in-D estimates for all outcomes. Models are adjusted for the percentage of a provider's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations. All outcome models assume that NYS PCMH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the NYS PCMH model relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the NYS PCMH group relative to the comparison group after NYS PCMH model implementation. The relative difference is the D-in-D estimate as a percentage of the NYS PCMH baseline period adjusted mean.

In these models, interaction terms were used to estimate the differential D-in-D effects of prior PCMH recognition.

The total weighted N is 101,620 for newly recognized PCMHs and 195,268 for previously recognized PCMHs. These numbers include all provider–month observations for both the NYS PCMH and comparison groups.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

G-1.4 Covariate Balance Between the New York State Patient-Centered Medical Home and Comparison Groups

As described in ***Appendix L***, annual propensity scores were created for the overall comparison sample at the provider–year level.

Table G-1-6 shows the covariate balance between the NYS PCMH and comparison groups in the baseline year (2016) for the overall study sample. This table includes the following:

- The covariate means for the NYS PCMH and comparison groups without propensity score weighting;
- The standardized difference between the NYS PCMH and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score–weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the NYS PCMH group means and the propensity score–weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores using logistic regressions in which the dependent variable was an indicator of inclusion in the intervention group. Although propensity scores were calculated in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included the covariates in ***Table G-1-6*** as well as 48 indicator variables for the three-digit ZIP code of the practice location (balance results not displayed) in the propensity score model. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table G-1-6 shows the balance between NYS PCMH and comparison group covariates before and after applying weights to observations. Prior to propensity score weighting, standardized differences were small except for the percentage of providers in the "other" specialty category, which largely comprises physician assistants and nurse practitioners, and the percentage of patients covered by a payer participating in multi-payer value-based payment negotiations. After propensity score weighting, standardized differences for all covariates except for one were all below the 0.10 threshold, indicating an acceptable level of covariate balance. The one covariate that did not reach balance was the percentage of providers in the "other" category, but the standardized difference was only slightly larger than the threshold, at 0.13.

Table G-1-6. Covariate balance between the New York State Patient-Centered Medical Home and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, NYS PCMH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Practice specialty					
Family medicine (%)	28.46	25.46	0.05	27.79	0.01
Internal medicine (%)	27.97	28.06	0.001	25.13	0.05
Pediatric medicine (%)	22.34	16.53	0.10	19.48	0.05
Hospital or clinic (%)	13.40	7.47	0.08	14.16	0.02
Other type (%)	7.83	20.10	0.25	13.26	0.13
Percentage of a practice's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations	50.30	33.37	0.27	50.71	0.01

Note: NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

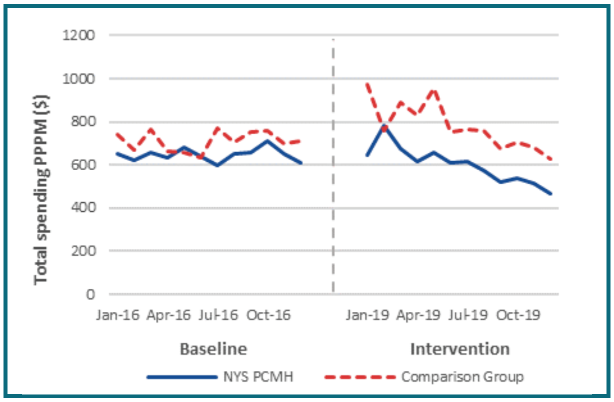
G-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures G-1-1 through ***G-1-4*** show propensity score–weighted means for 2016 and 2019 for the core D-in-D outcomes (total spending PPPM, inpatient admissions, ED visits, and readmissions) for the full sample of practices in the NYS PCMH and comparison groups.

The findings are as follows:

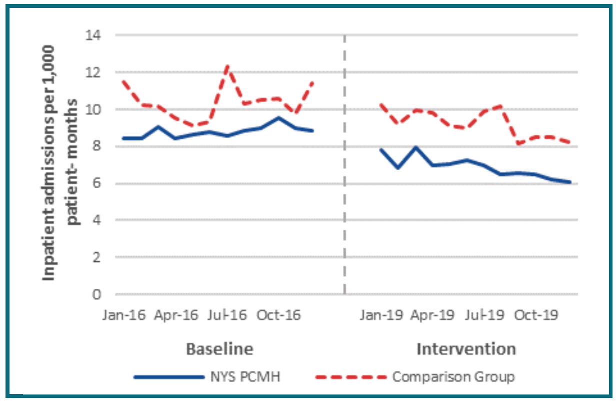
- Total spending PPPM remained flat in 2016 and decreased throughout 2019 for both NYS PCMH providers and comparison providers. Total spending PPPM was generally lower for NYS PCMH providers than for comparison providers (***Figure G-1-1***).
- Inpatient admissions per 1,000 patient–months remained flat in 2016 for both NYS PCMH providers and comparison providers and decreased in 2019 for both NYS PCMH and comparison providers. For both groups, the inpatient admission rate in 2019 was lower than that in 2016. The admission rate for NYS PCMH providers was consistently lower than that for comparison providers (***Figure G-1-2***).
- ED visits per 1,000 patient–months remained flat in 2016 for both NYS PCMH providers and comparison providers but decreased for both groups in 2019. The ED rate for NYS PCMH providers was consistently lower than that for comparison providers (***Figure G-1-3***).
- Readmissions within 30 days of discharge per 1,000 admissions increased slightly for both the NYS PCMH providers and comparison providers during the baseline period but declined for both groups in 2019. The readmission rate was generally lower for NYS PCMH providers than for comparison providers (***Figure G-1-4***).

Figure G-1-1. Trends in total spending per person per month for commercially insured patients in the New York State Patient-Centered Medical Home and comparison groups



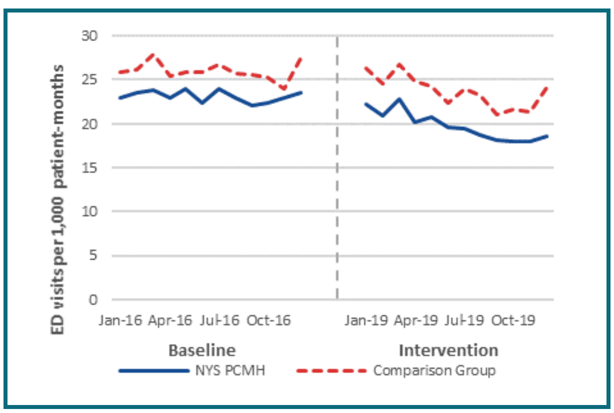
Note: NYS PCMH = New York State Patient-Centered Medical Home; PPPM = per person per month.

Figure G-1-2. Trends in all-cause acute inpatient admissions per 1,000 patient–months in the New York State Patient-Centered Medical Home and comparison groups



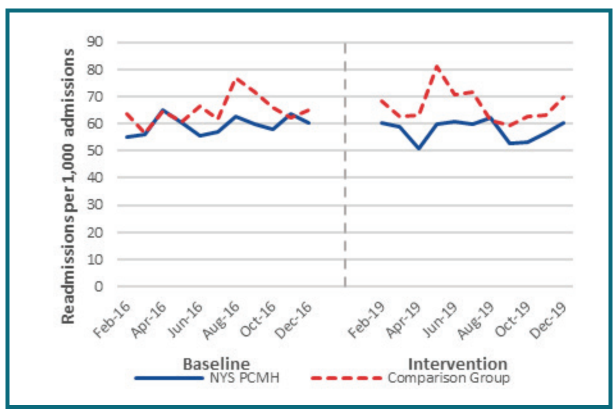
Note: NYS PCMH = New York State Patient-Centered Medical Home.

Figure G-1-3. Trends in outpatient emergency department visits per 1,000 patient–months in the New York State Patient-Centered Medical Home and comparison groups



Note: ED = emergency department; NYS PCMH = New York State Patient-Centered Medical Home.

Figure G-1-4. Trends in readmissions per 1,000 admissions in the New York State Patient-Centered Medical Home and comparison groups



Note: NYS PCMH = New York State Patient-Centered Medical Home.

Sources: Federal Evaluation Team analysis of New York commercial claims from FAIR Health, Inc.

G-1.6 Sensitivity Analyses

The NYS PCMH model's impacts could vary by provider specialty for two reasons. First, patient characteristics may differ by provider specialty.[65] For example, patients seen by pediatricians will most likely be children, while those seen by specialists in internal medicine will most likely be adults. Those seen by family practitioners, in clinics, or by nurse practitioners and physician assistants will likely be a mix of children and adults. Second, there may be differences across specialties in practice style, frequency of patient contact, and the stability of the health care provider–patient relationship, all of which may affect how adopting the NYS PCMH model affected the care received by patients.

Table G-1-7 shows how the impact estimates for the NYS PCMH model differ when effects are estimated separately by provider specialty. The findings are as follows:

- Although the D-in-D estimates for total spending for all specialties are negative, the estimates are significant only for family medicine and the "other" specialty category.
- Although D-in-D estimates for inpatient admissions are all negative, they are only significant for pediatricians.
- D-in-D estimates for ED visits are not significant for any specialty.
- Although D-in-D estimates for readmissions are negative when all specialty types are pooled, these effects are only significant for pediatric providers when specialty-specific impacts are estimated.
- Estimates of the impact on preventive primary care provider visits also vary by specialty. The D-in-D estimate was positive and significant for family medicine providers, negative and significant for hospital/clinic-based providers. and not statistically significant for internal medicine, pediatrics, and the "other" specialty category.
- The D-in-D estimate for preventive screenings was negative and significant for "other" specialties but not significant for any other provider specialty.
- The D-in-D estimate for behavioral health visits was negative and significant for the pooled provider estimate and for family medicine but was not significant for providers in the remaining specialty categories.
- D-in-D estimates for ACSC admissions were negative and significant for providers in the "other" specialty category but were not statistically significant for internal medicine, family medicine, pediatrics and hospital/clinic-based providers.

[65] Specialty is defined as a provider's primary taxonomy code in the National Plan and Provider Enumeration System.

Table G-1-7. Estimated difference-in-differences estimates by provider specialty

Outcome	Main result: All specialties, pooled	Internal medicine	Family medicine	Pediatrics	Hospital/clinic	Other
	Fixed effect regression-adjusted D-in-D (90% CI)					
Total spending PPPM ($)	-53.86** (-97.49, -10.23)	-90.83 (-222.63, 40.97)	-60.00*** (-91.72, -28.28)	-11.51 (-28.76, 5.74)	-27.06 (-174.22, 121.10)	-75.90* (-144.74, -7.06)
Inpatient admissions per 1,000 patient–months	-0.55* (-1.08, -0.02)	-0.55 (-1.37, 0.28)	-0.51 (-1.04, 0.01)	-0.60** (-1.07, -0.12)	-0.70 (-3.00, 1.60)	-0.38 (-1.17, 0.41)
ED visits per 1,000 patient–months	-0.65 (-1.80, 0.50)	-0.66 (-2.04, 0.71)	-0.81 (-1.63, 0.01)	0.46 (-0.28, 1.21)	-1.89 (-7.17, 3.39)	-0.89 (-2.31, 0.54)
Readmissions within 30 days of discharge per 1,000 admissions	-4.44 (-9.68, 0.80)	1.22 (-9.59, 12.03)	-12.04* (-22.88, -1.19)	-7.90 (-17.57, 1.77)	3.72 (-8.33, 15.76)	-5.86 (-17.43, 5.71)
Preventive primary care provider visits per 1,000 patient–months	-1.11 (-2.41, 0.20)	-0.86 (-2.20, 0.49)	1.57** (0.35, 2.80)	-0.16 (-1.76, 1.45)	-6.46** (-11.13, -1.78)	-1.88 (-4.52, 0.76)
Preventive screenings per 1,000 patient–months	-19.99 (-43.82, 3.83)	-14.26 (-35.77, 7.25)	-11.54 (-27.62, 4.54)	6.32 (-1.37, 14.02)	-78.88 (-169.10, 11.33)	-28.99* (-54.09, -3.89)
Behavioral health visits per 1,000 patient–months	-2.55** (-4.90, -0.20)	-1.08 (-4.16, 2.00)	-3.80*** (-5.78, -1.82)	1.25 (-0.61, 3.12)	-9.14 (-22.60, 4.32)	-0.27 (-3.26, 2.71)
Hospitalizations for ACSCs per 1,000 patient–months	-0.17 (-0.38, 0.04)	-0.25 (-0.67, 0.16)	-0.03 (-0.28, 0.21)	-0.04 (-0.14, 0.06)	-0.21 (-0.99, 0.56)	-0.53** (-0.93, -0.12)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: ACSC = ambulatory care sensitive condition; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NY = New York; NYS PCMH = New York State Patient-Centered Medical Home; OLS = ordinary least squares; PCMH = patient-centered medical home; PPPM = per person per month; SIM = State Innovation Model.

(continued)

Table G-1-7. Estimated difference-in-differences estimates by provider specialty (continued)

Methods: The analysis used an OLS model with provider-level fixed effects to obtain D-in-D estimates for all outcomes. Models are adjusted for the percentage of a provider's attributed patient panel insured by a payer participating in SIM multi-payer value-based payment negotiations. In the specialty models, interaction terms were used to estimate specialty–specific D-in-D effects. Specifically, the model included interactions between provider specialty dummy variables and the intervention period dummy variable and triple interactions between provider specialty dummy variables, the intervention period dummy variable, and the dummy variable indicating participation in the NYS PCMH model. Because the models include provider-level fixed effects, and the analysis assumes that provider specialty does not change between 2016 and 2019, the model does not include specialty-specific dummies alone. All outcome models assume that NYS PCMH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the NYS PCMH model relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the PCMH group relative to the comparison group after PCMH implementation. The relative difference is the D-in-D estimate as a percentage of the NYS PCMH baseline period adjusted mean.

The total weighted N for all models except readmissions is 224,679. For the readmissions model, the total weighted N is 205,960. (Because of data limitations, the readmissions model excludes observations from January 2016 and January 2019.) These numbers include all provider–month observations for both the NYS PCMH and comparison groups.

Sources: Federal Evaluation Team analysis of NY commercial claims from FAIR Health, Inc.

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Appendix H: State Innovation Model in Model Test States: Ohio

Payment Model Development	• Launched 43 episodes of care (EOCs) in Medicaid. By 2017, nearly 1.6 million Ohio Medicaid beneficiaries were in an episode and almost one-third of provider entities were eligible to receive incentive payments. • Completed three regular enrollment periods and two full years of Ohio Comprehensive Primary Care (Ohio CPC) between 2017 and 2019. In 2019, Ohio CPC included 250 practices, covering nearly half the Medicaid beneficiary population.
Delivery Model Transformation	• Potential for practice change was limited because most principal accountable providers (PAPs) were not accessing online performance reports on EOC cost and quality measures.
Health IT and Data Analytics	• In 2017, introduced referral reports to facilitate Ohio CPC referrals to higher quality, lower cost specialists. • Aligned Ohio CPC measures with the federal Comprehensive Primary Care Plus (CPC+) program.
Population Health	• Launched a school-based health care initiative to improve patient engagement among Medicaid child beneficiaries and foster collaboration among health care entities and school districts.
Sustainability	• Funding for Ohio CPC incorporated in the state's 2020–2021 budget. • Included both EOC and Ohio CPC requirements in the Medicaid managed care procurement for plans effective January 2022.
Implications	• Mandatory Medicaid managed care EOC and Ohio CPC participation fostered value-based payment (VBP) adoption, but voluntary commercial adoption was slow. • Aligning EOC and Ohio CPC with the federal CPC+ and Quality Payment Program (QPP) held potential for furthering VBP adoption and health care transformation.

H.1 Key State Context and the Ohio State Innovation Model Initiative

H.1.1 Pre-State Innovation Model health care in Ohio

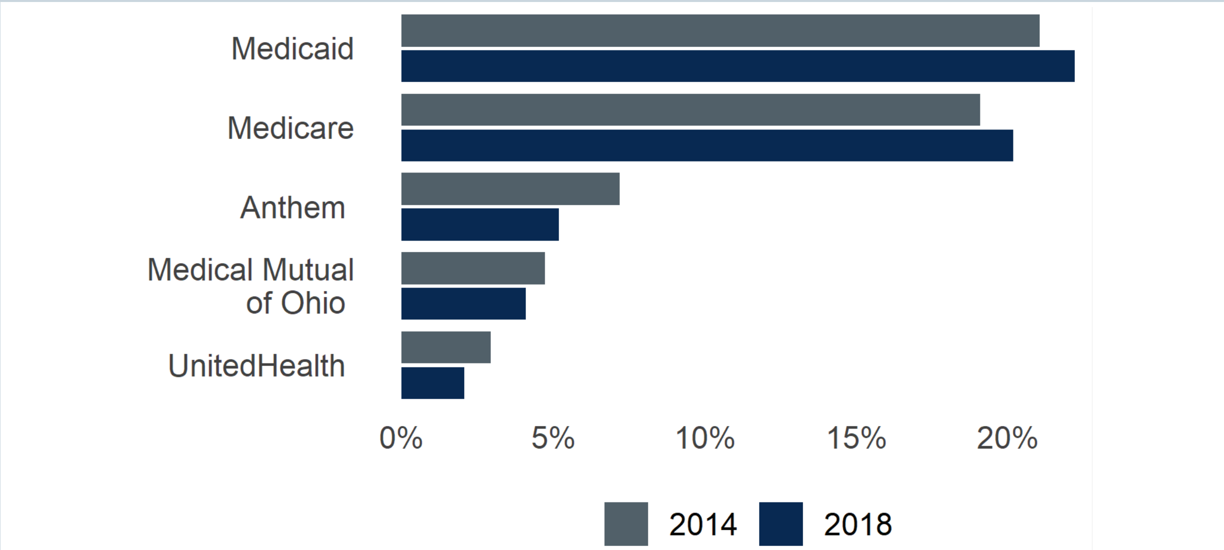
Ohio pursued its SIM Initiative goals within a highly competitive state insurance market, with no insurer covering more than 20 percent of the market. The Ohio health care system was dominated by large health systems in major markets and fee-for-service (FFS) care. The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurance market in Ohio is relatively competitive, as measured by relative market share of lives covered by each commercial insurer. Medicaid makes up the largest share of the market, followed by commercial insurers in 2014, and by Medicare in 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percentage of insured lives they covered between 2014 and 2018 (see ***Exhibit H-1***). Over the same period, in contrast, the three commercial insurers with the largest shares of covered lives (Anthem, Medical Mutual of Ohio, and UnitedHealth) shrank.

A majority of Ohio practices were small and located in urban areas. In 2015, about 19 percent of primary care practices were located in rural areas and 52 percent had a single provider. Eighteen percent of primary care practices had an existing involvement in a Medicare FFS alternative payment model (APM; e.g., the Medicare Shared Savings Program).[66]

[66] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***.

Exhibit H-1. Medicare and Medicaid increased their share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Ohio shown)



Note: HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

H.1.2 State Innovation Model Initiative in Ohio

Ohio's Office of Health Transformation (OHT) led the SIM Initiative from its launch until the office was disbanded in January 2019 at the end of the then-Governor's term. OHT directed and coordinated the efforts of relevant state agencies, including Medicaid, and engaged key partners in designing the SIM Initiative—including commercial health plans, health care collaboratives, advocates, and analysts. OHT worked with the SIM Core Team—which consisted of the major insurers (Aetna, Anthem, Buckeye, CareSource, Medical Mutual, Molina, Paramount, and United)—to align overall strategy across payers. These insurers together account for 80 percent of the insured population in Ohio. The Chief Executive Officers of these Medicaid and commercial plans committed to the Governor that they would help design and implement episode of care (EOC) and patient-centered medical home (PCMH) models in Ohio. Given the then-Governor's commitment to non-regulatory approaches to health care transformation for commercial plans and providers, voluntary stakeholder buy-in was key to the SIM Initiative implementation beyond Medicaid.

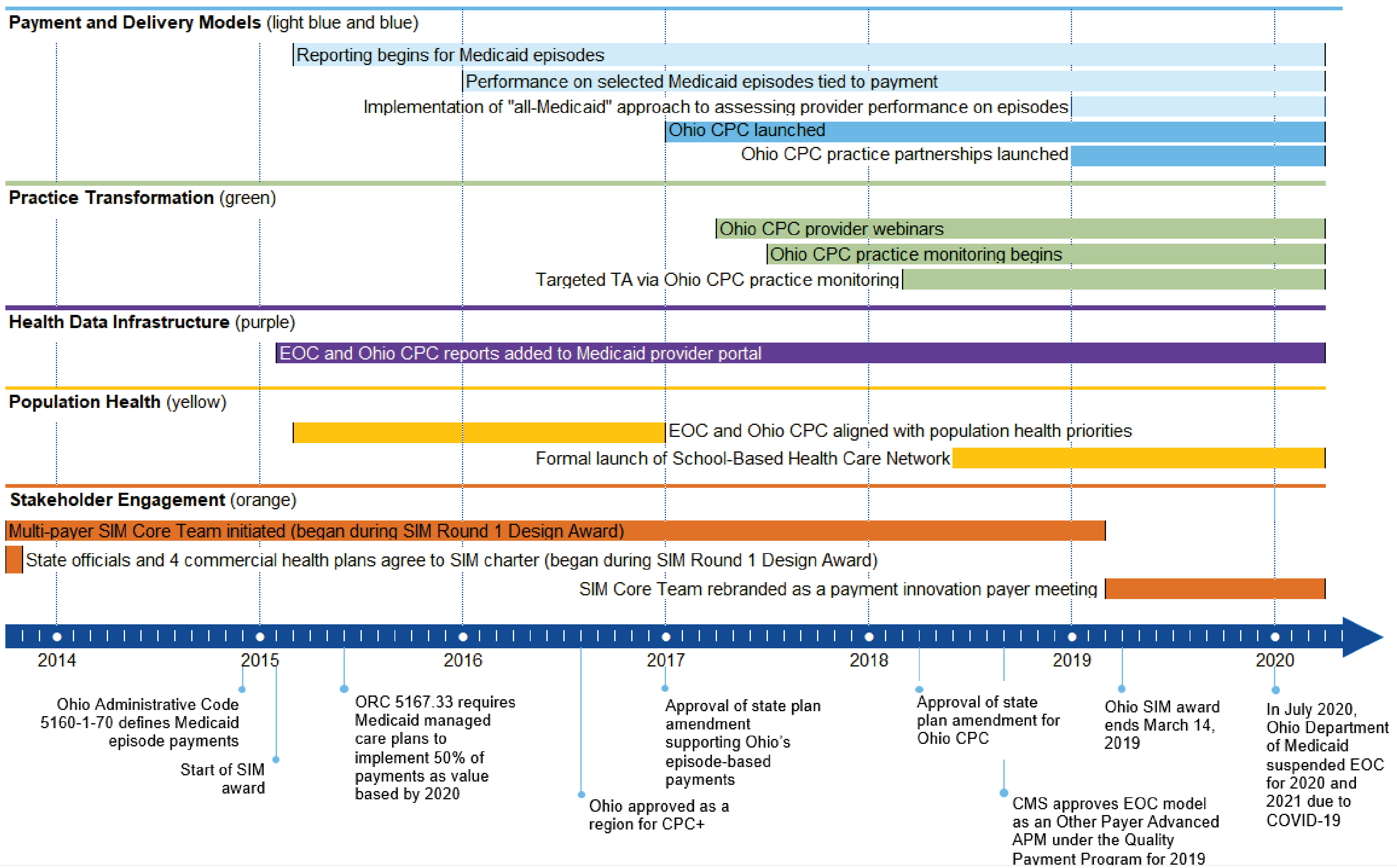
The Ohio SIM Initiative began on February 1, 2015, with the goals of enrolling 80 to 90 percent of residents in a value-based payment (VBP) model and covering 50 percent of the state's medical spending within five years. Ohio aimed to achieve these goals through two key strategies: a PCMH model (known as Ohio Comprehensive Primary Care [Ohio CPC]) and an

EOC model. Ohio's EOC model sought to encourage high-quality, patient-centered, and cost-effective care by holding a single clinician or entity accountable for care across all services related to a given episode. In Ohio's EOC model, the Accountable Entity responsible for all services related to a given episode was called a principal accountable provider (PAP). In the PCMH model, participating practices received per member per month (PMPM) payments, and for those meeting the eligibility criteria, shared savings tied to quality and cost goals for their attributed Medicaid populations. Ohio Medicaid required its managed care plans to implement the Ohio CPC and EOC models. Commercial insurers agreed to align with these strategies in principle, if not in design.

Several changes to the SIM Initiative's initial design occurred during implementation. The state had planned a 3-year regional rollout of Ohio CPC, but instead began the rollout statewide in 2016. The state also developed and deployed EOCs more rapidly than originally planned—deciding to launch 43 EOCs, short of the maximum of 50 Ohio had initially considered (RTI International, 2017, December). In addition, the rollout of the federal Comprehensive Primary Care Plus (CPC+) program in spring 2016 delayed implementation of Ohio CPC—because state officials made adjustments to align the Ohio CPC model with CPC+ just prior to the planned 2016 launch of Ohio CPC. In 2017, the expansion of Ohio CPC to non-accredited practices and the formation of practice partnerships planned for the 2018 enrollment year were delayed until 2019, due to reduced funding in the state budget (RTI International, 2019b).

Ohio's SIM award ended in March 2019. ***Exhibit H-2*** depicts the timeline of major Ohio SIM Initiative and SIM-related activities.

Exhibit H-2. Timeline of Ohio's SIM and SIM-related activities



Note: APM = alternative payment model; CPC = Comprehensive Primary Care; CPC+ = Comprehensive Primary Care Plus; EOC = episode of care; FFS = fee for service; GME = graduate medical education; ORC = Ohio Revised Code; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

H.2 Accomplishments from Ohio's State Innovation Model Initiative

This section summarizes Ohio's SIM Initiative award activities, accomplishments, and stakeholder feedback in three areas: delivery models and payment reform (***Section H.2.1***), enabling strategies to support health care delivery transformation (***Section H.2.2***), and population health (***Section H.2.3***). The chapter concludes by summarizing Ohio's efforts to sustain SIM Initiative activities and progress on reforms after the award period (***Section H.3***), and a discussion of implications and lessons learned from Ohio's experience (***Section H.4***).

The evaluation of Ohio's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM Initiative officials;
- A total of 57 interviews with state officials, providers, Medicaid managed care organizations, commercial plans, and other stakeholders over four annual interview rounds conducted since 2016, most recently in March 2019;
- Focus groups with Medicaid providers and patients; and
- Data derived from Medicaid beneficiary claims.

The evaluation included three quantitative analysis: one focused on Ohio CPC, one focused on the acute asthma exacerbation and perinatal EOCs, and one focused on statewide changes due to the SIM Initiative. The Ohio CPC analysis examined the model's impacts on health care spending, utilization, and quality for individuals attributed to the model during 2017 and 2018, the first two years of Ohio CPC implementation. The EOC analysis assessed the EOC model's impacts on Medicaid beneficiaries with acute asthma exacerbation and perinatal episodes during the first four years during which the two episodes were tied to payment. The statewide analysis provided insight into the cumulative impacts of all SIM activities in Ohio.

The Ohio Department of Medicaid (ODM) provided Medicaid claims and attribution data for the Ohio CPC analysis. The attribution data, which included each beneficiary's assignment to either an Ohio CPC practice or a practice not participating in Ohio CPC, was used to identify the treatment group (beneficiaries attributed to Ohio CPC practices) and the comparison group (beneficiaries attributed to non-Ohio CPC practices). Medicaid enrollees who were ineligible for the Ohio CPC model, such as dually eligible Medicare-Medicaid enrollees, were not included in the analysis.

Federal Medicaid claims files—from the Medicaid Analytic eXtract (MAX) and the Transformed Medicaid Statistical Information System Analytic Files (TAF) data sets—were used for the episode analyses.[67] The analyses included an out-of-state comparison group because the

[67] The EOC and statewide analyses did not include spending outcomes because of the challenge in capturing spending for specific services in managed care states.

EOC model was statewide and mandatory for eligible providers. For the perinatal and acute asthma exacerbation analyses, the treatment groups were Medicaid enrollees from Ohio who met episode definition criteria, and the comparison groups were Medicaid enrollees from Kansas and Kentucky who also met Ohio's episode definition criteria.

Although Ohio launched more than 40 episodes, the EOC analyses focused on perinatal and acute asthma exacerbation episodes. These two episodes were selected because they were among the first episodes to be tied to financial incentives, included tens of thousands of Medicaid enrollees, and focused on children and pregnant women, two populations of policy interest.

Like the EOC analysis, the statewide analysis also used the MAX and TAF Medicaid claims files. For this analysis, Medicaid enrollees in Ohio were compared to Medicaid enrollees from Kansas and Kentucky.

H.2.1 Delivery models and payment reforms

Key Results
• Stakeholders indicated that the Ohio SIM Initiative helped increase the knowledge of, and comfort levels with, VBP among Medicaid managed care plans and providers.
• Most PAPs did not access online performance reports on EOC cost and quality measures, which minimized the likelihood that providers made practice changes due to the EOC model.
• Some Ohio CPC practices and Medicaid plans expressed enthusiasm for a new communication plan, in which each Ohio CPC practice was assigned a lead plan. However, state officials reported that the new communications arrangement had mixed results for practices, depending on Medicaid managed care plans' capabilities to coordinate with practices.
• Ohio CPC practices and other stakeholders reported increased investments in both patient-centered care staffing and infrastructure.

During the 2019 site visit, stakeholders noted the shift that occurred in Ohio over the course of the award period. Stakeholders indicated that the SIM Initiative had facilitated the spread of VBP by raising provider awareness and encouraging providers to adopt new care models. This spread was reportedly driven by an obvious increase in providers' and Medicaid managed care plans' knowledge and comfort with VBP arrangements. One provider suggested that Ohio CPC's PMPM payments supported what that provider called a cultural shift within primary care practices that fostered understanding of the delivery reforms' value. Stakeholders also

> "I think it's safe to say that the landscape today is very different than it was when we started. And I think it's in part what we have been able to do with our [SIM Initiative] models and from a broad sense … The landscape is fundamentally different … I am seeing providers across the state being more thoughtful now about value and making it a pillar of their organization. And for those providers who have yet to think that way, they're actually behind the ball now, and they're having to play catch up."
>
> —Ohio state official

described how the SIM Initiative's payment reforms had created a common platform, increasing opportunities for collaboration between Medicaid managed care plans and providers.

Table H-1 highlights delivery system and payment reforms that occurred during the award period, as well as key activities relevant to sustainability, both pre- and post-award, through January 2021. Through the end of the award period, Ohio officials continued to increase the number of episodes tied to payment, distributed EOC payment incentives, and received approval to include the EOC model in Medicare's Quality Payment Program (QPP). QPP, launched in 2017, allowed Medicare to adjust provider reimbursement based on provider performance. For Ohio CPC, officials changed practice eligibility requirements during the final award year and distributed shared savings.

Table H-1. Ohio's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
EOC Model	**Targeted patients:** Medicaid beneficiaries with a qualifying EOC condition **Targeted providers (PAPs):** Individual clinicians, physician practices, or facilities, depending on episode type	• Generated reports for EOCs. • Issued episode-based payment incentives for some EOCs and linked more EOCs to payment in 2019. • PAP engagement with EOC reports was limited. • Included the EOC model as an APM under Medicare's QPP.	• The EOC model did not require dedicated funding after the SIM award, because EOC rewards and penalties were revenue-neutral. • ODM reduced the number of EOCs reported on by 13, with 11 eliminated for 2019, and 2 more for 2020, in order to focus "on specific sources of value that more significantly impact the covered Medicaid populations" (Ohio Department of Medicaid, 2019a). • OH released a new procurement for managed care plan participation in OH Medicaid on September 30, 2020. Requirements to continue the EOC model were included. • Because of the COVID-19 pandemic, ODM postponed collection of EOC-related financial penalties from 2018 and suspended both EOC reporting and financial incentives for 2020 and 2021 (Ohio Department of Medicaid, 2020a, 2020c). ODM planned to resume EOCs in 2022.

(continued)

Table H-1. Ohio's delivery system and payment reforms (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
OH CPC	**Targeted patients:** Most adult or child Medicaid beneficiaries, except certain groups, such as dual Medicare-Medicaid beneficiaries **Targeted providers:** Primary care practices enrolled in OH CPC	• OH CPC continued to add practices during each enrollment period. • In January 2021, OH CPC included 311 practices, 180 of which were in 34 practice partnerships; 42 new practices were added for 2021.	• OH CPC funding was included in the enacted 2020–2021 state budget, with an additional $12 million for the new optional CPC for Kids track. • Greater alignment with CPC+, potentially including downside risk, was being considered for the future. • OH released a new procurement for managed care plan participation in OH Medicaid on September 30, 2020, requiring participation in the CPC model (Ohio Department of Medicaid, 2020c).

Note: APM = alternative payment model; COVID-19 = coronavirus disease 2019; CPC+ = Comprehensive Primary Care Plus; EOC = episode of care; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; PAP = principal accountable provider; QPP = Quality Payment Program; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Episodes of care

Ohio launched reporting on EOCs in Medicaid in 2015. In 2016, Ohio began to tie payment incentives to EOCs, starting with three EOCs. In 2017, Ohio linked an additional six EOCs to payment incentives. PAP performance on quality and cost outcomes for these nine payment-linked EOCs generated $4.0 million in positive payment incentives and $4.2 million in negative incentives to PAPs—individual clinicians, practices, or facilities, depending on the episode—in 2017 (Ohio Department of Medicaid, 2019h).

By 2019, ODM had increased the number of episodes to 43 and linked 18 episodes to payment. However, in 2019 and 2020, ODM reduced the number of episodes in order to focus "on specific sources of value that more significantly impact the covered Medicaid populations (Ohio Department of Medicaid, 2019a)."

Beginning with 2019, state officials indicated they would assess provider performance on EOCs across all Medicaid plans, instead of the prior arrangement of assessing PAP performance on EOCs at the individual Medicaid plan level (Ohio Department of Medicaid, 2018e). The new "all-Medicaid" approach was intended to make more PAPs eligible to receive EOC awards or penalties. Prior to 2019, PAPs had to have five or more episodes *associated with a single Medicaid plan in a given year* to be eligible for EOC payment incentives. Beginning in 2019, PAPs were eligible for EOC payment incentives if they had at least five episodes across all Medicaid plans (Ohio Department of Medicaid, 2018e).

For all EOCs, Ohio state officials gathered feedback on episode design from expert groups of clinicians during the initial episode design process early in the program's development, or, later on, immediately after episode launch. In response to clinician feedback, state officials made changes, such as adding or removing quality measures from specific episodes or updating episode inclusion or exclusion criteria (Ohio Department of Medicaid, 2018a). State officials solicited feedback on EOCs on an ad hoc basis through 2018 (RTI International, 2019c). In fall 2018—to formalize the process of obtaining provider feedback on EOCs, convey decisions about EOC design updates to providers, and better inform episode design updates as the EOC model matures—Ohio state officials indicated they would periodically gather feedback via email, and hold annual provider meetings to discuss individual episodes or episodes that addressed similar conditions (Ohio Department of Medicaid, 2018a).

In 2019, Ohio received CMS approval to count participation in the Ohio Medicaid EOC model as participation in an Advanced Alternative Payment QPP Model (Ohio Department of Medicaid, 2018d). State officials regarded this approval as a key accomplishment that could help sustain the state's EOC model. However, it was not clear by the end of the award period in March 2019 whether QPP had an impact on provider awareness of EOCs. Unlike state officials, provider representatives and Medicaid managed care plan representatives did not appear to view QPP as central to the EOC model's future. Furthermore, given the EOC model's suspension for 2020 and 2021 due to the coronavirus disease 2019 (COVID-19) pandemic, providers would have had a limited opportunity to count EOC participation as taking part in an Advanced APM.

EOCs continued to be less widely used among the commercial plans that agreed to voluntarily align with Ohio SIM Initiative activities than in Ohio's Medicaid program, which mandated EOC model participation for Medicaid managed care plans and qualifying providers. In 2018, Ohio reported that four commercial plans produced provider performance reports for EOCs. Ohio also reported that one plan tied one episode to payment (Ohio Department of Medicaid, 2018f). In 2019, a representative of the commercial plan with one episode tied to payment indicated that the insurer was planning to expand the number of episodes tied to payment. For this commercial plan, negotiations with individual providers determined whether those providers received EOC-based payment. A representative of a second commercial plan indicated the plan had a very limited EOC reporting initiative, with no episodes tied to payment and fewer than 50 providers receiving EOC reports. In contrast, Ohio's Medicaid EOC model generated 58,596 EOC reports in third quarter 2018, the most recent quarter for which data were available.

Although Ohio posted EOC reports on PAP performance on the state's online Medicaid provider portal, the open rate for these reports remained low in 2018, the most recent year for which data were available. In fact, as Ohio launched more episodes and generated more EOC reports, the open rate trended downwards. In the third quarter 2018, PAPs accessed only 3.5 percent of available EOC reports—strongly suggesting that most PAPs were not using EOC reports to change practice patterns. State officials were aware that most PAPs were not accessing EOC reports, but indicated that PAPs who used the reports found them helpful. The limited EOC-related questions or comments from providers to Medicaid managed care plans, provider representatives, and state officials also indicated lack of engagement with the model. One state official observed there was less pushback from providers on EOCs than on Ohio CPC. But at least one stakeholder, a Medicaid managed care plan representative, expressed a different view—saying that provider awareness and understanding of Medicaid EOCs had increased over time.

> “I think people just don’t have confidence in the construction of the [episode] design, and they’re less likely to be motivated to implement based upon the reports they’re getting … I can’t explain the black box about how it spit out the case mix or acuity.”
>
> —Ohio provider representative

Stakeholders provided varying explanations for low PAP open rates for EOC reports**.** State officials believed that identifying the correct contacts within organizations would improve use of EOC report data. But state officials described difficulty in identifying the most effective point of contact for EOC reports, because the PAP for many EOCs was an organization rather than a single clinician. Stakeholders also described the limitations of EOC report data as currently reported. One state official indicated that the lagged nature of EOC reporting could serve as a barrier to using the reports. One Medicaid managed care plan representative described EOC reports as cumbersome, but indicated that Ohio had made efforts to improve the reports’ format and that some PAPs used the reports to identify opportunities for performance improvement. Two provider interviewees expressed concerns about both EOC data and definitions. One provider argued that it was challenging to accurately assess provider performance using quality measures derived from health care administrative claims. The other provider suggested that information on pediatric PAP performance on EOCs was uninformative, because the EOCs were not well-tailored to the pediatric population.

Some stakeholders questioned whether EOC payment incentives were large enough to change provider behavior, echoing provider concerns raised during a March 2018 site visit (RTI International, 2019a). As one Medicaid managed care plan representative noted, although smaller practices or individual providers might be sensitive to smaller incentives, large health systems could absorb several thousand dollars of EOC penalties. In a departure from the March 2018 findings, stakeholders did not identify the lagged distribution of EOC payment incentives as a challenge, even though payments for 2017 EOC performance were not distributed until early 2019 (RTI International, 2019a).

Two provider interviewees indicated that most providers were not engaged with the EOC model, because providers were focusing their attention on other issues. One stated that provider organizations were attempting to improve care quality via provider collaboratives or learning networks focusing on specific conditions. The other provider representative suggested that providers focused on basic concerns, such as obtaining timely reimbursement from Medicaid managed care plans, limiting provider engagement with either the EOC model or Ohio CPC.

> "I think it's an accumulation of the last five years in the Medicaid space in Ohio. There has been so much dramatic change. And yet the basic blocking and tackling of credentialing people, getting prior authorizations done, paying claims still doesn't happen effectively. So providers are either not paying attention to or not focused on is CPC working, or is it not? Are episodes working, or are they not? Because they're just worried about the six months it's taken to get a claim paid."
>
> —Ohio provider representative

Finally, many individual clinicians seemed unaware of Ohio Medicaid's EOC model, even when they were PAPs. For example, some members of a 2019 focus group of PAPs for the perinatal EOC—physicians who oversaw deliveries (Ohio Governor's Office of Health Transformation, 2018, April 19)—were familiar with "episode of care" as a clinical term because it was included in the electronic health records system they used. However, none of the perinatal episode focus group PAPs realized either: (1) that EOCs could be linked to payment incentives, or (2) that Ohio Medicaid had implemented an EOC model.

Despite continued reports of low levels of PAP open rates for EOC reports, Medicaid managed care plans reported that the 2019 distribution of EOC payment awards and penalties from the 2017 calendar year suggested that increased provider engagement might occur as more incentives were applied. A Medicaid managed care plan representative suggested that PAPs tended to ignore EOC reports until EOCs were linked to payment, at which point providers "sat up and took notice." The same Medicaid managed care representative said that, as Ohio tied more EOCs to payment, more PAPs from more specialties contacted the plan to discuss EOCs. One plan representative reported that PAPs who received penalties were more likely to reach out to plan representatives than were PAPs who received awards. Because provider communication increased after plans issued episode payments, one Medicaid plan representative predicted that provider communication could increase further in 2019, when two rounds of incentives were likely (for both 2017 and 2018 performance).

Views on Medicaid plans' assistance to providers on EOCs were mixed. Plan representatives reported describing the EOC initiative to providers, alerting providers about EOCs newly linked to payment, explaining EOC incentive calculations to providers, and helping providers identify opportunities for improving their performance. One state official reported that the amount of assistance Medicaid managed care plans gave to providers in EOCs varied by plan. The same state official also reported that: (1) Medicaid managed care plans became more involved in educating providers about EOCs when the plans themselves produced the EOC reports; and (2) when ODM began to *centrally* produce EOC reports in 2017, Medicaid managed care plans' role in helping providers understand EOCs diminished. Another official said "there was not a lot of" plan coordination with providers to help with either EOC or Ohio CPC report interpretation.

State officials employed several strategies to address low PAP engagement. One such strategy was the new process for obtaining provider feedback on the design of existing EOCs via email and annual provider meetings, which ODM officials presented in fall 2018. One state official indicated that ODM staff members were contemplating new methods to reach PAPs, such as asking providers interested in the EOC model to provide ODM with contact information. ODM staff were also considering ways to make both episode and Ohio CPC reports simpler and more actionable for providers, and to "be more creative in that space around sharing the information and helping [providers] understand." Finally, state officials viewed the EOC model's inclusion in Medicare's QPP as a means to increase provider buy-in for the EOC model. According to a state official, as Ohio Medicaid tied more episodes to payment, more clinicians would be eligible to receive credit under QPP, enabling more clinicians to benefit from the EOC model.

> "We have made a real concerted effort to connect with the providers [in EOC] … to answer questions, go over where their progress is, what it means for them and where there might be opportunities for us to work with them in meeting the goals for each episode that they may qualify for."
>
> —Medicaid managed care plan representative

Despite low PAP open rates for EOC reports and concerns about provider engagement, the EOC model reached a broad group of Medicaid enrollees and providers. In 2017, the most recent full year for which data are available, nearly 1.6 million (54.1 percent) Ohio Medicaid beneficiaries were in an episode.[68] In the same year, 18,299 individual and organizational provider entities—as defined by Ohio Medicaid billing ID—received an EOC report. This represents 78.4 percent of the 23,354 individual or organizational provider entities who had at least one valid or non-valid episode in 2017. Of the 23,354 provider entities with at least one episode in 2017, 7,326 (31.4%) had enough valid episodes to be eligible for episode payment rewards and penalties for 2017.[69]

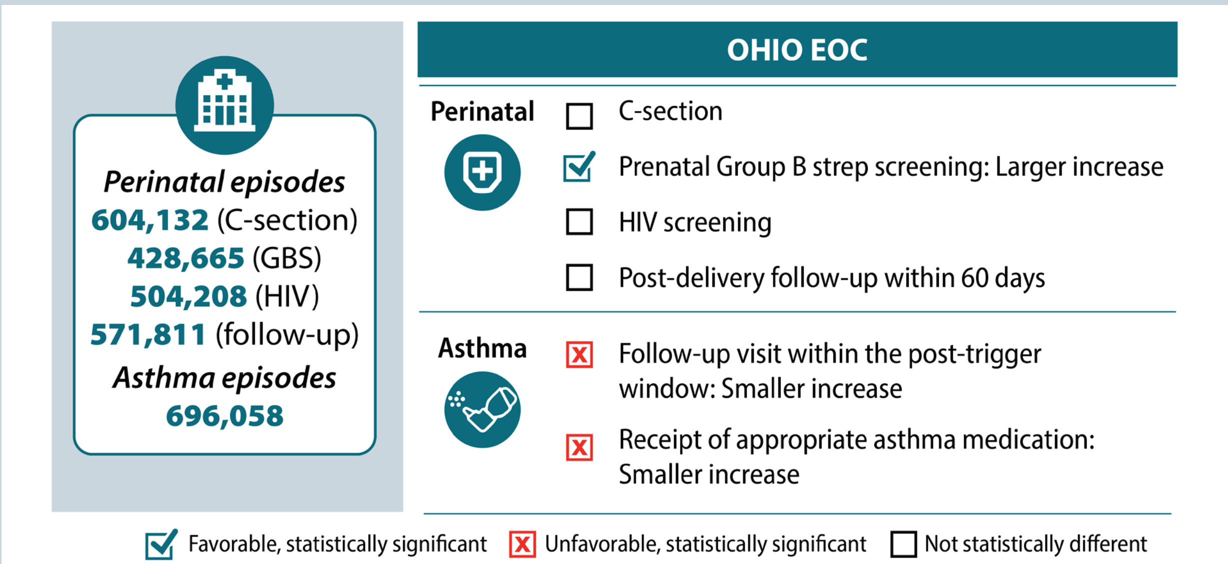
In November 2019, after the SIM Initiative ended, ODM announced that the number of episodes would be reduced from 43 to 30, reportedly to focus on high-value episodes for the Ohio Medicaid population (Ohio Department of Medicaid, 2019a). In response to the COVID-19

[68] This denominator includes all Medicaid beneficiaries in Ohio, not just the beneficiaries eligible to be included in an episode.
[69] Ohio Department of Medicaid. (2019, June). Ohio Metric Template for Quarter 4, Performance Year 4. Supplied by the Ohio Department of Medicaid.

pandemic, ODM suspended collections of penalties for EOC performance for the 2018 calendar year and then paused all EOC reporting and payment incentives for 2020 and 2021(Ohio Department of Medicaid, 2020a, 2020b). The new Medicaid managed care procurement included requirements to continue the EOC model in 2022.

Quantitative analysis of the perinatal and acute asthma exacerbation EOCs provided evidence on the EOC model's impacts from 2016—the first year that these EOCs were tied to payment—through 2019. This analysis indicated that the EOC model generally did not favorably change health care quality outcomes (see ***Exhibit H-3***). The perinatal EOC analysis included four outcomes tied to payment: cesarean section (C-section) rates, prenatal group B streptococcus (GBS) screening rates, prenatal human immunodeficiency virus (HIV) screening rates, and follow-up visits within 60 days of delivery. Changes in rates of C-sections, HIV screenings, and post-delivery follow-up did not differ between the Ohio EOC group and the comparison group. However, the percentage of episodes including prenatal GBS screenings increased in both the Ohio EOC and the comparison groups but increased slightly more in the Ohio EOC group (0.76 percentage points).

Exhibit H-3. Ohio's episode of care had no changes on cesarean sections, perinatal screening, and follow-up visits, and unfavorable impacts on asthma episodes in its first four years



Notes: Changes are relative to a comparison group. A checkmark indicates a favorable impact.

C-section = cesarean section; EOC = episode of care; GBS = group B streptococcus; HIV = human immunodeficiency virus; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF. See ***Appendix H-2*** for more detail.

The asthma exacerbation EOC analysis included two quality outcomes tied to payment: receipt of relevant follow-up care within 30 days after hospital discharge and use of appropriate asthma medication. Results for both outcomes were unfavorable for the Ohio EOC group. The percentage of asthma episodes with follow-up care within 30 days and with appropriate asthma medication use increased in both Ohio EOC and comparison groups but increased less in the Ohio EOC group (follow-up care: -0.75 percentage points, asthma medication: -4.03 percentage points). Providers' limited engagement with the EOC model likely explains the lack of favorable findings for the quantitative EOC analysis. Providers only opened a small percentage of EOC reports; and for at least some organizational providers, EOC financial incentives may not have been large enough to change provider behavior.

Because Ohio's state-led -evaluation had no comparison group and a limited timeframe, it is not readily comparable to findings from the federal evaluation. Ohio's state-led evaluation found reductions in spending for two episodes and increases in quality for two episodes from 2015 to 2016.[70] Similarly, the federal evaluation showed that quality outcomes trended upwards over time for both the Ohio EOC and comparison groups but the federal evaluation showed it increased less for the Ohio EOC group.

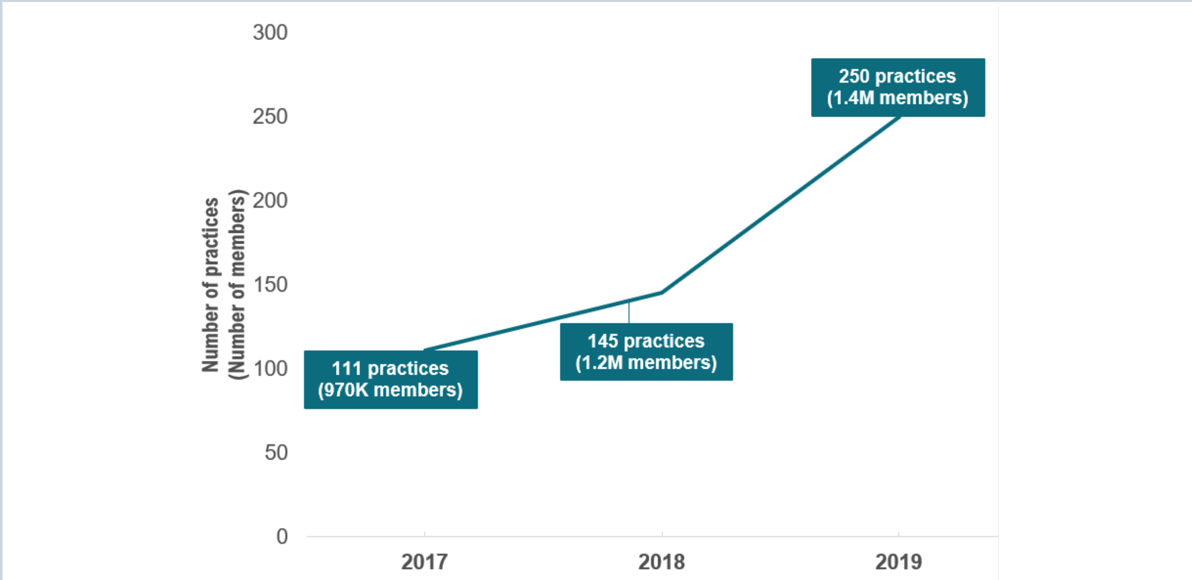
Ohio Comprehensive Primary Care

When the Ohio CPC model launched in January 2017, it included 111 practices and reached 970,000 Medicaid enrollees (***Exhibit H-4***). Ohio CPC continued to enroll new practices and grow in population reach, attributing patients to practices, providing PMPM payments to participating practices, and distributing shared savings. In 2019, the last year of the award period, Ohio CPC included 250 practices and reached approximately 1.4 million Medicaid enrollees, nearly half of Ohio's Medicaid population (Ohio Department of Medicaid, 2019d). In 2018, Medicaid managed care plans and practices appeared to have gained more understanding of Ohio CPC's operational details. A representative of one Medicaid managed care plan cited several examples of both plans' and practices' greater comfort and familiarity with the model including in the plans' abilities to explain attribution to practices and some practices' increased focus on improving care quality.

> "We are seeing, I think, real practice transformation of some of the groups that are like, 'Oh, this is what we should've been doing all along.' And then really some of them, not all, not many even, but some of them [are] really focusing on quality outcomes now … and not just so they could meet UDS [Uniform Data System] measures [that community health centers must report on annually to the federal government], like really focusing on patient-centered care. So, I think that is a direct driver from the CPC program."
>
> —Ohio Medicaid managed care plan representative

[70] Ohio Colleges of Medicine Government Resource Center. (2019, March). *Ohio's State Innovation Models Self-Evaluation Final Report*. Supplied by the Ohio Department of Medicaid.

Exhibit H-4. Number of Ohio Comprehensive Primary Care practices and members grew substantially between 2017–2019



Note: ODM = Ohio Department of Medicaid; OH CPC = Ohio Comprehensive Primary Care.
Sources: ODM; OH CPC 2020 Program Overview.

By design, 2018 was the year the state was to award shared savings to qualifying practices that achieved total cost of care savings in 2017. However, Medicaid managed care data quality issues delayed the calculation and distribution of shared savings until 2019. In January 2019, ODM indicated that five Ohio CPC practices had earned $11.2 million of shared savings for their performance in 2017, and ODM planned to distribute these awards to practices directly or via Medicaid managed care plans within 90 days (Applegate & Drake, 2019, February 14; Ohio Department of Medicaid, n.d.-c). Of the 34 practices eligible for shared savings in 2017, two practices received shared savings based on their improved performance on total cost of care in 2017 relative to a baseline value, and three practices received shared savings for improvement on total cost of care relative to their peers (Applegate & Drake, 2019, February 14).

Over the course of 2017–2019, Ohio designed and implemented new Ohio CPC policies to increase practice participation, by allowing smaller and less sophisticated practices to enroll. One major change was to allow practices without national PCMH accreditation or CPC+ participation to enroll, but ODM no longer recorded accreditation status, preventing assessment of the extent to which unaccredited practices enrolled in Ohio CPC. Another key change was introduction of practice partnerships, which allowed multiple practices to participate in Ohio CPC as a single entity and provided a path to Ohio CPC participation for smaller practices. Ohio required each practice partnership to be led by a “convening practice,” which was required to have been enrolled in Ohio CPC for a year and have at least 500 attributed Medicaid patients.

Practices that were not conveners were eligible to be part of a partnership if they had at least 150 attributed Medicaid patients (Ohio Department of Medicaid, 2018b). If the practice partnership entity had 5,000 or more total attributed Medicaid patients, the entity became eligible for shared savings.

> I think the notable difference I'm seeing this year is we're getting the less sophisticated practices kind of folding into the program, so they aren't necessarily NCQA accredited for patient centered medical home. They are still kind of getting oriented to functionally how does this program work and what is their role in the program."
>
> —Medicaid managed care plan representative

For 2019, Ohio CPC included 20 practice partnerships, made up of 105 individual practices (Ohio Department of Medicaid, 2018c). Of the 105 practices in practice partnerships, 56 were practices with 150 to 499 attributed Medicaid patients.

> On the CPC side, the biggest change is the lowering of the threshold and allowing smaller size practices to access the system. And how many have chosen to do that? I don't know the answer to that question; it could be very small, but at least changing that threshold in my mind has been important from a policy standpoint."
>
> —Provider representative

Although 20 newly formed practice partnerships participated in Ohio CPC in 2019, nearly all consisted of practice sites within the same organization—such as a health system, a large group practice, or a Federally Qualified Health Center (FQHC)—rather than groups of independent practices. As one provider representative explained, the practice partnerships allowed organizations to "bring in smaller sites" as "partners with the bigger sites" already participating in Ohio CPC. Few stakeholders noted any impacts from these policy changes—not unexpected, given that the changes had been in effect for less than three months at the time of the March 2019 site visit.

Responding to the state's request that Medicaid managed care plans help their participating practices meet Ohio CPC's activity requirements, the plans devised a system for communicating with practices. Every Ohio CPC practice was assigned a lead managed care plan, defined as the plan with which the practice had the most Medicaid beneficiaries (Ohio Department of Medicaid, 2019b).

The plans also began meeting regularly with their assigned practices to provide assistance. According to state officials, some plans and practices, including FQHCs, were enthusiastic about the assistance the plans provided. Other, less sophisticated practices responded less favorably. The state evaluator's September 2018 survey of Ohio CPC practices found that almost half the responding practices received Ohio CPC–related assistance from Medicaid managed care plans. This coordination between Medicaid managed care plans and practices continued the upward trend in communication between plans and practices begun earlier in the award period (RTI International, 2019c).

Ohio CPC practices continued to invest in practice support activities, using PMPM payments for new staff and infrastructure (RTI International, 2019c). According to the state evaluator's practice experience survey from September 2018, "most CPCs reported expansion of care management and practice support activities, including case management (80.7 percent), disease management (71.6 percent), medication management (55.0 percent), health information technology (66.1 percent), and facilitation of transitions across settings (63.3 percent). [Further,] 84.4 percent of respondents reported that PMPM payments supported practice investments to aid implementation of CPC activity requirements, including hiring additional data and information technology staff (72.5 percent), clinical staff (73.4 percent), and community outreach staff (22.9 percent) such as community health workers (CHWs)"(Ohio Colleges of Medicine Government Resource Center, 2019). Provider and plan representatives interviewed by this Evaluation Team also observed such Ohio CPC practices' investments. One Medicaid managed care plan representative and one provider indicated that Ohio CPC providers felt positively about the PMPM payments' ability to support care coordination and community outreach activities. But another Medicaid managed care plan representative said the flexibility practices had in using the PMPM payments sometimes made it difficult to connect how practices used PMPM payments with specific Ohio CPC program goals.

> "I think that just the partnership with the providers and us too has opened up. They need our help … and are more willing to come to us as managed care payment plans and payers and … are more receptive to the help we're offering even."
>
> —Ohio Medicaid managed care plan representative

> "So, I think our hope would be whatever CPC+ is using, we can come pretty close to doing the same with CPC and just fill in that alignment up front. So I think we're very open to the downside risk idea. We just need more detail from CMS on the CPC+ waiver and how they're going to do it."
>
> —Ohio state official

Ohio officials responded to the federal CPC+ funding opportunity by collaborating with plans and providers to apply successfully for Ohio to be a CPC+ region (RTI International, 2018). As noted, Ohio even paused its planned launch of Ohio CPC to make adjustments—such as updating the Ohio CPC quality measures—to further foster alignment with CPC+ (RTI International, 2019c). The state also expanded the SIM Core Team to include two additional commercial payers participating in CPC+ but not the SIM Initiative. Thereafter, state officials' conversations with the entire expanded SIM Core Team, as well as with individual participating plans, included a focus on CPC+.

A key finding from the March 2018 site visit was that stakeholders viewed this alignment with CPC+ as pushing forward health care payment and delivery reforms in Ohio (RTI International, 2019c). Stakeholders continued to recognize and support alignment between the two programs throughout the final award year. State officials included further alignment with CPC+, potentially including downside risk, as a future Ohio CPC goal.

Some stakeholders wanted Ohio CPC to be more responsive to the specific needs of children, and a focus on the pediatric population was introduced by the incoming administration, which had policy priorities focused on children (Ohio Department of Medicaid, 2019e). Stakeholders expressed several concerns about the pediatric issue. A Medicaid managed care plan representative noted that its pediatric practices did not feel that Ohio CPC's risk adjustment method accurately characterized health risks for pediatric patients.

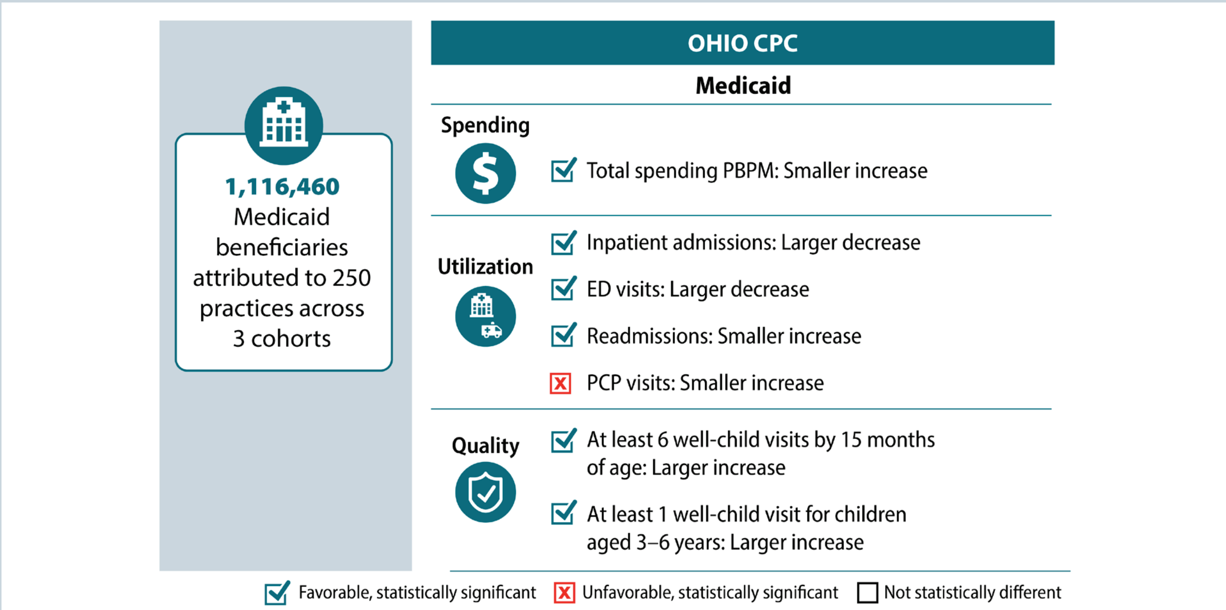
> "… if you look at all the modifying factors that impact outcomes, only 20 percent of those are the results of inpatient or clinical care. The other 80 percent are these social determinants or upstream work, which have a strong correlation to much of what the SIM programs were intended to hopefully get more penetration or more, more impact in improving outcomes."
>
> —Ohio provider

A provider representative described several aspects of Ohio CPC design as not working well for children's care, including patient attribution to practices as well as the shared savings methodology. The same provider representative also underscored the need for improvement in child health, noting that an assessment conducted by the Health Policy Institute of Ohio found that Ohio did not perform well relative to other states on population health measures for children (Aly & Bush Stevens, 2019, April). This representative thought the SIM Initiative's population approach could assist in changing the social determinants of health (SDoH) that affect child health outcomes, by fostering collaboration among primary care practices, parents, and schools—among others—to focus on prevention.

> "All of this I think is great theory. It simply doesn't work when you take adult focused improvement efforts and apply them to kids. The pediatric implications for the adult-focused episodes and CPC have not translated to pediatrics. The definitions don't work. The savings have not been generated. … We've not been able to unlock those payments to come all the way through to those of us who did the work. And it was quite time consuming."
>
> —Ohio provider representative

The quantitative analysis of Ohio CPC provided insight into the model's impacts during the award period. Most spending, utilization, and quality outcomes changed in a favorable direction for Medicaid beneficiaries attributed to Ohio CPC practices relative to comparison beneficiaries attributed to non-Ohio CPC practices (see ***Exhibit H-5***). During the first two years of Ohio CPC implementation, total spending per beneficiary per month increased for both groups but increased by $9.31 per beneficiary per month ***less*** for the Ohio CPC group than for the comparison group. The inpatient admission rate decreased in both the Ohio CPC and comparison groups but decreased more in the Ohio CPC group (-11.85 admissions per 1,000 beneficiaries). Outpatient ED visits decreased in the Ohio CPC group but increased in the comparison group, leading to a relative decreased in ED visits in the Ohio CPC group (-17.79 per 1,000 beneficiaries). The readmission rate increased for both the Ohio CPC and comparison groups but increased less for the Ohio CPC group (-5.63 readmissions per 1,000 discharges).

Exhibit H-5. Ohio's Comprehensive Primary Care model had favorable impacts on spending, hospital use, and well-child visits, and an unfavorable impact on primary care provider visits in its first two years



Notes: Changes are relative to a comparison group. A checkmark indicates a favorable impact.

CPC = Comprehensive Primary Care; ED = emergency department; ODM = Ohio Department of Medicaid; OH = Ohio; PBPM = per beneficiary per month; PCP = primary care provider.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM. See ***Appendix H-1*** for more detail.

One unexpected finding was that, although the primary care provider (PCP) visit rate increased in both the Ohio CPC and comparison groups, it increased less in the Ohio CPC group (net change: -10.32 visits per 1,000 beneficiaries). In contrast, the analysis found favorable changes for well-child visits, another measure of primary care use. The percentages of children aged 15 months with at least six well-child visits increased in both the Ohio CPC and comparison groups but increased more in the Ohio CPC group (4.63 percentage points). Similarly, the percentage of children ages 3 to 6 years with at least one well-child visit during the year increased in both the Ohio CPC and comparison groups but increased more in the Ohio CPC group (1.91 percentage points). The favorable results for well-child visits likely reflects that Ohio CPC practices were assessed specifically on their performance on well-child visits.

Ohio CPC practices were assessed on timeliness of prenatal and postpartum care visits for their pregnant attributed beneficiaries. The model-specific analysis showed that the percentage of pregnant beneficiaries with timely prenatal visits increased for Medicaid beneficiaries attributed to Ohio CPC and declined for the comparison group, leading to a relative increase in prenatal visits for the Ohio CPC group during the first two years of Ohio CPC implementation (2.99 percentage points). However, changes to the percentage of postpartum beneficiaries with a postpartum visit did not differ between Medicaid-enrolled beneficiaries attributed to Ohio CPC practices and comparison beneficiaries during the first two years of the Ohio CPC.

The findings from this analysis were generally more favorable than those from the state evaluation. Both evaluations identified favorable changes in the Ohio CPC group for inpatient admissions for adults and ED visits for children.[71] However, this evaluation found statistically significant favorable changes for total spending, well-child visits, and ED visit rates for adults; the state evaluation's estimated outcomes were not statistically significant (Ohio Colleges of Medicine Government Resource Center, 2019, March). Both analyses used similar treatment and comparison groups, but other methodological differences may explain the differing findings (e.g., the state evaluators' timeframe was shorter [2015–2017] than for the evaluation [2014–2018]).

After the award period ended, state Medicaid officials announced a plan to create an optional CPC for Kids track for Ohio CPC practices, created as part of the incoming Governor's prioritization of children's needs. To be eligible for this track, individual practices or practice partnerships had to have at least 150 attributed pediatric Medicaid patients. CPC for Kids practices also were to: (1) be assessed on pediatric-focused quality measures; (2) receive higher PMPM payments for attributed pediatric than adult patients; and (3) be eligible to receive shared savings—with performance based not only on quality metrics and total cost of care, but also on activities related to pediatric care provision (Ohio Department of Medicaid, 2019e).

The centrality of the pediatric population to Ohio CPC was reflected in the number of CPC for Kids practices. By 2021, 311 total practices participated in Ohio CPC. Among individually participating practices, 109 out of 131 were in the CPC for Kids track. In addition, 180 practices were in 34 practice partnerships, 28 of which were in the CPC for Kids track.

Statewide analysis

To assess whether the Ohio CPC and EOC models had impacts on the overall Ohio Medicaid population, this analysis compared changes in inpatient admissions, ED visits, and readmissions for Ohio Medicaid beneficiaries and comparison Medicaid beneficiaries from Kansas and Kentucky. While Ohio's SIM award began on February 1, 2015, the analysis focused on assessing impacts before and after 2016 to align with the start of the episode of care model, the earliest SIM payment model to be implemented in the state. The results from the analysis showed that changes to readmissions did not differ between Ohio Medicaid beneficiaries and

[71] Ohio Colleges of Medicine Government Resource Center. (2019, March). *Ohio's State Innovation Models Self-Evaluation Final Report*. Supplied by the Ohio Department of Medicaid.

comparison beneficiaries. However, inpatient admissions remained nearly constant for Ohio Medicaid beneficiaries but decreased for the comparison group, leading to a relative increase for Ohio beneficiaries (3.55 inpatient admissions per 1,000 Medicaid beneficiaries). Similarly, ED visit rates declined for both Ohio Medicaid beneficiaries and comparison beneficiaries but declined less among Ohio beneficiaries (157.65 ED visits per 1,000 beneficiaries). These unfavorable findings suggest that, although a broad swath of the Ohio Medicaid population was included in the Ohio CPC and EOC models, these models ultimately did not change trends in the overall Ohio Medicaid population (for more information, see ***Tables H-5*** through ***H-7*** in the Addendum at the end of this chapter).

H.2.2 Enabling strategies to support health care delivery transformation

Key Results
• Medicaid managed care data quality issues delayed Ohio CPC and EOC reporting and payments.
• Ohio CPC practices' use of referral reports was uneven.
• Stakeholders expressed enthusiasm for the Ohio CPC in-person learning sessions.
• To continue best-practices sharing across Ohio CPC practices, Ohio launched a monthly best practices webinar for Ohio CPC practices.

As part of the routine operations of Ohio CPC and the EOC model, Ohio continued to engage in activities related to quality measure alignment, health information technology (health IT) and data analysis infrastructure, and practice transformation and workforce development, as highlighted in ***Table H-2***. Alignment with EOC and Ohio CPC quality measures continued to be part of Medicaid managed care plans' contracts with the state. In terms of data analysis infrastructure, Ohio continued to produce claims-based reports on provider performance for the EOC and Ohio CPC initiatives. Practice transformation activities from 2017 through early 2019 included Ohio CPC and EOC webinars and Ohio CPC in-person learning sessions. In 2019, Ohio created best-practice webinars for Ohio CPC practices.

Table H-2. Ohio's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Quality measure alignment	Commercial and Medicaid payers	• ODM used Medicaid managed care contracts to achieve cost and quality measure alignment across FFS Medicaid and Medicaid managed care plans for OH CPC and EOC.	• Continued alignment seemed likely with inclusion of the EOC model and OH CPC in the Medicaid managed care re-procurement issued September 30, 2020.

(continued)

Table H-2. Ohio's enabling strategies to support health care delivery transformation (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Health IT and data analysis infrastructure	Providers participating in OH CPC and the EOC model	• ODM provided quarterly performance and attribution reports to OH CPC practices. Medicaid managed care plans initially produced EOC reports, but ODM began to provide all EOC reports in 2017 instead. • ODM calculated EOC payments and OH CPC shared savings. • Medicaid managed care data quality issues affected OH CPC and EOC model operations. • OH CPC practices did not uniformly use the referral reports, which were introduced in 2017 and discontinued in 2021 due to the suspension of the EOC model.	• ODM transferred report production to a long-term vendor.
Practice transformation and workforce development	Providers participating in OH CPC	• ODM used webinars to inform providers about OH CPC and EOC initiatives and to share best practices with OH CPC providers. • ODM hosted in-person learning sessions for OH CPC practices and Medicaid managed care plans in 2017 and 2018. • As a condition of participation, OH CPC practices underwent annual practice monitoring, beginning in 2017. The practice monitoring process identified OH CPC practices that needed TA to meet OH CPC's activity requirements. • Hospitals blocked an effort to use Medicaid Graduate Medical Education funding to train PCPs.	• ODM continued to host webinars after March 2019. • Practice monitoring, a key feature of OH CPC, was likely to continue as long as OH CPC is operational. • ODM planned to continue learning sessions for OH CPC practices.

Note: EOC = episode of care; FFS = fee for service; health IT = health information technology; ODM = Ohio Department of Medicaid; OH CPC = Ohio Comprehensive Primary Care; PCP = primary care provider; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Quality measure alignment

Throughout the SIM Initiative, Medicaid managed care plans were required to align on quality and cost measures for the EOC model and Ohio CPC. In addition, commercial plans voluntarily aligned some of their measures with those in the EOC model or Ohio CPC (RTI International, 2019c). Two Medicaid managed care plan representatives noted that their plans used measures beyond those in Ohio CPC and EOC to assess provider performance. One plan representative described working to adapt a CPC+ data tool to provide alerts and information on additional quality measures to Ohio CPC practices. The other plan incorporated additional or different measure targets into VBP provider contracts.

Health information technology and data analysis infrastructure

Data quality challenges, which remained a problem throughout the award period, delayed the calculation and distribution of EOC incentive payments and Ohio CPC shared savings. All quality and spending metrics for the EOC model and Ohio CPC were calculated from Medicaid claims. These Medicaid claims either came from FFS Medicaid or were provided to ODM by Medicaid managed care plans. ODM discovered that data submitted by one of the larger Medicaid managed care plans in Ohio were incomplete, affecting not only Ohio CPC and the EOC model but also general Ohio Medicaid operations. The issue was eventually resolved but resulted in a delay in the distribution of EOC and Ohio CPC reports, and in the calculation and distribution of EOC incentive payments and Ohio CPC shared savings. One state official said that Ohio CPC providers noticed the delay and asked officials about the status of Ohio CPC reports. According to another state official, the state found similar completeness issues in data submitted by a smaller Medicaid managed care plan, though it was unclear whether data challenges associated with the smaller plan meaningfully affected Ohio CPC and EOC reporting.

In 2017, Ohio introduced referral reports to facilitate Ohio CPC referrals to higher quality, lower cost specialists. Referral reports included data on PAP performance on quality and cost outcomes for selected episodes (Ohio Department of Medicaid, 2019c). A provider representative and a Medicaid managed care plan representative indicated that Ohio CPC practices were aware of referral reports but did not uniformly use them. The provider representative suggested that additional training could have increased referral report use. Other provider representatives and Ohio CPC clinician focus group participants indicated that referrals were often based on clinician relationships—either the referring clinician knew the referral provider personally, or the referral provider was affiliated with the referring clinician's health system. Although stakeholders did not point to measurable changes in practice patterns due to the referral reports, several stakeholders indicated that referral reports had the potential to alter specialist behavior. One provider representative suggested that losing patient referrals would have a greater impact on specialist practice patterns than the EOC payment incentives. Because information included in the referral reports was generated from the EOC model, the suspension of EOC reporting and payments in 2020 also resulted in the suspension of the referral reports.

> "We were told they [referral reports] were coming, but nobody was told how to use them effectively. So there's a huge assumption that they [practices] would all go, 'Oh great. Thank you. We're going to go ahead and dive into those babies.' No, no. So it took a long time for people to start using them, but I want to tell you the ones who used them, they found them extremely valuable."
>
> —Ohio provider representative

Practice transformation and workforce development infrastructure

Ohio convened in-person learning sessions for Ohio CPC practices, to highlight best practices for collaboration between Medicaid managed care plans and practices, explain Ohio CPC's shared savings methodology, and describe Ohio CPC changes. In first quarter 2019, Ohio added a monthly best practices webinar for practices participating in Ohio CPC, and distributed annual practice monitoring reports to Ohio CPC practices, as a way to check that practices were meeting the activity requirements. Practices could also receive technical assistance (TA) from Ohio's practice monitoring vendor if they were having difficulty meeting the activity requirements.

Stakeholders expressed enthusiasm for the in-person learning sessions, which continued after the SIM Initiative ended (RTI International, 2019c). Responding to feedback about the 2017 learning sessions, Ohio held three in-learning sessions in three different cities in 2018, rather than the previous year's two sessions in Columbus. Ohio also held the learning sessions earlier in the year—in summer rather than fall—in response to provider requests. Medicaid managed care plan representatives, a provider representative, and a state official all expressed appreciation for the face-to-face opportunity to interact with other Ohio CPC participants and share best practices. These sessions continued after the award period ended.

In 2019, state officials added a monthly webinar as another means of sharing best practices across Ohio CPC participants. Webinar topics included best practices for using Ohio CPC's quarterly patient attribution files, working with lead Medicaid managed care plans, and including non-traditional providers, such as dentists or behavioral health staff, in primary care (Ohio Department of Medicaid, n.d.-a). Because stakeholder interviews occurred in March 2019, there was little time for stakeholder feedback on the new webinars.

H.2.3 Population health

Key Results
• Ohio aligned Ohio CPC and EOC measures with population health priorities identified though the State Health Assessment (SHA) and State Health Improvement Plan processes.
• Ohio launched a school-based health care initiative, to improve patient engagement among Medicaid-covered children and foster primary care practice and school district collaboration.

Ohio's primary population health strategies tied to the SIM Initiative focused on aligning Ohio CPC and EOC metrics with priority areas determined through the State Health Assessment (SHA) and State Health Improvement Plan processes. (***Table H-3***). The priorities, determined in 2017, were maternal and infant health, chronic disease, and mental health and addiction (RTI International, 2018). Between spring 2017 and spring 2018, Ohio also completed related initiatives to strengthen linkages between health care and population health priorities—including an online database of population health indicators and an online repository of local health and community benefit hospital needs assessments, as well as community benefit hospital spending plans (RTI International, 2019c). The state released a new SHA in 2019, and a new Statewide Healthcare Innovation Plan in 2020.

Table H-3. Ohio's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
SHA and State Health Improvement Plan	Entire population of OH, as well as Medicaid beneficiaries with providers participating in EOC or OH CPC	• Identified statewide priorities. • Aligned EOC and OH CPC measures with population health priorities.	• A new SHA was completed in 2019 and a new State Health Improvement Plan in 2020. In the State Health Improvement Plan, OH CPC was cited as a strategy relevant to heart disease and diabetes.
School-based health care	Children in school districts with high concentrations of Medicaid children and families	• Launched the School-Based Health Care Network, which included 17 school districts. • Fostered school and practice partnerships, such as one in Toledo.	• Lack of funding to incentivize these partnerships remained a challenge. • The CPC for Kids Bonus Pool focused on additional pediatric activities related to school linkages, among other areas.

Note: CPC = Comprehensive Primary Care; EOC = episode of care; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; SHA = State Health Assessment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

For 2020, ODM made refinements to the Ohio CPC and EOC models. The perinatal episode was refined to increase focus on closing gaps in care for high-risk women, improve methods for comparing providers, and add transparency to neonate outcomes. For Ohio CPC, a behavioral health integration activity requirement was added (RTI International, 2019c).

At the end of 2017, Ohio began a school-based health care initiative as a strategy for Medicaid pediatric patient engagement. In 2018, the state reconvened the School-Based Advisory Work Group and contracted with McKinsey & Company to staff the group and assist in planning. In the same year, the state launched a School-Based Health Care Network of 17 Ohio school districts with catchment areas that included approximately 33,000 Medicaid beneficiaries. As the award period ended, the city of Toledo had established two clinics, and the state was still working to foster other partnerships at the local level. No funding was dedicated to incentivize the partnerships, but school linkages were included among activities considered for bonus awards in the post-award CPC for Kids.

The Ohio SIM Initiative did not implement strategies explicitly focused on SDoH. But state officials and stakeholders did note an increased focus on SDoH as payers and providers responded to VBP. Remarked one Medicaid managed care representative, "I think providers are starting to look at social determinants more so than they had ever thought about before. And I think that is a direct reflection of the SIM grant and that's good." It also appeared that ODM would move toward more explicit attention to SDoH going forward. Among the refinements to the Ohio CPC model in 2020, for example, ODM added a community services support and integration activity entailing use of a screening tool and connection to community resources when needed (Ohio Department of Medicaid, 2019f).

H.3 Sustainability

Key Results
• The state's budget for 2020–2021 incorporated funding for Ohio CPC, including additional funding for the new optional CPC for Kids. • Due to the COVID-19 pandemic, EOC negative incentives for 2018 were halted, and EOC reporting and all payments were suspended for 2020 and 2021. ODM planned to resume EOC in 2022. • State officials planned to continue both one-on-one and group meetings with Medicaid and commercial payers, with a focus on CPC+. • Ohio included continuation of both Ohio CPC and the EOC model as requirements in the new Medicaid managed care procurement released in September 2020. • Stakeholders believed Ohio was trending towards a preponderance of care (80 percent of patients, providers, or spending in some form of VBP)—facilitated by legislative and contractual levers, alignment with federal initiatives, a strong economy, and support for Ohio CPC from large independent practices.

Ohio's SIM Initiative leadership planned for sustainability from the start. Leadership in OHT and ODM designed SIM Initiative strategies, infrastructure, and implementation methods with the goal of sustainability through gubernatorial changes and the end of award funding. By the end of the final award year in March 2019, the work to maintain Ohio CPC and EOC had been transitioned to ODM, with contractors continuing to play a major role in planning and implementation. Leaders in OHT, which had been created by Executive Order of the former Governor, worked to: (1) transfer knowledge to a newly hired manager for the Payment Innovation Team at ODM, and (2) support hiring more staff and getting staff trained to carry out ongoing management of Ohio CPC and EOC. OHT and ODM prepared internal budget proposals to sustain the SIM Initiative activities, which were incorporated into the Governor's 2020–2021 budget proposal to the state legislature.

Direction and oversight of the SIM Initiative strategies continued to reside with the newly appointed Medicaid director. Day-to-day management was carried out by the new Payment Innovation Team, whose members carried over from the SIM Initiative and assumed responsibility for managing Ohio CPC and the EOC model. See ***Table H-4*** for a description of Ohio's sustainability plans for each SIM Initiative activity.

Table H-4. Sustainability of Ohio's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	EOC model	Yes	Medicaid managed care procurement.
	OH CPC	Yes	State investment (included in 2020–2021 state budget) and through Medicaid managed care procurement.
Population health	SHA and State Health Improvement Plan	Yes	State again contracted with HPIO, and both were completed 2019–2020.
	School-based health care	Yes	No dedicated funding in 2019, but CPC for Kids' bonus payments included some focus on school linkage activities.
Practice transformation	ODM learning sessions to educate providers, practices, and Medicaid managed care plans on OH CPC and EOC	Yes	ODM continued to host webinars and learning sessions for OH CPC practices.
	OH CPC practice monitoring	Yes	Ongoing.
Data analytics	OH CPC quarterly performance and attribution reports	Yes	ODM transferred report production to a long-term vendor.

Note: CPC = Comprehensive Primary Care; EOC = episode of care; HPIO = Health Policy Institute of Ohio; ODM = Ohio Department of Medicaid; OH CPC = Ohio Comprehensive Primary Care; SHA = State Health Assessment; SIM = State Innovation Model.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

A new Medicaid managed care procurement released September 30, 2020 (Ohio Department of Medicaid, n.d.-d), contained requirements for VBP, including Ohio CPC and EOC. Eleven plans applied for the procurement, and selections were expected to be announced in winter 2021 (Ohio Department of Medicaid). Inclusion of Ohio CPC and EOC in the Medicaid procurement meant that these models would continue to be part of Ohio Medicaid, at least as planned by ODM.

> "The episodes themselves, I don't feel like I'm as conversant with it. I do wonder if the incentives are powerful enough for the investment of energy and time that we put in and they put in. I'm not sure about that."
>
> —State official

It remained uncertain if further refinement of Medicaid's Ohio CPC, EOC model, or other VBP models or engagement of commercial plans would continue. A former state official wondered if there would be data analysis to understand the implementation issues and impact of the EOC model and Ohio CPC—to guide future changes in these initiatives or develop other VBP strategies. Without OHT serving as a convener of multiple state agencies, commercial plans, and Medicaid plans, it also was unclear whether the State Employee Health Plan and commercial plans would be engaged in the Ohio CPC and EOC models. Looking back, a former official believed that SIM Initiative successes rested on the mandates Medicaid had utilized, and that more progress could have been made had the state employed additional mandates.

> "I think wherever you have control, use it… I was disappointed that we didn't mandate that for the state employee plans because we have that control. We just didn't use it … if you have confidence in the model, also have confidence to mandate the model where you can."
>
> —Former state official

State officials in the new administration confirmed they would continue to have regular one-on-one meetings with each of the Medicaid and commercial health plans that had participated in the SIM Initiative. They expected the primary topic of discussion to be the federal CPC+ initiative, which also had been a focus, along with the SIM Initiative, under the prior administration. The ODM Payment Innovation Team also planned to continue multi-payer meetings on a quarterly basis (more frequently than before). The group would no longer be known as the SIM Core Team, but as a payment innovation payer group instead.

Throughout the award period, consumer and health care advocates and analysts reported that, despite expressing their interest, they had not received or been able to find information on the progress of the SIM Initiative. One consumer advocate noted in 2019 that there was nothing new posted about the Ohio SIM Initiative online, and that the state held no meetings with consumer advocates. While a former state official believed hospitals were the strongest constituency in Ohio for political support of payment innovation, support by knowledgeable policy analysts and consumer and advocacy groups could be important in sustaining initiatives.

> "And I have to say, when you don't hear you assume it's negative because you think if it was positive, they would be sharing it. Especially as the administration was concluding. That's the perfect time when you want to really solidify your legacy … I don't know of any consumer input that's been solicited or received. They haven't reached out to groups of representatives the last year."
>
> —Ohio health care analyst/advocate

With respect to preponderance of care, ODM estimated that 72 percent of all Medicaid enrollees, 41 percent of all Medicaid spending, and 42 percent of all eligible providers who accept Medicaid would be part of either EOC or Ohio CPC by the end of 2019 (Ohio Department of Medicaid, 2019g). State officials and representatives of Medicaid and the commercial plans were optimistic that the 80 percent goal would be achieved if current trends continued.

Legislative and contractual levers that facilitated progress towards a preponderance of care included state budget legislation that required Medicaid managed care plans to have 50 percent of their medical expenditures in VBP by 2020. State officials also encouraged practices' adoption of VBP by aligning Ohio CPC with CPC+ and obtaining approval for EOCs to be an APM under Medicare's QPP. A state official suggested that clear vision and active leadership from high-level state officials had ensured the SIM Initiative's implementation success, and in turn, accelerated progress towards an 80 percent preponderance of care. According to a former state official, non–SIM Initiative factors that facilitated progress towards the preponderance of care goal included: (1) a strong economy that enabled Ohio Medicaid to make "simple, smart, preventive investments," and (2) large independent practices' commitment to Ohio CPC. The same official suggested these large practices viewed Ohio CPC participation as a way to support practice infrastructure without being acquired by health systems.

Though progress was made, some barriers to achieving a preponderance of care were not addressed before the award period ended. Progress towards including the State Employee Health Plan in the EOC model or Ohio CPC stalled prior to the gubernatorial change; and it was unclear if engaging the State Employee Health Plan would be a goal for the new administration. In addition, the gubernatorial change brought an end to OHT, leaving no entity to orchestrate interagency action on VBP; instead, the lead responsibility for driving VBP progress rested with ODM. Finally, Ohio state officials were unable to obtain commercial data on VBP, though commercial plans often had different VBP goals than the goals of the state and CMS. For example, the representative of one commercial plan said the representative's plan was focused on increasing provider risk in current value-based arrangements rather than expanding the number of value-based arrangements with providers.

One year after the end of Ohio's SIM Initiative, COVID-19 and its related health care and economic repercussions led to changes with actual or potential effect on SIM Initiative strategies. As noted, ODM decided to suspend collection of negative incentives from 2018, and EOC reports and payments for 2020 and 2021—although ODM clearly stated that it intended to resume EOC reporting and payments for 2022 (Ohio Department of Medicaid, 2020b).

H.4 Implications of Findings/Lessons Learned

Based on the Ohio SIM Initiative implementation experience, stakeholders offered the following opportunities, challenges, and lessons for other states pursuing similar reforms:

- Requiring Medicaid managed care plan participation in Ohio CPC and the EOC via contractual requirements and regulation: (1) increased VBP in Ohio Medicaid, and

(2) helped standardize implementation of Ohio CPC and EOC models across Medicaid plans.

- Stakeholders reported that aligning Ohio CPC requirements with the federal CPC+ initiative encouraged primary care practice transformation (RTI International, 2019c). State officials believed that allowing providers to use EOC participation to count towards QPP participation would both increase provider engagement and help sustain the EOC model.
- Low PAP engagement with the EOC model was a persistent challenge that Ohio did not resolve before the award period's end. Stakeholders attributed this lack of PAP engagement to the design and reporting of episodes, the design of episode payment incentives, and the challenges of communicating with health care organizations required to participate in the EOC model.
- Contrary to expectations that smaller, independent practices would collaborate to form practice partnerships—a new program feature for Ohio CPC in 2019—existing practices used the 2019 partnerships to enroll additional practice sites in Ohio CPC.
- Although the Ohio SIM Initiative did not focus directly on SDoH, stakeholders indicated that Ohio's strategy of using payment reform to focus attention on population health, including SDoH, did have some impact.
- From the beginning, Ohio designed Ohio CPC and the EOC model to be sustained after the SIM award's end, and took significant steps to prepare for the 2019 gubernatorial change as well as the end of the SIM award. Ohio CPC and the EOC model were included as required elements of the new Medicaid managed care procurement (Ohio Department of Medicaid, n.d.-d).

Addendum

Table H-5. Ohio's Comprehensive Primary Care model had favorable impacts on spending, hospital use, and well-child visits and an unfavorable impact on primary care provider visits in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: OH CPC	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)	↑	↑	**-9.31†** (-13.53, -5.09)	-2.6	<0.001
Inpatient Admissions per 1,000 Population	↓	↓	**-11.85†** (-15.04, -8.67)	-12.3	<0.001
ED Visits per 1,000 Population	↓	↑	**-17.79†** (-30.27, -5.30)	-1.3	0.02
Readmissions per 1,000 Discharges	↑	↑	**-5.63†** (-9.11, -2.15)	-4.6	0.01
PCP Visits per 1,000 Population	↑	↑	**-103.23‡** (-160.35, -4.61)	-3.9	0.003
Children Aged 15 Months with At Least 6 Well-child Visits (%)	↑	↑	**4.63†** (3.16, 6.10)	13.8	<0.001
Children Aged 3 to 6 Years with At Least 1 Well-child Visit (%)	↑	↑	**1.91†** (0.79, 3.04)	3.6	0.01
Timely Prenatal Visits (%)	↑	↓	**2.99†** (2.16, 3.82)	5.4	<0.001
Postpartum Visits (%)	↑	↑	-0.04 (-0.76, 0.67)	-0.1	0.92

†	Significant change in expected direction	↑	Favorable increase	↓	Favorable decrease
‡	Significant change in unexpected direction	↑	Unfavorable increase	↓	Unfavorable decrease
	No change	↑	Increase from baseline through implementation	↓	Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; PBPM = per beneficiary per month; PCP = primary care provider.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

Table H-6. Ohio's episode of care had no changes on cesarean-sections, perinatal screening, and follow-up visits, and unfavorable impacts on asthma episodes in its first four years in which episodes of care were tied to payment

Selected outcomes	Change in outcome from baseline to implementation period: OH EOC	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Perinatal Episodes with a C-Section (%)	↑ (unfavorable increase)	No change	0.42 (-0.04, 0.87)	1.5	0.13
Perinatal Episodes with Prenatal Group B Streptococcus Screening (%)	↑ (favorable increase)	↑	**0.76†** **(0.00002, 1.51)**	0.9	0.09996
Perinatal Episodes with Prenatal HIV Screening (%)	↑ (favorable increase)	↑	0.76 (-0.70, 2.21)	1.0	0.39
Perinatal Episodes with a Post-Delivery Follow-Up Visit Within 60 Days (%)	↑ (favorable increase)	↑	0.36 (-0.26, 0.98)	0.5	0.34
Asthma Episodes with Follow-Up Care Within the Post-Trigger Window (%)	↑ (favorable increase)	↑	**-0.75‡** (-1.32, -0.18)	-1.7	0.03
Asthma Episodes with Receipt of Appropriate Asthma Medication (%)	↑ (favorable increase)	↑	**-4.03‡** (-6.38, -1.67)	-8.9	0.005

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table. Percentage of episodes with a post-delivery follow-up visit within 60 days excludes KY from the comparison group.

C-section = cesarean section; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; HIV = human immunodeficiency virus; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

Table H-7. Ohio's SIM models did not produce favorable utilization changes in utilization for Ohio's Medicaid population in the first four years following SIM payment model implementation

Selected outcomes	Change in outcome from baseline to implementation period				
	OH statewide	Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Inpatient Admissions per 1,000 Beneficiaries	⊖	↓	**3.55‡** (2.05, 5.06)	4.1	<0.001
ED Visits per 1,000 Beneficiaries	↓	↓	**157.65‡** (140.27, 175.03)	13.0	<0.001
Readmissions per 1,000 Discharges	↑	↑	1.89 (-0.82, 4.61)	1.2	0.25

- † Significant change in expected direction
- ‡ Significant change in unexpected direction
- ⊖ No change
- ↑ Favorable increase
- ↑ Unfavorable increase
- ↑ Increase from baseline through implementation
- ↓ Favorable decrease
- ↓ Unfavorable decrease
- ↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table. Percentage of episodes with a post-delivery follow-up visit within 60 days excludes KY from the comparison group.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

Appendix H-1: Ohio Comprehensive Primary Care Impact Results

H-1.1 Overview

Launched in January 2017, the Ohio Comprehensive Primary Care (Ohio CPC) initiative is a patient-centered medical home (PCMH) model for primary care practices, including practices providing pediatrics and maternity care, that serve Ohio Medicaid patients. To enroll in Ohio CPC, practices were required to attest that they were meeting “activity requirements”—such as providing same-day appointments and team-based care—associated with providing patient-centered primary care. Prior to January 2019, practices also were required to have at least 500 attributed Medicaid patients and have national PCMH accreditation or be a Medicare Comprehensive Primary Care Plus (CPC+) practice to participate in Ohio CPC (Centers for Medicare and Medicaid Services, 2021).

Ohio CPC practices received risk-adjusted per beneficiary per month (PBPM) payments, reports on practice performance on quality measures, and lists of attributed Medicaid patients on a quarterly basis. Practices with 60,000 or more attributed beneficiary-months were eligible for shared savings on an annual basis. To receive shared savings, practices had to meet quality and efficiency benchmarks and produce savings on total cost of care relative to either their own historical trends or to peer practices (Ohio Department of Medicaid, n.d.-c). The Ohio CPC model did not require participating practices to undertake specific health care delivery transformation activities. However, a survey of Ohio CPC practices conducted for Ohio’s self-evaluation found that 84 percent of Ohio CPC practices reported that the PBPM payments helped fund practice investments in health information technology (health IT) and data infrastructure, the hiring of new staff, and the connecting of patients to community services.

Ohio CPC began in January 2017 with 92 practices; 19 CPC+ practices joined the Ohio CPC program during the special CPC+ enrollment period in April 2017. In January 2018, 50 additional practices joined the Ohio CPC program. By 2018, the second year of Ohio CPC’s operation, over 1 million Ohio Medicaid beneficiaries were attributed to participating practices. Ohio CPC continued to enroll more practices on an annual basis.

The analysis addressed the following research question:

- To what extent did Ohio CPC result in changes in health care spending, utilization, quality, and maternity outcomes for Ohio Medicaid beneficiaries?

The hypothesis for this analysis was that Ohio CPC’s financial support of practice transformation activities via PBPM payments could reduce rates of inpatient admissions, emergency department (ED) visits, and readmissions for Ohio CPC–attributed Medicaid beneficiaries relative to a comparison group. Reductions in inpatient admissions and ED visits could lead to slower growth in total spending, inpatient spending, and ED spending. Furthermore, it was expected that meeting the activity requirements related to increasing patient access to care and conducting outreach to patients could increase use of primary care provider (PCP) visits and well-child visits. Similarly, because one activity requirement focused on follow-up visits after a hospital discharge, it seemed likely that Medicaid patients attributed to Ohio CPC could be more likely to receive a follow-up visit relative to a comparison group. Finally, because Ohio CPC practices were assessed on timely prenatal and postpartum visits, it was expected that the Ohio CPC model would improve maternity outcomes.

Table H-1-1 provides a snapshot of the study methods.

Table H-1-1. Methods snapshot

Method	Description
Participating practices	To be eligible for the Ohio CPC model prior to January 2019, practices were required to have at least 500 attributed Medicaid beneficiaries. Practices also agreed to meet activity requirements—such as extended patient hours—associated with the provision of patient-centered primary care. This analysis included three cohorts of practices. The first, largest cohort of practices joined the model in January 2017; the second cohort of practices joined in April 2017; and the third cohort of practices joined in January 2018. In 2018, 145 practices participated in Ohio CPC.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Ohio Medicaid claims data were provided by the Ohio Department of Medicaid.
Sample	The intervention group included Medicaid beneficiaries who were attributed to practices that participated in the Ohio CPC model (n=1,116,460). The comparison group included similar Ohio Medicaid beneficiaries attributed to practices that did not participate in Ohio CPC (n=1,888,767). Ohio CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the Ohio CPC and comparison groups based on each beneficiary's total length of time attributed to Ohio CPC versus non-Ohio CPC practices.
Timeframe	The timeframe for the impact analysis was January 1, 2014, through December 31, 2018. The study period was chosen to accommodate rolling entry at the practice level so that the analysis includes at least three years of baseline data and up to two years of intervention period data for all practices. The intervention period began on January 1, 2017.
Measures	The analysis assessed the effects of Ohio CPC on four core outcomes including total spending PBPM, inpatient admissions, outpatient ED visits, and readmissions. The analysis also examined impacts on additional outcomes, including inpatient, ED, professional, and prescription drug spending; visits to primary care providers; well-child visits; follow-up visits within 14 days of discharge; and maternity outcomes.
Statistical analysis	Logistic regression for binary outcomes, negative binomial regression for count outcomes, and OLS models for continuous outcomes were used. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: CPC = Comprehensive Primary Care; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month.

A full description of the Ohio CPC program and a summary of the key impact analysis findings are available in ***Appendix H***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix H*** provide detailed information regarding Ohio CPC impact findings in tables and figures:

- ***Section H-1.2*** presents results of difference-in-differences (D-in-D) analyses for Ohio CPC Medicaid beneficiaries and their comparison group;
- ***Section H-1.3*** presents results of D-in-D analyses separately for children and adults for the core outcomes;
- ***Section H-1.4*** provides information on annual covariate balance between the Ohio CPC and comparison groups before and after propensity score weighting;
- ***Section H-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section H-1.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for core outcomes change when Ohio CPC and comparison group trends are assumed to be on non-parallel paths beginning in the baseline period.

H-1.2 Estimates of Ohio Comprehensive Primary Care's Impact on Spending, Utilization, Quality, and Maternity Outcomes

Tables H-1-2 through ***H-1-5*** show annual and overall estimates of Ohio CPC's impact on health care spending, utilization, quality, and maternity outcomes for Ohio Medicaid beneficiaries. These impact estimates come from D-in-D models, which are described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the Ohio CPC and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the Ohio CPC impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

H-1.2.1 Estimates of Ohio Comprehensive Primary Care's impact on core outcomes

Table H-1-2 shows the estimates of the Ohio CPC model on total spending PBPM, inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries attributed to Ohio CPC practices relative to comparison beneficiaries.[72] The findings are as follows:

[72] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

- Total spending PBPM increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by $9.31 less for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- Inpatient admissions decreased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but decreased by 11.85 more admissions per 1,000 beneficiaries for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- ED visits decreased for the Ohio CPC group and increased for comparison beneficiaries, leading to a relative decrease of 17.79 visits per 1,000 beneficiaries for Medicaid beneficiaries attributed to Ohio CPC practices ($p=0.02$).
- Readmissions within 30 days of discharge increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 5.63 fewer readmissions per 1,000 discharges for the Ohio CPC group during the first two years of Ohio CPC implementation ($p=0.01$).

Table H-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Ohio Comprehensive Primary Care and comparison groups

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	359.68	354.51	389.81	403.76	-19.17 (-24.72, -13.63)	-5.3	<0.001
Year 2	359.68	354.51	413.25	406.41	1.61 (-4.82, 8.05)	0.4	0.68
Overall	359.68	354.51	400.93	404.95	-9.31 (-13.53, -5.09)	-2.6	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	96.59	98.29	82.37	101.26	-17.17 (-20.07, -14.28)	-17.8	<0.001
Year 2	96.59	98.29	76.66	83.99	-5.96 (-11.86, -0.07)	-6.2	0.10
Overall	96.59	98.29	79.66	93.52	-11.85 (-15.04, -8.67)	-12.3	<0.001
ED visits per 1,000 population							
Year 1	1324.49	1353.77	1318.14	1389.68	-41.51 (-56.49, -26.53)	-3.1	<0.001
Year 2	1324.49	1353.77	1315.64	1336.19	8.47 (-11.95, 28.89)	0.6	0.50
Overall	1324.49	1353.77	1316.95	1365.71	-17.79 (-30.27, -5.30)	-1.3	0.02
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	121.90	124.69	164.15	177.89	-8.85 (-14.00, -3.70)	-7.3	0.005
Year 2	121.90	124.69	183.72	189.70	-1.82 (-6.36, 2.72)	-1.5	0.51
Overall	121.90	124.69	173.12	182.85	-5.63 (-9.11, -2.15)	-4.6	0.01

(continued)

Table H-1-2. Differences in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Ohio Comprehensive Primary Care and comparison groups (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CPC = Comprehensive Primary Care; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for the inpatient admission and readmissions outcomes, and a negative binomial model to obtain D-in-D estimates for the ED outcome. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 8,238,566; the weighted N for the readmission outcome is 739,808. These numbers include all person-year (or discharge-year) observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.2.2 Estimates of Ohio Comprehensive Primary Care's impact on spending categories

Table H-1-3 shows the estimates of the Ohio CPC model's impact on inpatient, ED, professional, and prescription drug spending PBPM for Medicaid beneficiaries attributed to Ohio CPC practices relative to comparison beneficiaries attributed to non-Ohio CPC practices. The findings are as follows:

- Inpatient spending PBPM increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by $7.61 less for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- Changes to ED spending PBPM did not differ between Medicaid beneficiaries attributed to Ohio CPC practices and comparison beneficiaries during the first two years of Ohio CPC implementation.
- Professional spending decreased slightly for the Ohio CPC group and increased for the comparison group, leading to a relative decrease of $4.75 PBPM for Ohio CPC beneficiaries during the first two years of Ohio CPC implementation ($p<0.001$).
- Prescription drug spending PBPM increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by $4.24 more for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).

Table H-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending for Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	36.22	36.92	61.36	73.92	-11.87 (-15.67, -8.07)	-32.8	<0.001
Year 2	36.22	36.92	67.24	70.83	-2.89 (-7.26, 1.48)	-8.0	0.28
Overall	36.22	36.92	64.15	72.53	-7.61 (-10.49, -4.73)	-21.0	<0.001
ED spending PBPM ($)							
Year 1	24.89	26.38	23.26	25.10	-0.35 (-0.85, 0.15)	-1.4	0.25
Year 2	24.89	26.38	23.42	24.41	0.50 (-0.26, 1.26)	2.0	0.28
Overall	24.89	26.38	23.33	24.79	0.05 (-0.39, 0.50)	0.2	0.84
Professional spending PBPM ($)							
Year 1	143.53	147.64	140.23	151.18	-6.85 (-8.29, -5.41)	-4.8	<0.001
Year 2	143.53	147.64	145.27	151.79	-2.42 (-4.24, -0.61)	-1.7	0.03
Overall	143.53	147.64	142.62	151.45	-4.75 (-5.90, -3.60)	-3.3	<0.001
Prescription drug spending PBPM ($)							
Year 1	90.58	85.41	96.75	87.08	4.49 (2.85, 6.12)	5.0	<0.001
Year 2	90.58	85.41	99.30	90.15	3.97 (1.43, 6.52)	4.4	0.01
Overall	90.58	85.41	97.96	88.46	4.24 (2.76, 5.72)	4.7	<0.001

(continued)

Table H-1-3. Differences in the pre–post change in inpatient, emergency department, professional, and prescription spending for Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; CPC = Comprehensive Primary Care; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all spending outcomes. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 8,238,566. This number includes all person-year observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.2.3 Estimates of Ohio Comprehensive Primary Care's impact on utilization

Table H-1-4 shows the estimates of Ohio CPC's impact on PCP visits and follow-up visits within 14 days of discharge for Medicaid beneficiaries attributed to Ohio CPC practices relative to comparison beneficiaries attributed to non-Ohio CPC practices. The findings are as follows:

- The percentage of Medicaid beneficiaries with at least one PCP visit increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 3.79 percentage points less for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- PCP visits increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 103.23 fewer visits per 1,000 Medicaid beneficiaries for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- The percentage of hospital discharges with a follow-up visit within 14 days of discharge increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 1.54 percentage points less for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).

Table H-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with at least one PCP visit during the year							
Year 1	64.18	63.16	62.10	64.18	-2.81 (-3.55, -2.06)	-4.4	<0.001
Year 2	64.18	63.16	61.93	66.44	-4.88 (-6.52, -3.24)	-7.6	<0.001
Overall	64.18	63.16	62.02	65.19	-3.79 (-4.66, -2.92)	-5.9	<0.001
PCP visits per 1,000 population							
Year 1	2692.91	2521.76	2882.36	2795.29	-102.31 (-151.77, -52.85)	-3.8	<0.001
Year 2	2692.91	2521.76	3070.04	2972.88	-104.25 (-211.44, 2.94)	-3.9	0.11
Overall	2692.91	2501.74	2971.43	2874.86	-103.23 (-160.35, -4.61)	-3.9	0.003
Percentage of hospital discharges with a follow-up provider visit within 14 days of discharge							
Year 1	51.59	45.75	56.30	52.34	-1.86 (-2.45, -1.27)	-3.6	<0.001
Year 2	51.59	45.75	58.35	53.67	-1.17 (-2.65, 0.32)	-2.3	0.20
Overall	51.59	45.75	57.25	52.86	-1.54 (-2.30, -0.78)	-3.0	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; PBPM = per beneficiary per month; PCP = primary care provider.

(continued)

Table H-1-4. Differences in the pre–post change in primary care provider visits and follow-up visits within 14 days of hospital discharge in Ohio Comprehensive Primary Care and the comparison group (continued)

Methods: The analysis used logistic regression models for beneficiaries with at least one primary care visit and follow-up visits within 14 days of hospital discharge and a negative binomial model to obtain D-in-D estimates for visits for PCPs. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. The estimated probability of a primary care visit and follow-up provider visit within 14 days of discharge was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. The PCP visits models include a differential trend beginning in the baseline period. The 14-day follow-up models assumes that OH CPC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for any PCP visits is 8,238,566 and the total weighted N for follow-up visits within 14 days of hospital discharge is 1,001,650. These numbers include all person-year (or discharge-year) observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.2.4 Estimates of Ohio Comprehensive Primary Care's impact on quality

Table H-1-5 shows the estimates of Ohio CPC's impact on the percentage of child Medicaid beneficiaries attributed to Ohio CPC practices with an appropriate number of well-child visits relative to comparison children attributed to non-Ohio CPC practices. The findings are as follows:

- The percentage of children with at least six well-child visits by 15 months of age increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 4.63 percentage points more for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- The percentage of children aged 3 to 6 years with at least one well-child visit increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 1.91 percentage points more for the Ohio CPC group during the first two years of Ohio CPC implementation ($p=0.01$).

Table H-1-5. Differences in the pre–post change in well-care visits for child Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of eligible children with at least six well-child visits by 15 months of age							
Year 1	33.66	29.38	45.83	35.41	5.81 (3.69, 7.93)	17.3	<0.001
Year 2	33.66	29.38	49.18	41.04	3.26 (1.26, 5.27)	9.7	0.01
Overall	33.66	29.38	47.38	37.98	4.63 (3.16, 6.10)	13.8	<0.001
Percentage of eligible children aged 3 to 6 years with at least one well-child visit during the year							
Year 1	52.72	48.95	56.85	50.80	2.29 (1.30, 3.28)	4.3	<0.001
Year 2	52.72	48.95	57.13	51.90	1.48 (-0.67, 3.62)	2.8	0.26
Overall	52.72	48.95	56.98	51.29	1.91 (0.79, 3.04)	3.6	0.01

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; PBPM = per beneficiary per month.

(continued)

Table H-1-5. Differences in the pre–post change in well-care visits for child Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for both well-child outcomes. The estimated probabilities for the well-care visit outcomes were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period. Unlike other outcomes, the well-child visit outcomes have shorter baseline periods: one baseline year for well-child visits for children aged 15 months and two baseline years for well-child visits for children aged 3 to 6 years. These baseline periods were excluded because of anomalous trends in the well-child visit outcomes in during those baseline years.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the well-child visit (15-month) outcome is 168,186; the weighted N for the well-child visit (3 to 6 years) outcome is 781,024. These numbers include all person-year observations for all OH CPC and comparison group child members eligible for these outcomes.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.2.5 Estimates of Ohio Comprehensive Primary Care's impact on maternity care outcomes

Table H-1-6 shows the estimates of Ohio CPC's impact on timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries with a live birth attributed to Ohio CPC relative to similar comparison beneficiaries. The findings are as follows:

- The percentage of beneficiaries with timely prenatal visits increased for Medicaid beneficiaries attributed to Ohio CPC and declined for the comparison group, leading to a relative increase of 2.99 percentage points more for the Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- Changes to the percentage of beneficiaries with postpartum visits did not differ between Medicaid beneficiaries attributed to Ohio CPC and the comparison group during the first two years of Ohio CPC implementation.
- Changes to the percentage of beneficiaries with an initiation of a most effective or moderately effective method of contraception within 60 days of delivery did not differ between Medicaid beneficiaries attributed to Ohio CPC and the comparison group during the first two years of Ohio CPC implementation.
- Changes to the percentage of beneficiaries with an initiation of long-acting reversible contraceptive within 60 days of delivery did not differ Medicaid beneficiaries attributed to Ohio CPC and the comparison group during the first two years of Ohio CPC implementation.

Table H-1-6. Differences in the pre–post change in timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with timely prenatal visits							
Year 1	55.79	53.34	57.70	51.21	4.03 (3.01, 5.05)	7.2	<0.001
Year 2	55.79	53.34	57.84	53.59	1.81 (0.48, 3.15)	3.3	0.03
Overall	55.79	53.34	57.77	52.25	2.99 (2.16, 3.82)	5.4	<0.001
Percentage of beneficiaries with postpartum visits							
Year 1	54.08	50.86	55.29	52.43	-0.34 (-1.46, 0.78)	-0.6	0.61
Year 2	54.08	50.86	56.98	53.49	0.29 (-0.55, 1.14)	0.5	0.57
Overall	54.08	50.86	56.09	52.89	-0.04 (-0.76, 0.67)	-0.1	0.92
Percentage of beneficiaries with an initiation of a most effective or moderately effective method of contraception within 60 days of delivery							
Year 1	32.31	31.07	32.77	31.75	-0.23 (-0.97, 0.50)	-0.7	0.60
Year 2	32.31	31.07	32.51	31.09	0.19 (-0.71, 1.09)	0.6	0.73
Overall	32.31	31.07	32.65	31.46	-0.03 (-0.61, 0.54)	-0.1	0.92

(continued)

Table H-1-6. Differences in the pre–post change in timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with an initiation of long-acting reversible contraceptive within 60 days of delivery							
Year 1	6.96	6.64	8.63	8.43	-0.20 (-0.78, 0.38)	-2.8	0.58
Year 2	6.96	6.64	8.55	8.28	-0.12 (-0.81, 0.57)	-1.7	0.78
Overall	6.96	6.64	8.59	8.36	-0.16 (-0.61, 0.29)	-2.3	0.56

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all maternity care outcomes. The estimated probabilities for the maternity care outcomes were multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

(continued)

Table H-1-6. Differences in the pre–post change in timely prenatal visits, postpartum visits, initiation of a most effective or moderately effective method of contraception within 60 days of delivery, and initiation of long-acting reversible contraceptive within 60 days of delivery for Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcomes is 164,714. This number includes all person-year observations for all OH CPC and comparison group members eligible for these outcomes.

Source: Claims provided by the ODM.

H-1.3 Estimates of Ohio Comprehensive Primary Care's Impact on Adults and Children

The analysis assessed the Ohio CPC model's impacts on adults and children separately for core outcomes. Because the health care needs of adults and children differ, the Ohio CPC model could produce differential impacts on health care utilization and spending for these groups. However, within the analysis timeframe, Ohio CPC implementation did not differ for adult and pediatric populations.[73]

H-1.3.1 Estimates of Ohio Comprehensive Primary Care's impact on core outcomes for adults

Table H-1-7 shows the estimates of the Ohio CPC model's impact on total spending PBPM, inpatient admissions, and ED visits for adult Medicaid beneficiaries attributed to Ohio CPC practices relative to adult comparison beneficiaries attributed to non-Ohio CPC practices. The findings are as follows:

- Changes to total spending PBPM did not differ between adult Medicaid beneficiaries attributed to Ohio CPC practices and adult comparison beneficiaries during the first two years of Ohio CPC implementation.
- Inpatient admissions decreased in the adult Ohio CPC group and increased in the adult comparison group, leading to a relative decrease of 6.74 admissions per 1,000 beneficiaries for adult Medicaid beneficiaries attributed to Ohio CPC practices ($p<0.001$).
- ED visits increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 33.90 fewer visits per 1,000 beneficiaries for the adult Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).

[73] In 2020, the Ohio Department of Medicaid launched CPC for Kids, designed for practices that served significant numbers of Medicaid children.

Table H-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	532.28	533.29	603.88	612.80	-8.03 (-15.77, -0.28)	-1.5	0.09
Year 2	532.28	533.29	643.17	640.92	3.13 (-4.12, 10.39)	0.6	0.48
Overall	532.28	533.29	622.09	625.01	-2.85 (-8.20, 2.49)	-0.5	0.38
All-cause acute inpatient admissions per 1,000 population							
Year 1	132.96	139.53	124.86	143.69	-11.88 (-13.47, -10.29)	-8.9	<0.001
Year 2	132.96	139.53	128.28	135.53	-0.80 (-4.88, 3.28)	-0.6	0.75
Overall	132.96	139.53	126.44	140.15	-6.74 (-8.82, -4.67)	-5.1	<0.001
ED visits per 1,000 population							
Year 1	1692.94	1765.77	1691.63	1847.32	-78.28 (-95.55, -61.02)	-4.6	<0.001
Year 2	1692.94	1765.77	1731.09	1787.99	17.47 (-12.96, 47.90)	1.0	0.34
Overall	1692.94	1765.77	1709.92	1821.57	-33.90 (-50.77, -17.02)	-2.0	<0.001

Notes: CI = confidence interval; CDPS = Chronic Illness and Disability Payment System; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; OLS = ordinary least squares; PBPM = per beneficiary per month.

(continued)

Table H-1-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for adult Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for the total spending outcome, a logistic regression model for the inpatient admission outcome, and a negative binomial model to obtain D-in-D estimates for the ED visit outcome. The estimated probability of any inpatient admission and the estimated ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the CPC group relative to the comparison group after CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 3,912,164. This number includes all adult person-year observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.3.2 Estimates of Ohio Comprehensive Primary Care's impact on core outcomes for children

Table H-1-8 shows the estimates of the Ohio CPC model's impact on total spending PBPM, inpatient admissions, and ED visits for child Medicaid beneficiaries attributed to Ohio CPC practices relative to child comparison beneficiaries attributed to non-Ohio CPC practices. The findings are as follows:

- Total spending PBPM increased for both Medicaid beneficiaries attributed to Ohio CPC practices and the comparison group but increased by $18.25 less for the child Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- Inpatient admissions decreased for both Medicaid beneficiaries attributed to Ohio CPC practices and the comparison group but decreased by 10.23 more admissions per 1,000 beneficiaries for the child Ohio CPC group during the first two years of Ohio CPC implementation ($p<0.001$).
- ED visits increased for both Medicaid beneficiaries attributed to Ohio CPC practices and the comparison group but increased by 12.36 fewer visits per 1,000 beneficiaries for the child Ohio CPC group during the first two years of Ohio CPC implementation ($p=0.05$).

Table H-1-8. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	202.46	184.58	198.81	211.26	-30.35 (-33.84, -26.85)	-15.0	<0.001
Year 2	202.46	184.58	211.22	198.70	-5.38 (-11.02, 0.27)	-2.7	0.12
Overall	202.46	184.58	204.82	205.48	-18.25 (-21.52, -14.97)	-9.0	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	60.23	55.21	46.89	57.15	-15.97 (-19.17, -12.77)	-26.5	<0.001
Year 2	60.23	55.21	41.87	42.04	-4.12 (-8.73, 0.50)	-6.8	0.14
Overall	60.23	55.21	44.46	50.19	-10.23 (-13.00, -7.45)	-17.0	<0.001
ED visits per 1,000 population							
Year 1	968.31	910.53	990.60	946.40	-15.84 (-27.46, -4.23)	-1.6	0.02
Year 2	968.31	910.53	984.32	933.81	-8.65 (-26.68, 9.38)	-0.9	0.43
Overall	968.31	910.53	987.56	940.60	-12.36 (-22.95, -1.76)	-1.3	0.05

(continued)

Table H-1-8. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for child Medicaid beneficiaries in Ohio Comprehensive Primary Care and the comparison group (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; OLS = ordinary least squares; PBPM = per beneficiary per month.

<u>Methods</u>: The analysis used an OLS model to obtain D-in-D estimates for the total spending outcome, a logistic regression model for the inpatient admission outcome, and a negative binomial model to obtain D-in-D estimates for the ED visit outcome. The estimate probability of any inpatient admission and ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean. The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 4,316,607. This number includes all child person-year observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.4 Annual Covariate Balance Between the Ohio Comprehensive Primary Care and Comparison Groups

As described in ***Appendix L**,* the analysis created annual propensity scores for the overall comparison sample at the person-year level and at the inpatient discharge level and for any comparison subgroups. These subgroups included pregnant or postpartum beneficiaries included in the maternity outcomes, all adults, all children, and the specific subgroups for the well-child outcomes.

Tables H-1-9 shows covariate balance between the Ohio CPC and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The table includes the following:

- The covariate means for the Ohio CPC and comparison groups without propensity score weighting;
- The standardized difference between the Ohio CPC and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the Ohio CPC group means and the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores in each analysis year were estimated using logistic regressions in which the dependent variable was an indicator of inclusion in the Ohio CPC group. Although calculated propensity scores were calculated in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

All covariates in ***Table H-1-9*** were included in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table H-1-9 shows balance between Ohio CPC and comparison group covariates before and after applying weights to person-year observations for Medicaid beneficiaries. Prior to propensity score weighting, standardized differences were above 0.10 for several person- and area-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table H-1-9. Covariate balance between the Ohio Comprehensive Primary Care and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, OH CPC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	54.32	53.30	0.02	54.39	0.002
Age in years	22.80	25.00	0.12	22.70	0.009
Percentage of people who are disabled	5.70	5.60	0.004	5.69	0.0002
Percentage of people whose race is non-white	50.60	41.99	0.17	51.03	0.009
Total months of enrollment during year	10.90	10.80	0.07	11.00	0.02
CDPS risk score, logged[a]	-0.10	-0.10	0.06	-0.10	0.01
Percentage of people who had changes to attribution status across calendar quarters[b]	39.40	22.49	0.37	41.76	0.05
County level					
Percentage of people residing in a Metropolitan Statistical Area	84.32	78.16	0.16	84.30	0.001
Percentage of people living in poverty [2016]	15.70	15.40	0.09	15.70	0.01
Hospital beds per 1,000 people [2015]	3.80	3.40	0.19	3.80	0.01
Median age in years [2010]	38.20	39.00	0.28	38.10	0.03
Percentage of people (under 65) without health insurance [2016]	6.70	6.80	0.01	6.80	0.02
FQHCs per 1,000 people [2016]	0.03	0.02	0.10	0.03	0.002

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

[b] The covariate for changes to attribution status indicates whether beneficiaries were attributed to both Ohio CPC practices and non-Ohio CPC practices while enrolled in Ohio Medicaid. Ohio CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the Ohio CPC and comparison groups based on each beneficiary's total length of time attributed to Ohio CPC versus non-Ohio CPC practices.

CDPS = Chronic Illness and Disability Payment System; CPC = Comprehensive Primary Care; FQHC = Federally Qualified Health Center; ICD = International Classification of Diseases; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care.

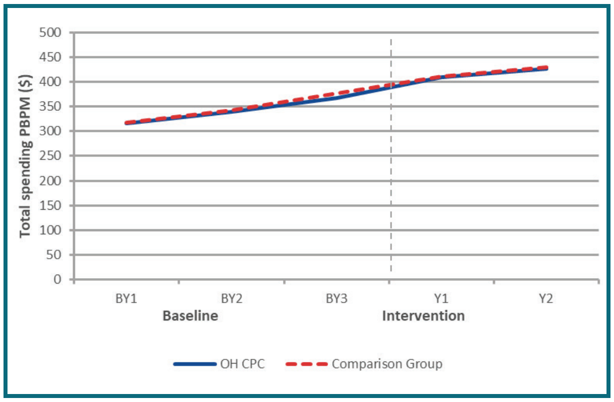
Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

H-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures H-1-1 through ***H-1-4*** show propensity score-weighted trends for all analysis years for the core D-in-D outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the Ohio CPC and comparison groups. All core outcomes appeared to exhibit parallel trends during the baseline period. As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the Ohio CPC and comparison groups to determine the specification of the D-in-D models.

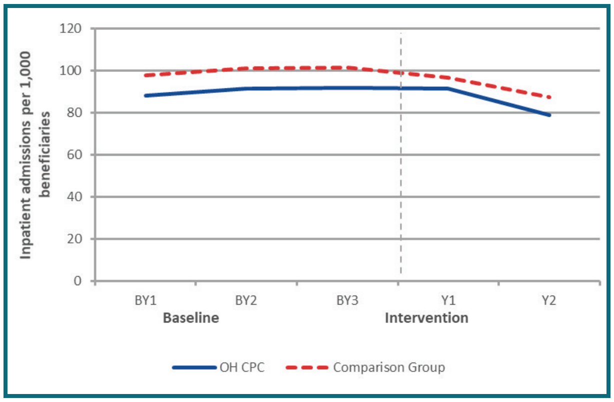
- Total spending PBPM increased from the baseline period through the intervention period for both the Ohio CPC and comparison groups. Total spending was slightly lower in the Ohio CPC group than in the comparison group (***Figure H-1-1***). The trends for both groups appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 beneficiaries remained stable from the baseline period through the first intervention year for both the Ohio CPC and comparison groups. The inpatient admission rate declined for both groups between the first and second intervention years. The inpatient admission rate for the Ohio CPC group was consistently lower than that for the comparison group (***Figure H-1-2***). The trends for both groups appear to be parallel during the baseline period.
- ED visits per 1,000 beneficiaries declined for both the Ohio CPC and comparison groups from the baseline through the intervention period. The ED visit rate for the Ohio CPC group was consistently lower than that for the comparison group (***Figure H-1-3***). The trends appear to be parallel during the baseline period.
- Readmissions within 30 days increased from baseline through the intervention period for both the Ohio CPC and the comparison groups. The readmission rate for the Ohio CPC group was consistently lower than that for the comparison group (***Figure H-1-4***). The trends appear to be parallel during the baseline period.

Figure H-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the Ohio Comprehensive Primary Care and comparison groups



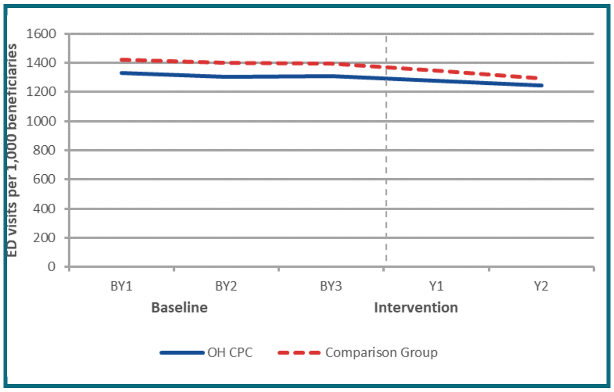
Note: BY = baseline year; OH CPC = Ohio Comprehensive Primary Care; PBPM = per beneficiary per month; Y = year.

Figure H-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Ohio Comprehensive Primary Care and comparison groups



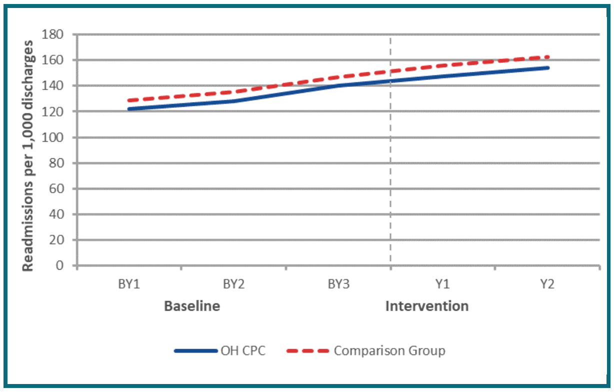
Note: BY = baseline year; OH CPC = Ohio Comprehensive Primary Care; Y = year.

Figure H-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Ohio Comprehensive Primary Care and comparison groups



Note: BY = baseline year; ED = emergency department; OH CPC = Ohio Comprehensive Primary Care; Y = year.

Figure H-1-4. Trends in readmissions per 1,000 discharges in the Ohio Comprehensive Primary Care and comparison groups



Note: BY = baseline year; OH CPC = Ohio Comprehensive Primary Care; Y = year.

Source: Federal Evaluation Team analysis of Ohio Medicaid claims data from the Ohio Department of Medicaid.

H-1.6 Sensitivity Analysis

Table H-1-10 shows how the impact estimates for the Ohio CPC for the core outcomes differ when the D-in-D models assume (1) parallel trends in outcomes between the Ohio CPC and comparison groups beginning in baseline period (same as the main analysis reported in ***Table H-1-2***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). As noted below, the findings for the core outcomes were robust to the inclusion of a differential trend.

- The overall total spending PBPM, inpatient admissions, ED visits, and readmissions D-in-D estimates were in the same direction and statistical significance across the different model specifications. However, the model specification for the sensitivity analysis produced D-in-D estimates that were of a larger magnitude than the D-in-D estimates for the main analysis.

Table H-1-10. Differences in the pre–post change in total spending per beneficiary per month, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Ohio Comprehensive Primary Care and comparison groups

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Total spending PBPM ($)		
Year 1	-19.17*** (-24.72, -13.63)	-35.62*** (-39.91, -31.34)
Year 2	1.61 (-4.82, 8.05)	-26.36*** (-36.50, -16.22)
Overall	-9.31*** (-13.53, -5.09)	-31.23*** (-36.54, -25.91)
Inpatient admissions per 1,000 population		
Year 1	-17.17*** (-20.07, -14.28)	-37.97*** (-43.45, -32.48)
Year 2	-5.96* (-11.86, -0.07)	-39.55*** (-49.89, -29.21)
Overall	-11.85*** (-15.04, -8.67)	-38.72*** (-44.41, -33.02)
ED visits per 1,000 population		
Year 1	-41.51*** (-56.49, -26.53)	-96.66*** (-108.10, -85.22)
Year 2	8.47 (-11.95, 28.89)	-84.71*** (-107.49, -61.93)
Overall	-17.79** (-30.27, -5.30)	-90.99*** (-103.36, -78.62)

(continued)

Table H-1-10. Differences in the pre–post change in total spending per beneficiary per month, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Ohio Comprehensive Primary Care and comparison groups (continued)

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Readmissions within 30 days of discharge per 1,000 discharges		
Year 1	-8.85*** (-14.00, -3.70)	-17.15*** (-24.47, -9.82)
Year 2	-1.82 (-6.36, 2.72)	-16.87*** (-25.07, -8.68)
Overall	-5.63*** (-9.11, -2.15)	-17.02*** (-22.48, -11.56)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; ODM = Ohio Department of Medicaid; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; OLS = ordinary least squares; PBPM = per beneficiary per month.

Methods: The analysis used an OLS model to obtain D-in-D estimates for the total spending outcome, a logistic regression model to obtain D-in-D estimates for the inpatient admission and readmissions outcome, and a negative binomial model to obtain D-in-D estimates for the ED outcome. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people). The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non–OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non–OH CPC practices.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 8,238,566; the weighted N for the readmission outcome is 739,808. These numbers include all person-year (or discharge-year) observations for both the OH CPC and comparison groups.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the ODM.

Appendix H-2: Ohio Episodes of Care Impact Results

H-2.1 Overview

Launched in 2015, the Ohio episodes of care (EOCs) program sought to encourage high-quality, patient-centered, and cost-effective care by holding a single clinician or entity accountable for care across all services related to a given episode. In Ohio's EOC model, the Accountable Entity is called a principal accountable provider (PAP). All Medicaid providers in Ohio are eligible to be PAPs, and provider participation in the EOC program is mandatory.

Providers are subject to both positive and negative payments, depending on their performance on spending and quality metrics for a given episode. Provider performance on episode spending and quality metrics is summarized in episode reports made available to PAPs.

During the SIM Initiative award period, Ohio reported on a total of 43 episodes and linked 18 episodes to financial incentives. Ohio began reporting on an initial set of episodes beginning in 2015. In January 2016, Ohio linked episodes to provider payments for the first time. The first three episodes linked to provider performance-based payments were asthma acute exacerbation, chronic obstructive pulmonary disease (COPD) acute exacerbation, and perinatal. PAPs who meet quality thresholds while keeping risk-adjusted annual costs below a "commendable" threshold are eligible for financial incentives, and PAPs whose costs exceed an "acceptable" threshold may receive a financial penalty. The EOC model was designed so that aggregate positive and negative incentives were roughly equivalent. For example, Ohio fee-for-service and Medicaid managed care plans eventually distributed $2.1 million in awards and received $1.8 million back as penalties based on provider performance on the three episodes in 2016 (Ohio Department of Medicaid, 2019h).

The EOC impact analysis focused on the impact of the perinatal and asthma exacerbation episodes on Medicaid utilization and quality. These episodes were selected because (1) they represented two of the three episodes first linked to payment and (2) perinatal care represented a key health policy interest. The COPD episode was not included because there were many fewer COPD than there were asthma exacerbation and perinatal episodes (Ohio Colleges of Medicine Government Resource Center, 2018).

The analysis addressed the following research question:

- To what extent did the EOC payment reform result in changes in health care utilization and quality for acute asthma exacerbation and perinatal episodes in Ohio Medicaid?

It was expected that the EOC model's financial incentives should be associated with improvements in quality measures and reduced health care utilization. However, stakeholder interviews and provider focus groups indicated that many providers did not engage with the EOC model.

Table H-2-1 provides a snapshot of the study methods.

Table H-2-1. Methods snapshot

Method	Description
Participating providers	The EOC model was mandatory for all providers that accepted Medicaid in Ohio. For the acute asthma exacerbation episode, the PAPs were facilities that treated patients with an acute asthma exacerbation. For the perinatal episode, the PAPs were either individual physicians or practices that billed for the delivery of newborns (Ohio Department of Medicaid, n.d.-b).
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences. Separate analyses were conducted for the perinatal and acute asthma exacerbation episodes.
Data	MAX and TAF data for January 2013 through December 2019 for perinatal episodes and January 2014 through December 2019 for asthma episodes.[74]
Sample	For both the perinatal and acute asthma exacerbation analyses, the intervention group included all perinatal and acute asthma exacerbation episodes in Ohio within the analysis timeframe. The comparison group included perinatal and acute asthma exacerbation episodes in Kansas and Kentucky. The total weighted N for each perinatal outcome model is 604,132 (C-section); 428,665 (GBS screening), 504,208 (HIV screening); and 571,811 (follow up provider visit after delivery). The total weighted N for each asthma outcome model is 696,058.
Episode definitions	Perinatal episodes were triggered by a live birth in a health care setting. The live birth was reported on a professional claim and usually had a corresponding facility claim. Perinatal episodes began 280 days before the delivery and ended 60 days after the delivery. Individuals were excluded from the perinatal episode analysis if they had a total of 27 or more diagnosed health risk factors, were less than 12 years old or more than 49 years old, were dual Medicare-Medicaid enrollees, did not have full Medicaid benefits, left the birth facility against medical advice, had a hospitalization lasting more than 30 days during the episode period, were receiving cancer treatment or died. Acute asthma exacerbation episodes were triggered by an inpatient admission or an ED visit with a primary asthma diagnosis. Asthma exacerbation episodes began on the day that an individual used inpatient or ED services for an asthma exacerbation. The asthma episode ended 30 days after being discharged from the facility that provided care during the initial asthma exacerbation event. Individuals with an asthma exacerbation event were excluded from the analysis if they were less than 2 or more than 64 years old, did not have full Medicaid benefits, and had certain comorbidities. The episode definitions and exclusions were based on documentation provided on the Ohio and Tennessee Medicaid websites (Ohio Department of Medicaid, 2021). Tennessee was the other SIM Round 2 state with an EOC model. Because the Ohio and Tennessee episode definitions were very similar, differences were resolved across the episode definitions, so episodes for the Ohio and Tennessee analyses were constructed in the same way.

(continued)

[74] During the analysis timeframe, the Centers for Medicare and Medicaid Services transitioned from producing Medicaid data in the MAX format to the TAF format. The exact date of the transition from MAX to TAF varies by state. For more information about this transition, see ***Appendix L***.

Table H-2-1. Methods snapshot (continued)

Method	Description
Timeframe	The timeframe for the impact analysis was January 1, 2013, through December 31, 2019, for perinatal episodes and January 1, 2014, through December 31, 2019 for asthma episodes.[75] The intervention period began on January 1, 2016, when episodes were initially tied to payment.
Measures	The analysis assessed the effects of the EOC model on several outcomes. For the perinatal EOC, the outcomes were C-section rates, prenatal HIV screening rates, prenatal screening rates for GBS, and follow-up provider visits within 60 days of delivery. For the asthma EOC, the outcomes were rates of relevant follow-up care within the post-trigger window and rates of receipt of appropriate asthma medication.[76]
Statistical analysis	All perinatal and asthma outcomes were binary and modeled with logistic regression models. All observations in the comparison group were multiplied by a propensity score weight. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables. All models also included a comparison state indicator variable to account for state-specific differences.

Note: C-section = cesarean section; D-in-D = difference-in-differences; ED = emergency department; EOC = episode of care; GBS = group B streptococcus; HIV = human immunodeficiency virus; MAX = Medicaid Analytic eXtract; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files.

A full description of the Ohio EOC model and a summary of the key impact analysis findings are available in ***Appendix H***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix H-2*** provide detailed information regarding EOC impact findings in tables and figures:

- ***Section H-2.2*** presents results of difference-in-differences (D-in-D) analyses for perinatal and acute asthma exacerbation EOCs;
- ***Section H-2.3*** presents results of D-in-D analyses separately for children and adults for the acute asthma exacerbation EOC;
- ***Section H-2.4*** provides information on covariate balance between the Ohio EOCs and comparison groups before and after propensity score weighting;
- ***Section H-2.5*** describes trends in perinatal and acute asthma exacerbation outcomes over the analysis timeframe; and
- ***Section H-2.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for perinatal and acute asthma exacerbation outcomes when assumptions about Ohio EOC and comparison group trends change.

[75] The timeframe for the asthma episodes is shorter because of MAX data issues for 2013.
[76] Because more than 85 percent of Ohio's Medicaid population is in Medicaid managed care, it is not possible to construct reliable spending outcomes for Ohio and comparison states in MAX and TAF data. Medicaid managed care plans' payments to providers were zeroed out in MAX data and were not well-populated in TAF data.

H-2.2 Estimates of Episode of Care's Impact on Perinatal and Asthma Outcomes

Tables H-2-2 and ***H-2-3*** show annual and overall estimates of the Ohio EOC model's impact on perinatal and asthma outcomes for Ohio Medicaid beneficiaries. These impact estimates come from D-in-D models, which are described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the EOC and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the EOC impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

H-2.2.1 Estimates of episode of care's impact on perinatal outcomes

Table H-2-2 shows the estimates of the EOC model's impact on outcomes for Ohio Medicaid beneficiaries with a perinatal episode relative to out-of-state beneficiaries with a perinatal episode.[77] The findings are as follows:

- Changes to the percentage of perinatal episodes involving a delivery by cesarean section (C-section) did not differ between Ohio Medicaid beneficiaries and the comparison group during the first four years in which EOCs were linked to provider payments.
- The percentage of vaginal birth episodes where the mother received screening for group B streptococcus (GBS) increased for both Ohio Medicaid beneficiaries and the comparison group but increased by 0.76 percentage points more for the Ohio EOC group during the first four years in which EOCs were linked to provider payments (p=0.099962).
- Changes to the percentage of all perinatal episodes where the mother was screened for the human immunodeficiency virus (HIV) did not differ between Ohio Medicaid beneficiaries and the comparison group during the first four years in which EOCs were linked to provider payments.
- Changes to the percentage of all perinatal episodes where the mother had a follow-up visit within 60 days of delivery did not differ between Ohio Medicaid beneficiaries and the comparison group during the first four years in which EOCs were linked to provider payments.

[77] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

Table H-2-2. Differences in the pre–post change in outcomes for Ohio Medicaid beneficiaries and comparison beneficiaries with a perinatal episode of care

Outcome	Baseline period adjusted mean, OH EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of all perinatal episodes with a delivery by C-section							
Year 1	28.11	32.37	28.73	32.37	0.67 (-0.13, 1.47)	2.4	0.17
Year 2	28.11	32.37	28.31	32.91	-0.26 (-1.25, 0.73)	-0.9	0.66
Year 3	28.11	32.37	28.32	31.79	0.81 (0.02, 1.60)	2.9	0.09
Year 4	28.11	32.37	28.22	32.04	0.46 (-0.59, 1.51)	1.6	0.47
Overall	28.11	32.37	28.40	32.29	0.42 (-0.04, 0.87)	1.5	0.13
Percentage of vaginal birth episodes where the mother was screened for GBS							
Year 1	83.16	78.60	83.04	79.79	-1.06 (-2.23, 0.12)	-1.3	0.14
Year 2	83.16	78.60	85.49	80.48	0.82 (-0.72, 2.35)	1.0	0.38
Year 3	83.16	78.60	86.32	79.41	2.52 (0.86, 4.18)	3.0	0.01
Year 4	83.16	78.60	85.80	80.94	0.75 (-0.92, 2.42)	0.9	0.46
Overall	83.16	78.60	85.13	80.12	0.76 (0.0002, 1.51)	0.9	0.09996

(continued)

Table H-2-2. Differences in the pre–post change in outcomes for Ohio Medicaid beneficiaries and comparison beneficiaries with a perinatal episode of care (continued)

Outcome	Baseline period adjusted mean, OH EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of all perinatal episodes where the mother was screened for HIV							
Year 1	75.59	67.84	75.73	70.97	-2.58 (-5.36, 0.20)	-3.4	0.13
Year 2	75.59	67.84	80.11	72.10	1.04 (-1.81, 3.90)	1.4	0.55
Year 3	75.59	67.84	80.23	69.30	3.61 (0.77, 6.44)	4.8	0.04
Year 4	75.59	67.84	81.16	73.42	1.00 (-2.23, 4.24)	1.3	0.61
Overall	75.59	67.84	79.22	71.36	0.76 (-0.70, 2.21)	1.0	0.39
Percentage of all perinatal episodes where the mother had a follow up visit within 60 days after delivery							
Year 1	74.93	55.73	75.42	57.84	-1.10 (-2.32, 0.11)	-1.5	0.14
Year 2	74.93	55.73	76.77	56.93	0.91 (-0.20, 2.01)	1.2	0.18
Year 3	74.93	55.73	76.81	56.48	1.27 (-0.01, 2.56)	1.7	0.10
Year 4	74.93	55.73	77.56	58.76	0.35 (-1.02, 1.72)	0.5	0.67
Overall	74.93	55.73	76.60	57.44	0.36 (-0.26, 0.98)	0.5	0.34

Notes: C-section = cesarean section; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; GBS = group B streptococcus; HIV = human immunodeficiency virus; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

(continued)

Table H-2-2. Differences in the pre–post change in outcomes for Ohio Medicaid beneficiaries and comparison beneficiaries with a perinatal episode of care (continued)

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included a comparison state indicator variable to account for time-invariant differences across states. All outcome models assume that OH EOC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the OH EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for each model is 604,132 (C-section); 428,665 (GBS); 504,208 (HIV); and 571,811 (follow up). These numbers include all episode-level observations for both the OH EOC and comparison groups. The N varies because the GBS model includes only vaginal birth episodes, the HIV model excludes 2015 due to a data anomaly in KY, and the follow up visit model excludes KY from the comparison group in all years due to data issues affecting multiple years.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-2.2.2 Estimates of episode of care's impact on acute asthma exacerbation outcomes

Table H-2-3 shows the estimates of the EOC model's impact on outcomes for Ohio Medicaid beneficiaries with an asthma episode relative to out-of-state beneficiaries with an asthma episode. The findings are as follows:

- The percentage of asthma episodes that included a follow-up visit within the post-trigger window increased for both Ohio Medicaid beneficiaries and the comparison group but increased by 0.75 percentage points less for the Ohio EOC group during the first four years in which EOCs were linked to provider payments (p=0.03).
- The percentage of asthma episodes that included appropriate medications increased for both Ohio Medicaid beneficiaries and the comparison group but increased by 4.03 percentage points less for the Ohio EOC group during the first four years in which EOCs were linked to provider payments (p=0.005).

Table H-2-3. Differences in the pre–post change in outcomes for Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, OH EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	43.59	38.28	44.56	40.93	-1.74 (-2.51, -0.96)	-4.0	<0.001
Year 2	43.59	38.28	44.44	40.23	-1.13 (-2.16, -0.11)	-2.6	0.07
Year 3	43.59	38.28	45.72	40.15	0.22 (-1.08, 1.52)	0.5	0.78
Year 4	43.59	38.28	45.16	39.69	0.13 (-1.51, 1.77)	0.3	0.90
Overall	43.59	38.28	44.91	40.25	-0.75 (-1.32, -0.18)	-1.7	0.03
Percentage of episodes for which patients were on appropriate asthma medications within the trigger or post-trigger window							
Year 1	45.00	67.33	44.91	72.64	-5.95 (-10.31, -1.60)	-13.2	0.02
Year 2	45.00	67.33	45.48	73.89	-6.96 (-11.59, -2.34)	-15.5	0.01
Year 3	45.00	67.33	47.76	72.84	-3.34 (-7.54, 0.86)	-7.4	0.19
Year 4	45.00	67.33	51.25	70.78	2.70 (-3.18, 8.58)	6.0	0.45
Overall	45.00	67.33	46.92	72.54	-4.03 (-6.38, -1.67)	-8.9	0.005

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

(continued)

Table H-2-3. Differences in the pre–post change in outcomes for Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included a comparison state indicator variable to account for time-invariant differences across states. All outcome models assume that OH EOC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the OH EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 696,058. These numbers include all episode-level observations for both the OH EOC and comparison groups.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-2.3 Estimates of episode of care's Impact on Acute Asthma Exacerbation Outcomes for Adults and Children

The analysis assessed the EOC model's impacts on asthma outcomes for adults and children separately. Because the health care needs of adults and children differ, the EOC model could produce differential impacts for these groups. However, EOC model implementation did not differ for adult and pediatric populations.

H-2.3.1 Estimates of episode of care's impact on acute asthma exacerbation outcomes for adults

Table H-2-4 shows the estimates of the EOC model's impact on outcomes for adult Medicaid beneficiaries with an asthma episode relative to adult comparison beneficiaries with an asthma episode. The findings are as follows:

- Changes to the percentage of episodes that included a follow-up visit within the post-trigger window did not differ between adult Medicaid beneficiaries in Ohio and the comparison group during the first four years in which EOCs were linked to provider payments.
- The percentage of episodes that included appropriate asthma medications decreased for adult Medicaid beneficiaries in Ohio and increased in the comparison group, leading to a relative decrease of 4.80 percentage points for adults in the Ohio EOC group during the first four years in which EOCs were linked to provider payments ($p<0.001$).

Table H-2-4. Differences in the pre–post change in outcomes for adult Ohio Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, OH EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	43.06	37.12	44.30	39.25	-0.97 (-2.41, 0.47)	-2.2	0.27
Year 2	43.06	37.12	44.00	38.25	-0.22 (-2.35, 1.92)	-0.5	0.87
Year 3	43.06	37.12	45.64	38.79	0.86 (-1.16, 2.87)	2.0	0.48
Year 4	43.06	37.12	44.77	38.73	0.04 (-1.68, 1.77)	0.1	0.97
Overall	43.06	37.12	44.62	38.76	-0.13 (-1.07, 0.81)	-0.3	0.82
Percentage of patients on appropriate asthma medications within the trigger or post-trigger window							
Year 1	45.65	68.39	42.94	71.71	-6.29 (-9.30, -3.28)	-13.8	<0.001
Year 2	45.65	68.39	43.16	72.53	-7.07 (-10.58, -3.55)	-15.5	<0.001
Year 3	45.65	68.39	45.25	71.66	-3.88 (-6.25, -1.52)	-8.5	0.01
Year 4	45.65	68.39	47.62	70.50	-0.10 (-3.96, 3.76)	-0.2	0.97
Overall	45.65	68.39	44.42	71.59	-4.80 (-6.42, -3.19)	-10.5	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

(continued)

Table H-2-4. Differences in the pre–post change in outcomes for adult Ohio Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included a comparison state indicator variable to account for time-invariant differences across states. All outcome models assume that OH EOC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the OH EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 408,348. These numbers include all episode-level observations for both the OH EOC and comparison groups.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-2.3.2 Estimates of episode of care's impact on acute asthma exacerbation outcomes for children

Table H-2-5 shows the estimates of the EOC model's impact on outcomes for child Medicaid beneficiaries with an asthma episode relative to child comparison beneficiaries with an asthma episode. The findings are as follows:

- The percentage of episodes that included a follow-up visit within the post-trigger window increased for both for child Medicaid beneficiaries in the Ohio EOC model and the comparison group but increased by 1.18 percentage points less for children in the Ohio EOC group during the first four years in which EOCs were linked to provider payments (p=0.07).
- Changes to the percentage of episodes that included appropriate asthma medications did not differ between child Medicaid beneficiaries in Ohio and the comparison group during the first four years in which EOCs were linked to provider payments.

Table H-2-5. Differences in the pre–post change in outcomes for child Ohio Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, OH EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	43.98	40.08	44.90	43.25	-2.29 (-4.14, -0.44)	-5.2	0.04
Year 2	43.98	40.08	44.96	42.86	-1.84 (-3.46, -0.21)	-4.2	0.06
Year 3	43.98	40.08	45.67	42.06	-0.31 (-2.68, 2.07)	-0.7	0.83
Year 4	43.98	40.08	45.47	41.12	0.46 (-2.60, 3.53)	1.1	0.80
Overall	43.98	40.08	45.21	42.31	-1.18 (-2.25, -0.11)	-2.7	0.07
Percentage of patients on appropriate asthma medications within the trigger or post-trigger window							
Year 1	44.36	65.10	48.28	73.18	-5.05 (-12.24, 2.14)	-11.4	0.25
Year 2	44.36	65.10	49.40	74.99	-6.25 (-13.13, 0.63)	-14.1	0.14
Year 3	44.36	65.10	51.88	73.49	-1.84 (-10.09, 6.40)	-4.2	0.71
Year 4	44.36	65.10	56.93	70.17	7.30 (-2.16, 16.75)	16.4	0.20
Overall	44.36	65.10	51.06	72.96	-2.35 (-6.24, 1.55)	-5.3	0.32

(continued)

Table H-2-5. Differences in the pre–post change in outcomes for child Ohio Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs. All outcome models assume that OH EOC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the OH EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 289,382. These numbers include all episode-level observations for both the OH EOC and comparison groups.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-2.4 Covariate Balance Between the Episode of Care and Comparison Groups

As described in ***Appendix L***, the analysis created propensity scores for the comparison samples at the episode level and for the comparison subgroups of adults and children. Different propensity scores were created for each perinatal outcome because of the slightly different samples for each outcome. (For example, the GBS screening outcome includes beneficiaries with vaginal births and excludes beneficiaries with C-section.)

Table H-2-6 shows covariate balance between the Ohio EOC and comparison groups for the percentage of perinatal episodes with a C-section. Covariate balance for this outcome is illustrative of that for other perinatal outcomes, for which covariate balance is not shown. ***Table H-2-7*** shows covariate balance between the Ohio EOC and comparison groups for the acute asthma exacerbation episodes. Covariate balance for the adult and child samples for the asthma episode analysis are not shown.[78] The tables include the following:

- The covariate means for the EOC and comparison groups without propensity score weighting;
- The standardized difference between the EOC and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the EOC group means and the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores were estimated using logistic regressions in which the dependent variable was an indicator of inclusion in the EOC group.

All covariates in ***Table H-2-6*** were included in the propensity score models for each perinatal outcome. All covariates in ***Table H-2-7*** were included in the asthma propensity score model, except for the percentage of the population in poverty, beds per 1,000 population, median age, and percentage without insurance. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

[78] Unlike other analyses in this report which used annual propensity scores, the propensity scores for the comparison groups in the Ohio and Tennessee EOC analyses were based on the full study period. Few individuals in the sample for the perinatal and asthma EOC analyses had more than one episode, so a single set of propensity scores based on the entire study sample allowed more alignment/common support between the EOC (treatment) and comparison groups. In other model-specific analyses in this report, many individuals were in the sample in multiple years so annual scores were used to account for evolution of the sample over time.

Table H-2-6 and ***Table H-2-7*** show balance between Ohio EOC and comparison group covariates before and after applying weights to episode-level observations for Medicaid beneficiaries. As previously noted, the analysis of each outcome relied on slightly different populations, so balance was checked independently for each one. For example, GBS screening is only an outcome measure for episodes with a vaginal delivery and excludes C-sections, the HIV model excludes 2015 due to a data anomaly in Kentucky, and the follow up visit model excludes Kentucky from the comparison group in all years due to potential data issues affecting multiple years. ***Table H-2-6*** shows balance for the population used in the perinatal EOC analysis of the C-section outcome, which was the only outcome to include data from all states and years. Prior to weighting, the EOC (intervention) group was not well-balanced with the comparison group on covariates such as age, residence in a Metropolitan Statistical Area, percentage of the county population living in poverty, and county-level primary care provider supply. After weighting, all the standardized differences fell below the 0.1 threshold deemed acceptable for this analysis. Balance in the samples for all other perinatal outcomes was similar.

Table H-2-7 indicates that, for the asthma EOC analysis, most outcomes showed poor balance before weighting. After weighting, all covariates had standardized differences that fell below the 0.10 threshold except for three county level variables: hospital beds per 1,000, median age, and percentage without insurance. This is likely due to a lack of variation in county-level variables; the absolute differences were small for each covariate.

Table H-2-6. Covariate balance between the perinatal and episode of care comparison groups for the cesarean section outcome

Variable	Unweighted mean or percentage, OH EOC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Age in years	25.70	25.20	0.10	25.80	0.01
Percentage of people who are disabled	1.86	1.98	0.01	1.68	0.01
CDPS risk score, logged[a]	0.70	0.70	0.09	0.80	0.05
County level					
Percentage of people residing in a Metropolitan Statistical Area	80.00	53.89	0.58	81.04	0.03
Percentage of people living in poverty [2016]	15.40	18.80	0.61	15.00	0.08
PCPs per 1,000 people (2016)	0.80	0.60	0.48	0.80	0.02

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; EOC = episode of care; ICD = International Classification of Diseases; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; PCP = primary care provider; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

Table H-2-7. Covariate balance between the asthma and episode of care comparison groups in the last baseline year

Variable	Unweighted mean or percentage, OH EOC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	59.88	53.62	0.13	59.42	0.01
Age in years	22.8	19.6	0.22	22.7	0.01
Age in years squared	721.3	601.1	0.15	719.3	0.003
Child indicator	41.36	54.86	0.27	42.44	0.02
Percentage of people who are disabled	9.51	12.52	0.10	9.09	0.01
Total months of enrollment during year	11.4	11.5	0.09	11.4	0.01
CDPS risk score, logged[a]	0.4	0.3	0.08	0.4	0.02
County level					
Percentage of people residing in a Metropolitan Statistical Area	86.3	68.82	0.43	84.81	0.04
Percentage of people living in poverty [2016]	15.7	17	0.26	15.8	0.005
Hospital beds per 1,000 people [2015]	3.9	4	0.06	4.5	0.25
Median age in years [2010]	38.6	37.2	0.48	36.7	0.68
Percentage of people (under 65) without health insurance [2016]	6.7	7.4	0.30	7.1	0.20
PCPs per 1,000 people [2016]	0.9	0.7	0.47	0.8	0.06

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; EOC = episode of care; ICD = International Classification of Diseases; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; PCP = primary care providers; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-2.5 Trends in Perinatal and Asthma Outcomes

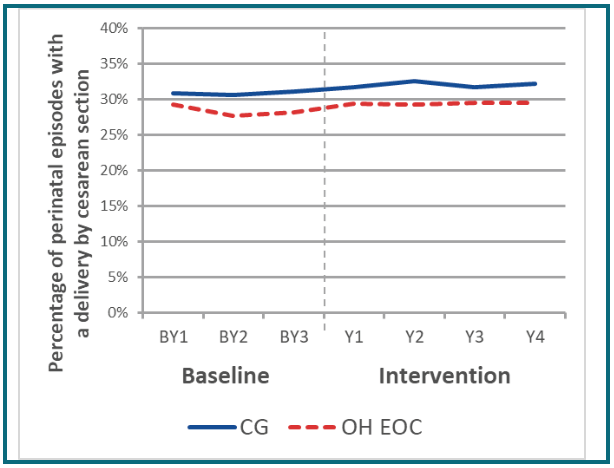
Figures H-2-1 through ***H-2-6*** show propensity score-weighted trends for the perinatal and asthma outcomes for the Ohio EOC and comparison groups. Trends for perinatal outcomes were relatively stable over the analysis period and generally moved in the same directions for both the Ohio EOC and comparison groups. For the follow-up care for asthma outcome, both the Ohio EOC and comparison groups increased slightly over the analysis period. For the appropriate asthma medications outcome, trends for the Ohio EOC and comparison groups moved in different directions during both the baseline and intervention periods.

As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the Ohio EOC and comparison groups to determine the specification of the D-in-D models.

H-2.5.1 Trends in perinatal outcomes

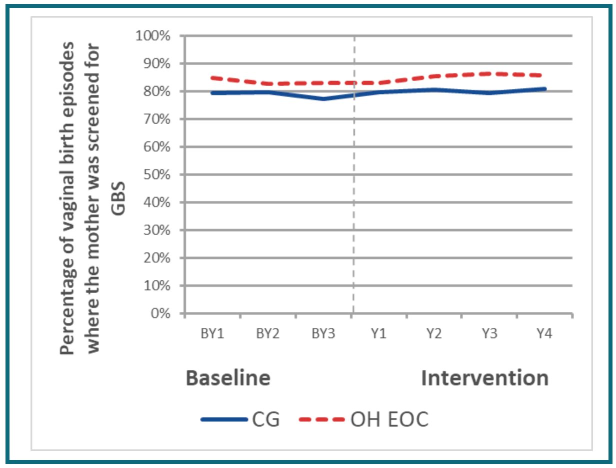
- Although there was a slight dip from Baseline Year 1 (2013) to Baseline Year 2 in Ohio's C-section rate for perinatal episodes, the overall trend was generally flat. On the other hand, C-section rates trended slightly upward for the comparison states (***Figure H-2-1***). The trends for both groups appeared to be parallel during the baseline period, especially in the last two baseline years.
- For the GBS test outcome, there is a slight upward trend in both Ohio and the comparison groups over the analysis period (***Figure H-2-2***). The trends for both groups appeared to be generally parallel during the baseline period.
- The trends for the HIV screening outcome include a gap in the final baseline year (2015) due to a data anomaly in Kentucky, a comparison state. Nonetheless, HIV screening rates for both the Ohio EOC and comparison groups trended upward over time (***Figure H-2-3***). Due to the missing year, it is hard to determine if the trends were parallel during the baseline period. For all perinatal outcomes, less weight was put on Baseline Year 1 (2013) when assessing trends. This is because it is only possible to analyze episodes with births in the last three months of Baseline Year 1 due to the required 280-day pre-delivery period included in each episode.
- For both the Ohio EOC and comparison groups, there was an upward trend in follow up visits with a primary care provider (including obstetricians-gynecologists [OB-GYNs]) for the mother within 60 days following the delivery (***Figure H-2-4***). The trends appeared to be parallel during the baseline period.

Figure H-2-1. Trends in the percentage of perinatal episodes with a delivery by cesarean section for Medicaid beneficiaries in the Ohio episode of care and comparison groups



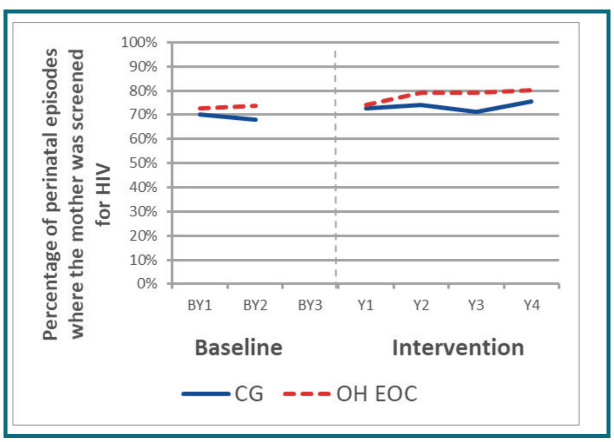
Note: BY = baseline year; CG = comparison group; EOC = episode of care; OH = Ohio; Y = year.

Figure H-2-2. Trends in the percentage of vaginal birth episodes where the mother was screened for group B streptococcus for Medicaid beneficiaries in the Ohio episode of care and comparison groups



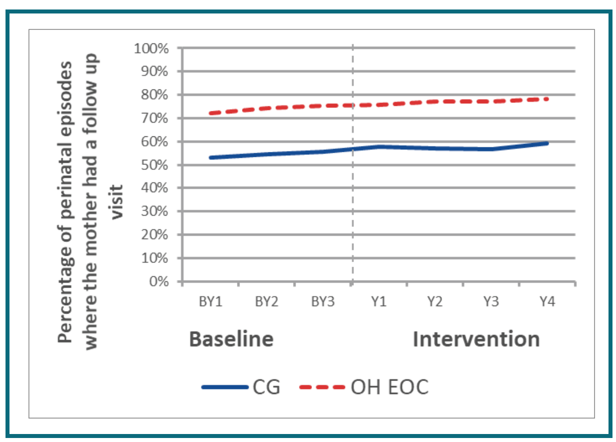
Note: BY = baseline year; CG = comparison group; EOC = episode of care; GBS = group B streptococcus; OH = Ohio; Y = year.

Figure H-2-3. Trends in the percentage of perinatal episodes where the mother was screened for human immunodeficiency virus for Medicaid beneficiaries in the Ohio episode of care and comparison groups



Note: BY = baseline year; CG = comparison group; EOC = episode of care; HIV = human immunodeficiency virus; OH = Ohio; Y = year.

Figure H-2-4. Trends in the percentage of perinatal episodes where the mother had a follow up visit for Medicaid beneficiaries in the Ohio episode of care and comparison groups



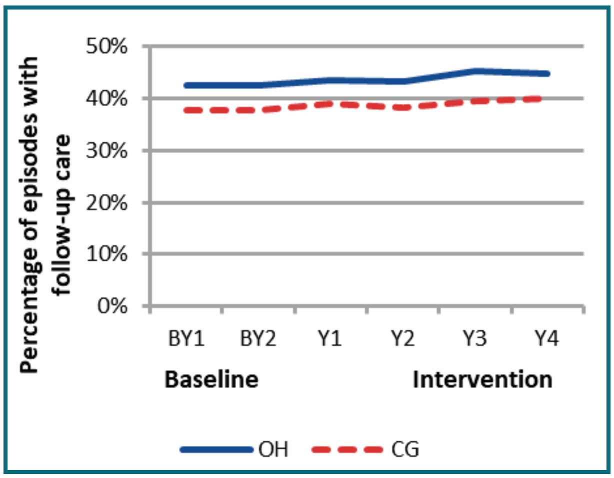
Note: BY = baseline year; CG = comparison group; EOC = episode of care; OH = Ohio; Y = year.

Source: Federal Evaluation Team analysis of Ohio, Kansas, and Kentucky claims data from the Medicaid Analytic eXtract (MAX) and Transformed Medicaid Statistical Information System Analytic Files (TAF).

H-2.5.2 Trends in acute asthma exacerbation outcomes

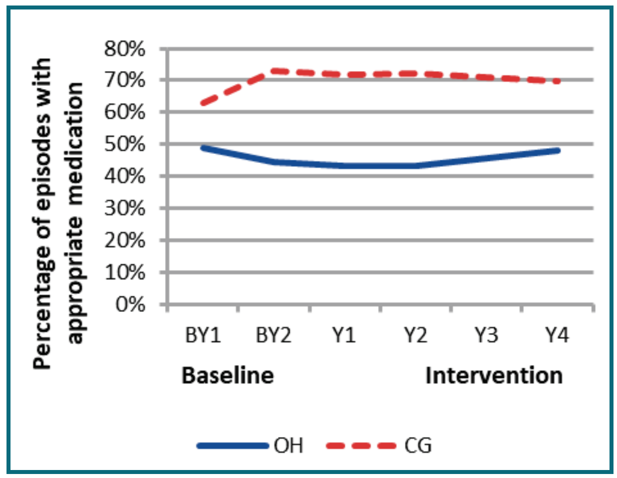
- Trends in the percentage of asthma episodes that included a follow-up visit increased slightly from the baseline through the intervention period for both the Ohio EOC and the comparison groups (***Figure H-2-5***).
- Trends in the percentage of asthma episodes that included appropriate asthma medication decreased in the baseline period for Ohio EOC group while increasing in the comparison group (***Figure H-2-6***). During the intervention period, trends increased slightly in the Ohio EOC group while remaining steady for the comparison group.

Figure H-2-5. Trends in the percentage of asthma episode of care that included a follow-up visit for Ohio and the comparison group



Note: BY = baseline year; CG = comparison group; OH = Ohio; Y = year.

Figure H-2-6. Trends in the percentage of asthma episode of care that included appropriate asthma medication for Ohio and the comparison group



Note: BY = baseline year; CG = comparison group; OH = Ohio; Y = year.

Source: Federal Evaluation Team analysis of Ohio, Kansas, and Kentucky claims data from the Medicaid Analytic eXtract (MAX) and Transformed Medicaid Statistical Information System Analytic Files (TAF).

H-2.6 Sensitivity Analysis

Tables H-2-8 and ***H-2-9*** show how the impact estimates for Ohio EOC for the perinatal and asthma outcomes differ when the D-in-D models assume (1) parallel trends in outcomes between the Ohio EOC and comparison groups beginning in baseline period (same as the main analysis reported in ***Tables H-2-2*** and ***H-2-3***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). As noted below, several findings were not robust to the inclusion of a differential trend.

- The estimates for perinatal outcomes were all sensitive to model specification, with assumptions of non-parallel trends leading to larger impact estimates that were often in unfavorable directions. However, the lack of consistent linear trends during the baseline period led to poor fit for the C-section and GBS screening models when assuming differential trends. Similarly, the limited amount of baseline data for the HIV screening outcome (baseline "year" 1 only includes births from roughly the last three months of 2013) adds considerable doubt to whether the observed baseline "trends" would have continued as the model assumed. The main analysis estimates that assume parallel trends are more credible.
- The estimates for asthma outcomes were sensitive to model specification. With the inclusion of the linear trend, the change in the percentage of episodes that included a follow-up visit within the post-trigger window did not differ between the Ohio EOC group and the comparison group. Unlike the main findings, the percentage of episodes with appropriate medications increased more for the Ohio EOC group than for the comparison group with the inclusion of the linear trend. However, these findings lacked face validity as the adjusted mean values differed widely from the descriptive trends, suggesting that this model was not a good fit to the data.

Table H-2-8. Differences in the pre–post change in perinatal episode of care outcomes for Medicaid beneficiaries in Ohio episode of care and comparison groups

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Percentage of all perinatal episodes with a delivery by C-section		
Year 1	0.67 (-0.13, 1.47)	1.19 (-0.01, 2.39)
Year 2	-0.26 (-1.25, 0.73)	0.59 (-1.50, 2.68)
Year 3	0.81* (0.02, 1.60)	1.97 (-0.49, 4.42)
Year 4	0.46 (-0.59, 1.51)	1.95 (-0.98, 4.87)
Overall	0.42 (-0.04, 0.87)	1.40** (0.30, 2.49)

(continued)

Table H-2-8. Differences in the pre–post change in perinatal episode of care outcomes for Medicaid beneficiaries in Ohio episode of care and comparison groups (continued)

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Percentage of vaginal birth episodes where the mother was screened for GBS		
Year 1	-1.06 (-2.23, 0.12)	-2.18*** (-3.36, -1.00)
Year 2	0.82 (-0.72, 2.35)	-0.91 (-3.30, 1.47)
Year 3	2.52** (0.86, 4.18)	0.05 (-3.60, 3.70)
Year 4	0.75 (-0.92, 2.42)	-2.14 (-5.84, 1.57)
Overall	0.76* (0.00002, 1.51)	-1.25 (-2.67, 0.17)
Percentage of all perinatal episodes where the mother was screened for HIV		
Year 1	-2.58 (-5.36, 0.20)	-5.98*** (-9.23, -2.73)
Year 2	1.04 (-1.81, 3.90)	-4.70** (-7.93, -1.47)
Year 3	3.61** (0.77, 6.44)	-5.03** (-9.15, -0.91)
Year 4	1.00 (-2.23, 4.24)	-8.46*** (-12.37, -4.55)
Overall	0.76 (-0.70, 2.21)	-5.92*** (-7.74, -4.10)
Percentage of all perinatal episodes where the mother had a follow up visit within 60 days after delivery		
Year 1	-1.10 (-2.32, 0.11)	-2.14** (-3.72, -0.57)
Year 2	0.91 (-0.20, 2.01)	-0.78 (-3.88, 2.33)
Year 3	1.27 (-0.01, 2.56)	-1.04 (-4.72, 2.64)
Year 4	0.35 (-1.02, 1.72)	-2.42 (-6.82, 1.98)
Overall	0.36 (-0.26, 0.98)	-1.55 (-3.18, 0.07)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: C-section = cesarean section; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; GBS = group B streptococcus; HIV = human immunodeficiency virus; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

(continued)

Table H-2-8. Differences in the pre–post change in perinatal episode of care outcomes for Medicaid beneficiaries in Ohio episode of care and comparison groups (continued)

Methods: The analysis used logistic regression models to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included a comparison state indicator variable to account for time-invariant differences across states.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation.

The total weighted N for each model is 604,132 (C-section); 428,665 (GBS); 504,208 (HIV); and 571,811 (follow up). These numbers include all episode-level observations for both the OH EOC and comparison groups. The N varies because the GBS model excludes vaginal birth episodes, the HIV model excludes 2015 due to a data anomaly in KY, and the follow up visit model excludes KY from the comparison group in all years due to potential data issues affecting multiple years. These numbers include all episode-level observations for both the OH EOC and comparison groups.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

Table H-2-9. Differences in the pre–post change in asthma episode of care outcomes for Medicaid beneficiaries in Ohio episode of care and comparison groups

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Percentage of episodes where the patient receives follow-up care within the post-trigger window		
Year 1	-1.74*** (-2.51, -0.96)	-0.73 (-2.62, 1.16)
Year 2	-1.13* (-2.16, -0.11)	0.54 (-2.70, 3.78)
Year 3	0.22 (-1.08, 1.52)	2.57 (-1.85, 6.99)
Year 4	0.13 (-1.51, 1.77)	3.15 (-2.15, 8.45)
Overall	-0.75** (-1.32, -0.18)	1.14 (-0.66, 2.94)
Percentage of patients on appropriate asthma medications within the trigger or post-trigger window		
Year 1	-5.95** (-10.31, -1.60)	13.68*** (10.18, 17.19)
Year 2	-6.96** (-11.59, -2.34)	23.85*** (16.55, 31.16)
Year 3	-3.34 (-7.54, 0.86)	34.97*** (27.36, 42.59)
Year 4	2.70 (-3.18, 8.58)	44.58*** (38.54, 50.62)
Overall	-4.03*** (-6.38, -1.67)	27.39*** (24.23, 30.55)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH EOC group relative to the comparison group after EOC model implementation.

The total weighted N for all models is 696,058. These numbers include all episode-level observations for both the OH EOC and comparison groups.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and TAF.

Appendix H-3: Ohio Statewide Results

H-3.1 Overview

The federal evaluation included statewide impact analyses for Ohio and Tennessee, the two SIM Round 2 states that met the following two criteria:

1. The state rolled out more than one health care payment or delivery model for a payer population. In a state that only launched one payment or delivery model via the SIM Initiative, the model-specific analyses describe the impact of that model. For states with more than one SIM payment or delivery model, the statewide analyses were an opportunity to examine the aggregate effects of more than one initiative.

2. The model-specific analyses for these states showed statistically significant impacts.

Under the SIM award, Ohio implemented two health care payment and delivery models in Medicaid, Ohio Comprehensive Primary Care (Ohio CPC) and episodes of care (EOCs). Ohio CPC is a patient-centered medical home (PCMH) model for primary care practices. The EOC model holds a single clinician or entity accountable for care across all services related to a given condition. In the Ohio CPC model, participating primary care practices received per member per month (PMPM) payments to provide care for attributed Medicaid beneficiaries. Some practices were also eligible for annual shared savings based on their performance on spending and quality measures. In the EOC model, providers received financial awards or penalties based on their performance on spending and quality measures. More information about the Ohio CPC and EOC models is available in ***Appendix H***.

Both the Ohio CPC and EOCs were evaluated as model-specific analyses. The model-specific analysis of the EOCs program focused on two episodes: perinatal and asthma episodes. The Ohio CPC analysis produced generally favorable outcomes for Ohio Medicaid beneficiaries in the Ohio CPC model relative to an in-state comparison group. Findings for the EOC analysis were only favorable for one perinatal outcome and were either unfavorable or not statistically significant for all other perinatal and asthma outcomes. The model-specific analyses are summarized in ***Appendix H*** and more detailed information about model impacts is available in ***Appendices H-1*** and ***H-2***.

The specific research question for the Ohio statewide impact analyses was:

- Is there evidence of SIM Initiative impacts on admissions, emergency department (ED) visits, and 30-day readmissions?

Table H-3-1 provides a snapshot of the study methods.

Table H-3-1. Methods snapshot

Method	Description
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	MAX and TAF data for January 2014 through December 2019.[79]
Sample	All non-dual Medicaid beneficiaries with full benefits who were enrolled in Medicaid in Ohio or a comparison state (Kansas or Kentucky) during the study period were included in the sample. The total weighted Ns for inpatient admissions and ED visits models are 29,156,590 and 2,859,829 for the readmissions model.
Timeframe	The timeframe for the impact analysis was January 1, 2014, through December 31, 2019. The intervention period was defined as the earliest point at which either of the models linked provider performance to payment. The intervention period began on January 1, 2016, when the EOC model first tied performance on perinatal and asthma episode quality measures and spending to financial awards and penalties. (The Ohio CPC model did not launch until 2017.)
Measures	The measures for the statewide impact analyses included the utilization core measures for the federal evaluation of Round 2 of the SIM Initiative, admissions, outpatient ED visits, and readmissions.[80]
Statistical analysis	Inpatient admissions and readmissions were binary and modeled with logistic regression models. The ED visits outcome was a count variable and modeled with a negative binomial model. All observations in the comparison group were multiplied by a propensity score weight and the eligibility fraction. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables.[81]

Note: CPC = Comprehensive Primary Care; D-in-D = difference-in-differences; ED = emergency department; EOC = episode of care; MAX = Medicaid Analytic eXtract; TAF = Transformed Medicaid Statistical Information System Analytic Files.

A full description of each model and a summary of the key impact analysis findings are available in ***Appendix H***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix H-3*** provide detailed information regarding statewide impact findings in tables and figures:

- ***Section H-3.2*** presents results of difference-in-differences (D-in-D) analyses for the utilization outcomes;

[79] During the analysis timeframe, the Centers for Medicare and Medicaid Services transitioned from producing Medicaid data in the MAX format to the TAF format. The exact date of the transition from MAX to TAF varies by state. For more information about this transition, see ***Appendix L***.
[80] Because more than 85 percent of Ohio's Medicaid population is in Medicaid managed care, it is not possible to construct reliable spending outcomes for Ohio and comparison states in MAX and TAF data. Medicaid managed care plans' payments to providers were zeroed out in MAX data and were not well-populated in TAF data.
[81] Unlike the Tennessee statewide analysis, the Ohio statewide analysis did not include comparison state indicator variables. D-in-D models for Ohio that included an indicator variable for residence in Kentucky (with Kansas as a referent category) failed to converge.

- ***Section H-3.3*** provides information on covariate balance between Medicaid beneficiaries in Ohio and the out-of-state comparison beneficiaries before and after propensity score weighting;
- ***Section H-3.4*** describes trends in utilization outcomes over the analysis timeframe; and
- ***Section H-3.5*** presents results from a sensitivity analysis that shows how D-in-D estimates for utilization outcomes when assumptions about Ohio and comparison group trends change.

H-3.2 Estimates of Statewide Impact on Utilization Outcomes

Table H-3-2 show annual and overall estimates of the Ohio's statewide impact on utilization outcomes for Ohio Medicaid beneficiaries. These impact estimates come from D-in-D models, which are described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for Medicaid beneficiaries in Ohio and out-of-state comparison beneficiaries during the baseline period and the intervention period;
- D-in-D estimates of the statewide impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

H-3.2.1 Estimates of the statewide impact on utilization outcomes

Table H-3-2 shows the statewide estimates of the impact on outcomes for Ohio Medicaid beneficiaries relative to out-of-state beneficiaries. The findings are as follows:

- Inpatient admissions remained almost unchanged for Ohio Medicaid beneficiaries but decreased for comparison beneficiaries, resulting in a relative increase of 3.55 admissions per 1,000 beneficiaries in Ohio during the first four years following SIM payment model implementation.
- ED visits decreased for both Ohio Medicaid beneficiaries and comparison beneficiaries but decreased by 157.65 fewer visits per 1,000 beneficiaries in Ohio during the first four years following SIM payment model implementation ($p<0.001$).
- Changes in readmissions did not differ between Ohio Medicaid beneficiaries and comparison beneficiaries during the first four years of the SIM following SIM payment model implementation.

Table H-3-2. Differences in the pre–post change in outcomes for Ohio Medicaid beneficiaries and comparison state beneficiaries

Outcome	Baseline period adjusted mean, OH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient admissions per 1,000 beneficiaries							
Year 1	86.90	92.64	85.29	92.79	-1.75 (-2.89, -0.61)	-2.0	0.01
Year 2	86.90	92.64	89.49	86.76	8.10 (3.63, 12.57)	9.3	0.003
Year 3	86.90	92.64	87.30	89.80	3.20 (1.03, 5.37)	3.7	0.02
Year 4	86.90	92.64	86.00	87.03	4.72 (1.56, 7.88)	5.4	0.01
Overall	86.90	92.64	87.05	89.13	3.55 (2.05, 5.06)	4.1	<0.001
ED visits per 1,000 beneficiaries							
Year 1	1214.08	1040.20	1180.32	907.35	120.82 (99.47, 142.17)	10.0	<0.001
Year 2	1214.08	1040.20	1158.92	876.68	135.02 (102.77, 167.28)	11.1	<0.001
Year 3	1214.08	1040.20	1130.43	825.87	169.20 (129.90, 208.49)	13.9	<0.001
Year 4	1214.08	1040.20	1137.76	799.80	210.91 (166.87, 254.95)	17.4	<0.001
Overall	1214.08	1040.20	1152.43	853.99	157.65 (140.27, 175.03)	13.0	<0.001

(continued)

Table H-3-2. Differences in the pre–post change in outcomes for Ohio Medicaid beneficiaries and comparison state beneficiaries (continued)

Outcome	Baseline period adjusted mean, OH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
30-day readmissions per 1,000 discharges							
Year 1	164.06	151.52	172.54	161.93	-2.63 (-8.16, 2.90)	-1.6	0.43
Year 2	164.06	151.52	175.47	154.50	8.44 (4.34, 12.54)	5.1	<0.001
Year 3	164.06	151.52	176.87	163.73	-0.21 (-5.01, 4.58)	-0.1	0.94
Year 4	164.06	151.52	177.06	162.25	1.66 (-5.54, 8.86)	1.0	0.71
Overall	164.06	151.52	175.49	160.67	1.89 (-0.82, 4.61)	1.2	0.25

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for inpatient admissions and 30-day readmissions and a negative binomial model for ED visits. The estimated probabilities of all outcomes were multiplied by 1,000 to obtain a rate per 1,000. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, and percentage uninsured). All outcome models assume that OH and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the OH group relative to the comparison group after SIM model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH group relative to the comparison group after SIM model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the OH group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for inpatient admissions and ED visit models is 29,156,590 and 2,859,829 for the readmissions model. These numbers include all observations for both OH and the comparison group.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-3.3 Covariate Balance Between Ohio and the Comparison Group

As described in ***Appendix L**,* the analysis created annual propensity scores for the comparison sample at the person-year level and the inpatient discharge level.

Table H-3-3 shows covariate balance between Ohio Medicaid beneficiaries and the comparison group in the last baseline year at the person-year level. (Covariate balance in the person-year level sample in other years and for the discharge-level sample is not shown.) The covariate balance table includes the following:

- The covariate means for Ohio and the comparison groups without propensity score weighting;
- The standardized difference between Ohio and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between Ohio means and the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores were estimated using logistic regressions in which the dependent variable was an indicator of residing in Ohio.

All covariates in ***Table H-3-3*** were included in the propensity score models, except for the percentage without health insurance, which was excluded to optimize balance on the other covariates. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table H-3-3 shows balance between Ohio and comparison group covariates before and after applying weights for Medicaid beneficiaries. The findings for the last baseline year are displayed; all years showed similar results. ***Table H-3-3*** shows that, for the Ohio statewide analysis, the standardized differences before weighting reflected poor balance between the groups for county-level variables; individual-level variables showed good balance. After weighting, all standardized differences for the individual-level variables were well below the 0.1 threshold considered to indicate acceptable balance for these analyses. For the county-level variables, three covariates (percentage residing in a Metropolitan Statistical Area, percentage living in poverty, and hospital beds per 1,000) still had a weighted standardized difference above the 0.1 threshold, likely due to lack of variation in these covariates.

Table H-3-3. Covariate balance between Ohio and the comparison group in the last baseline year

Variable	Unweighted mean or percentage, OH	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Age in years	54.05	53.31	0.01	53.99	0.001
Age in years squared	23.8	21.4	0.14	23.6	0.01
Child	875.4	736.7	0.14	863.4	0.01
Percentage of people who are disabled	44.71	50.65	0.12	45.19	0.01
Number of months enrolled in year	5.31	8.52	0.13	5.02	0.01
CDPS risk score, logged[a]	10.5	10.7	0.08	10.4	0.02
County level					
Percentage of people residing in a Metropolitan Statistical Area	80.17	56.02	0.54	74.38	0.14
Percentage of people living in poverty [2016]	15.6	18.5	0.52	16.6	0.21
Hospital beds per 1,000 people [2015]	3.5	3.8	0.11	4.4	0.29
Median age in years [2010]	38.7	37.7	0.34	38.5	0.10
Percentage of people (under 65) without health insurance [2016]	7.8	8.3	0.24	7.7	0.06
PCPs per 1,000 people [2016]	0.8	0.7	0.44	0.8	0.07

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

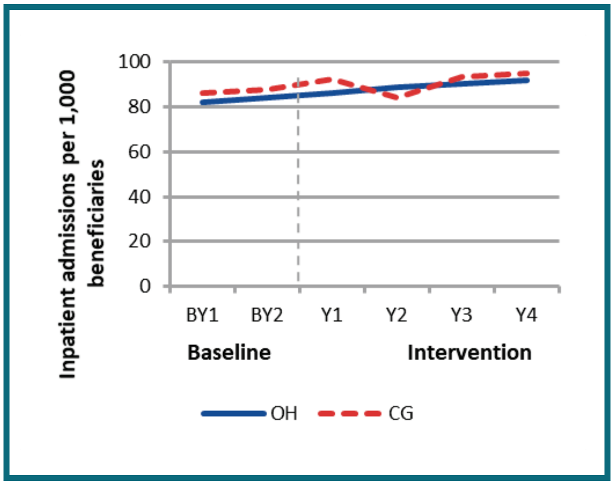
CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; PCP = primary care provider; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

H-3.4 Trends in Statewide Ohio Outcomes

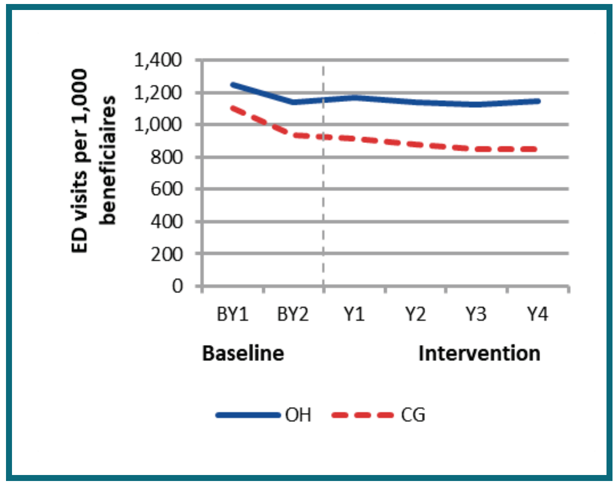
- ***Figures H-3-1*** through ***H-3-3*** show propensity score-weighted trends for utilization outcomes for Ohio and the comparison group. Trends for inpatient admissions and readmissions increased over the study period for both groups, while ED visit rate trends declined for both groups from the baseline to the intervention period. As described in ***Appendix L***, visual inspection of baseline trends in treatment and comparison groups was used to determine D-in-D model specification. However, because the baseline period for this analysis only has two data points, there is not enough information to determine whether the baseline trends for Ohio and the comparison group are parallel. As a result, all D-in-D models for this analysis are specified to assume that the trends for the Ohio and comparison group are parallel during the baseline period. Inpatient admissions per 1,000 beneficiaries increased from the baseline period to the intervention period for both Ohio and the comparison group, although there was a slight decrease from Year 1 to Year 2 of the intervention period for the comparison group (***Figure H-3-1***).
- ED visits per 1,000 beneficiaries declined for both Ohio and the comparison group from the baseline period to the intervention period (***Figure H-3-2***).
- The 30-day readmission rate increased for Ohio and the comparison group from the baseline period to the intervention period (***Figure H-3-3***).

Figure H-3-1. Trends in inpatient admissions per 1,000 beneficiaries for Ohio and the comparison group



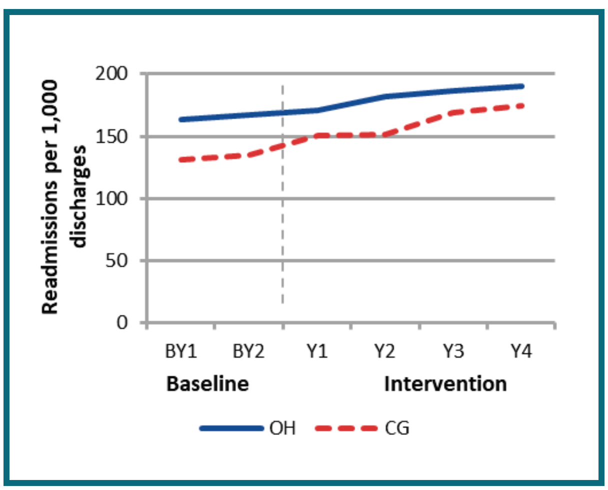
Note: BY = baseline year; CG = comparison group; OH = Ohio; Y = year.

Figure H-3-2. Trends in the emergency department visits per 1,000 beneficiaries for Ohio and the comparison group



Note: BY = baseline year; CG = comparison group; ED = emergency department; OH = Ohio; Y = year.

Figure H-3-3. Trends in the rate of 30-day readmissions per 1,000 discharges for Ohio and the comparison group



Note: BY = baseline year; CG = comparison group; OH = Ohio; Y = year.

Source: Federal Evaluation Team analysis of Ohio, Kansas, and Kentucky claims data from the Medicaid Analytic eXtract (MAX) and the Transformed Medicaid Statistical Information System Analytic Files (TAF).

H-3.5 Sensitivity Analysis

Table H-3-4 shows how the impact estimates for Ohio for utilization outcomes differed when the D-in-D models assumed the following: (1) parallel trends in outcomes between Ohio and the comparison group beginning in baseline period (same as the main analysis reported in ***Table H-3-2***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). As noted below, the findings for inpatient admissions and 30-day readmissions were robust to the inclusion of a differential trend, but the findings for ED visits were not the same in the sensitivity analysis.

- The overall inpatient admissions D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming non-parallel trends, found a larger estimate (in absolute value).
- The sign on the overall ED visits D-in-D estimate was positive in the main analysis but negative in the sensitivity analysis. The D-in-D estimate was statistically significant for both the main analysis and the sensitivity analysis.
- The readmissions D-in-D estimate was not statistically significant in either approach.

Table H-3-4. Differences in the pre–post change in utilization outcomes for Medicaid beneficiaries in Ohio and the comparison group

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Inpatient admissions per 1,000 beneficiaries		
Year 1	-1.75** (-2.89, -0.61)	-0.39 (-2.83, 2.05)
Year 2	8.10*** (3.63, 12.57)	10.24*** (7.72, 12.75)
Year 3	3.20** (1.03, 5.37)	6.41* (0.67, 12.14)
Year 4	4.72** (1.56, 7.88)	8.86** (1.98, 15.73)
Overall	3.55*** (2.05, 5.06)	6.22*** (3.89, 8.56)
ED visits per 1,000 beneficiaries		
Year 1	120.82*** (99.47, 142.17)	13.91 (-16.87, 44.68)
Year 2	135.02*** (102.77, 167.28)	-44.03 (-96.01, 7.94)
Year 3	169.20*** (129.90, 208.49)	-80.94 (-172.40, 10.53)

(continued)

Table H-3-4. Differences in the pre–post change in utilization outcomes for Medicaid beneficiaries in Ohio and the comparison group (continued)

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Year 4	210.91*** (166.87, 254.95)	-117.08 (-250.23, 16.06)
Overall	157.65*** (140.27, 175.03)	-55.38** (-97.05, -13.71)
30-day readmissions per 1,000 discharges		
Year 1	-2.63 (-8.16, 2.90)	-4.19 (-11.05, 2.68)
Year 2	8.44*** (4.34, 12.54)	5.83 (-8.73, 20.40)
Year 3	-0.21 (-5.01, 4.58)	-4.11 (-26.40, 18.19)
Year 4	1.66 (-5.54, 8.86)	-3.40 (-31.26, 24.45)
Overall	1.89 (-0.82, 4.61)	-1.36 (-11.03, 8.30)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; OH = Ohio; TAF = Transformed Medicaid Statistical Information System Analytic Files.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for inpatient admissions and 30-day readmissions and a negative binomial model for ED visits. The estimated probabilities of all outcomes were multiplied by 1,000 to obtain a rate per 1,000. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, and percentage uninsured).

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome in the OH group relative to the comparison group after SIM model implementation. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the OH group relative to the comparison group after SIM model implementation.

The total weighted N for inpatient admissions and ED visit models is 29,156,590 and 2,859,829 for the readmissions model. These numbers include all observations for both OH and the comparison group.

Source: Federal Evaluation Team analysis of OH, KS, and KY claims data from the MAX and the TAF.

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Appendix I: State Innovation Model in Model Test States: Rhode Island

Payment Model Development

- To advance value-based payments (VBPs), Rhode Island expanded patient-centered medical homes (PCMHs) and aligned commercial payers' and Medicaid's transformation goals.
- Patient-Centered Medical Home-Kids (PCMH-Kids) increased primary care visits but did not consistently lower costs or increase quality of care compared to their non-PCMH-Kids counterparts.
- Integrated behavioral health (IBH) improved primary care provider (PCP) capacity to treat behavioral health conditions.

Delivery Model Transformation

- Community Health Teams (CHTs) worked with PCPs to assess needs and connect high-risk patients with services.
- Providers received training on new payment models, behavioral health conditions, and patients' care planning.

Health IT and Data Analytics

- The care management dashboards, integrated services data ecosystem, and all-payer claims database (APCD) helped improve quality reporting and care delivery.

Population Health

- An assessment, referral, and treatment project produced and disseminated information about smoking cessation services.
- SIM investments fostered connections among CHTs, health equity zones (HEZs), and Accountable Entities to improve population health.

Sustainability

- Almost all SIM Initiative investments will be sustained through a combination of private and public resources.
- A new Planning and Research Unit will implement activities and support collaboration.
- Without evidence of cost savings and return on investment, continued expansion of PCMH-Kids may be challenging.

Implications

- Key factors in the RI SIM Initiative's success were engaging stakeholders early, creating a business case attractive to payers, and fostering agency, stakeholder, and community collaboration.
- Despite delays, a multi-stakeholder Steering Committee with implementation authority helped create strong stakeholder buy-in and plans for sustainability.

I.1 Key State Context and the Rhode Island State Innovation Model Initiative

I.1.1 Pre-State Innovation Model health care in Rhode Island

Rhode Island's history of support for provider and payer transition to value-based care began well before the SIM Initiative. Since 2008, when the state launched a multi-payer initiative to advance the spread of patient-centered medical homes (PCMHs) across the state, Rhode Island has used its regulatory and contractual authority to increase adoption of alternative payment models (APMs) among commercial and public payers (***Exhibit I-1***). Rhode Island is unique in that it is the only state in the country with a health insurance commissioner. Over the past decade, the Office of the Health Insurance Commissioner (OHIC) has played a key role in moving its four commercial insurers away from fee-for-service (FFS) payment mechanisms toward greater adoption of APMs. Every year, OHIC promulgates a set of "regulations, called the affordability standards requiring insurers to invest in primary care and set annual targets for PCMH and APM participation (State of Rhode Island Office of the Health Insurance Commissioner, n.d.-b).

Beginning in 2015, State leadership took additional steps to further the expansion of APMs in Medicaid. In February 2015, the Governor signed an executive order to create a Working Group to Reinvent Medicaid, which outlined an approach to increasing value-based care delivery for public insurers. To align with OHIC's delivery reform strategy, Medicaid adopted the same APM targets for participating Medicaid managed care organizations (MCOs) as those required for commercial health plans. In early 2016, Medicaid also launched an Accountable Entity (AE) initiative requiring Medicaid MCOs contract with integrated provider organizations on a total cost-of-care basis. Although Medicaid AEs did not receive direct SIM funding, a key objective of SIM leadership was alignment between commercial and Medicaid health transformation goals. (State of Rhode Island The Executive Office of Health and Human Services, n.d.-a)

Exhibit I-1. Rhode Island made significant investments in value-based care prior to the SIM Initiative

Only state with a health insurance commissioner that **mandates APM adoption by commercial payers**

Concentrated payer market with significant VBP models prior to SIM, including extensive adult PCMH

Multi-payer PCMH initiative supported by Medicaid and all 4 commercial insurers

Existing **all-payer claims database to support implementation and evaluation of APMs**

Note: APM = alternative payment model; PCMH = patient-centered medical home; SIM = State Innovation Models; VBP = value-based payment.

Source: Federal Evaluation Team review of state documents.

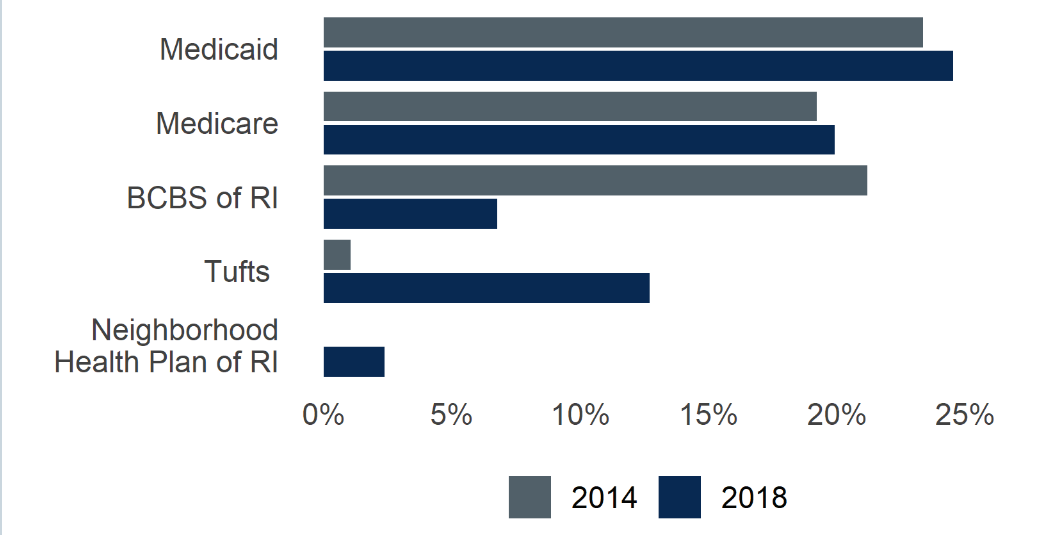
The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Rhode Island was relatively concentrated. Together, commercial health insurers make up the largest share of the market in 2014, followed by Medicaid and then Medicare, though Medicaid became the dominant insurer by 2018 (see ***Exhibits 8-5*** and ***8-6***).

Between 2014 and 2018 both public payers increased the percentage of insured lives they covered (see ***Exhibit I-2***). During that same time, the commercial insurer with the largest share of covered lives changed from Blue Cross Blue Shield of Rhode Island to Tufts Group.

A majority of Rhode Island practices were small and located in urban areas. In 2015, less than 1 percent of primary care practices were located in rural areas and 62 percent had a single provider. Seventeen percent of primary care practices had an existing involvement in Medicare's FFS APM.[82]

[82] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit I-2. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Rhode Island shown)



Note: BCBS = Blue Cross Blue Shield; HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners; RI = Rhode Island.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

I.1.2 State Innovation Model Initiative in Rhode Island

The Rhode Island SIM Initiative built on the state's existing foundation for delivery system reform by investing in a wide range of investments designed to improve access to value-based, integrated care. By fostering a "culture of collaboration"[83] across multiple state agencies and stakeholder groups, SIM leadership bolstered the state's vision for transformation by expanding the state's PCMH initiative to kids, furthering the integration of behavioral health and primary care, and implementing new health information technology (health IT) tools to aid in quality reporting and care delivery. The state also invested in training the health care workforce to address the clinical and social needs of individuals with complex conditions. In total, the SIM Initiative funded almost 15 different projects in practice transformation, workforce, health IT, and patient engagement.

[83] The project director was highly regarded for her ability to achieve broad representation and consensus among state policy officials, providers, payers, and community groups on the SIM Initiative Steering Committee. Additionally, the SIM Initiative's project team was comprised of representatives from multiple state agencies, which helped encourage alignment across existing delivery reform initiatives in the state.

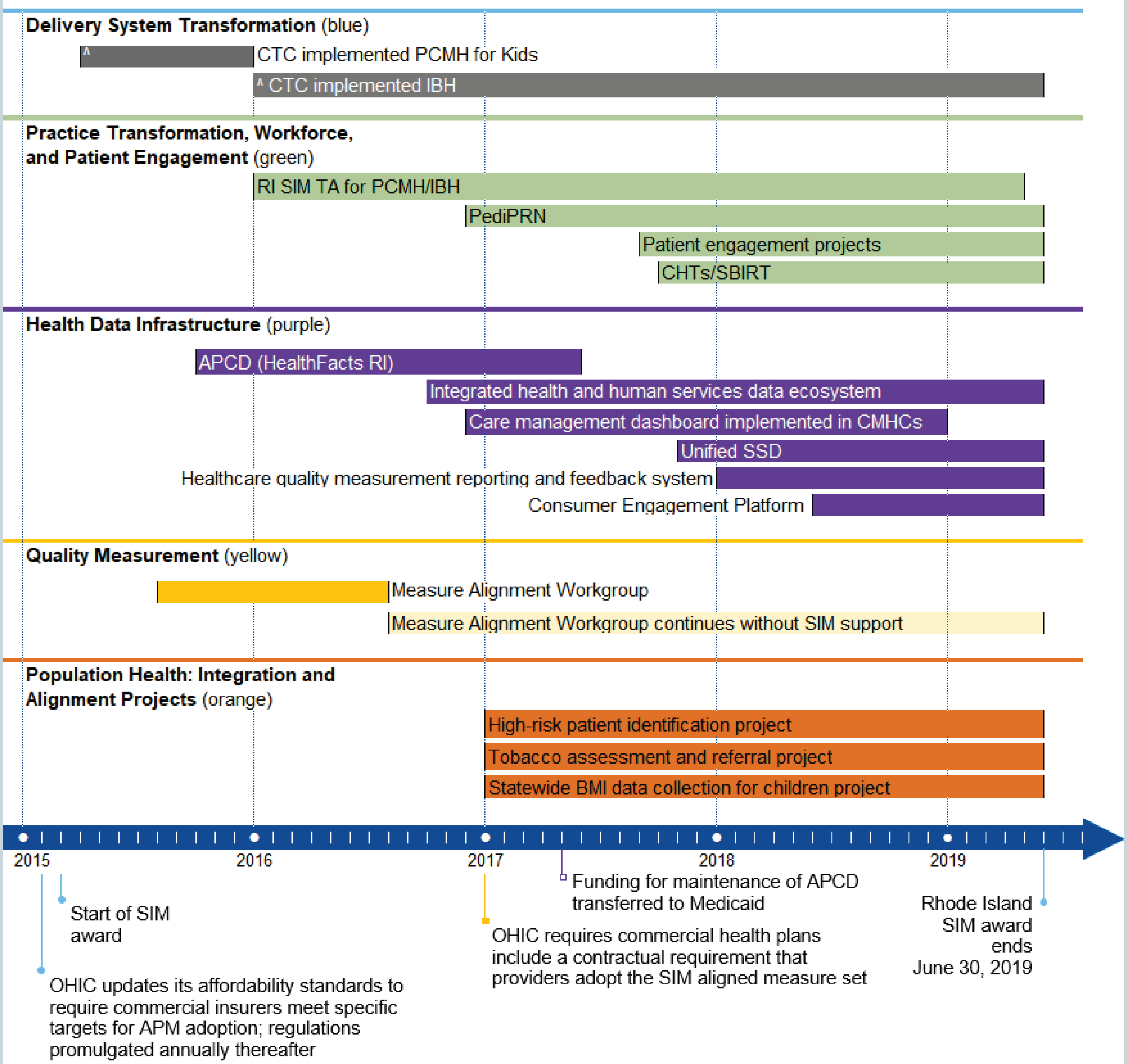
During the planning phase of the Model Test award, Rhode Island experienced challenges recruiting staff and managing a Steering Committee to guide the selection of SIM investments.[84] As a result, full project implementation did not begin until July 2016. Although the state's staffing model and its Steering Committee were key to Rhode Island's success, they did delay project implementation. For example, all Steering Committee decisions were made using a consensus model, which helped facilitate buy-in and support, but was also time consuming. Similarly, challenges navigating the state's complex procurement process impeded the state's ability to launch projects in a timely manner. As a result, some projects outlined in the state's original operational plan were not completed during the three-year SIM award cycle. Nonetheless, almost all SIM-supported investments were sustained after the end of the SIM Initiative—a testament to the state's strong leadership team, dedicated staff, and robust stakeholder engagement.

> "… RI SIM is committed to an integrated approach to the physical and behavioral health needs of Rhode Islanders, carried out by moving from an FFS health care system to one based on value that addresses the social and environmental determinants of health. Our major activities are providing support to the health care providers and patients making their way through this new health care system."
>
> —Rhode Island SIM Operational Plan, May 2018

SIM Initiative implementation in Rhode Island began in July 2016 and ended in June 2019. ***Exhibit I-3*** depicts the timeline of major Rhode Island SIM Initiative and SIM-related activities.

[84] For additional details on the RI Steering Committee see prior SIM Annual Reports.

Exhibit I-3. Timeline of Rhode Island SIM and SIM-related activities



Notes: Gray bars (with ^) denote that the items are not SIM activities or policies but are important for context.

APCD = all-payer claims database; APM = alternative payment model; BMI = body mass index; CHT = Community Health Team; CMHC = community mental health center; CTC = Care Transformation Collaborative; IBH = integrated behavioral health; OHIC = Office of the Health Insurance Commissioner; PCMH = patient-centered medical home; PediPRN = Pediatric Psychiatry Resource Network; RI = Rhode Island; SBIRT = Screening, Brief Intervention, and Referral to Treatment; SIM = State Innovation Model; SSD = Social Services Directory; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

I.2 Accomplishments from Rhode Island's State Innovation Model Initiative

This section summarizes Rhode Island's SIM award activities, accomplishments, and stakeholder feedback into three sections: delivery models and payment reform (***Section I.2.1***), enabling strategies to support health care delivery transformation (***Section I.2.2***), and population health (***Section I.2.3***). The chapter concludes with a summary of Rhode Island's efforts to sustain SIM activities and progress on reforms after the SIM award period ended (***Section I.3***) and a discussion of implications and lessons learned from Rhode Island's experience (***Section I.4***).

The evaluation of Rhode Island's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM Initiative officials;
- A total of 78 interviews with state officials, primary care and behavioral health providers, Medicaid and commercial plan representatives, and consumer advocacy organizations over four annual interview rounds conducted since 2016, most recently in spring 2019;
- Focus groups with primary care practices participating in the Patient-Centered Medical Home-Kids (PCMH-Kids) and integrated behavioral health (IBH) initiatives and community mental health centers (CMHCs), as well as Medicaid beneficiaries served by these primary care providers (PCPs); and
- Commercial and Medicaid claims for calendar years 2013–2018.

The quantitative impact analysis used Medicaid and commercial claims to examine changes to health care spending, utilization, and quality for children attributed to PCMH-Kids practices relative to children attributed to non–PCMH-Kids practices. The analysis focused on PCMH-Kids because—when fully implemented—the initiative reached approximately 80 percent of Medicaid-enrolled children and half of the commercial pediatric population. The analysis examined the effects of PCMH-Kids only on children attributed to the first practice cohort, because only the first cohort received SIM-funded practice transformation assistance; the second and third cohorts received technical assistance (TA) funded by non-SIM sources.

I.2.1 Delivery models and payment reforms

Key Results
• PCMH-Kids expanded in July 2019 to include 17 additional practice sites (Care Transformation Collaborative of Rhode Island, n.d.)—bringing the total coverage of the 37 PCMH-Kids practices to approximately half the commercially insured pediatric population and more than 80 percent of pediatric Medicaid enrollees.
• Although the first cohort of PCMH-Kids practices showed a favorable increase in primary care visits compared to non-PCMH-Kids counterparts, total spending and inpatient admissions also increased.
• Providers universally praised the state's PCMH IBH pilot for expanding access to care for patients with mental health or substance needs and successfully educating providers on treating behavioral health conditions.

In January 2016, the state's SIM Initiative awarded a three-year TA contract to the Care Transformation Collaborative of Rhode Island (CTC-RI). CTC-RI, a stakeholder collaborative, was created in 2008 to foster spread of the PCMH model across the state. Beginning January 2016, CTC-RI used SIM Initiative funds to support practice transformation activities for nine PCPs transitioning into PCMH-Kids, as well as 10 adult primary care practices interested in becoming IBH practices. Pediatric medical homes were specifically designed to address the unique needs of children and adolescents, including behavioral health. SIM-funding also supported IBH practices which received enhanced training and education to deliver better coordinated primary and behavioral health care to adults. As of July 2019, approximately 110,000 children were enrolled in 37 PCMH-Kids practices and 42,000 adults in 10 IBH practices.[85] It is noteworthy that Rhode Island's PCMH multi-payer initiative was supported by Medicaid and all four commercial insurers in the state. ***Table I-1*** highlights the payment and delivery system reforms supported by the Rhode Island SIM Initiative and their respective accomplishments and challenges.

[85] This represents total participation in the PCMH-Kids initiative after the initial SIM-supported pilot with nine primary care practices. Two cohorts were added to the original pilot as part of the state's PCMH-Kids expansion—Cohort 2 in July 2017 and Cohort 3 in July 2019. The expansion cohorts were not supported with SIM funding.

Table I-1. Rhode Island's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
PCMH-Kids	Medicaid and commercial pediatric population enrolled in 37 participating primary care practices	• In July 2019, commercial health plans and Medicaid approved a third expansion (Cohort 3) of PCMH-Kids to 17 additional practices, bringing the total number of practices participating in PCMH-Kids to 37. • Although PCMH-Kids funding was secured through 2022, mixed results on demonstrable savings from the program raised concerns about continued expansion after the end of the SIM Initiative. • PCMH certification continued to be a burdensome and costly process for providers.	• Medicaid and commercial health plans with additional support from Tufts and the American Academy for Pediatrics to support TA
IBH PCMH initiative	Medicaid and commercial adult population enrolled in 10 adult primary care practices	• Secured funding from United Health Care to expand the IBH practice transformation support to 10 additional practice sites through February 2020. • Provider participants praised the program's impact on expanding capacity to treat patients with mental health and substance needs. • Administrative barriers that impeded integration—such as inconsistent billing policies across payers, and dual co-pays for patients seeing a primary care doctor and BH professional during the same visit—remained unresolved. • Long-term sustainability was uncertain, as only one commercial payer was funding the next phase of practice transformation assistance for the 10 participating IBH practices. • A Brown University evaluation found that CHTs produced cost savings of $2.85 for every $1 spent.[a]	• United Health Plan to fund practice transformation support for 10 additional practices • Rhode Island Foundation, United, Tufts, and BCBS committed to funding the two cohort children's IBH pilot through 2023

Notes: [a] https://www.ctc-ri.org/community-health-team-overview-results

BCBS = Blue Cross Blue Shield; BH = behavioral health; CHT = Community Health Team; IBH = integrated behavioral health; PCMH = patient-centered medical home; PCMH-Kids = Patient-Centered Medical Home-Kids; SIM = State Innovation Model; TA = technical assistance.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Patient-Centered Medical Home-Kids

Providers expressed satisfaction with the support and TA they received through PCMH-Kids. The Rhode Island SIM Initiative supported practice transformation and quality improvement efforts for PCMH-Kids practices by funding on-site TA and virtual learning collaboratives. Participating practices received assistance from coaches who helped practices collect data for quality measurement, develop workflows to support quality assurance, improve

> "So I can speak for our practice and for myself. It's been extremely transformative. We've really started to move into a different way of being able to care for our patients and expand our teamwork and care coordination."
>
> —Rhode Island PCMH-Kids provider

patient and family centered care processes, and enhance capacity to screen for and treat behavioral health issues.

Additionally, through funding from health plans, many practices hired social workers as care coordinators to help care for complex patients. Providers participating in PCMH-Kids consistently described improvements in their capacity to address behavioral and mental health needs within their facilities—noting greater awareness of mental health issues among providers and increasing behavioral and mental health screening rates. Participating providers further praised PCMH-Kids for helping to improve care coordination and referral processes, by educating providers on the resources available to better address the needs of children with chronic illnesses.

> “The real challenge is feeding the monster because all of this stuff is really expensive. Nurse care managers are expensive, data analysts are expensive, maintaining the EHR in order to extract the data is expensive, the physician and nurse practitioner time to do all of this is expensive.”
>
> —Rhode Island PCMH-Kids provider

Over the course of the SIM Initiative, providers and other stakeholders consistently reported challenges associated with meeting the annual PCMH (National Committee for Quality Assurance [NCQA]) certification standards. An ongoing frustration for pediatricians was that the per member per month (PMPM) payment for PCMH-Kids practices ($3.50) was $2.00 less than the analogous payment for adult practices ($5.50). When designing the program, the state’s assumption was that treating children was less expensive than treating adults. However, since all PCMHs had to meet the same NCQA certification and reporting requirements, regardless of the population they served, paying PCMH-Kids practices a lower PMPM was counterintuitive. With additional financing from Medicaid in 2019, the state increased the PMPM payment for pediatric practices from $3.00 to $3.50, but according to one provider “this is still just a drop in the bucket.”

The claims-based analysis of the PCMH-Kids initiative showed that the first cohort of practices did not consistently realize improvements in spending and utilization for attributed Medicaid and commercially insured children, relative to pre-implementation and post-implementation trends for children attributed to their comparison counterparts (see ***Exhibit I-4***). Practice-level changes appeared to have translated into greater increases in PCP visits for children attributed to PCMH-Kids practices. Primary care provider visits increased for the Medicaid PCMH-Kids group, the commercial PCMH-Kids group, and their respective comparison groups, but increased more in both PCMH-Kids groups (185.15 visits per 1,000 Medicaid-covered children; 88.55 visits per 1,000 commercially insured children). However, spending from increased PCP use was not offset by relative reductions in inpatient admissions or ED visits. The inpatient admission rate did not change for Medicaid-covered children in PCMH-Kids but decreased among comparison group, leading to a relative increase in the admission rate for the Medicaid PCMH-Kids group (2.89 admissions per 1,000 Medicaid-covered children).

Similarly, the ED visit rate for Medicaid-covered children in PCMH increased, while the rate for comparison group did not change, resulting in a relative increase in the ED visit rate for the Medicaid PCMH-Kids group (32.27 ED visits per 1,000 population). For commercially insured children, the inpatient admission rate decreased for both children in PCMH-Kids and the comparison groups but decreased slightly less for children in PCMH-Kids (4.43 admissions per 1,000 commercially insured children). Changes to the ED visit rate did not differ between the commercially insured PCMH-Kids group and the comparison group. The ED visit rate finding contrasts with the state-led evaluation—which only compared changes during the post-implementation period (rather than comparing pre-implementation and post-implementation trends)—and showed a small reduction in ED visits for PCMH-Kids patients relative to a comparison group (Care Transformation Collaborative of Rhode Island, n.d.).

Exhibit I-4. Rhode Island's Patient-Centered Medical Home-Kids had unfavorable impacts on spending, emergency department visits and favorable impacts on primary care provider visits, well-child visits, and adolescent well-care visits in its first three years

106,930 Medicaid beneficiaries
106,340 commercial plan members
(9 primary care practices)

RHODE ISLAND PCMH-KIDS

	Commercial	Medicaid
Spending	☒ Total spending PMPM: Smaller decrease	☐ Total spending PMPM
Utilization	☐ ED visits ☑ PCP visits: Larger increase	☒ ED visits: Larger increase ☑ PCP visits: Larger increase
Quality	☐ Adolescents with well care visits	☑ Adolescents with well care visits: Larger increase

☑ Favorable, statistically significant ☒ Unfavorable, statistically significant ☐ Not statistically different

Notes: Changes are relative to a comparison group. A checkmark indicated a favorable impact.

ED = emergency department; PCMH = patient-centered medical home; PCP = primary care provider; PMPM = per member per month; RI = Rhode Island.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health. See ***Appendix I-1*** for more detail.

Claims-based analyses of Rhode Island's PCMH-Kids

For more information, see ***Table I-5*** in the Addendum at end of this chapter. For full results describing the impact of PCMH-Kids on Medicaid and commercially insured populations, see ***Appendix I-1***.

Changes to total Medicaid spending did not differ between PCMH-Kids children and the comparison children. For commercially insured children, total spending decreased for both children in PCMH-Kids and the comparison group but decreased less for children in PCMH-Kids than for comparison children ($32.71 PMPM for commercially insured children). This increase may result from more appropriate utilization—since PCMH-Kids providers praised the TA they received as part of PCMH-Kids participation for increasing their ability to: (1) detect mental health issues, and (2) make referrals based on greater knowledge of resources available.

Results for claims-based analysis of spending and utilization among children with a behavioral health condition were similar to those for all children (see ***Appendix I-1.3***).[86] Notably, unfavorable increases in total spending PMPM (Medicaid and commercial), ED visits per 1,000 population (Medicaid only), and behavioral health–related spending PMPM (Medicaid only) for children in PCMH-Kids than for comparison children were *larger* among children with a behavioral health condition than among all children. These differences were partly due to higher baseline spending and utilization but may also reflect greater unmet health care needs prior to the SIM Initiative.

Practice-level changes appeared to have translated into some primary care-related quality improvements. The percentage of Medicaid-covered children aged 3 to 6 with at least one well-child visit during a year increased for both the PCMH-Kids and comparison groups but increased more in the PCMH-Kids group (5.22 percentage points among Medicaid-covered children). Similarly, the percentage of Medicaid-covered adolescents aged 12 to 17 with at least one well-care visit during a year increased for both the PCMH-Kids and comparison groups but increased more in the PCMH-Kids group (4.52 percentage points among Medicaid-covered adolescents). On the other hand, among commercially insured children, changes to well-care visits for children aged 3 to 6 years and adolescent well-care visits did not differ between the PCMH-Kids group and the comparison group. The percentage of children with asthma who remained on asthma medication for at least 75 percent of the year increased for both commercially insured children in the PCMH-Kids and comparison groups but increased more among the PCMH-Kids group than in the comparison group (14.06 percentage points among commercially insured children). Changes to asthma medication adherence did not differ between the Medicaid PCMH-Kids group and the comparison group.

[86] Children with a behavioral health condition are defined as having a mental health, chemical dependency, or developmental disorder; attention deficit disorder (ADD) or attention deficit/hyperactivity disorder (ADHD); or tobacco use diagnosis during the year.

Integrated behavioral health

The SIM Initiative funded practice facilitation activities for PCPs participating in the Care Transformation Collaborative's IBH initiative.[87] Specifically, SIM Initiative monies supported a clinical psychologist to provide individualized TA and training to each IBH practice.

Participating practices also employed a licensed social worker with behavioral health training to coordinate care for patients and connect them with additional services. Providers participating in the IBH initiative universally praised the pilot for not only educating providers on how best to treat patients with a behavioral health condition, but also on expanding access to care for patients with mental health and substance needs. Pilot participants also provided examples of enhanced coordination and communication among providers that did not necessarily collaborate prior to IBH. One nurse care manager described co-facilitating diabetes support groups with a psychologist to help patients develop coping skills and behavior change strategies. Another participant described holding daily team huddles to discuss patient needs and treatment.

> "One of the things that's changed for us is just a different approach to having behavioral health in the office, where it's more about access than about long-term relationships … Back in 2000, we had a psychologist. He sat in the office. We might do warm handoffs and deliver a patient to that individual, but his practice quickly filled … The newer approach I think is more about having somebody who can meet a patient, address a need. So they're quicker visits, more access, and that's been quite good for us."
>
> —Rhode Island IBH provider

Challenges remained to future sustainability of the IBH program, however, despite provider support and some early positive outcomes (Yeracaris, Campbell, Coleman, Cabral, & Hurwitz, 2019). Although a majority of providers and state officials were highly satisfied with the IBH initiative, not all private payers fully signed onto the IBH model. Only one payer financed practice facilitation assistance for the additional expansion practices. One commercial health plan representative reported supporting IBH as a concept, but noted lack of evidence on effective integration models. Notably, this payer was experimenting with IBH pilots within its own total cost of care contracts. One provider indicated the state had been testing various IBH models for many years prior to the SIM Initiative, but with limited success. What made the SIM IBH pilot particularly effective, remarked the same provider, was its practice facilitation component, which provided individualized TA to each practice on strategies for using and collaborating with an embedded behavioral health professional in their practice.

SIM galvanized the state to further incentivize behavioral and physical health care integration. About half of Rhode Island's SIM-supported investments included a behavioral

[87] Practice facilitation support consisted of hiring a practice facilitator to train providers on how to screen for mental health and substance use conditions, educate providers on how to deliver team-based care to patients with a behavioral health diagnosis, and how to use data to improve care for high-risk patients.

health component. Many stakeholders remarked that the state's central focus on IBH empowered state agencies to prioritize and support integration activities moving forward. For example, Medicaid required its AEs to create organizational relationships and partnerships with behavioral health providers to ensure access to mental health treatment for its attributed population. Medicaid also planned to help sustain the state's CHT intervention and PCMH-Kids program, both of which trained PCPs to screen for mental health and substance use conditions and connect patients to appropriate behavioral health services. OHIC took steps to promote coordinated care between physical and behavioral health providers, by drafting recommendations on ways to remove from future regulations administrative and financial barriers to integration. In July 2020, OHIC published new affordability standards that implemented these recommendations and laid the groundwork for an APM for IBH practices (Gorbea, n.d.).

I.2.2 Enabling strategies to support health care delivery transformation

Key Results
• Health IT investments helped providers detect patterns in patient utilization, coordinate care for individuals with mental illness, evaluate the cost and impact of new projects, and identify potential areas for transformative policy implementation. • Payers and providers continued to highlight quality measure alignment as one of the SIM Initiative's major accomplishments. • The care management dashboard was operational in all CMHCs and was effectively assisting providers with tracking and monitoring patient ED visits and inpatient admissions. • Stakeholders widely supported the electronic clinical quality measure (eCQM) reporting and feedback system for its potential to reduce reporting burden, but administrative and interoperability challenges slowed progress in populating the eCQM. • Community Health Teams (CHTs) collaborated with PCPs to assess the social, behavioral, and medical needs of high-risk patients and connect them with services. • To improve expertise and prepare for new payment models, providers received training on Screening, Brief Intervention, and Referral to Treatment (SBIRT); diagnosis and treatment of children's behavioral health conditions; and talking to patients about palliative care and advanced care planning.

Health information technology strategies

State officials leveraged data analytic capabilities and health IT tools to support APMs. Several projects—such as the care management dashboards, the integrated health and human services data ecosystem and the all-payer claims database (APCD)—were viewed as successes. However, stakeholders noted it was too early to assess the impact of the electronic clinical quality measure (eCQM) reporting and feedback system (also known as the health care quality measurement reporting and feedback system) and the unified social services directory. As a testament to the importance of maintaining health IT projects, state officials were able to secure funding to sustain all SIM-initiated projects except the provider directory,[88] which the state put on hold because of a software and data quality issue. While state officials and other stakeholders perceived the provider directory as a potentially valuable tool, there were no plans for sustainability. (See ***Table I-2*** for a brief description of Rhode Island's health IT strategies to support health care delivery transformation and their respective accomplishments and challenges and ***Exhibit I-5*** for the reach of Rhode Island's enabling strategies.)

State officials, payers, and providers all perceived the care management dashboards as highly successful. Early evidence from a University of Rhode Island study indicated a decline in ED use, inpatient stays, and psychiatric inpatient stays associated with the CMHC dashboard (Rhode Island State Evaluation Team University of Rhode Island & Brown University). Additionally, state officials and payers noted a potential return on investment through reduced hospital admissions and readmissions. CMHC staff who used the dashboards regularly reported being able to identify patterns in patient utilization. For example, one user credited the dashboard with helping to identify patients with seasonal affective disorder (SAD) or patients who were reactive to anniversaries. Another user was able to identify an undiagnosed physical concern for an individual with a serious mental illness who could not communicate their symptoms. According to mental health center representatives, the dashboards also help facilitate increased communication with payers.

Stakeholders widely supported the eCQM reporting and feedback system for its potential to reduce reporting burden and facilitate delivery system transformation. By aggregating providers' electronic health record (EHR) data, the eCQM was to serve as a central database for reporting quality improvement measures. The project also helped to align multiple state and federal reporting requirements and reduce the data collection and reporting burden on providers.

[88] See Annual Report 3 for detailed information on the challenges associated with creating a provider directory.

Table I-2. Rhode Island's enabling strategies to support health care delivery transformation[a]

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Health IT projects	State agencies, payers, and providers throughout the state	• The APCD provided claims data and analytic reports to support state evaluations of SIM Initiative and non–SIM Initiative projects. • CMHCs successfully integrated the Care Management dashboard into their workflow and effectively monitored patient ED visits and admissions. • The integrated data ecosystem, which connected data systems across public agencies, supported an analysis of child maltreatment in the state. • SIM Initiative funds supported data validation for the USSD, which was designed to connect PCPs to social service and community organizations. • Some projects were delayed due to an extended stakeholder engagement process. • Some other projects, such as the eCQM, were delayed due to unexpected challenges related to data sharing and insufficient buy-in from payers.	• The APCD, data ecosystem, and eCQM would be sustained using a Medicaid administrative match. • CMHCs would sustain the dashboards. • The Rhode Island Foundation and Medicaid administrative match would sustain the USSD.
Practice transformation and workforce projects	PCPs, hospitals, and BH providers	• The CHT/SBIRT project supported eight CHTs that served almost 3,000 patients between July 2018 and June 2019.[b] • By June 2018, the SBIRT Training Center had trained 783 providers. • By June 2019, the PediPRN had assisted with diagnosis and treatment of 693 patients. • By June 2019, the Behavioral Health Workforce Project had trained 1,112 staff from 39 organizations. • Interprofessional Community Preceptors Institute trained two cohorts of staff from community-based health and social service agencies to serve as health student preceptors. • The state evaluations of the practice transformation and workforce investments were not completed as of January 2019, hampering the SIM Initiative's ability to demonstrate the investments' value. • Most projects secured funding to continue, but the absence of the SIM Initiative steering committee and SIM-funded staff might make it difficult to continue coordination across projects and scale up proven projects.	• Medicaid, the SOR grant, and SAMHSA funding would sustain the CHT/SBIRT project • The Behavioral Health Workforce Project would be sustained with SOR funding • A HRSA grant would sustain the PediPRN project • To sustain the Community Preceptor Institute, the state received approval for a Medicaid 1115 Waiver

(continued)

Table I-2. Rhode Island's enabling strategies to support health care delivery transformation[a] (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Patient engagement projects	Patients facing end-of-life decisions or children with social-emotional challenges, depending on project	• Trained over 511 clinicians in techniques to improve palliative care communication. • Reached over 597,000 people with information on holding end-of-life conversations. • Established web-based support for providers seeking to integrate advanced care planning into their workflows. • Provided 'train the trainer' training to 14 staff from three schools on how to better engage students with social-emotional challenges in learning. • The absence of the SIM Initiative steering committee and SIM-funded staff might make it difficult to continue coordination across projects and scale up proven projects.	• Completed with some sustainability funding from the DOH

Notes: [a] Most of the data presented in the workforce and patient engagement rows were from the *Rhode Island SIM Model Test Grant Final Report*, which was issued September 27, 2019.

[b] http://www.eohhs.ri.gov/Portals/0/Uploads/Documents/SIM/CommunityHealthTeamStateEvaluation-Final.pdf

APCD = all-payer claims database; BH = behavioral health; CHT = Community Health Team; CMHC = community mental health center; eCQM = electronic clinical quality measure; ED = emergency department; health IT = health information technology; HRSA = Health Resources and Services Administration; PCP = primary care provider; PediPRN = Pediatric Psychiatry Resource Network; SAMHSA = Substance Abuse and Mental Health Services Administration; SBIRT = Screening, Brief Intervention, and Referral to Treatment; SIM = State Innovation Model; SOR = State Opioid Response; USSD = Unified Social Services Directory.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Exhibit I-5. Rhode Island's enabling strategies to support health care delivery transformation had broad reach across the state

WORKFORCE TRANSFORMATION

- **8** Community Health Teams served almost **3,000 patients.**
- The SBIRT Training Center trained **783 providers.**
- PediPRN diagnosed and treated **693 patients.**
- The Behavioral Health Workforce Project trained **1,112 staff** from **39 organizations.**

PATIENT ENGAGEMENT

- More than **511 clinicians** were trained on how to use techniques to improve palliative care communication.
- More than **597,000 people** were provided information about holding **end-of-life** conversations.
- **14 staff** members from **3 schools** participated in the Train the Trainer training on how to better engage students with social and emotional challenges in learning.

Note: PediPRN = Pediatric Psychiatry Resource Network; SBIRT = Screening, Brief Intervention, and Referral to Treatment.

Source: Federal Evaluation Team review of state documents.

The eCQM was not without its challenges, however. Originally, state officials intended to use data from Rhode Island's health information exchange (HIE) system (CurrentCare) to populate the database; however, legal and technical hurdles necessitated obtaining data directly from practices, causing unanticipated delays. Additionally, state officials indicated that not all payers bought into the project as originally envisioned. Lack of payer buy-in necessitated state officials taking more time to meet individually with payers, to explain the project and its potential benefits. After this course correction, the project was revitalized and came back on track. As of September 2019, six practices were submitting data to the eCQM as part of a pilot, and many additional providers expressed interest in participating.

> "It takes a lot of time to engage people to build trust and I think trying to get trust from people for a system that's not yet launched and can't be easily demonstrated is really difficult. It's just taken a lot of work and handholding and conversations and commitment to [garner support for eCQM]."
>
> —Rhode Island official

The integrated health and human services data ecosystem, which linked data across multiple state agencies, was perceived by both state officials and providers as a valuable tool for analyzing cross-agency policy issues. Interviewees described using health and child welfare data from the ecosystem for a state analysis related to child maltreatment as groundbreaking, transforming how stakeholders thought about children in need. The state analysis identified three major findings: (1) prevention of maltreatment starts in the community rather than individual households; (2) it was more effective to support families, particularly those suffering from opioid use disorder/substance use disorder, rather than individuals; and (3) children absent from the system were at highest risk of maltreatment. Findings from the state analysis led to discussions among state officials and community stakeholders about how the state could better identify and address cases of child maltreatment moving forward.

State officials indicated that the state had applied APCD data for evaluation purposes and viewed the database as a critical resource for evaluating the value and impact of state projects.[89] Examples of studies using APCD data to evaluate SIM Initiative investments included a state CHT evaluation and a University of Rhode Island end-of-life evaluation. State officials also used APCD data to better understand trends in health care cost growth and utilization and develop an annual health care cost growth target. One outcome of this cost analysis was a cost growth target of 3.2 percent, along with a compact hospitals and payers signed in December 2018 to implement measures to meet the identified growth target (Rhode Island Health Care Cost Trends Steering Committee, 2018, December 19). State officials and providers who used the APCD for many types of analyses described one limitation on the usefulness of the database—its reliance on de-identified data.

In 2018, the state directed SIM Initiative resources to create a statewide social services directory, the Unified Social Services Directory (USSD). The USSD's goal was to leverage an already existing database the United Way maintained to develop a central location to house all existing social services resources in the state. Multiple stakeholders viewed the directory as a valuable tool for helping providers address the social determinants of health (SDoH) by facilitating referrals to community-based services. Although the USSD was not completed during the SIM Initiative, the United Way led its continuation (Tumber, Bunzli, & Rosenberg, 2019). The USSD was also slated for inclusion in the health IT Strategic Planning Roadmap (referenced later in this section).

Rhode Island's opt-in consent policy for the state's HIE system, CurrentCare, reduced the usefulness of certain health IT tools, like the Consumer Engagement Platform (CEP), that relied on the system. In 2018**,** the SIM Initiative funded development of the CEP—a web-based consumer engagement platform that enabled consumers to upload, store, and share Advance Directives with their providers. Documents and assessments uploaded to the CEP were subsequently incorporated into the patient's CurrentCare medical record. The platform launched in December 2018 with nine practices. By summer 2019, the state was hoping to incorporate functionality for uploading screening assessments such as Screening, Brief Intervention, and

[89] See Annual Report 2 and Annual Report 3 for more details about RI APCD.

Referral to Treatment (SBIRT) into the CEP. However, several providers and one state official described integration of the CEP with CurrentCare as problematic, because many providers did not use CurrentCare, and the state's opt-in consent policy limited the tool's reach among patients. Legislation to move CurrentCare from an opt-in consent policy to an opt-out policy was introduced to the Rhode Island assembly in April 2019, but no action had been taken as of September 2019. Notably, a previous RTI evaluation of the Multi-Payer Advanced Primary Care Practice (MAPCP) project documented provider concerns related to Rhode Island's HIE, particularly problems related to data reliability and difficulties navigating the portal (RTI International, 2017, June).

> "We're really seeing this roadmap as an opportunity to take all of our health IT investments, including the SIM investments, [and] all the things that we've learned from stakeholders ….and think strategically about how we can pull this all together."
>
> —Rhode Island official

To help ensure support for SIM-funded health IT investments, the state embarked on a strategic planning process to develop a roadmap and implementation plan for health IT activities. The Roadmap, published in July 2020, encouraged alignment across existing health IT activities in the state and mapped out a vision for future work (State of Rhode Island The Executive Office of Health and Human Services, n.d.-b). State officials and SIM steering committee members viewed the process for developing this strategic plan—which included gathering input from more than 100 public and private sector representatives—as a strategy for helping to both reform and sustain the SIM health IT investments.

Quality measure alignment

Payers and providers highlighted quality measure alignment and creation of an aligned measure set as one of the SIM Initiative's major successes. The SIM Initiative Steering Committee formed a measure alignment workgroup in 2015 to develop a standard measure set to reduce provider burden associated with having to report multiple quality metrics to different payers. In addition to selecting measures that aligned with other public and private entities such as CMS, NCQA, and the Joint Commission, the workgroup selected measures that aligned with the state's population health priorities.

After successfully developing three measure sets (one for PCPs, one for accountable care organizations [ACOs], and one for hospitals), responsibility for convening the workgroup was transferred to OHIC in late 2016, thus ensuring ongoing state support for an annual process to review and update the aligned measure set (State of Rhode Island Office of the Health Insurance Commissioner, n.d.-a). Beginning in January 2017, OHIC started requiring all commercial insurers to adopt the aligned measure sets in their contracts with providers. As of 2019, Medicaid also required its MCOs to adopt the aligned measure set in its contracts with AEs. Additions to the 2019 calendar year measure set, such as screening for alcohol use and health-related social needs, served to reinforce the goals of other projects supported by the SIM Initiative, such as CHT/SBIRT and the integration and alignment high risk project.

Practice transformation and workforce projects

Rhode Island's SIM Initiative conducted many projects intended to support practice transformation and workforce development (see ***Table I-2***). This section examines the three projects multiple stakeholders identified as particularly strong provider supports: CHT/SBIRT, Pediatric Psychiatry Resource Network (PediPRN), and the SBIRT Training Center.[90]

> "… and on the Community Health Teams with SBIRT, we are seeing statistically significant reduction in their [patients'] risk scores when they're triaged, we're seeing decrease in anxiety and depression rates … ."
>
> —Rhode Island official

CHTs work with PCPs to assess the social, behavioral, and medical health needs of high-risk patients and connect patients to community-based support services. Rhode Island tested the CHT concept prior to receiving the SIM award, and planned to expand the model with SIM funding. Subsequently, in 2016, Rhode Island received a grant from the Substance Abuse and Mental Health Services Administration (SAMHSA) to implement SBIRT into clinical settings. State officials elected to braid funding for this SBIRT grant with the SIM-funded CHT project, to better coordinate care for high-risk patients and achieve operational efficiencies. The CHT/SBIRT project launched in June 2017; by early 2018, it was supporting eight fully functional CHTs, four of which were new CHTs implemented during the SIM Initiative. In August 2019, the state's CHT evaluation reported that, on average, CHT patients experienced a reduction in health risk as well as depression and anxiety within the first five months of engagement with a CHT (University of Rhode Island, 2019, August 7). Evidence of CHTs' success led the Medicaid agency to commit to funding the CHTs through its AEs after the SIM Initiative ended. The state's CHT evidence also led to creation of two new CHTs, which began operating in March 2020 with Rhode Island Department of Health (RIDOH) and CTC-RI support. These CHTs are to focus on patients with hypertension, diabetes, or at-risk for cardiovascular disease.

Consolidating administration of the SBIRT and CHT investments required more coordination and collaboration across agencies, which delayed implementation. But braiding the two funding streams had the major advantage of enabling Rhode Island to use SAMHSA funding to embed SBIRT-trained staff in all eight CHTs. Provider representatives from CHTs reported that administering the SBIRT assessment helped them get a broader overall sense of each person and his/her clinical needs. Additionally, stakeholders reported that combining the two grants

[90] Due to the high volume of investments supported by RI SIM funds and limited space in the report, we chose to highlight only those investments considered particularly impactful at the time of our interviews. For additional information on the other interventions, including the behavioral health workforce project and preceptor institute please see: *Rhode Island State Innovation Final Report*. Released September 27, 2019.

sparked partnerships that would not have occurred without the collaboration. One state official noted the example of a CHT partnering with a behavioral health provider to test centralized follow-up to SBIRT screening.

State officials, CHT representatives, and other stakeholders all praised the quality and content of the training and TA the CHT/SBIRT contractor provided. One CHT member expressed particular appreciation for the mentoring the team received from a more experienced CHT. The same team member praised the resources provided as well as the quarterly meetings, which provided CHTs an opportunity to share best practices and challenges with one another. Each CHT developed a memorandum of understanding (MOU) with each practice that delineated how the two entities would coordinate and deliver care. CHTs were also able to obtain training on SBIRT screening from the SBIRT Training Resource Center (a separate SIM-funded project).

> "The meetings that we go to where they bring all the providers together, they work as a team, they do not pit us against each other. We are all succeeding together, which has been fantastic."
>
> —Rhode Island CHT member

PediPRN launched in December 2016 as a telephone consultation resource for pediatric PCPs. Providers could call in to consult with a child psychiatrist during business hours about diagnosis or treatment of a patient. From its origin, PediPRN was intended, not just to help with individual cases, but to increase PCPs' knowledge of how to treat behavioral health conditions in children—ultimately enabling providers to treat certain conditions without psychiatric support. By April 2019, PediPRN had assisted more than 150 PCPs with diagnosis and treatment of more than 600 patients.[91] Providers and other stakeholders expressed strong support for the program throughout the SIM Initiative. Due to its success in engaging PCPs, state officials added functions to PediPRN during the award period—including four PCP trainings, a 10-session in-depth PCP training course on child mental health, and additional funding for youth suicide prevention. To sustain its work after the SIM Initiative ended, PediPRN was slated to rely on multiple funding sources, including a five-year Health Resources and Services Administration (HRSA) grant to provide telephone consultation to obstetricians. In addition, state officials secured approval of a Medicaid Section 1115 Research & Demonstration Projects waiver in February 2020, which enabled Medicaid reimbursement for telephonic psychiatric consultation.

> "… PediPRN has probably the best chance of having a long-term impact on the delivery of behavioral health care, just by the fact that the earlier you're able to identify and intervene, the less impact that has on the adult system … ."
>
> —Rhode Island official

[91] Horowitz, K., & Barker, D. (2019, April 11). *PediPRN—Child Psychiatry Access Project, vendor summary*. Presented to the SIM Steering Committee.

I.2.3 Population health

Key Results
• As planned, the tobacco assessment referral and treatment project produced and disseminated information about health plans' coverage of smoking cessation services.
• The high-risk patient identification and the statewide children's body mass index (BMI) data collection projects only partially met their goals, mainly in facilitating collaborations.
• SIM investments fostered connections among Community Health Teams (CHTs), health equity zones (HEZs), and AEs, which stakeholders described as improving population health.

State officials leveraged SIM resources to address three existing population health priorities: aligning best practices in tobacco assessment, referral, and treatment; leveraging infrastructure for BMI data collection; and identifying high-risk patients to improve quality health care. The SIM Steering Committee selected these projects in early 2017, based on broad stakeholder input into their population health priorities (Centers for Medicare & Medicaid Services [CMS], 2017). According to multiple state and provider representatives, what made these investments successful was the emphasis on identifying projects that built on existing state priorities and projects. ***Table I-3*** provides a brief description of Rhode Island's five population health activities and their respective accomplishments and challenges.

Table I-3. Rhode Island's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
State Health Improvement Plan	Patients experiencing a condition in one of eight health focus areas	• Issued Health Assessment Report in July 2017. • Developed the State Health Improvement Plan, updated annually with SIM Operational Plans.	Continuing to update State Health Improvement Plan annually
High-risk patient identification	High-risk adults and children, and the providers who served them	• Surveyed existing approaches to identify, screen for, and meet the needs of high-risk patients. • Determined that implementing a universal approach to high-risk screening and assessment was not a good strategy for addressing the unique needs of different providers' populations. • Stakeholder reluctance to change the risk assessment tools they were already using.	Project completed; other identification efforts continued

(continued)

Table I-3. Rhode Island's population health activities (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Tobacco assessment referral and treatment	Patients who smoked	• Developed matrices to summarize health plans' tobacco cessation coverage to help providers secure services for patients. • Included tobacco cessation in SBIRT training. • Highlighted matrices in RIDOH's Health Connections newsletter. • Updating the matrices absent SIM Initiative funding seen as a challenge.	DOH would continue to update and use the matrices
Statewide collection of BMI data on children	RI children	• RI KIDS COUNT, RIDOH, Hassenfeld Child Health Innovation Institute, three health insurance plans, and the SIM Initiative collaborated to collect accurate BMI data at the state and city/town level. • Issued *Childhood Overweight and Obesity: New Data from Rhode Island* in March 2019. • Continuing work toward the original goal of building the infrastructure for a real-time, de-identified statewide BMI data repository without SIM Initiative's convening resources seen as a challenge.	RI KIDS COUNT continued to lead the partnership, which produced an updated report in May 2020
Connect SIM projects to HEZs	HEZs and those they serve	• Fostered connections among CHT, HEZ, and AE, including sharing knowledge of how to use CHWs. • Maintaining the newly built relationships after the SIM Initiative ended seen as a challenge.	Ongoing

Note: AE = Accountable Entity; BMI = body mass index; CHT = Community Health Team; CHW = community health worker; HEZ = health equity zone; RI = Rhode Island; RIDOH = Rhode Island Department of Health; SBIRT = Screening, Brief Intervention, and Referral to Treatment; SIM = State Innovation Model; USSD = Unified Social Services Directory.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

The tobacco assessment referral and treatment project produced and disseminated information about health plans' coverage of smoking cessation services, to aid in developing standardized coverage policies across public and private payers. As planned, this work continued under RIDOH auspices. In September 2019, the RIDOH prepared an update of the smoking cessation coverage material—which, as of July 2020, continued to offer it as a resource.

The statewide BMI data collection project was unable to build a statewide BMI data repository as originally envisioned. However, the SIM Initiative did facilitate a partnership—among RI KIDS COUNT (the non-profit project lead), a university-based research center, three health plans, and community groups—to create a BMI database for a representative sample of children. In March 2019, RI KIDS COUNT released a brief based on analysis of that data (Rhode Island Kids Count, 2019, March), and in May 2020, updated the KIDS COUNT publication (Rhode Island Kids Count, 2020).

The high-risk patient identification project at first sought to develop a universal screening tool to define and identify "high-risk" adults and children in the state. After meeting and exchanging lessons learned, stakeholders determined that a universal tool might not be appropriate, given the uniqueness of each provider's population and setting. However, meeting participants were glad they had the opportunity to learn from one another about how each practice was addressing this challenge.

> "We had a very interesting methodology for combining [obesity] data from our kids registry with the health information exchange with data submitted from specific health plans to get a representative sample."
>
> —Rhode Island official

Stakeholders reported that coordination and collaboration among health equity zones (HEZs) and SIM-funded projects improved population health.[92] HEZs were coalitions of organizations and community residents that worked together to eliminate health disparities and improve health outcomes in local communities. Established by the RIDOH prior to the start of the SIM Initiative, HEZs did not directly receive SIM funding. State officials, however, always intended to coordinate their SIM investments with HEZ activities, because the goals of the two sets of initiatives were complementary. In late 2017, the SIM Steering Committee provided funding for RIDOH to help foster connections between the two streams of work. To solidify these collaborations, RIDOH staff made presentations about CHTs and other SIM activities at HEZ learning events, and organized meetings to discuss the benefits of coordination. Fostering partnerships among the HEZs, CHTs, and Medicaid AEs became the primary focus of these learning activities, as all three entities are focused on improving population health. According to stakeholders, the partnerships succeeded in their goals. For example, one HEZ reported serving on an AE's Community Advisory Council. The same HEZ also reported that a CHT helped it integrate community health workers (CHWs) into its operations.

> "Moving the needle on population health is kind of impossible over this time period with the data that we have."
>
> —Rhode Island official

Stakeholders' impressions of the SIM Initiative's ultimate impact on population health were mixed. As noted by one state official, "90 percent of your health is determined outside the clinic." This state representative, along with other stakeholders, reported that the SIM Initiative's primary focus on improving clinical care for individual patients would have little impact on overall population health. But other interviewees—noting that the three-year award period was insufficient time to produce a measurable effect on population health—remained optimistic that the SIM-funded interventions would ultimately produce improvements

[92] Each HEZ conducted needs assessments and developed a strategic plan to build on the community's assets to address community needs. The RIDOH supported HEZs with braided public health funding beginning with their launch in 2015.

in population health, particularly the CHTs. As described in ***Section I.2.3***, CHTs were designed to address, not only the medical needs of high-risk patients, but also SDoH.

I.3 Sustainability

Key Results
• After a year of Steering Committee preparation, Rhode Island planned to sustain a majority of the SIM interventions using a mix of funding mechanisms, including Medicaid, grants, foundation support, and commercial health plans. • The state hoped to advance value-based payment (VBP) after the SIM Initiative. Payer and provider support for VBP was growing, according to stakeholders—even though some interviewees would have preferred a wider choice among VBP models than the state's primary focus on PCHMs.

The state arranged for most SIM-funded initiatives to be sustained after the award period. However, because one of the most successful elements of Rhode Island's SIM initiative was its governance model, the absence of SIM leadership might make it difficult to continue coordination as policy priorities shifted**.** State officials convened the Committee twice after the SIM Initiative, but its last meeting was in November 2019. In addition, most SIM-funded staff moved to new positions with other responsibilities once funding ended.

In an effort to mitigate post–SIM coordination challenge, state officials created a new Planning and Research Unit within the Executive Office of Health and Human Services (EOHHS), and hired the former SIM Project Director to lead the Unit. State officials intended for the Unit to maintain interagency coordination, as well as complete SIM projects that did not conclude during the three-year award period. There is some evidence that this approach worked. Since the end of the SIM award, two new CHTs were created, a children's IBH project was launched, the KIDS COUNT led partnership to track children's BMI continued its work, and RIDOH continued to update and use the smoking cessation material created under SIM. See ***Table I-4*** for a description of Rhode Island's sustainability plans for each SIM Initiative activity.

Table I-4. Sustainability of Rhode Island's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	PCMH-Kids	Yes	Medicaid and commercial health plans with additional support from Tufts and the American Academy for Pediatrics to support TA.
	IBH PCMH Initiative	Yes	United Health Plan funded practice transformation support for 10 additional practices. Rhode Island Foundation, United, Tufts, and BCBS funded the two-cohort children's IBH pilot through 2023.
Workforce/ Practice Transformation	SBIRT Training Resource Center	Yes	To be sustained through SOR funds through September 2020.
	PediPRN—Child Psychiatry Access Project	Yes	HRSA grant through September 2023.
	BH Providers—Provider Coaching	Yes	SOR funding.
	Community Preceptor Program	Yes	State investment (Medicaid 1115 Waiver).
Health IT	CMHC Dashboards	Yes	CMHCs.
	EOHHS Data Ecosystem	Yes	State investment (Medicaid administrative match).
	Health Care Quality Measurement Reporting and Feedback System (eCQM)	Yes	State investment (Medicaid administrative match).
	CEP	Yes	SAMHSA grant for SBIRT.
	USSD	Yes	To be included in the health IT Strategic Plan moving forward, supported by the Rhode Island Foundation and Medicaid administrative match.
	APCD	Yes	State investment (Medicaid administrative match).
	Provider Directory	No	Discontinued.
Population health	Integration and Alignment	Yes	High-risk project's work completed; continued support by project partners for other two projects (DOH for smoking cessation and Rhode Island KIDS COUNT for measuring childhood obesity).
	Population Health Plan	Yes	DOH.

Note: APCD = all-payer claims database; BH = behavioral health; CEP = Consumer Engagement Platform; CMHC = community mental health center; CHT = Community Health Team; DOH = Department of Health; eCQM = electronic clinical quality measure; EOHHS = Executive Office of Health and Human Services; health IT = health information technology; HRSA = Health Resources and Services Administration; IBH = integrated behavioral health; PCMH = patient-centered medical home; PCMH-Kids = Patient-Centered Medical Home-Kids; PediPRN = Pediatric Psychiatry Resource Network; SAMHSA = Substance Abuse and Mental Health Services Agency; SBIRT = Screening, Brief Intervention, and Referral to Treatment; SOR = State Opioid Response; TA = technical assistance; USSD = Unified Social Service Directory.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

The state hoped to advance value-based payment (VBP) after the SIM Initiative ended, by expanding the reach of Medicaid AEs and requiring greater adoption of total cost of care, capitated, and risk-based contracts among the state's commercial payers. New OHIC regulations (Gorbea, n.d.) required plans to make 50 percent of payments via APM by January 1, 2021 and annually thereafter; and CTC-RI continued to work with plans and providers to develop a capitated primary care model (Yeracaris, 2020, July). Over 2016–2018, the share of commercial insured payments made through an APM in the state remained relatively stable (at between 45–46 percent). The state did not track the percentage of payments made under an APM in Medicaid; but as of December 2018, approximately 50 percent of the Medicaid population was enrolled in an AE.[93] Stakeholders expected the APM proportion of the commercial insured payments to increase in the coming years, as Medicaid AEs expanded their reach across the state.

> "You could have the most incredible primary care practices in the country in Rhode Island, but if you don't have specialists on board, if you don't have hospitals on board, and the other parts of the system, then … primary care is only a small piece. You need much more engagement from other types of providers to really succeed in managing costs and improving quality and patient experience of care."
>
> —Rhode Island payer

According to multiple stakeholders, provider and payer support for VBP has been growing in the state. One commercial payer reported having 60 percent of its patient population enrolled in an ACO that required its providers to accept downside risk. Physicians said they would have liked to see more emphasis on APMs and incentivizing total cost of care models in future years, because the majority of payment demonstrations in the state were directed at PCPs. One provider representative noted that VBP contracts that included specialists were the minority, and if the state truly wanted to reduce health care costs, all physician types would have had to participate in an APM. In this vein, new OHIC regulations included new annual targets for specialist APMs through 2024 (Gorbea, n.d.).

I.4 Implications of Findings/Lessons Learned

- The Rhode Island State Team's fostering of a "culture of collaboration," which provided opportunities for multiple agencies, stakeholders, and community groups to influence the SIM Initiative's design was a key factor in meeting SIM objectives.

- Delegating decision-making authority to the SIM Steering Committee initially slowed project launch due to the time needed to form the committee and achieve consensus, but ultimately strong engagement from Committee members benefited project implementation and improved sustainability.

[93] Evaluation call meeting notes. March 2019. Data on Medicaid participation in APMs was not available throughout the evaluation due to a lack of aligned reporting metrics for OHIC and Medicaid.

- Fragmentation of funding across multiple health IT and workforce investments, combined with a lengthy procurement process, created implementation challenges for Rhode Island's SIM Initiative, as some projects experienced delays in launching and others could not be completed during the award period.

- Embedding a SIM staff person in the Medicaid agency might have helped advanced VBP more efficiently, by facilitating greater alignment between commercial and Medicaid health transformation goals.

- Despite the state's success in sustaining PCMH-Kids for the immediate future, concerns about low return on investment and a desire for more APMs that place providers at risk persisted.

- Success of CMHC dashboard highlighted the value of continued investment in dashboards and clinical alert systems.

- Rhode Island invested heavily in sustainability planning the final year of the SIM Initiative, by forming a sustainability workgroup and devoting time at every Steering Committee meeting to discussing financing options. As a result, almost all SIM projects were to be sustained after the end of the SIM Initiative.

- Creating a solid business case and engaging stakeholders early in the design process was essential to successful implementation.

Addendum

Table I-5. Rhode Island's Patient-Centered Medical Home-Kids Cohort 1 had unfavorable impacts on spending, inpatient admissions, and emergency department visits and favorable impacts on primary care provider visits, well-child visits, adolescent well-care visits, and asthma medication management in its first three years

Selected outcomes	Change in outcome from baseline to implementation period: RI PCMH-Kids	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($) (Medicaid)	↑	↑	8.08 (-2.37, 18.54)	3.0	0.20
Total Spending PMPM ($) (commercial)	↓	↓	**32.71‡** (15.26, 50.16)	14.0	0.002
Inpatient Admissions per 1,000 Population (Medicaid)		↓	**2.89‡** (0.66, 5.12)	6.8	0.03
Inpatient Admissions per 1,000 Population (commercial)	↓	↓	**4.43‡** (1.69, 7.16)	11.2	0.01
ED Visits per 1,000 Population (Medicaid)	↑		**32.27‡** (22.11, 42.44)	11.1	<0.001
ED Visits per 1,000 Population (commercial)	↓	↓	1.79 (-1.55, 5.13)	1.4	0.38
PCP Visits per 1,000 Population (Medicaid)	↑	↑	**185.10†** (64.04, 306.16)	6.9	0.01
PCP Visits per 1,000 Population (commercial)	↑	↓	**88.55†** (24.84, 152.26)	2.7	0.02
Well-Child Visits (3–6 Years Old) (%) (Medicaid)	↑	↑	**5.22†** (2.04, 8.40)	8.4	0.01
Well-Child Visits (3–6 Years Old) (%) (commercial)	↓	↓	-0.83 (-1.73, 0.08)	-0.9	0.13
Adolescent Well-Care Visits (%) (Medicaid)	↑	↑	**4.52†** (1.74, 7.30)	8.5	0.01
Adolescent Well-Care Visits (%) (commercial)	↑	↑	-0.29 (-1.54, 0.95)	-0.4	0.70
Asthma medication for 75% of the year (%) (Medicaid)	↑	↑	4.54 (-1.23, 10.32)	15.8	0.20
Asthma medication for 75% of the year (%) (commercial)	↑	↓	**14.06†** (8.24, 19.89)	40.2	<0.001

(continued)

Table I-5. Rhode Island's Patient-Centered Medical Home-Kids Cohort 1 had unfavorable impacts on spending, inpatient admissions, and emergency department visits and favorable impacts on primary care provider visits, well-child visits, adolescent well-care visits, and asthma medication management in its first three years (continued)

†	Significant change in expected direction	↑	Favorable increase	↓	Favorable decrease
‡	Significant change in unexpected direction	↑	Unfavorable increase	↓	Unfavorable decrease
⊖	No change	↑	Increase from baseline through implementation	↓	Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PBPM = per beneficiary per month; PCMH-Kids = Patient-Centered Medical Home-Kids; PCP = primary care provider; PMPM = per member per month; RI = Rhode Island.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

Appendix I-1: Rhode Island Patient-Centered Medical Home-Kids Impact Results

I-1.1 Overview

Rhode Island used SIM funds to transform nine primary care practices into pediatric medical homes under the Patient-Centered Medical Home-Kids (PCMH-Kids) program. Pediatric medical homes were designed to improve care coordination and management for children with complex conditions, including those with behavioral health conditions. The nine selected practice sites (Cohort 1) joined the pilot PCMH-Kids program in April 2015, and SIM support for practice transformation began in January 2016. The SIM Initiative helped finance onsite technical assistance to help practices meet National Committee for Quality Assurance (NCQA) certification standards; the implementation of screening for attention deficit/ hyperactivity disorder (ADHD); and data collection and reporting on child-specific quality metrics. In addition to this practice transformation assistance, all PCMH-Kids practices receive an enhanced per person per month (PPPM) payment from one of four commercial health plans or Medicaid to support the care coordination activities delivered to their members.

Certified PCMH-Kids practices are required to implement universal screening for ADHD as well as developmental disabilities and intellectual developmental disabilities. It is expected that this model will increase the number of children identified with these and other behavioral health conditions. The model also emphasized linking children with acute and chronic care needs to appropriate specialty care.

The nine PCMH-Kids practices in Cohort 1 comprise 82 providers and approximately 30,000 patients. Eleven additional PCMH-Kids sites (Cohort 2) were added in July 2017, and 17 more sites (Cohort 3) were added in July 2019. Only Cohort 1 received practice transformation assistance funded by the SIM Initiative. Cohorts 2 and 3 were financed through other sources. Upon full implementation, the analysis anticipates that these 37 PCMH-Kids practices will cover approximately 50 percent of the commercial pediatric population in Rhode Island and 90 percent of the state's pediatric population.

To assess the effects of Rhode Island's PCMH-Kids model on care for Medicaid beneficiaries, the following research question was addressed:

- To what extent did participation in PCMH-Kids result in changes in health care spending, utilization, and quality of care for children enrolled in a PCMH-Kids practice?

It was hypothesized that increased screening and care coordination will likely lead to higher quality care for children with complex conditions, resulting in reduced emergency department (ED) visits and inpatient admissions in the PCMH-Kids group relative to the comparison group. This relative reduction in utilization would result in reductions in the growth of inpatient, ED, and total spending in the PCMH-Kids group relative to the comparison group. However, increased screening and linkages to specialty care could result in increased well-child visits and professional spending for the PCMH-Kids group. ***Table I-1-1*** provides a snapshot of the study methods.

Table I-1-1. Methods snapshot

Method	Description
Participating practices	The PCMH-Kids model included three cohorts of primary care practices. Participating practices received technical assistance and per person per month payments to support enhanced care coordination efforts. Only Cohort 1 practices, which entered the PCMH-Kids model in 2015, received practice transformation assistance funded by the SIM Initiative, so this analysis focused on Cohort 1 practices. The nine PCMH-Kids practices in Cohort 1 included 82 providers and approximately 30,000 patients.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Rhode Island all-payer claims data were provided by the Rhode Island Department of Health.
Sample	The intervention group included Medicaid beneficiaries and commercial plan members attributed to providers participating in PCMH-Kids Cohort 1. The comparison group comprised similar Medicaid and commercial beneficiaries attributed to providers who did not participate in any of the PCMH-Kids cohorts. The Medicaid analytic sample included 602,390 Medicaid beneficiaries who were either attributed to providers that participated in PCMH-Kids Cohort 1 (n=106,930) or who were attributed to providers that did not participate in PCMH-Kids (n=495,460). The commercial analysis sample included 486,389 commercial plan members who were either attributed to providers that participated in PCMH-Kids Cohort 1 (n=106,340) or who were attributed to providers that did not participate in PCMH-Kids (n=380,049).
Timeframe	The timeframe for the impact analysis was April 2012 through March 2018, which includes three baseline years (April 2012–March 2014) and three intervention years (April 2015–March 2018).
Measures	The analysis assessed the effects of PCMH-Kids on three core outcomes including inpatient admissions, outpatient ED visits, and total spending (annual per person per month in dollars). Additional outcomes examined were inpatient, ED, professional, prescription, and behavioral health spending; visits to PCPs; well-child visits for ages 3 to 6 and for adolescents; ADHD follow-up care visits; and asthma medication management rates. These quality measures were selected because they reflect the emphasis of PCMH-Kids on screening for ADHD and developmental disabilities and intellectual developmental disabilities and on coordinating care for complex and chronic conditions.
Statistical analysis	The analysis used logistic regression for binary outcomes, negative binomial regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid or commercial insurance. Standard errors were clustered at the provider level to account for correlation in outcomes within providers. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: ADHD = attention deficit/hyperactivity disorder; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PCMH-Kids = Patient-Centered Medical Home-Kids; PCP = primary care provider; SIM = State Innovation Model.

This chapter reports on the impact of PCMH-Kids on spending, utilization, and quality for beneficiaries who were attributed to nine practices that participated in PCMH-Kids Cohort 1.

A full description of the PCMH-Kids program and a summary of the key impact analysis findings are available in ***Appendix I***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the PCMH-Kids model's impact findings in tables and figures:

- ***Section I-1.2*** presents results of difference-in-differences (D-in-D) analyses for PCMH-Kids Medicaid beneficiaries and commercial plan members and their comparison group;
- ***Section I-1.3*** presents results of D-in-D analyses for individuals with a behavioral health condition for the selected outcomes;
- ***Section I-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity-score weighting;
- ***Section I-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section I-1.6*** presents results from sensitivity analysis that shows how D-in-D estimates for core outcomes change when assumptions about whether outcomes for the PCMH-Kids and comparison groups are on parallel paths during the baseline period change.

I-1.2 Estimates of Patient-Centered Medical Home-Kids' Impact on Spending, Utilization, and Quality

Tables I-1-2 through ***I-1-5*** show annual and overall estimates of PCMH-Kids' impact on health care spending, utilization, and quality for Rhode Island Medicaid beneficiaries and commercial plan members. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome for each payer for the overall intervention period, the following are present:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the PCMH-Kids impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

I-1.2.1 Estimates of Patient-Centered Medical Home-Kids' impact on core outcomes

Table I-1-2 shows the estimates of the PCMH-Kids model's impact on total spending per person per month, inpatient admissions, and ED visits for Medicaid beneficiaries and commercial plan members attributed to PCMH-Kids practices relative to comparison children. The findings are as follows:

- Changes to total spending PPPM did not differ between Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries during the first three years of PCMH-Kids implementation. Total spending PPPM decreased for both commercial plan members attributed to PCMH-Kids practices and comparison plan members but increased by $32.71 less for the commercial PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.002).

- Inpatient admissions remained almost unchanged in the Medicaid PCMH-Kids group and decreased for comparison beneficiaries, leading to a relative increase of 2.89 visits per 1,000 beneficiaries for Medicaid beneficiaries attributed to PCMH-Kids practices during the first three years of implementation (p=0.03). Inpatient admissions decreased for both commercial plan members attributed to PCMH-Kids practices and comparison plan members but decreased by 4.43 fewer visits per 1,000 people for the commercial PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.01).

- ED visits increased in the Medicaid PCMH-Kids group and remained almost unchanged for comparison beneficiaries, leading to a relative increase of 32.27 visits per 1,000 beneficiaries for Medicaid beneficiaries attributed to PCMH-Kids practices during the first three years of implementation (p<0.001). Changes to ED visits did not differ between commercial plan members attributed to PCMH-Kids practices and comparison beneficiaries during the first three years of PCMH-Kids implementation.[94]

[94] Other analyses model ED visits as a count. In this analysis, ED visits are modeled with a logistic regression model because 97 percent of person-year observations in the commercial sample have zero or one ED visits in a year. Although a smaller percentage (91 percent) of children in the Medicaid sample have either zero or one ED visits, Medicaid ED visits are also modeled with a logistic regression to allow for comparison of D-in-D findings across the two payers.

Table I-1-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Medicaid	270.09	245.75	283.07	250.54	8.08 (-2.37, 18.54)	3.0	0.20
Commercial	233.74	209.25	224.72	167.52	32.71 (15.26, 50.16)	14.0	0.002
All-cause acute inpatient admissions per 1,000 population							
Medicaid	42.76	42.46	43.00	39.66	2.89 (0.66, 5.12)	6.8	0.03
Commercial	39.37	39.62	28.91	24.87	4.43 (1.69, 7.16)	11.2	0.01
ED visits per 1,000 population							
Medicaid	291.41	273.58	325.48	272.86	32.27 (22.11, 42.44)	11.1	<0.001
Commercial	129.40	147.55	126.13	141.93	1.79 (-1.55, 5.13)	1.4	0.38

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; PCMH = patient-centered medical home; RI = Rhode Island.

Methods: The analysis used an ordinary least squares model to obtain D-in-D estimates for spending outcomes and a logistic regression model to obtain D-in-D estimates for inpatient admissions and ED visits. The estimated probabilities of any inpatient admission and any ED visit were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Both Medicaid and commercial models adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variable (prescription drug coverage). For the Medicaid analysis, the total spending and inpatient admissions models assumes that PCMH-Kids and comparison group outcome trends are parallel during the baseline period; the ED visits model includes a differential trend between the PCMH-Kids and comparison groups beginning in the baseline period.

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Table I-1-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group (continued)

For the commercial analysis, the ED visits model assumes that PCMH-Kids and comparison group outcome trends are parallel during the baseline period; total spending and inpatient admissions models include a differential trend between the PCMH-Kids and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted Ns for all outcome models are 186,294 for Medicaid and 183,725 for commercial plans. These numbers include all person-year observations for both the PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.2.2 Estimates of Patient-Centered Medical Home-Kids' impact on spending categories

Table I-1-3 shows the estimates of the PCMH-Kids model's impact on inpatient, ED, professional, prescription drug, and behavioral health–related spending PPPM for Medicaid beneficiaries and commercial plan members attributed to PCMH-Kids practices relative to comparison children. The findings are as follows:

- Changes to inpatient spending PPPM did not differ between Medicaid and commercially insured children attributed to PCMH-Kids practices and comparison children during the first three years of PCMH-Kids implementation.

- Changes to ED spending PPPM did not differ between Medicaid and commercially insured children attributed to PCMH-Kids practices and comparison children during the first three years of PCMH-Kids implementation.

- Professional spending PPPM decreased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but decreased by $5.84 less for the Medicaid PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.01). Professional spending PPPM decreased for both commercial plan members attributed to PCMH-Kids practices and comparison beneficiaries but decreased by $5.09 less for the commercial PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.001).

- Changes to prescription drug spending PPPM did not differ between Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries during the first three years of PCMH-Kids implementation. Prescription drug spending PPPM increased for both commercial plan members attributed to PCMH-Kids practices and comparison beneficiaries but increased by $3.49 more for the commercial PCMH-Kids group during the first three years of PCMH-Kids implementation (p<0.001).

- Behavioral health–related spending PPPM decreased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but decreased by $3.67 less for the Medicaid PCMH-Kids group during the first three years of PCMH-Kids implementation (p<0.001). Changes to behavioral health–related spending PPPM did not differ between commercial plan members attributed to PCMH-Kids practices and comparison plan members during the first three years of PCMH-Kids implementation.

I-1.2.3 Estimates of Patient-Centered Medical Home-Kids' impact on utilization

Table I-1-4 shows the estimates of the PCMH-Kids model's impact on primary care provider (PCP) visits for Medicaid beneficiaries and commercial plan members attributed to PCMH-Kids practices relative to comparison children. The findings are as follows:

- The percentage of Medicaid beneficiaries with at least one PCP visit increased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but increased by 2.35 percentage points more for the Medicaid PCMH-Kids group during the first three years of PCMH-Kids implementation ($p=0.02$). The percentage of commercial plan members with at least one PCP visit increased in the PCMH-Kids group and decreased slightly for comparison plan members, leading to a relative increase of 1.60 percentage points for commercial plan members attributed to PCMH-Kids practices during the first three years of PCMH-Kids implementation ($p<0.001$).

- Primary care provider visits increased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but increased by 185.10 more visits per 1,000 beneficiaries for the PCMH-Kids group during the first three years of PCMH-Kids implementation ($p=0.01$). Primary care provider visits increased for the commercial PCMH-Kids group and decreased for comparison plan members, leading to a relative increase of 88.55 visits per 1,000 members for commercial plan members attributed to PCMH-Kids practices during the first three years of PCMH-Kids implementation ($p=0.02$).

Table I-1-3. Differences in the pre–post change in inpatient, emergency department, professional, prescription drug, and behavioral health–related spending for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PPPM ($)							
Medicaid	45.13	39.56	52.23	46.81	-0.23 (-6.15, 5.69)	-0.5	0.95
Commercial	72.85	64.75	50.16	28.42	13.64 (-0.33, 27.61)	18.7	0.11
ED spending PPPM ($)							
Medicaid	16.58	15.23	16.44	14.88	0.18 (-0.40, 0.75)	1.1	0.61
Commercial	11.52	12.27	12.98	13.43	0.30 (-0.88, 1.47)	2.6	0.68
Professional spending PPPM ($)							
Medicaid	124.65	111.55	121.23	102.33	5.84 (1.98, 9.70)	4.7	0.01
Commercial	78.96	73.09	77.74	66.79	5.09 (2.54, 7.64)	6.4	0.001
Prescription drug spending PPPM ($)							
Medicaid	27.77	25.80	28.25	25.50	0.78 (-0.40, 1.96)	2.8	0.28
Commercial	21.81	18.52	27.92	21.14	3.49 (1.94, 5.05)	16.0	<0.001
Behavioral health–related spending PPPM ($)							
Medicaid	29.71	26.15	28.33	21.12	3.67 (1.94, 5.41)	12.4	<0.001
Commercial	9.94	8.24	7.85	6.25	-0.09 (-0.99, 0.80)	-1.0	0.86

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Table I-1-3. Differences in the pre–post change in inpatient, emergency department, professional, prescription drug, and behavioral health–related spending for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group (continued)

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; RI = Rhode Island.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all spending outcomes. Both Medicaid and commercial models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year) and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variable (prescription drug coverage). For the Medicaid analysis, all outcome models assume that the PCMH-Kids and comparison group outcome trends are parallel during the baseline period. For the commercial analysis, all outcome models include a differential trend between the PCMH-Kids and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

The total weighted Ns for all outcome models are 186,294 for Medicaid and 183,725 for commercial plans. These numbers include all person-year observations for both the RI PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

Table I-1-4. Difference in the pre–post change in primary care provider visits for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of beneficiaries with at least one primary care visit during the year							
Medicaid	74.58	75.58	80.45	78.99	2.35 (0.75, 3.94)	3.1	0.02
Commercial	92.62	90.09	93.81	89.94	1.60 (0.87, 2.32)	1.7	<0.001
PCP visits per 1,000 beneficiaries							
Medicaid	2670.97	2934.06	3106.82	3201.95	185.10 (64.04, 306.16)	6.9	0.01
Commercial	3285.69	3352.70	3302.55	3280.36	88.55 (24.84, 152.26)	2.7	0.02

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; PCMH-Kids = Patient-Centered Medical Home-Kids; PCP = primary care provider; PPPM = per person per month; RI = Rhode Island.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for the percentage of children with at least one primary care visits and a negative binomial model to obtain D-in-D estimates for PCP visits per 1,000 children. The probability of having at least one PCP visit in a year was multiplied by 100 to produce a percentage. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Both Medicaid and commercial models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variables (prescription drug coverage). Medicaid and commercial PCP visit models include a differential trend between the PCMH-Kids and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

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Table I-1-4. Difference in the pre–post change in primary care provider visits for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group (continued)

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted Ns for all outcome models are 186,294 for Medicaid and 183,725 for commercial plans. These numbers include all person-year observations for both the PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.2.4 Estimates of Patient-Centered Medical Home-Kids' impact on quality

Table I-1-5 shows the estimates of the PCMH-Kids model's impact on well-child visits, adolescent well-care visits, ADHD follow-up care, and asthma medication management for Medicaid beneficiaries and commercial plan members attributed to PCMH-Kids practices relative to comparison children.

- The percentage of children ages 3 to 6 years with at least one well-child visit increased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but increased by 5.22 percentage points more for the Medicaid PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.01). Changes to the percentage of children ages 3 to 6 years with at least one well-child visit did not differ between commercial plan members attributed to PCMH-Kids practices and comparison members during the first three years of PCMH-Kids implementation.
- The percentage of adolescents ages 12 to 17 with at least one adolescent well-care visit increased for both Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries but increased by 4.52 percentage points more for the Medicaid PCMH-Kids group during the first three years of PCMH-Kids implementation (p=0.01). Changes to the percentage of adolescents ages 12 to 17 with at least one adolescent well-care visit did not differ between commercial plan members attributed to PCMH-Kids practices and comparison members during the first three years of PCMH-Kids implementation.
- Changes to the percentage of children ages 6 to 12 years with an ADHD diagnosis who had at least one ADHD follow-up care visit within 30 days after the start date of their first ADHD prescription did not differ between Medicaid and commercially insured children attributed to PCMH-Kids practices and comparison children during the first three years of PCMH-Kids implementation.
- Changes to the percentage of children ages 6 to 12 years with an ADHD diagnosis who had at least two ADHD follow-up care visits within 31 to 300 days (1) after the start date of the first ADHD prescription and (2) following an initial provider visit did not differ between children attributed to PCMH-Kids practices and comparison children during the first three years of PCMH-Kids implementation. The weighted sample size for this outcome is 981 for Medicaid and 707 for commercial plans, so there may not be enough power to detect statistically significant changes.
- Changes to the percentage of children with asthma ages 5 to 17 years remaining on asthma medication for at least 75 percent of the treatment period did not differ between Medicaid beneficiaries attributed to PCMH-Kids practices and comparison beneficiaries during the first three years of PCMH-Kids implementation. The percentage of children remaining on asthma medication for at least 75 percent of the treatment period increased in the commercial PCMH-Kids group and decreased for comparison plan members, leading to a relative increase of 14.06 percentage points for commercial plan members attributed to PCMH-Kids practices during the first three years of PCMH-Kids implementation (p<0.001).

Table I-1-5. **Differences in the pre–post change in well-child visits, adolescent well-care visits, attention deficit/hyperactivity disorder follow-up care, and asthma medication management for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group**

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of children aged 3 to 6 years with at least one well-child visit during the year							
Medicaid	61.96	60.48	68.69	62.18	5.22 (2.04, 8.40)	8.4	0.01
Commercial	88.64	84.71	87.63	84.47	-0.83 (-1.73, 0.08)	-0.9	0.13
Percentage of eligible adolescents aged 12 to 17 years with at least one adolescent well-care visit during the year							
Medicaid	53.47	49.60	64.05	55.90	4.52 (1.74, 7.30)	8.5	0.01
Commercial	81.65	76.78	82.68	78.41	-0.29 (-1.54, 0.95)	-0.4	0.70
Percentage of children ages 6 to 12 years with an ADHD diagnosis and at least one ADHD follow-up care visit within 30 days after the start date of the first ADHD prescription (initiation phase)							
Medicaid	48.74	52.28	48.65	52.34	-0.17 (-8.34, 8.01)	-0.3	0.97
Commercial	49.90	52.58	42.52	54.22	-8.85 (-18.94, 1.25)	-17.7	0.15
Percentage of children ages 6 to 12 years with an ADHD diagnosis and at least two ADHD follow-up care visits within 31 to 300 days (1) after the start date of the first ADHD prescription and (2) following an initial provider visit (continuation and maintenance phase)							
Medicaid	54.66	56.79	56.81	62.04	-3.01 (-18.36, 12.35)	-5.5	0.75
Commercial	65.41	56.77	64.07	58.66	-3.39 (-21.13, 14.35)	-5.2	0.75

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Table I-1-5. Differences in the pre–post change in well-child visits, adolescent well-care visits, attention deficit/hyperactivity disorder follow-up care, and asthma medication management for Medicaid beneficiaries and commercial plan members in Patient-Centered Medical Home-Kids and the comparison group (continued)

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of children with asthma aged 5 to 17 remaining on asthma medication for at least 75% of the treatment period							
Medicaid	28.70	26.19	41.06	33.02	4.54 (-1.23, 10.32)	15.8	0.20
Commercial	35.02	40.92	48.87	38.54	14.06 (8.24, 19.89)	40.2	<0.001

Notes: ADHD = attention deficit/hyperactivity disorder; APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all quality outcomes. The estimated probability of each outcome was multiplied by 100 to produce a percentage. Both Medicare and commercial models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variable (prescription drug coverage). All outcome models include a differential trend between the PCMH-Kids and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

The total weighted Ns for the well-child visit (aged 3–6) model are 44,766 for Medicaid and 34,593 for commercial plans. The total weighted Ns for the adolescent well-child visits model are 47,903 for Medicaid and 60,148 for commercial plans. The total weighted Ns for the ADHD initiation rate model is 3,282 for Medicaid and 1,912 for commercial plans. The total weighted Ns for the ADHD continuation and maintenance model are 981 for Medicaid and 707 for commercial plans. The total weighted Ns for the asthma medication model are 5,021 for Medicaid and 2,421 for commercial plans. These numbers include all person-year observations for both the RI PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.3 Estimates of Patient-Centered Medical Home-Kids' Impact on Children with a Behavioral Health Condition

The analysis assessed the PCMH-Kids model's impacts separately on children with behavioral health conditions for a selected set of outcomes. In each measurement year, the analysis defines children with a behavioral health condition as having a mental health, chemical dependency, or developmental disorder; attention deficit disorder (ADD)/ADHD; or tobacco use diagnosis during that year. Because the PCMH-Kids model is focused on care coordination for children with complex health needs and on accessing specialty care, the model could potentially produce larger impacts on health care spending and utilization for children with behavioral health conditions. Furthermore, because PCMH-Kids included incentives for screenings that should identify more children with certain behavioral health conditions earlier in life, it was expected that utilization of specialty services, specialty payments, and total payments would increase for children with behavioral health disorders under PCMH-Kids.

I-1.3.1 Estimates of Patient-Centered Medical Home-Kids' impact on core outcomes for children with a behavioral health condition

Table I-1-6 shows the estimates of the PCMH-Kids model's impact on total spending PPPM, inpatient admissions, and ED visits for Medicaid beneficiaries and commercial plan members with a behavioral health condition attributed to PCMH-Kids practices relative to comparison children. The findings are as follows:

- Total spending PPPM increased for both Medicaid beneficiaries with a behavioral health condition attributed to PCMH-Kids practices and comparison beneficiaries with a behavioral health condition but increased by $38.65 more for the Medicaid PCMH-Kids group with a behavioral health condition during the first three years of PCMH-Kids implementation (p=0.06). Total spending PPPM also increased for both commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison plan members with a behavioral health condition but increased by $80.59 more for the commercial PCMH-Kids group with a behavioral health condition during the first three years of PCMH-Kids implementation (p=0.07).
- Changes to inpatient admissions did not differ between Medicaid beneficiaries and commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison children with a behavioral health condition in the first three years of PCMH-Kids implementation.
- ED visits increased for both Medicaid beneficiaries with a behavioral health condition attributed to PCMH-Kids practices and comparison beneficiaries with a behavioral health condition but increased by 44.25 more visits per 1,000 beneficiaries for the Medicaid PCMH-Kids group with a behavioral health condition during the first three years of PCMH-Kids implementation (p<0.001). Changes to ED visits did not differ between commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison plan members with a behavioral health condition in the first three years of PCMH-Kids implementation.

Table I-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries and commercial plan members with a behavioral health condition in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Medicaid	610.68	584.02	798.84	733.72	38.65 (5.20, 72.10)	6.3	0.06
Commercial	524.96	487.85	694.06	576.29	80.59 (6.69, 154.49)	15.4	0.07
All-cause acute inpatient admissions per 1,000 population							
Medicaid	70.04	65.86	79.97	75.31	0.29 (-4.48, 5.06)	0.4	0.92
Commercial	96.89	95.45	80.05	76.87	2.98 (-5.78, 11.73)	3.1	0.58
ED visits per 1,000 population							
Medicaid	370.79	349.45	428.79	359.23	44.25 (22.26, 66.24)	11.9	<0.001
Commercial	183.01	208.28	179.62	211.22	-5.96 (-14.36, 2.43)	-3.3	0.24

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; RI = Rhode Island.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending and a logistic regression model to obtain D-in-D estimates for the inpatient admission and ED visits. The estimated probability of any inpatient admission and ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Both Medicaid and commercial models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variables (prescription drug coverage). All outcome models include a differential trend in outcomes between the PCMH-Kids and comparison groups beginning in the baseline period.

(continued)

Table I-1-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries and commercial plan members with a behavioral health condition in Patient-Centered Medical Home-Kids and the comparison group (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

The total weighted Ns for all outcome models are 52,732 for Medicaid and 40,487 for commercial plans. These numbers include all person-year observations for both the RI PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.3.2 Estimates of Patient-Centered Medical Home-Kids' impact on spending for children with a behavioral health condition

Table I-1-7 shows the estimates of the PCMH-Kids model's impact on ED, inpatient admissions, professional, prescription drug, and behavioral health spending PPPM for Medicaid beneficiaries and commercial plan members with a behavioral health condition attributed to PCMH-Kids practices relative to comparison children. The findings are as follows:

- Changes to inpatient spending PPPM did not differ between Medicaid beneficiaries and commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison children with a behavioral health condition during the first three years of PCMH-Kids implementation.
- Changes to ED spending PPPM did not differ between Medicaid beneficiaries and commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison children with a behavioral health condition during the first three years of PCMH-Kids implementation.
- Changes to professional spending PPPM did not differ between Medicaid beneficiaries with a behavioral health condition attributed to PCMH-Kids practices and comparison children with a behavioral health condition during the first three years of PCMH-Kids implementation. Professional spending PPPM increased for both commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison plan members with a behavioral health condition but increased by $9.27 more for the commercial PCMH-Kids group with a behavioral health condition during the first three years of PCMH-Kids implementation (p=0.08).
- Changes to prescription drug spending PPPM did not differ between Medicaid beneficiaries with a behavioral health condition attributed to PCMH-Kids practices and comparison beneficiaries with a behavioral health condition during the first three years of PCMH-Kids implementation. Prescription drug spending PPPM increased for both commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison plan members with a behavioral health condition but increased by $7.75 more for the commercial PCMH-Kids group with a behavioral health condition during the first three years of PCMH-Kids implementation (p=0.03).
- Behavioral health spending PPPM increased in the Medicaid PCMH-Kids group with a behavioral health condition and decreased for comparison beneficiaries with a behavioral health condition, leading to a relative increase of $14.51 for Medicaid beneficiaries with a behavioral health condition attributed to PCMH-Kids practices during the first three years of PCMH-Kids implementation (p<0.001). Changes to behavioral health–related spending did not differ between commercial plan members with a behavioral health condition attributed to PCMH-Kids practices and comparison children with a behavioral health condition during the first three years of PCMH-Kids implementation.

Table I-1-7. Differences in the pre–post change in inpatient, emergency department, professional, prescription drug, and behavioral health spending for Medicaid beneficiaries and commercial plan members with a behavioral health condition in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PPPM ($)							
Medicaid	87.97	84.46	166.17	156.29	6.23 (-13.20, 25.65)	7.1	0.60
Commercial	194.43	177.27	235.81	171.78	46.84 (-11.71, 105.39)	24.1	0.19
ED spending PPPM ($)							
Medicaid	22.42	21.71	24.95	23.46	0.78 (-0.47, 2.03)	3.5	0.31
Commercial	16.59	20.33	20.39	27.30	-3.17 (-6.55, 0.20)	-19.1	0.12
Professional spending PPPM ($)							
Medicaid	319.36	289.35	340.37	298.78	11.91 (-0.20, 24.02)	3.7	0.11
Commercial	156.93	149.62	183.41	166.82	9.27 (0.57, 17.96)	5.9	0.08
Prescription drug spending PPPM ($)							
Medicaid	55.40	54.42	66.30	62.23	3.10 (-0.48, 6.69)	5.6	0.15
Commercial	50.73	43.05	81.01	65.59	7.75 (1.91, 13.58)	15.3	0.03

(continued)

Table I-1-7. Differences in the pre–post change in inpatient, emergency department, professional, prescription drug, and behavioral health spending for Medicaid beneficiaries and commercial plan members with a behavioral health condition in Patient-Centered Medical Home-Kids and the comparison group (continued)

Outcome	Baseline period adjusted mean, RI PCMH-Kids	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, RI PCMH-Kids	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Behavioral health–related spending PPPM ($)							
Medicaid	98.92	93.07	106.60	86.25	14.51 (9.04, 19.98)	14.7	<0.001
Commercial	39.31	36.19	43.35	39.14	1.08 (-2.80, 4.97)	2.8	0.65

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; RI = Rhode Island.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all spending outcomes. Both Medicaid and commercial models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score, multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicaid model included an additional person-level variable (Medicaid entitlement based on disability) and county-level variable (percentage of children who are considered low income). The commercial model included an additional person-level variables (prescription drug coverage). For the Medicaid analysis, all outcome models assume that the PCMH-Kids and comparison group outcome trends are parallel during the baseline period. For the commercial analysis, all outcome models include a differential trend between the RI PCMH-Kids and comparison group beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

The total weighted N for all outcome models is 52,732 for Medicaid and 40,487 for commercial plans. These numbers include all person-year observations for both the RI PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.4 Annual Covariate Balance Between the Patient-Centered Medical Home-Kids and Comparison Groups

As described in ***Appendix L****,* annual propensity scores were created for the overall comparison sample at the person-year level and for any comparison subgroups. These subgroups included beneficiaries diagnosed with a behavioral health condition and condition-specific subgroups created for quality outcomes.

Tables I-1-8 and ***I-1-9*** show covariate balance between the PCMH-Kids and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The table includes

- the covariate means for the PCMH-Kids and comparison groups without propensity score weighting;
- the standardized difference between the PCMH-Kids and comparison group means without propensity score weighting ("unweighted standardized differences");
- the propensity score-weighted means for the comparison group ("comparison weighted"); and
- the standardized difference between the PCMH-Kids group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis using logistic regressions in which the dependent variable was an indicator of inclusion in the PCMH-Kids group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so tables are presented only for the last baseline year.

The analysis included all covariates in ***Tables I-1-8*** and ***I-1-9*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table I-1-8. Covariate balance between the Patient-Centered Medical Home-Kids and comparison groups in the last baseline year, Medicaid beneficiaries

Variable	Unweighted mean or percentage, RI PCMH-Kids	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of persons that are female	48.92	48.41	0.01	48.94	0.0004
Age in years	7.6	8.3	0.15	7.6	0.004
Percentage of persons that are disabled	7.24	5.17	0.09	7.24	<0.0001
Total months of enrollment during year	10.8	10.6	0.08	10.8	0.002
CDPS risk score, logged[a]	-0.3	-0.4	0.12	-0.3	0.0007
Multiple payers in a month during year	15.67	12.61	0.09	15.68	0.0002
County level					
Percentage of persons in poverty	16.2	16.4	0.05	16.2	0.002
Hospital beds per 1,000 population	3.4	3.4	0.05	3.4	0.002
Median age in years	38.3	38.2	0.05	38.3	0.002
Percentage of people (under 65 years) without health insurance	9.3	9.4	0.06	9.3	0.002
Percentage of children who are considered low income	92.98	94.95	0.08	92.98	0.0001

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

Table I-1-9. Covariate balance between the Patient-Centered Medical Home-Kids and comparison groups in the last baseline year, commercial plan members

Variable	Unweighted mean or percentage, RI PCMH-Kids	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	50.05	48.70	0.03	50.14	0.002
Age in years	8.8	9.5	0.15	8.7	0.007
Total months of enrollment during year	11	10.6	0.15	11	0.001
Percentage of people who have prescription drug coverage	83.66	82.58	0.03	83.55	0.003
Hierarchical Condition Category risk score, logged[a]	-0.7	-0.8	0.06	-0.7	0.0006
Multiple payers in a month during year	13.86	14.08	0.01	13.94	0.003
County level					
Percentage of people living in poverty	14.1	14.9	0.19	14.1	0.0004
Hospital beds per 1,000 population	2.7	3	0.17	2.7	0.001
Median age in years	39.7	39.2	0.19	39.7	0.0007
Percentage of people (under 65 years) without health insurance	8.2	8.7	0.21	8.2	0.0006

Notes: [a] Hierarchical Condition Category risk score is a risk adjustment score calculated from ICD-9 and ICD-10 diagnosis codes, with larger Hierarchical Condition Category scores corresponding to higher predicted health care costs.

ICD = International Classification of Diseases; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

Tables I-1-8 and ***I-1-9*** show balance between the PCMH-Kids and comparison group covariates before and after applying weights to person-year observations for Medicaid beneficiaries and commercial plan members, respectively. Prior to propensity score weighting, standardized differences were above 0.10 for two person-level characteristics, age and the logged Chronic Illness and Disability Payment System score in the Medicaid analysis. After propensity score weighting, standardized differences decreased between the PCMH-Kids and comparison groups, indicating that propensity score weighting improved covariate balance. In addition, for all covariates for the Medicaid analysis, standardized differences after propensity score weighting were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

For the commercial analysis, standardized differences were above 0.10 for two person-level characteristics, age and total months of enrollment, and all area-level covariates during the year prior to propensity score weighting. After propensity score weighting, standardized differences between the PCMH-Kids and comparison groups were below the 0.10 threshold, indicating an acceptable level of covariate balance.

I-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures I-1-1 through ***I-1-6*** show propensity score-weighted trends for all analysis years for the core D-in-D outcomes (total spending per person per month, inpatient admissions, and ED visits) for the full samples of Medicaid beneficiaries and commercial plan members in the intervention and comparison groups. For the Medicaid sample, total spending and inpatient admissions appeared to show parallel trends for the PCMH-Kids group and comparison group during the baseline period; ED visits appeared to show non-parallel trends across the two groups during the baseline period. For the commercial sample, all core outcomes appeared to exhibit non-parallel trends between the PCMH-Kids group and the comparison group during the baseline period.

As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the PCMH-Kids and comparison groups to determine the specification of the D-in-D models.

I-1.5.1 Trends in core outcomes, Medicaid beneficiaries

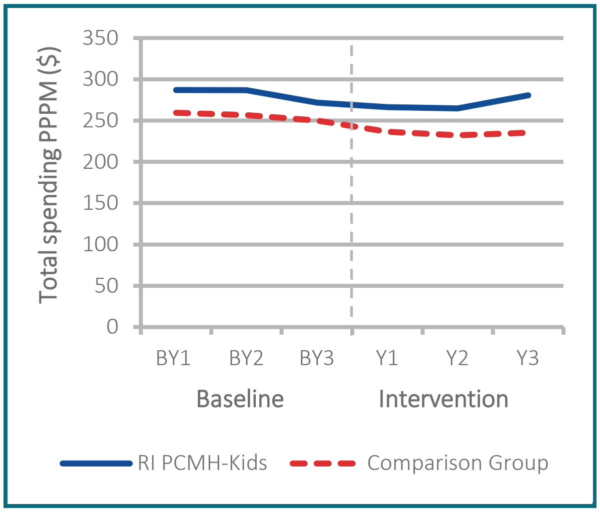
Figures I-1-1 through ***I-1-3*** present trends for the three core outcomes (total spending PPPM, inpatient admissions, and ED visits) for the full sample of Medicaid beneficiaries in the intervention and comparison groups. The findings are as follows:

- Total spending PPPM decreased during the baseline period and during the first two years of intervention period for both the PCMH-Kids and comparison groups. Total spending increased in the last year of the intervention period for both the PCMH-Kids and comparison groups. The rate was consistently higher in the PCMH-Kids group relative to the comparison group (***Figure I-1-1***). The trends appear to be parallel during the baseline period.

- Admissions per 1,000 beneficiaries decreased during the baseline period and continued to decrease slightly during the intervention period for both the PCMH-Kids and comparison groups. The admission rate was similar for both groups during the first two years of baseline period but began to diverge in the last baseline year. The rate was consistently higher in the PCMH-Kids group relative to the comparison group (***Figure I-1-2***). The trends appear to be parallel during the baseline period.

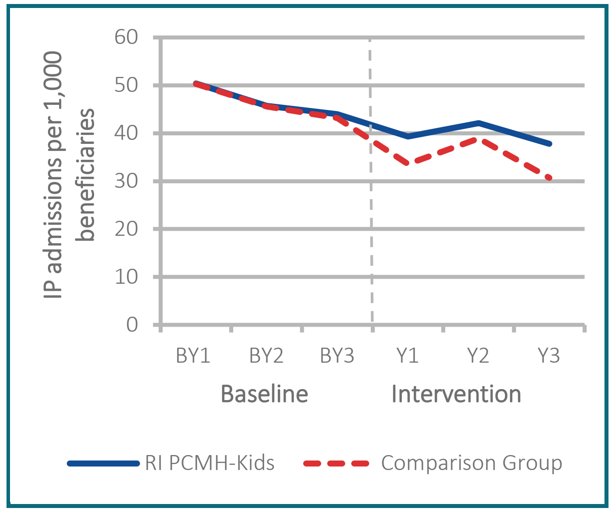
- ED visits per 1,000 beneficiaries decreased and then increased for the PCMH-Kids group and remained stable for the comparison group during the baseline period. The ED visit rate for the PCMH-Kids group increased from the last baseline period to the first intervention period before declining in the remaining two years. On the other hand, the ED visit rate in the comparison group remained relatively stable in the first two years of the intervention period before decreasing slightly in the last intervention year (***Figure I-1-3***). The ED visit rate was consistently higher in the PCMH-Kids group relative to the comparison group. The trends do not appear to be parallel during the baseline period.

Figure I-1-1. Trends in total spending per person per month for Medicaid beneficiaries in the Patient-Centered Medical Home-Kids and comparison groups



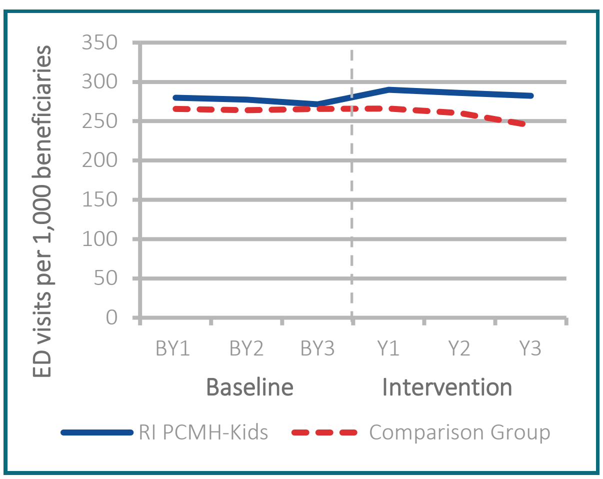
Note: BY = baseline year; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; RI = Rhode Island; Y = year.

Figure I-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Patient-Centered Medical Home-Kids and comparison groups



Note: BY = baseline year; IP = inpatient; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island; Y = year.

Figure I-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Patient-Centered Medical Home-Kids and comparison groups



Note: BY = baseline year; ED = emergency department; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island; Y = year.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.5.2 Trends in core outcomes, commercial plan members

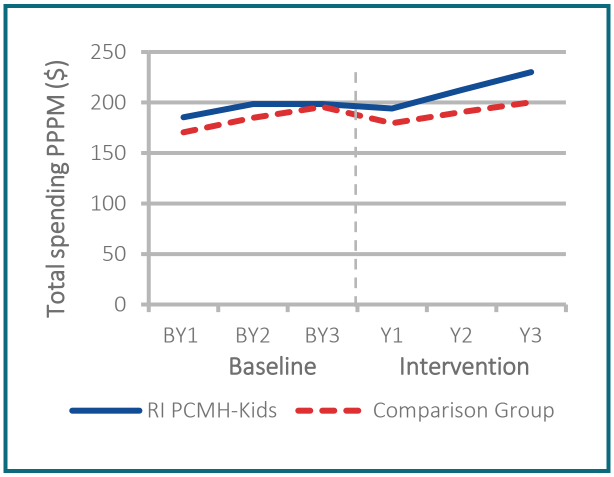
Figures I-1-4 through ***I-1-6*** present trends for the three core outcomes (total spending per person per month, inpatient admissions, and ED visits) for the full sample of commercial plan members in the PCMH-Kids and comparison groups.

- Total spending PPPM increased during the baseline period for both the PCMH-Kids group and comparison groups. Spending decreased for both groups in the first intervention year for both groups before continuing to trend upwards in the last two intervention years. Spending was consistently lower in the comparison group than in the PCMH-Kids group (***Figure I-1-4***). The trends for the PCMH-Kids and comparison groups appear to be non-parallel during the baseline period.

- Admissions per 1,000 plan members increased more in the comparison group than in the PCMH-Kids group in the second baseline year. From the last baseline year through the end of the intervention period, the admission rate decreased for the comparison group. However, the admission rate for the PCMH-Kids group increased in the second intervention year before declining again in the last year (***Figure I-1-5***). The trends for the PCMH-Kids and comparison groups appear to be non-parallel during the baseline period.

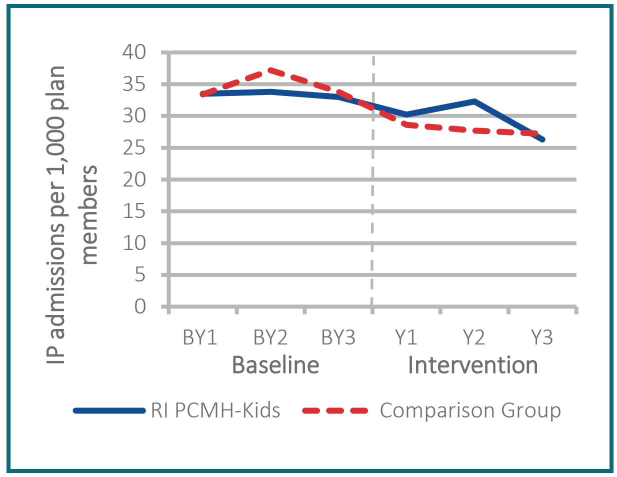
- ED visits per 1,000 plan members remained relatively stable during the baseline period and decreased slightly for both the PCMH-Kids group and the comparison group during the intervention period. The rate was consistently lower for the treatment group than in the comparison group (***Figure I-1-6***). The trends appear to be parallel during the baseline period.

Figure I-1-4. Trends in total spending per person per month for commercial plan members in the Patient-Centered Medical Home-Kids and comparison groups



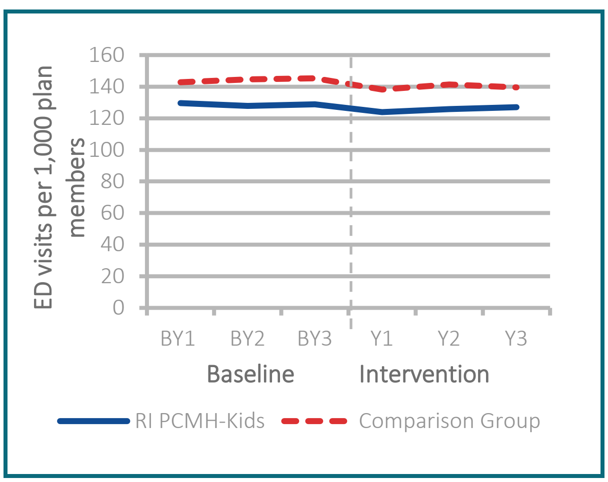
Note: BY = baseline year; PCMH-Kids = Patient-Centered Medical Home-Kids; PPPM = per person per month; RI = Rhode Island; Y = year.

Figure I-1-5. Trends in all-cause acute inpatient admissions per 1,000 commercial plan members in the Patient-Centered Medical Home-Kids and comparison groups



Note: BY = baseline year; IP = inpatient; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island; Y = year.

Figure I-1-6. Trends in outpatient emergency department visits per 1,000 commercial beneficiaries in the intervention and comparison groups



Note: BY = baseline year; ED = emergency department; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island; Y = year.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

I-1.6 Sensitivity Analyses

Table I-1-10 shows how the impact estimates for Rhode Island's PCMH-Kids model for the core outcomes differ when the D-in-D models assume either parallel or non-parallel baseline trends in outcomes for the PCMH-Kids and comparison groups. D-in-D estimates for inpatient admissions and ED visits for Medicaid beneficiaries and commercial plan members were robust to a model specification that accounted for non-parallel trends in the baseline period. D-in-D estimates for total spending were not robust to the model specification that assumed non-parallel baseline trends. The findings are as follows:

- For both payer-specific analyses, the total spending PPPM D-in-D estimates were in the same direction across the two approaches. However, the D-in-D estimates were not significant in the main analysis and significant in the sensitivity analysis.

- For both payer-specific analyses, the inpatient admissions D-in-D estimates were in the same direction and significance and had similar magnitudes across the two approaches.

- The ED visit D-in-D estimates were statistically significant and positive in both the main analysis and the sensitivity analysis for the Medicaid population. In the commercial population, the estimate was not statistically significant in both the main analysis and the sensitivity analysis.

Table I-1-10. Differences in the pre–post change in core outcomes (total spending, inpatient admissions, emergency department visits) for Medicaid and commercial beneficiaries in Patient-Centered Medical Home-Kids and the comparison group

Outcome	Parallel trends assumption	Main analysis: Regression-adjusted D-in-D (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D (90% CI)
Total spending PPPM ($)			
Medicaid	Main: Parallel Sensitivity: Not parallel	8.08 (-2.37, 18.54)	21.48* (2.72, 40.24)
Commercial	Main: Not parallel Sensitivity: Parallel	32.71*** (15.26, 50.16)	9.80 (-0.98, 20.57)
All-cause acute inpatient admissions per 1,000 population			
Medicaid	Main: Parallel Sensitivity: Not parallel	2.89** (0.66, 5.12)	4.97** (1.55, 8.38)
Commercial	Main: Not parallel Sensitivity: Parallel	4.43*** (1.69, 7.16)	3.21*** (1.51, 4.92)
ED visits per 1,000 population			
Medicaid	Main: Not parallel Sensitivity: Parallel	32.27*** (22.11, 42.44)	11.89*** (6.81, 16.96)
Commercial	Main: Parallel Sensitivity: Not parallel	1.79 (-1.55, 5.13)	6.46 (-0.05, 12.98)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: APCD = all-payer claims database; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PPPM = per person per month; PCMH-Kids = Patient-Centered Medical Home-Kids; RI = Rhode Island.

Methods: The analysis used an OLS model to obtain estimates for total spending and a logistic regression model to obtain D-in-D estimates for inpatient admissions and ED visits. The estimated probabilities of any inpatient admission and any ED visit were multiplied by 1,000 to obtain an approximate rate per 1,000 beneficiaries. Models are adjusted for person-level variables (gender, age, a count of total months enrolled in the measurement year, the logged CDPS or Hierarchical Condition Category risk score), provider-level variables (multiple payers in a month in the measurement year), and county-level variables (percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured). The Medicare model included additional person-level variables (Medicaid entitlement based on disability) and county-level variables (percentage of children who are considered low income). The commercial model included additional person-level variables (percentage with prescription drug coverage).

(continued)

Table I-1-10. Differences in the pre–post change in core outcomes (total spending, inpatient admissions, emergency department visits) for Medicaid and commercial beneficiaries in Patient-Centered Medical Home-Kids and the comparison group (continued)

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of RI PCMH-Kids relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the RI PCMH-Kids group relative to the comparison group after RI PCMH-Kids implementation. The relative difference is the D-in-D estimate as a percentage of the RI PCMH-Kids baseline period adjusted mean.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 186,294 for Medicaid; and 183,725 for commercial plans. These numbers include all person-year observations for both the RI PCMH-Kids and comparison groups.

Source: Federal Evaluation Team analysis of RI all-payer claims data from the RI Department of Health.

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Appendix J: State Innovation Model in Model Test States: Tennessee

Payment Model Development

- More than one-third of the TennCare Medicaid population was attributed to a patient-centered medical home (PCMH).
- Almost half of the TennCare population eligible for Health Link—health homes for TennCare members with high behavioral health needs—were enrolled in the program.
- All of TennCare's long-term services and supports (LTSS) members in nursing facilities received services through a value-based payment (VBP) model.
- All TennCare members were eligible for VBP under the episode of care (EOC) model.

Delivery Model Transformation

- Supports for health system transformation included comprehensive stakeholder involvement, training and technical assistance (TA), PCMH and Health Link measure alignment, and implementation of the care coordination tool (CCT) for PCMH and Health Link providers.

Health IT and Data Analytics

- The CCT, which supported care coordination and reduction in care gaps, provided real-time admission, discharge, and transfer (ADT) data from hospitals and access to some managed care organization (MCO) and pharmacy data.

Population Health

- The state established multidisciplinary community-based councils, called County Health Assessments (CHAs), to identify their counties' population health priorities and own the resulting action plan.

Sustainability

- TennCare-contracted MCOs were responsible for expanding, monitoring, and supporting providers in the PCMH and Health Link programs.
- TennCare MCOs were responsible for monitoring and calculating risk/gain sharing for EOC program.
- The state planned to continue state budget funding for the CCT and LTSS programs.

Implications

- The 100 percent managed care Medicaid environment, combined with the positive working relationships among all parties, strongly helped both VBP implementation and its penetration into the TennCare population.
- The implementation successes throughout the SIM Initiative underscored the importance of stakeholder engagement and state responsiveness.

J.1 Key State Context and the Tennessee State Innovation Model Initiative

J.1.1 Pre-State Innovation Model health care in Tennessee

Three key factors characterized the pre–SIM Initiative health care landscape in Tennessee (***Exhibit J-1***). First, health care delivery and payment reform efforts prior to the SIM Initiative were fragmented. Second, Tennessee did not expand Medicaid eligibility under the Patient Protection and Affordable Care Act. Third, the population had—and would continue to have after the SIM Initiative—higher than national rates of self-reported poor/fair health and chronic disease prevalence (State Health Access Data Assistance Center [SHADAC], n.d.).

TennCare (the state's Medicaid program) had been almost entirely managed care since 1994, with three managed care organizations (MCOs)—Blue Care, UnitedHealthcare, and Amerigroup—providing services to the majority of TennCare enrollees. Tennessee contracted with its TennCare MCOs to provide behavioral health, physical health, and long-term services and supports (LTSS); and primary care reform initiatives took place within specific regions and MCOs. Some commercial payers and Medicaid MCOs implemented patient-centered medical home (PCMH) pilots, but these efforts varied in size and scope and were not widespread. Numerous stakeholders described the MCOs before the SIM Initiative as operating independently of one another, with little collaboration. In contrast, state and MCO officials reported that their relationship with each other was very collaborative, which was a strong asset in working together in implementing the SIM Initiative.

Exhibit J-1. Several factors characterized Tennessee's health care landscape prior to the SIM Initiative

Health care delivery varies by region. **Higher than average rates of poor/fair health** and chronic disease.

Medicaid, without Medicaid expansion, most prevalent insurer, followed by Medicare.

TennCare is almost entirely managed care including BH, physical health, and long-term care services.

Collaborative relationship between state and MCOs.

Note: BH = behavioral health; MCO = managed care organization; SIM = State Innovation Model.

Source: Federal Evaluation Team review of state documents.

Tennessee had ongoing efforts to address LTSS payment. From their very beginning, TennCare's three MCOs managed two managed care long-term services and supports (MLTSS) programs: The Employment and Community First (ECF) CHOICES program launched in 2010, and the ECF program launched in 2016. In 2013, when Tennessee ranked 47th in the nation on the Five Star Quality Reporting System for nursing homes, the state began work on the Quality Improvement in Long-Term Services and Supports (QuILTSS) initiative, funded through a Robert Wood Johnson Foundation grant, to develop a value-based payment (VBP) structure for long-term care.

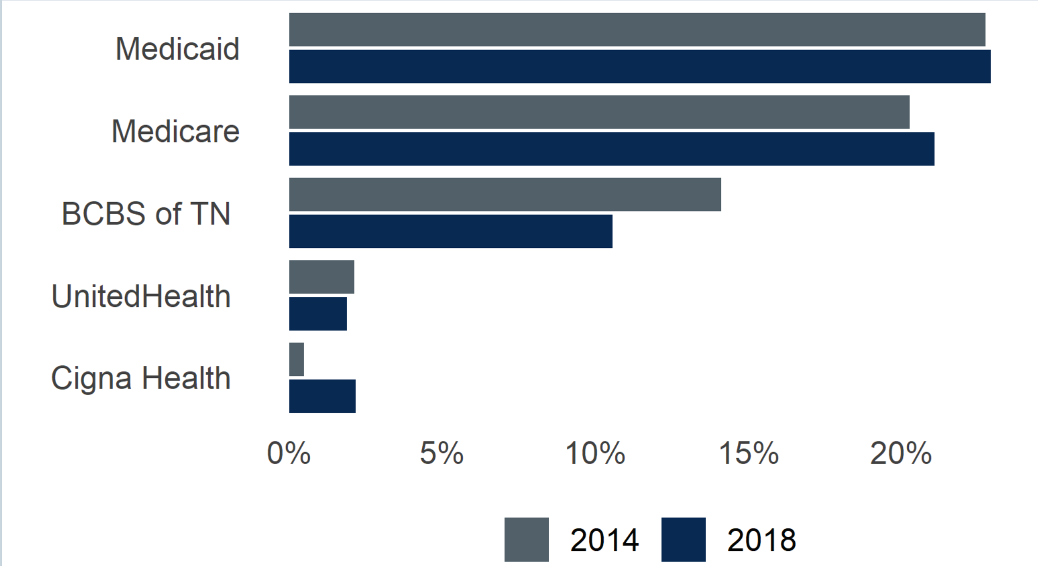
Tennessee is geographically diverse, encompassing both concentrated metropolitan areas (primarily Nashville, Memphis, Knoxville, and Chattanooga) and large expanses of rural communities. Health care delivery varies by region, with large health systems and group practices covering the major metropolitan areas, and Federally Qualified Health Centers (FQHCs), individual practitioners, and small hospitals providing care in rural areas. In 2015, about a quarter (23 percent) of primary care practices were located in rural areas and 51 percent had a single provider. Ten percent of primary care practices had an existing involvement in a Medicare fee-for-service alternative payment model (APM) (e.g., Comprehensive Primary Care Plus, the Medicare Shared Savings Program).[95]

The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurance market in Tennessee was relatively concentrated. Medicaid makes up the largest share of the market, followed by commercial insurers in 2014 and by Medicare, in 2018 (see ***Exhibits 8-5*** and ***8-6***).

Both public payers increased the percent of insured lives they covered between 2014 and 2018 (see ***Exhibit J-2***). In contrast, the percent of insured lives covered by the third most common insurer (Blue Cross Blue Shield [BCBS] of Tennessee) shrank slightly between 2014 and 2018, although BCBS remained the dominant commercial health insurer in the state.

[95] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

Exhibit J-2. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Tennessee shown)



Note: BCBS = Blue Cross Blue Shield; HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners; TN = Tennessee.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

J.1.2 State Innovation Model Initiative in Tennessee

The Governor designated the Tennessee Division of TennCare to lead the Health Care Innovation Initiative—the official name for the SIM Initiative in the state. Within the Division of TennCare, responsibility for day-to-day leadership of the initiative rested with the director of the Strategic Planning and Innovation Group, who reported directly to the deputy commissioner of TennCare. Additional staff, including the chief medical officer and chief information officer, supported primary care transformation, episodes of care (EOCs), and LTSS implementation. For other governance and implementation activities, the Division of TennCare partnered with the Tennessee Department of Health (TDH) and the Benefits Administration within the Department of Finance & Administration.

Tennessee prioritized stakeholder engagement and capacity building in planning and implementing delivery reform activities during the SIM Initiative. Outside state government departments, the Tennessee SIM Initiative involved Technical Advisory Groups of payers, providers, and state staff; meetings with MCOs; and meetings with provider associations, community forums, and work groups.

Tennessee's long-standing managed care environment, existing partnerships, and MCO contracts that detailed SIM Initiative participation requirements were critical factors that facilitated robust payer engagement and APM adoption. State officials discussed the importance of TennCare being fully managed care—which allowed the state to leverage MCO contracts and strong existing partnerships with the MCOs—to promote provider education and buy-in to the new VBP models. Explained one state official, "There is just a huge amount of influence to partner with the MCOs to advance these programs forward."

Tennessee's SIM Initiative included three statewide strategies that primarily affected the Medicaid population: primary care transformation, LTSS reforms, and an EOC model. Primary care transformation and LTSS reforms were Medicaid-specific programs. The EOC model, although its predominant impact was on Medicaid, also encompassed state employee plans.

Primary care transformation comprised PCMHs (primary care clinics that achieved or were actively working towards National Committee for Quality Assurance [NCQA] accreditation), Tennessee Health Link (health homes for TennCare members with high behavioral health needs), and a care coordination tool (CCT) intended to allow PCMH and Health Link providers to identify and track gaps in care through admission, discharge, and transfer (ADT) feeds and MCO claims. The EOC model encompassed care delivered by multiple providers in relation to specific, pre-determined acute health care events, with episodes overseen by key providers accountable for relevant providers' overall cost and quality of care provided.[96]

LTSS reforms focused on quality improvement and shifting to VBP in nursing facilities (NFs) and enhanced respiratory care (ERC); improving home- and community-based services (HCBS) with a focus on workforce development; and better addressing the needs of individuals with intellectual or developmental disabilities (ID/DD) and significant behavioral health needs.

Population health was not a central component of initial SIM Initiative plans, though the state did make progress in this area from 2018 through January 2020, by developing a Vital Signs online dashboard and working with multidisciplinary county-level health councils to conduct County Health Assessments (CHAs). Overall, the state aimed to use its SIM Initiative to "make health care in Tennessee a value-based system focused on efficiency, quality of care, and the patient experience." (TN Division of TennCare, n.d.-c)

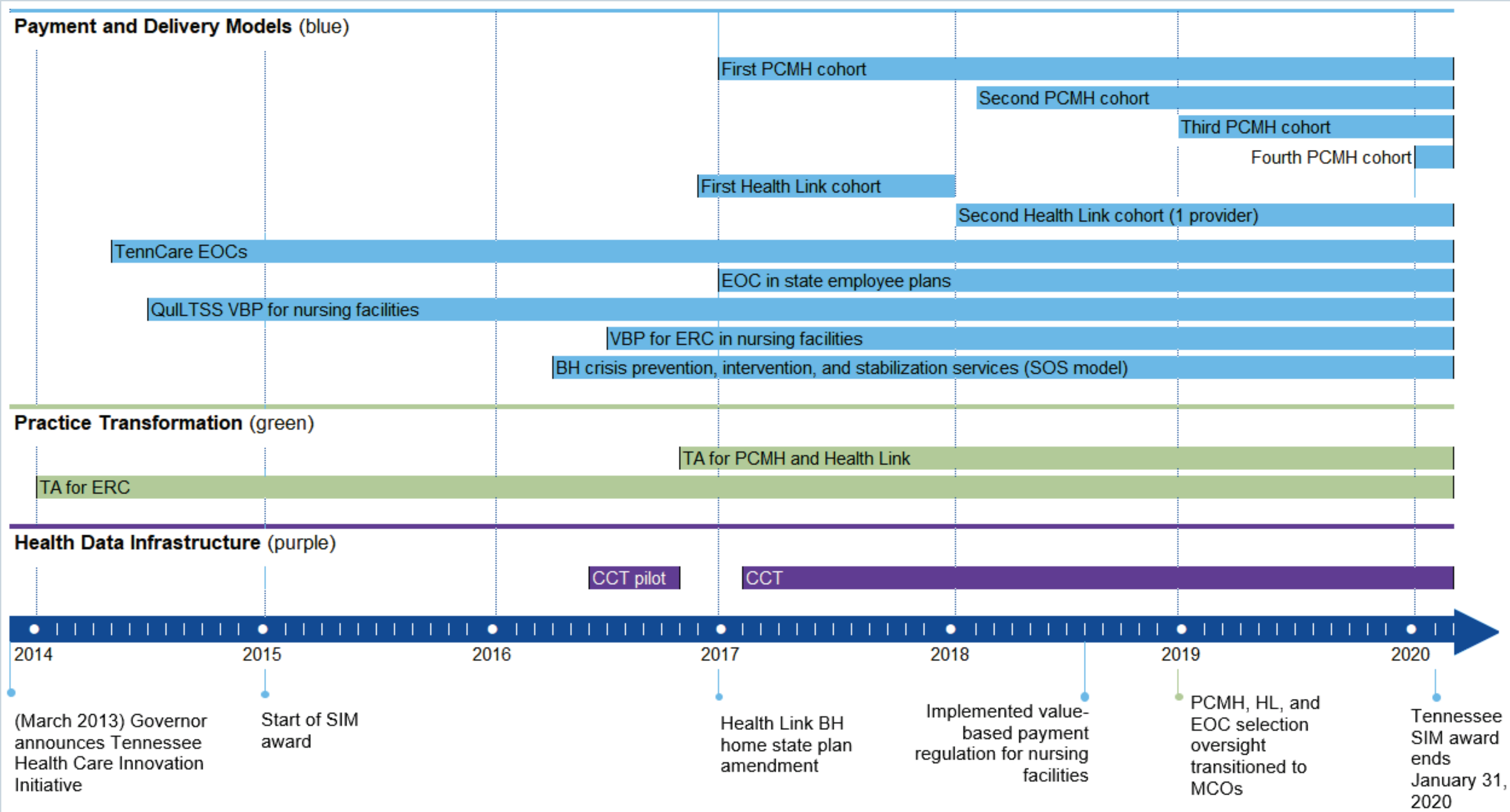
Implementation of Tennessee's SIM Initiative proceeded according to plan and schedule. Two modifications were made to the initial plan that resulted in facilitating implementation of the EOC model. In January 2018, the state modified the EOC model in plans that contracted with the state employee benefits administration, to remove the payment model's downside financial risk to providers and to make provider participation voluntary. In May 2018, the state paused the

[96] Each episode begins with a preview period of five quarters during which time providers receive informational reports. Incentive payments are assessed after the fifth quarterly assessment report.

design of new episodes, scaling back the number of episodes originally planned in TennCare from 75 to 48 to dedicate more resources toward maintaining and improving the existing episodes.

Tennessee's SIM award ended in January 2020. ***Exhibit J-3*** depicts the timeline of major Tennessee SIM Initiative and SIM-related activities.

Exhibit J-3. Timeline of Tennessee SIM and SIM-related activities



Note: BH = behavioral health; CCT = care coordination tool; EOC = episode of care; ERC = Enhanced Respiratory Care; HL = Health Link; MCO = managed care organization; PCMH = patient-centered medical home; QuILTSS = Quality Improvement in Long-Term Services and Supports; SIM = State Innovation Model; SOS = System of Support; TA = technical assistance; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

J.2 Accomplishments from Tennessee's State Innovation Model Initiative

This section summarizes Tennessee's SIM Initiative activities, accomplishments, and stakeholder feedback into three areas: delivery models and payment reform (***Section J. 2.1***), enabling strategies to support health care delivery transformation (***Section J.2.2***), and population health (***Section J.2.3***). The chapter concludes by summarizing Tennessee's efforts to sustain SIM activities and progress on reforms after the award period ended (***Section J.3***), and a discussion of implications and lessons learned from Tennessee's experience (***Section J.4***).

The evaluation of Tennessee's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM Initiative officials;
- A total of 87 interviews with state officials, primary care and behavioral health officials, Medicaid MCOs and commercial plans, and other stakeholders over five annual interview rounds conducted since 2016, most recently in 2020;
- Medicaid claims data.

The evaluation included three quantitative analysis: one focused on Tennessee Health Link, one focused on the acute asthma exacerbation and perinatal EOCs, and one focused on statewide changes due to the SIM Initiative. The Health Link analysis assessed the impact of Health Link on expenditures, utilization, and quality of care. The EOC analysis assessed the EOC model's impacts on Medicaid beneficiaries with acute asthma exacerbation and perinatal episodes during the first five years during which the two episodes were tied to payment. The statewide analysis provided insight into the cumulative impacts of all SIM activities in Tennessee.

Medicaid claims provided by Tennessee were used to examine changes to health care spending, utilization, and quality for a subset of Medicaid beneficiaries enrolled in Health Link for whom certain diagnostic information was available, relative to a comparison group of Medicaid beneficiaries meeting the same diagnostic criteria but not actively enrolled in the program. An additional analysis, also using claims data but without a comparison group, compared outcomes for a different subset of Health Link participants before and after Health Link participation. Defining a comparison group for this analysis was not possible, because this subset of beneficiaries was eligible for Health Link based on characteristics that were not available in claims data. Health Link was selected for quantitative analysis because the state invested a substantial portion of SIM funds in this initiative. Because Health Link initially launched in December 2016, only two years of Medicaid data were available post–Health Link implementation.

Federal Medicaid claims files—from the Medicaid Analytic Extract (MAX) and the Transformed Medicaid Statistical Information System Analytic Files (TAF) data sets—were used for the episode analyses. The analyses included an out-of-state comparison group because the EOC model was statewide and mandatory for eligible providers. For the perinatal and acute asthma exacerbation analyses, Medicaid enrollees from Tennessee who met episode definition criteria were compared to Medicaid enrollees from Kansas, South Carolina, and Kentucky who also met Tennessee's episode definition criteria.

Although Tennessee launched 48 episodes, the EOC analyses focused on perinatal and acute asthma exacerbation episodes. These two episodes were selected because they were among the first episodes to be tied to financial incentives, included tens of thousands of Medicaid enrollees, and focused on children and pregnant women, two populations of policy interest.

Like the EOC analysis, the statewide analysis also used the MAX and TAF data sets. For this analysis, Medicaid enrollees in Tennessee were compared to Medicaid enrollees from Kansas, South Carolina, and Kentucky.

J.2.1 Delivery models and payment reforms

Key Results
• The state made significant inroads in reaching the TennCare population through a combination of SIM Initiative strategies, including PCMH, Health Link, EOC, and LTSS models. • Just over one-third (37 percent) of total TennCare members were attributed to a SIM-supported PCMH. Almost half (47 percent) of TennCare members eligible for Health Link were enrolled in the program. All TennCare members were eligible for EOC model services. All TennCare LTSS members in NFs received services through a SIM Initiative VBP model. • EOC model implementation resulted in some providers re-examining their operations and making changes to improve quality, reduce emergency department (ED) use, and improve efficiency. • TennCare contractually shifted responsibility for management of PCMHs and Health Link to MCOs as of January 2019.

Tennessee's SIM Initiative made great strides in incorporating and institutionalizing primary care delivery system and payment reforms. Tennessee's implementation of SIM Initiative programs, target population for its programs, key accomplishments and challenges, and plans to sustain those programs when SIM funding ended, are illustrated in ***Table J-1*** and ***Exhibit J-4***.

Table J-1. Tennessee's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
EOC model	Providers	• 48 episodes were implemented in Medicaid, with mandatory participation and risk-/gain-sharing. • Due to COVID-19, all risk-sharing payments were waived for the 2019 performance period. • 12 episodes were implemented in state employee plans, with voluntary participation and gain-sharing, but without downside risk.	• For Medicaid plans, MCOs will continue oversight of episodes performance reports, and calculating risk- and gain-sharing payments. • For state employee plans, state employee plan payers will continue oversight of episodes performance reports and calculating gain-sharing payments.
PCMH model	TennCare enrollees, primary care providers	• Phased-in addition of PCMHs in waves each January, for a total of 81 PCMH practices representing 488 sites and 37% of eligible TennCare members. • Quality and efficiency metrics linked to shared savings incentive payments from 25–50%, depending on patient panel size. • Quality improvements shown across 16 of 18 quality core measures from 2017 through 2019. • As of October 2020, 93.7% of participating practices had NCQA PCMH recognition.	• TennCare required MCOs' assumption of provider selection and oversight of PCMHs starting 2019.
HL model	TennCare enrollees with significant BH needs, BH providers	• Participation by 18 HLs representing 188 sites and 47% of eligible TennCare members. • Shared savings payments distributed to HL providers for the first time in 2019; Payments to providers capped at 10% of total HL Medicaid reimbursement starting in 2020. • Quality improvements across 11 of 18 quality measures from 2017 through 2019, particularly those for physical health.	• The HL model was added to the state Medicaid plan via a state plan amendment in 2017. • TennCare required MCOs' assumption of provider selection and oversight of Health Link starting in 2019.
LTSS VBP models	All NFs	• TennCare implementation of new value-driven prospective payment regulation for NFs on August 1, 2018.	• State embedded changes within TennCare NF reimbursement rules.
	NFs providing ERC	• Continued progress in providers changing and improving the way they delivered care as a result of incentives and supports.	• State incorporated the quality measures and payment incentive structure into TennCare rules.
	Individuals with ID/DD	• Fielding a survey tool to assist TennCare in developing workforce benchmarks.	• State plans were to incorporate workforce recruitment and retention indicators into LTSS purchasing strategies.

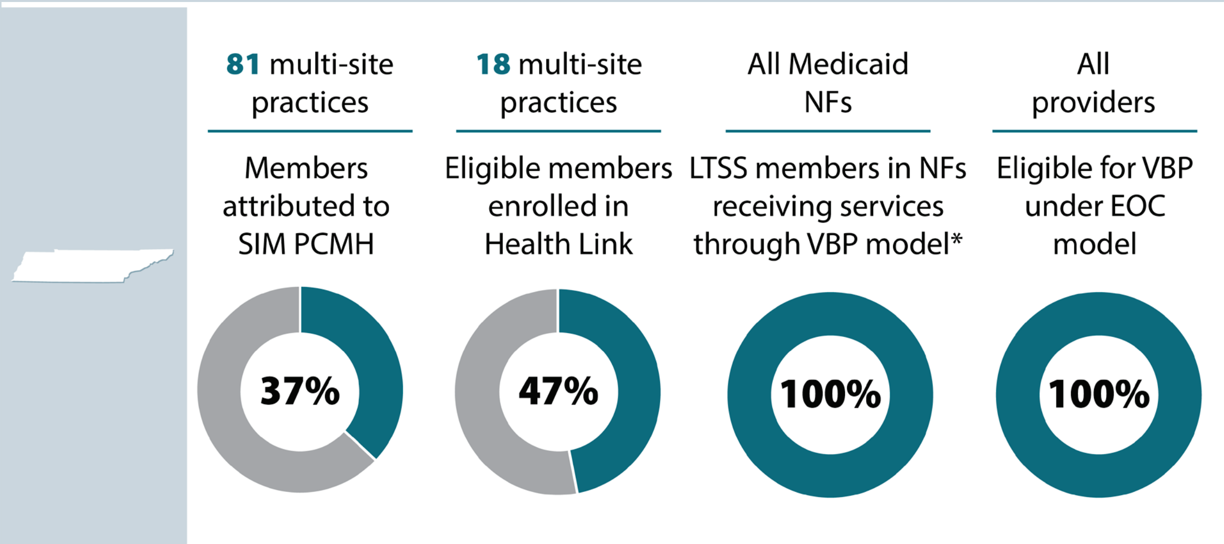
(continued)

Table J-1. Tennessee's delivery system and payment reforms (continued)

Note: BH = behavioral health; COVID-19 = coronavirus disease 2019; EOC = episode of care; ERC = enhanced respiratory care; HL = Health Link; ID/DD = intellectual or developmental disabilities; LTSS = long-term services and supports; MCO = managed care organization; NCQA = National Committee for Quality Assurance; NF = nursing facility; PCMH = patient-centered medical home; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Exhibit J-4. Tennessee's SIM Initiative made great strides in incorporating and institutionalizing value-based payment



* This does not include the percentage of LTSS members in Home and Community Based (HCBS) programs that use VBP because that percentage is unknown.

Note: EOC = episode of care; LTSS = long-term services and supports; NF = nursing facility; PCMH = patient-centered medical home; SIM = State Innovation Model; VBP = value-based payment.

Sources: Medicaid State Fact Sheets; Kaiser Family Foundation; TennCare Delivery System Transformation Conference, October 2020.

Patient-centered medical homes

> "We're in this together, we're in it to improve the lives of the people in Tennessee."
>
> —Tennessee payer

By the end of the SIM Initiative, Tennessee had continued to progress in PCMH expansion, with stakeholders attributing growth in the number of PCMHs in each new wave and provider buy-in to: (1) increased program visibility and stability from alignment of this delivery model across MCOs, (2) the state's and MCOs' commitment to transparency and open communication with providers, and (3) the positive impact of PCMHs on beneficiaries' health through improved care coordination and focus on improving quality of care. As one payer said, "A couple of years ago, my providers didn't totally understand what it was … And now, instead of us reaching out to providers, providers are reaching out to us concerning the program. They want to know, what do I need to do to join, who do I need to talk to?"

> "The overall patient-centered medical home program is thinking about all the things that affect the health of your patient and not just treating what you have in front of you."
>
> —Tennessee payer

As of February 2020, each MCO estimated that 37–40 percent of its TennCare members were enrolled in a PCMH.[97] The PCMH program had made progress in the integration of behavioral health with physical care by strengthening relationships and information sharing capabilities with Health Link providers, resulting in approximately 90 percent of behavioral health referrals by PCMHs being made to Health Link practices, according to an MCO official.

Highlights of State's Patient-Centered Medical Home Analysis

- Quality improvements occurred across 16 of 18 core measures.
- The largest improvement of 68 percent per year was in a diabetes metric for controlling high blood pressure (<140/90).
- Childhood immunization rates increased by 20% per year.
- Asthma medication compliance increased by 12 percent per year.
- Total cost of care decreased by 3 percent in the second year of the program for PCMH members, relative to a non-PCMH control group.

Improvement in the quality of care delivered to PCMH members through efficient service provision also evolved during the SIM Initiative. TennCare's own analyses (TN Division of TennCare, 2019b) showed quality improvements and overall expenditure reductions for those served by PCMHs in the first two years of the program. Reductions in expenditures were credited to positive utilization trends that included a decline in hospital outpatient services, and a reduction in emergency department (ED) costs and ancillary services such as laboratory and diagnostic testing (TN Division of TennCare, 2019b). Access to care improved for PCMH members as well. Providers in the second year of PCMH were more effective at getting PCMH members who had not been to a primary care provider (PCP) in the past two years to complete a preventive care visit, compared to the control group (TN Division of TennCare, 2019b). TennCare's first incentive payment was made to 19 PCMH providers for 2017 performance, based on quality and efficiency metrics. In August 2019, 53 PCMH providers received outcome bonus payments for calendar year (CY) 2018 totaling approximately $11.1 million.

Health Link

TennCare's primary care transformation progress continued with the Health Link program's work in integrating physical and behavioral health care to improve the quality of care provided to members, while also providing care efficiently. Health Link direct care staff reported

[97] February 2020 RTI site visit interviews with TennCare MCOs.

an increased focus on physical health, building relationships with PCPs in the community, and developing understanding of clients' physical health needs. While integrating physical health care in community mental health settings was viewed difficult by Health Link practices, reports from state officials, providers, payers, and increasingly beneficiaries, indicated that Health Link boosted the level of integration within participating provider organizations. Some Health Link clinics developed internal primary care capacity; others partnered with PCMH and non-PCMH primary care practices, making referrals between practices based on patients' needs. One Health Link stakeholder noted practice changes—such as hiring hospital liaison staff and nurse practitioners to better address physical health needs, using in-house medical expertise to support direct staff engagement on physical health needs, and offering regular in-house training on managing physical health issues.

Claims-based Analyses of Tennessee Health Link

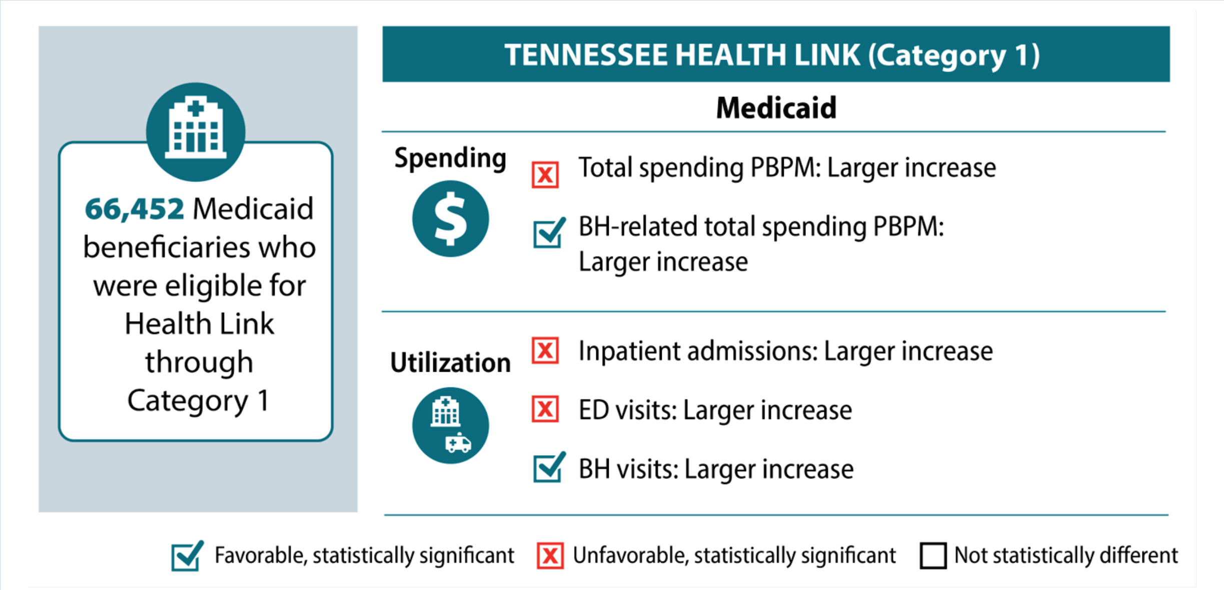
For more information, see ***Tables J-5*** through ***J-8*** in the Addendum at end of this chapter. For full results describing the impact of Health Link, see ***Appendix J-1***.

The quantitative impact analysis findings reflect Health Link's emphasis on physical and behavioral health integration and the opportunities created for Health Link beneficiaries to access care (see ***Exhibit J-5***). The core analysis compared results for Tennessee Medicaid beneficiaries enrolled in Health Link based on prior diagnoses for serious mental illness[98] (Category 1) to the comparison group of Tennessee Medicaid beneficiaries eligible based on the same criteria but not enrolled in Health Link.

As noted above, Health Link practices made several efforts to improve beneficiaries' access to primary care and physical health services. In line with the model, behavioral health visits and PCP visits counts increased for Medicaid beneficiaries participating in Health Link and remained almost unchanged in the comparison group, leading to relative increases in behavioral health visits and PCP visits in the Health Link group (0.30 primary care visits per beneficiary, 7.19 behavioral health visits per beneficiary).

[98] The four diagnoses included are: (1) attempted suicide or self-injury; (2) bipolar disorder; (3) homicidal ideation; and (4) schizophrenia.

Exhibit J-5. Tennessee's Health Link (Category 1) had unfavorable impacts on spending and hospital use, and favorable impacts on behavioral health visits in its first two years



Notes: Changes are relative to a comparison group. A checkmark indicates a favorable impact.
BH = behavioral health; ED = emergency department; PBPM = per beneficiary per month; TN = Tennessee.
Source: Federal Evaluation Team analysis of TN Medicaid claims data analysis from TennCare. See ***Appendix J-1*** for more detail.

Other key utilization outcomes also increased. Inpatient admissions and ED visits increased for Medicaid beneficiaries participating in Health Link, while decreasing for comparison beneficiaries, leading to relative increases in inpatient admissions and ED visits for the Health Link group (36.97 admissions per 1,000 population, 396.88 ED visits per 1,000 population). Readmissions increased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but decreased less for Health Link participants (-26.66 readmissions per 1,000 discharges). Behavioral health–related inpatient admissions and behavioral health ED visits increased for Medicaid beneficiaries participating in Health Link but declined for comparison beneficiaries, leading to relative increases in those outcomes for the Health Link group (27.12 behavioral health–related inpatient admissions per 1,000 population and 30.47 behavioral health–related ED visits per 1,000 population). The increases in utilization in the Health Link group relative to the comparison group could reflect increased beneficiary access to necessary care early in the intervention period. A longer analytic timeframe be needed to better understand the effect of Health Link participation on utilization patterns.

Due to the expected relationship between utilization and spending, the spending outcome measures reflected increases for the Health Link group relative to the comparison group. During the first two years of implementation, total spending per beneficiary per month (PBPM) and total behavioral health–related spending PBPM increased for Medicaid beneficiaries participating in Health Link while decreasing for comparison beneficiaries, leading to relative increases in total and behavioral health–related spending for the Health Link group (total spending: $213.87 PBPM, behavioral health–related spending: $121.72 PBPM). The relative increase in total spending was largely driven by a relative increase in behavioral health spending for Health Link beneficiaries ($121.72 PBPM), which is expected given the relative increase in access to primary care and behavioral health visits.

Additional analyses focused on changes before and after Health Link implementation for each Health Link eligibility category separately (without a comparison group due to data limitations). In addition to the beneficiaries eligible for Health Link based on diagnostic criteria (Category 1), discussed above, other analyzed eligibility categories included beneficiaries eligible for Health Link based on utilization criteria (Category 2) and beneficiaries eligible for Health Link based on provider documentation of a functional need (Category 3). Some of the most promising findings were for the group with documented functional need; these beneficiaries were younger on average and did not qualify for Health Link due to a serious mental illness diagnosis, which may have contributed to making it easier to affect outcomes for this group. Inpatient admissions, ED visits, and behavioral health–related inpatient and ED spending decreased for beneficiaries eligible for Health Link based on functional need, whereas behavioral health visits increased.

While TennCare's state-led evaluation showed quality improvements and overall reductions in the total cost of care for those served by Health Link in the first two years of the program, the different TennCare methodology precluded direct comparisons with the federal evaluation results reported here (TN Division of TennCare, 2019b).

Focus groups from 2018 through 2020 with providers, caseworkers, and beneficiaries illustrated challenges and growth within Health Link's program implementation. In 2018, providers and beneficiaries talked about increased caseloads and turnover with frontline staff. Caseworkers noted they did not always feel prepared to address the physical health care issues being raised as part of the new service delivery model. Providers and beneficiaries also observed that the new emphasis on integrated care shifted assistance from other necessary beneficiary supports, such as housing, transportation, and food supports.

Providers discussing these topics in March 2019 still found engaging clients about their physical health needs challenging, but had received training and were making referrals for primary and specialty care when needed. Providers and clients saw the transition to the Health Link model in both positive and negative terms. Some individuals in both groups felt less "hand-holding" encouraged independence, but others in both groups thought the Health Link model could make it more difficult for enrollees to access needed ancillary services. Providers and caseworkers appreciated the flexibility Health Link afforded them to address individual patient needs, rather than using a one-size-fits-all approach. Prior to Health Link implementation, caseworkers were required to have a face-to-face visit at least once per month with all clients on their caseload, whether clinically indicated or not. Health Link permitted quarterly face-to-face contact with beneficiaries, with monthly telephone contact. Direct care staff said they liked this flexibility, which allowed them to spend more time with clients with the most acute needs, thus better managing practice resources.

Beneficiary consumers in February 2020 focus groups were universally positive—highlighting case managers exceeding expectations to ensure patients had housing, food, and timely access to their medications. This may indicate that caseworkers adopted and utilized the flexibility the Health Link model provided in meeting each client's needs. Beneficiaries also talked about routinely discussing their physical health care needs with caseworkers and having appointments made by their caseworkers for preventive and medical care. Consumers gave their Health Link providers high marks in patient satisfaction.

> "Yeah, she's pretty good. She do house visits. And when I was in the hospital, she actually came to the hospital to see me. And also set me up with—like Mental Co-Op will pick you up for your appointments, So now, when I'm going to my doctors' appointments or have to get tests done or anything, she set it up where they come and pick me up. I don't have to ride the bus no more."
>
> —Health Link beneficiary talking about caseworker 2020 focus group

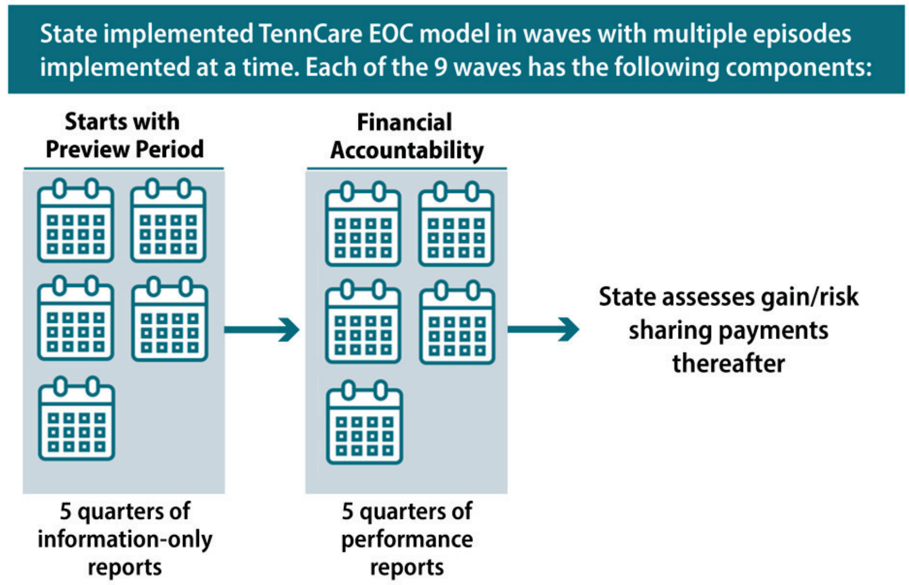
The 14 top performing Health Link providers received their first bonus incentive payment, based on process and outcome measures of quality and utilization, of over $6.5 million in August 2018 for performance year 2017. These bonus payments increased in 2020 to about $12 million to 18 Health Link providers for performance year 2019. These payments were larger than the state had anticipated; so, to sustain the viability of the incentive program, TennCare capped incentive payments at 10 percent of an organization's total TennCare Health Link reimbursement, starting with performance year 2019 incentive payments made in August 2020.

Episodes of care

State and payer stakeholders viewed the TennCare EOC program[99] as a successful and impactful addition to the state health care landscape in working to transform the delivery of specialty and acute health care services—with improvements in both quality and cost effectiveness (EOC phase-in shown in ***Exhibit J-6***). A state official described the EOC program as "one of the most important things we're doing as a state and the most important thing we're doing as a Medicaid agency."

[99] The state implemented the EOC model in nine "waves," meaning several episodes at a time, for a total of 48 episodes. Each wave began with a preview period in which five quarterly information-only reports were received by providers. This was followed by quarterly episode performance reports tied to financial accountability. After the fifth quarterly episode performance report, the state assessed providers' gain or risk sharing payment amounts.

Exhibit J-6. Tennessee episode of care model was implemented in nine waves



Note: EOC = episode of care.

Source: *TennCare delivery system transformation: Episodes of care analytics report*, Division of TennCare (October 2019).

State officials pointed out that, after three years of EOC performance data, they had seen over $40 million in recurring savings in their base budget because of more efficient and appropriate care and had paid out more in gain sharing payments than they had taken back in risk sharing payments. And overall, EOC showed an estimated savings of $45.2 million in 2019 compared to costs on the assumption of similar spending on specialty services in TennCare, plus a 3 percent annual medical inflation rate (TN Division of TennCare, n.d.-a).[100] In 2018, there were six waves (27 episodes total) for which the state reported 739,197 (TN Division of TennCare, n.d.-b) valid episodes, with net savings varying substantially with episode type.[101] As of 2018, episodes with the highest estimated reduction in average spend included perinatal (spend reduction of $13.5 million in 2018), respiratory infections (spend reduction of $6.8 million in 2018), and asthma exacerbation (spend reduction of $4.2 million in 2018) (TN Division of TennCare, 2019a). TennCare MCO stakeholders echoed the state officials' perspective, with one calling the program "very aggressive," but also "mov[ing] the needle very quickly."

[100] Estimated savings are calculated as the difference between actual cost and projected cost. The projected cost includes a 3 percent annual medical inflation rate for specialty care services provided in TennCare.
[101] This number might have included duplication of beneficiaries who triggered multiple episodes, as the state cannot provide unduplicated counts.

While provider advocacy organizations and many providers expressed opposition towards the EOC model in the early years of the SIM Initiative, concerns moderated with time and experience with the model. TennCare providers and stakeholders interviewed during February 2020 expressed general acceptance of the EOC model. This shift in view was attributed to the state's continued work in soliciting and making modifications to EOCs based on provider feedback, the reduced impact in implementing 36 percent fewer EOCs than initially planned (including a roll-back in the number of behavioral health EOCs), and the realization that the financial impact of risk sharing on practices was less than initially feared. Gain-sharing payments exceeded risk-sharing payments in all four years of reporting, with gain-sharing payments in 2018 exceeding risk sharing payments by $686,000 (TN Division of TennCare, 2019a). Due to the coronavirus disease 2019 (COVID-19) pandemic, TennCare waived all risk sharing payments for the 2019 performance period.

Interviews with TennCare providers during the EOC program's implementation showed an impact of the model in gradually shifting some providers' behavior in the medical care given to their patients. Providers interviewed during 2017 and 2018 said the EOC program had not led to changes in how they practiced. But providers interviewed in the next two years discussed hiring a nurse practitioner or other practitioner to increase coverage, providing additional lab work and services in-house (instead of their previous custom of sending patients to a hospital clinic or ED), and increasing their focus on follow-up care. These providers said they had revisited office practices and made modifications as a result of EOC model implementation, with the intent of reducing ED use and improving quality and efficiency. Some providers also mentioned receiving positive patient feedback on these new processes and services, and that these practice changes were implemented for all patients, which went beyond the TennCare program to patients with other insurance coverage. State officials also reported positive feedback from behavioral health providers using episode report data to improve their prescribing practice and provide better care to patients across the continuum.

> "I would argue … that [behavioral health episodes] are an extremely important tool for us to continue … that program has single-handedly started driving some pretty massive change in the prescription practice of doctors that are treating these types of behavioral health episodes."
>
> —Tennessee state official

Several TennCare providers opined a positive view that the EOC model was bringing much needed accountability and standardization to their specialty, and reimbursing providers for the high-quality care they already provided. Providers from one practice emphasized this by saying, "A lot of us have been kind of screaming for it in some ways, because it [the standardization] makes our life easier, it's better care for the patient … And if we get reimbursed better for that, we're happy." These providers noted that standardized metrics and targets helped reinforce best practices to the entire clinical staff, providing a clear roadmap to receiving gain-sharing payments.

Each EOC had quality measures. Overall, 80 percent of metrics tied to gain sharing incentives between 2017 and 2018 showed either improvement or maintained performance; 86 percent of metrics not tied to gain sharing also showed either improvement or maintained performance (TN Division of TennCare, 2019a).

The quantitative impact analysis findings completed for the federal evaluation, reported here, reflect the lag in behavior changes reported by providers in Tennessee. This evaluation used a claims-based analysis of the first five years in which the asthma and perinatal EOCs were tied to provider payments. The evaluation examined changes to selected quality outcomes—also used to assess provider performance on EOCs—for Medicaid beneficiaries in Tennessee and in a comparison group of similar states (Kentucky, Kansas and South Carolina). Similar to the state's own analyses, this impact analysis found improvements in most quality metrics after EOCs were implemented. However, asthma EOC quality metrics generally improved more in the comparison group than in Tennessee, resulting in unfavorable changes in quality for Tennessee relative. However, these findings were driven by the first two years of the asthma EOC operation. After this initial period, changes to outcomes did not differ between Tennessee and the comparison group, suggesting that it took time for the asthma EOC to affect trends in quality outcomes. The annual findings are in line with the lack of behavior change reported by providers during the early years of EOC model implementation.

For perinatal episodes, the percentage of perinatal episodes that included a cesarean section delivery (C-section) declined more in Tennessee than in the comparison group (-1.07 percentage points), which lines up with the state's own findings (see ***Exhibit J-7***). The percentage of perinatal episodes with post-delivery follow-up visits declined slightly in Tennessee while increasing in the comparison group (-1.21 percentage points). However, the post-delivery follow-up rate started quite high for both Tennessee and the comparison group (74% versus 73% for the comparison group), so there was little room for improvement.

Episodes gained some traction among payers of state employee plans over the course of the SIM Initiative, reaching 12 EOCs in 2020; but with voluntary provider participation, its impact remained limited. State officials did note the EOC initiative influenced commercial carriers' efforts on a larger level, with Humana implementing three EOCs nationally, based on Tennessee's episodes: total joint replacement, spinal fusion, and maternity care. In fall 2019, CMS designated the Episodes program as an Advanced APM by CMS through 2025. This designation gave more Tennessee providers the ability to join the APM track of Medicare's Quality Payment Program (QPP) by participating in TennCare's Episodes program and rewarded them with the potential to earn additional bonuses from Medicare. State officials said they had secured this designation for the Episodes program as an incentive for providers participation, in the hope the designation would broaden the program's impact.

Exhibit J-7. Tennessee's perinatal episode of care had a favorable impact on cesarean sections in its four years, and its asthma episode of care had unfavorable impacts in its first five years

Perinatal episodes
233,798 (C-section)
236,519 (follow-up)

Asthma episodes
215,625
215,233 (asthma exacerbation)

TENNESSEE EOC

Perinatal	☑	C-section: Larger decrease
	☒	Post-delivery follow-up within 60 days: Larger decrease
Asthma	☒	Follow-up visit within the post-trigger window: Smaller increase
	☒	Receipt of appropriate asthma medication: Smaller increase
	☒	Repeat acute asthma exacerbation: Larger increase

☑ Favorable, statistically significant ☒ Unfavorable, statistically significant ☐ Not statistically different

Notes: Changes are relative to a comparison group. A checkmark indicates a favorable impact.

C-section = cesarean section; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF. See ***Appendix J-2*** for more detail.

Long-Term Services and Supports

LTSS encompasses a range of interventions (either facility-based or in the home or community), for individuals with significant physical, cognitive, and/or behavioral health needs. In Tennessee, the SIM Initiative focused on transitioning NF payment into a VBP model; improving the quality of care for residents in NFs and those needing ventilator support; improving HCBS for individuals with ID/DD, including individuals with significant behavioral health needs; and focusing on improving the LTSS workforce through competency-based learning.

Tennessee implemented a prospective payment for NFs on August 1, 2018, with a retroactive effective date of July 1, 2018. This shifted Tennessee's nursing care system further toward VBP, using a case mix reimbursement model that included a tiered rate structure based on a quality incentive component. To incorporate key non-claims–based measures, Tennessee developed and implemented its uniform data collections tool—the Resident, Family and Staff Satisfaction and Resident Culture Change and Quality of Life Assessment/Survey in 2019. The state collected baseline data used to assess quality of life measures as another facet of NF reimbursement. Under the prospective payment rules, each facility's rate was tiered based on its performance on key quality measures in the prior measurement period. Reflecting the impact of COVID-19 on NFs, TennCare made the 2020 NRC Health survey optional, allowing NFs to use the results from their 2019 survey instead. A capital cost component of the rate was also enhanced based on quality performance. Starting in 2021, the state planned to set aside a quality incentive pool to be built into the prospective rates, as opposed to a previous quarterly adjustment.

In late 2019, TennCare introduced another component of the LTSS VBP methodology, incentivizing competency-based training for direct care staff (details provided in Workforce section below). Full implementation of this component continued through fall 2020, with oversight by the Value-Based Purchasing Team in LTSS and the TennCare Fiscal Division.

The ERC program was another component of the SIM Initiative. As it matured, SIM-funded state practice improvement contractors reported they were no longer seeing the dramatic results of previous years, as the program moved to address the more complex and challenging patients on ventilators. But participating providers continued to see successes with residents whom other providers and systems had determined as incapable of weaning from ventilator support. Data submitted to TennCare by providers for April through September 2019 showed that seven of 10 facilities had wean rates at or above 50 percent (TN Division of TennCare, 2019). Contractors reported they saw providers continuing to transform the way they did business, noting that low-performing providers were embracing the program and moving up in the tiered payment system. Contractors also noted that program successes and performance-based reimbursement incentivized NF ownership of essential and state-of-the art equipment. By 2020, ERC nurse case managers reported that the ERC program fostered an environment of quality assurance and accountability at facilities through documentation.

TennCare also implemented changes to its HCBS LTSS program—including the ECF CHOICES program, which used VBP strategies to improve the state's employment programs for adults with disabilities. State data from April 2019 showed that employment rates in ECF CHOICES for working age adults increased by more than 45 percent in 18 months (TN Division of TennCare, 2019).

Another HCBS program targeted individuals with ID/DD and significant behavioral health needs. Program analysis conducted in 2019 reported promising results. The System of Support (SOS) initiative focused on individuals with ID/DD and serious behavioral health needs. The SOS service was a person-centered, comprehensive but time-limited program to improve outcomes for individuals with ID/DD and significant behavioral health needs. The SOS model featured crisis planning and prevention, crisis stabilization and in-home supports, and care management and transition services. State officials reviewed pre- and post-utilization data on a sample of individuals who had been enrolled in the SOS program between 2015 and 2018. In the six-month post-utilization period after discharge from the service, enrollees had a 73 percent reduction in utilization across all claims types, a 44 percent reduction in crisis respite, a 25 percent reduction in ED use, and a 77 percent reduction in psychiatric inpatient utilization.[102] TennCare would continue this program after the award period, with oversight through TennCare's Value-Based Purchasing Office. Responsibility for post–SIM Initiative oversight of LTSS programs would be by TennCare's Office of Behavioral Health.

Statewide Analysis

To assess whether the Tennessee Health Link, PCMH, EOC, and LTSS models had impacts on the overall Tennessee Medicaid population, this analysis compared changes in inpatient admissions, ED visits, and readmissions for Tennessee Medicaid beneficiaries and comparison Medicaid beneficiaries from Kansas, South Carolina, and Kentucky. Inpatient admissions decreased for both Tennessee and the comparison group but decreased less in Tennessee relative to the comparison group (5.37 admissions per 1,000 beneficiaries). Likewise, ED visits decreased for both Tennessee and the comparison group but decreased less in Tennessee (144.19 ED visits per 1,000 beneficiaries). The 30-day readmission rate increased for Tennessee and decreased for the comparison group, leading to a relative increase in readmissions in Tennessee (38.20 readmissions per 1,000 discharges). These findings are in line with relative increases in utilization found in the Health Link population and relatively poorer quality performance for EOC quality metrics relative to the out of state comparison group.

J.2.2 Enabling strategies to support health care delivery transformation

Key Results
• Tennessee's SIM-related payment and delivery system changes were rooted in state investment in a range of enabling strategies—especially comprehensive stakeholder engagement, extensive training and TA, and development and use of the CCT. • The deliberate alignment of quality metrics between the TennCare PCMH and Health Link programs contributed to practice transformation and closer integration of physical and behavioral health care. • The core health information technology (health IT) strategy in Tennessee's SIM Initiative continued to be the CCT. As of January 2020, all hospitals statewide (except for four state-owned psychiatric hospitals) were reporting ADT data into the CCT. • Though some data issues remained, payers, providers, and state officials widely regarded the CCT as an effective tool for closing gaps and coordinating care.

Tennessee's enabling strategies supporting health care delivery transformation in the state's SIM program are provided in ***Table J-2***.

[102] Tennessee state official, personal communication, March 7, 2019.

Table J-2. Tennessee's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Practice transformation assistance	PCMH and Health Link practices	• Stakeholder meetings and Learning Collaboratives. • Training and TA by contractor.	• Stakeholder meetings will continue, and TennCare MCOs will continue regional Learning Collaboratives. • State-funded training and TA by contractor continued until 2020, when TennCare MCOs assumed provision of training and TA.
Workforce development	Direct service LTSS providers and practices	• New VBP model and associated data collection tool. • Online learning system pilot. • Competency-based curriculum tied to course credit and two-year degree.	• Contractor will continue state-funded trainings on the data collection tool. • Workforce incentives were built into Medicaid NF payment. • Access to educational funds to support course work.
Health IT and data analytics	PCMH and Health Link providers	• Almost 100 percent of hospitals statewide (excluding the four state-owned psychiatric facilities) reported ADT feeds to the CCT quality apps that enabled payers and providers to report on non-claims data.	• The state updated the tool to provide more analytical capabilities for providers. This was rolled out in 2020 under a new vendor. • Funding for the CCT included in the state's ongoing budget.
Quality measure alignment	PCMH and Health Link providers	• Measure alignment between PCMH and Health Link.	• TennCare MCOs will monitor and provide data and TA on quality performance to PCMH and Health Link.
Stakeholder engagement	Providers, beneficiary consumers	• Thoughtful, iterative process for engaging a range of stakeholders, including outreach, meetings, and an iterative rulemaking process.	• Stakeholders/state officials reported stakeholder engagement as built into state policy development.

Note: ADT = admission, discharge, transfer; CCT = care coordination tool; ERC = enhanced respiratory care; health IT = health information technology; LTSS = long-term services and supports; MCO = managed care organization; PCMH = patient-centered medical home; SIM = State Innovation Model; TA = technical assistance; VBP = value-based payment.

Source: Federal Evaluation Team analysis of interviews, focus groups, and state documents.

Practice transformation assistance

Changing how providers delivered care was a key focus of the Tennessee SIM Initiative. While the move to a VBP methodology supported these changes, significant investment in training, and the provision of tools such as the CCT were important change drivers. The practice transformation support provided by TennCare's TA contractor assisted PCMHs in working towards and securing NCQA PCMH recognition. Support provided through Learning Collaboratives assisted PCMH and Health Link providers in integrating physical and behavioral health care.

In July 2017, TennCare launched the NCQA PCMH recognition requirement for program participants, with SIM Initiative funding available to cover the cost. With help from in-person, one-on-one assistance and coaching from the state's TA contractor, 93.7 percent of all PCMH providers had attained NCQA PCMH recognition as of October 2020. Wave 4 providers had until June 30, 2021 to achieve NCQA PCMH recognition. Instead of ending the state's contract with the TA contractor in January 2020, when responsibility transferred to MCOs for assisting providers in reaching PCMH recognition, the state extended the contract through 2023 for providers coming into the PCMH program in future waves starting in January of each year.

Learning collaboratives served as an effective method for addressing challenges related to communicating among PCMH and Health Link providers and understanding the differences between the two models and the services PCPs in PCMHs and behavioral health providers in Health Link delivered. With the SIM Initiative's focus on integrating physical and behavioral health, PCMHs and Health Link providers became referral sources that needed to work effectively with one another. State officials described success in holding quarterly learning collaboratives that included both PCMH and Health Link providers in the same room—listening to the same presentations, discussing shared barriers, and going to the same breakout sessions. These learning collaboratives facilitated networking among PCMH and Health Link providers, and participants talked about the positive impact these meetings had on their communication with one another. These collaboratives, run by a SIM-funded contractor through 2019, were newly organized and run by the MCOs starting in 2020, in which both PCPs and mental health providers participated.

MCOs saw success in intensive coaching and peer-to-peer learning opportunities to support low-performing EOC quarterbacks. One MCO held focus groups that brought together the highest and lowest performing providers for a specific episode, to share best practices and strategies for meeting the acceptable cost and quality thresholds. This MCO provided detailed spreadsheets and data reports for low-performing practices and providers—to help them clearly understand the specific metrics on which they were underperforming, and how much they needed to improve to receive a payout. Participants' data was also provided in comparison to peers, which helped motivate improvement and resulted in many practices meeting their metrics for the first time.

> "These [learning collaborative] sessions let PCP offices hear about challenges behavioral health providers are experiencing. And health link providers are also seeing improvements in their practices because they have been able to build relationships with PCMHs. The networking has helped providers in both types of practices."
>
> —Tennessee state official

Workforce development

The state of Tennessee viewed workforce investment as an extension of its effort to promote value and improve the quality of care in its LTSS system. While the workforce development program was originally intended to focus on workforce training, the state determined in 2018 that a training program alone would not sufficiently address the severe direct service provider (DSP) shortage across LTSS in both NFs and HCBS for individuals with ID/DD.

Despite offering higher rates of reimbursement for direct services within their ECF CHOICES program (designed for people of all ages with ID/DD), provider agencies continued to struggle with inadequate staffing. In response to these ongoing challenges, Tennessee implemented a VBP strategy to incentivize providers to reduce turnover, support their staff, and improve LTSS workforce training. To implement this strategy, Tennessee hired a university-based contractor to develop a data collection tool to obtain workforce data from provider agencies statewide. The data tool utilized a modified version of the National Core Indicators Staff Stability survey. Data from the tool enabled practices to develop their own quality improvement plans for workforce development, but also allowed the state to track systemic progress. Provider agencies were given a $2,000 incentive to establish processes to complete the workforce data collection tool. Data collected in 2019 provided baseline data for quality benchmarking going forward.

During 2019, the state made significant strides in its work to improve the LTSS workforce through competency-based training for direct care staff. Consistent with other aspects of the state's long-term care strategy, workforce development was embedded in its VBP approach. TennCare leadership worked closely with a private non-profit organization, the Quality Improvement in Long-Term Services and Supports (QuILTSS) Institute, to develop a competency-based curriculum for direct care staff at NFs, which was rolled out at the end of 2019. During the first year of implementation, NFs would receive points toward incentive payments depending on the percent of facility staff who participated in training orientation. In fall 2020, the state implemented further incentives for direct care staff who completed coursework developed by the QuILTSS Institute.

Importantly, TennCare and QuILTSS Institute leadership worked closely with the state's Board of Regents to craft a curriculum that met accreditation standards for Tennessee's community college system. Moreover, students taking these courses could access Department of Education funds for through Tennessee PROMISE, a scholarship program for high school students and RECONNECT, a grant program for adults returning to school, to pay for these courses. While this coursework was voluntary for direct care staff, employees would receive wage increases ($.50–$1.00) upon completion of these courses. A line item had been included in the governor's 2020 budget for these wage increases but was deferred due to the COVID-19 pandemic and its impact on state revenue and budgeting priorities.

Nursing facility representatives saw the workforce development initiative as problematic. Administrators noted they were surprised to hear about an automatic increase in staff pay, and were concerned that their payer mix, which included Medicare and private pay, would not cover this increase, which was tied only to Medicaid payment. State leaders were confident that, once the facilities worked through the initial challenges, the plan would go forward as planned and that the multiple incentives built into the approach—course credit toward a two-year degree, access to public funds to pay for them, an increase in wages, and incentives for employers—would succeed in improving the LTSS workforce.

The state planned to continue partnering with the QuILTSS Institute to develop additional trainings for its LTSS direct care staff, work that would be overseen going forward by TennCare and LTSS leadership.

Health information technology and data analytics

The core health IT strategy in Tennessee's SIM Initiative was the CCT, which launched in February 2017 with the goal of supporting care coordination and reducing gaps in care in PCMH and Health Link practices. Although the CCT was developed and maintained with non-SIM funding (Health Information Technology for Economic and Clinical Health Act [HITECH] funds, at a 90/10 federal/state match), the CCT directly supported PCMH and Health Link providers by providing: (1) real-time ADT data from Tennessee Hospital Association (THA) hospitals, and (2) access to claims-based clinical data and attribution data from MCOs and to some pharmacy claims from PCMH-affiliated pharmacies. Pharmacists in the pilot phase of a Medication Therapy Management program also used the CCT, which enabled participating pharmacists to oversee drug interactions, medication prescribing, and drug compliance.

> "If you're looking at the ADT, you see this member went to the emergency room and contact him educate him that, 'Hey I was open during these hours you went to the emergency room,' so that that won't happen again and we decrease emergency use."
>
> —Tennessee payer

As of February 2020, nearly 100 percent of hospitals statewide were reporting ADT data into the CCT. Hospital participation steadily increased after summer 2017 because of the state's collaboration with THA—which led outreach to the hospitals for ADT feed participation, and used the Association's close relationship with the hospitals to garner buy-in. Since many psychiatric hospitals did not have electronic health records (EHRs), THA worked with its own data vendor to abstract data from these hospitals' registration systems, and format them to be CCT-compatible. The only hospitals that did not the capability to report ADT data were the four state-owned regional psychiatric hospitals. THA was working with these hospitals and had expected to have their data

> "I think people feel more comfortable using it now than they did, certainly in the beginning because they've learned to use it but also they've seen the value in using it and they feel more confident in the information that's in it."
>
> —Advocacy organization

in the CCT by summer 2019, but was delayed. MCOs addressed the information gap at these regional facilities by sending providers a behavioral health census report multiple times per week.

Payers, providers, and other stakeholders agreed that the CCT was used frequently among providers in both PCMH and Health Link—to identify when patients were used hospital-based care (including ED visits), and conduct necessary follow-up, transitional care management, and coordination. TennCare MCOs reported that most of their providers used the CCT; one MCO stated that 96 percent of its PCMH and Health Link providers were accessing it. One MCO used monthly CCT usage reports to target outreach and education to providers about the benefits of the tool. Providers often mentioned using the CCT to identify patients when they went to the ED, contacting them to determine the reason for the visit, and educating them on non-ED options for care. Providers also used the CCT to determine members of their patient panel who required updated readings for blood pressure and body mass index (BMI). As one provider explained, "It's far better information than we've ever had." Officials discussed several ideas for expanding the CCT's scope, including adding social determinants of health data and expanding pharmacists' use of the tool. When speaking about the tool's future, one state official proclaimed, "the sky's the limit on how it can be used."

Although stakeholders noted the successes of the CCT, there were initial concerns about relying on the CCT to understand quality measures. Payers and providers explained that there were lags and inconsistencies in the MCO-provided and TennCare-processed claims data used as input for quality measures in the CCT. In June 2018, state officials—acknowledging ongoing technical difficulties with the MCO data—advised providers to stop using the quality measures in the CCT and use the MCOs' more detailed quality reports until the data issues were resolved. As of March 2019, the state said they were "down to the last few issues" with the CCT. Work continued with the CCT vendor and TennCare's internal team to resolve issues related to the accuracy of the quality measures data in the tool. TennCare noted in February 2020 that good progress had been made, but the state would be working on a Statement of Work for a new CCT vendor, with implementation in summer/fall 2020.

Quality measure alignment

Alignment of quality measures across the PCMHs and Health Link programs promoted integrated care delivery. TennCare developed a set of core quality measures for both programs, and stakeholders reported that the state was receptive to input from both MCOs and providers throughout measure design and implementation.

PCMH and Health Link providers received reports on the same quality measures and same thresholds across their entire Medicaid panel. Payer, provider, and state official stakeholders reported significant improvements in care integration and provider communication as a result of these aligned measures. Stakeholders noted that requiring behavioral health providers to report physical health measures in Health Link promoted not just new coding and reporting approaches, but also a new way of thinking about care delivery. Explained one payer, "It has enhanced the conversation. If I am a behavioral health provider, [my patients with] diabetes could have certain drugs that contribute to [their] behavior. If [diabetes] is outside the framework of what we talk about with the patient, it's not on my radar. So, it reframes a bit of what behavioral providers have traditionally taught, but it certainly positions everybody to really promote integration."

> "We've seen significant improvement in the first year. Diabetic measures improved 6%, EPSDT [early and periodic screening, diagnostic, and treatment] totals went up 5%, we reduced ER [emergency room] visits by four out of a thousand member months. So those are successes of the program."
>
> —Tennessee payer

MCOs used quality measures to identify low-performing PCMH and Health Link practices and provide targeted assistance to improve performance. MCOs reported running reports and looking across practices to assess their performance on the quality metrics. For practices not performing well, MCOs had a variety of internal resources to support providers, including one-on-one TA, instruction on how to understand performance reports and improve their metrics, and peer-to-peer learning opportunities. PCMH and Health Link practices could also receive TA through the contractor the state hired with SIM Initiative funds, as described earlier in this section.

> "If the PCMH or Health Link is struggling with referrals, we find providers, make folks available, navigate referrals. We work on quality metrics, the one about follow-up after behavioral health hospitalization, HEDIS [Healthcare Effectiveness Data and Information Set], making appointments."
>
> —Tennessee payer

Stakeholder engagement

Throughout the SIM Initiative, the state made a commitment to investing in working with a range of stakeholders and using their feedback to refine program design and implementation. One state official asserted, "stakeholder engagement is a huge priority for all of our value-based programs," and several others noted the importance of engaging stakeholders throughout the design and implementation process. TennCare officials led engagement efforts; these officials and their staff invested extensive time and work in making these efforts meaningful for everyone involved. The Operational Teams within TennCare that assumed responsibility for these programs starting in January 2019 continued this commitment to stakeholder engagement.

> "There's a tendency in value-based payment to figure out what you already measure or can easily measure and then value those things. We intentionally took a different path, which was: tell me what we value."
>
> —Tennessee state official

TennCare officials and their TA contractor included provider trainings, provider stakeholder calls, technical advisory groups for episodes, annual episodes design feedback sessions, learning collaboratives, regional learning collaborative, regional conferences, webinars, and numerous onsite provider visits. The state also facilitated provider engagement through mandates in the LTSS program to hold advocacy group meetings quarterly and partner with the THA to obtain ADT data and buy-inform hospitals across the state. State officials noted the importance of being intentional in planning which stakeholders to include, when and where to engage them, and how to expertly facilitate communication among diverse and opinionated stakeholders. State officials also discussed the importance of thoughtful follow-up after meeting with stakeholders—including summarizing the discussion and recommendations, incorporating recommendations into program design, and re-engaging stakeholders after making modifications. Multiple payer and provider stakeholders complimented the state's willingness to meaningfully engage with a range of voices—including those with dissenting opinions—and make changes to the programs throughout the SIM Initiative. TennCare incorporated stakeholder feedback into each SIM Initiative component in response to payer and provider feedback, concerns, and input.

Payers noted the importance of building strong relationships with providers, especially during system transformation. All TennCare MCOs hired specialized staff to communicate with and educate providers on the VBP and practice transformation efforts. One payer stated that the most effective way to obtain provider buy-in was through upfront care coordination payments, giving this explanation: "Retrospective pay is good and it's nice and obviously is a part of value-based payments systems, but anything you can do on a prospective basis to help fund that work and fund the activity, it makes a huge difference."

J.2.3 Population health

Key Results
• The Vital Signs dashboard, rolled out publicly in fall 2018, was provided directly to County Health Councils, along with data packages that contained county demographic profiles and information on county performance on the 12 Vital Signs metrics. These were to be used in developing local quality improvement initiatives. • In early 2019, TDH began its CHA pilot in 16 counties and in 2020, expanded to an additional 27 counties.

Tennessee's SIM Initiative population health work focused on developing a State Population Health Improvement Plan that included two new initiatives: Vital Signs and CHA (***Table J-3***). The goal of these initiatives, beginning with a re-framing of Tennessee's State Health Plan (an annual TDH report), was to support development of actionable strategic planning tools for use by community organizations and other partners to address pressing health needs in the state and promote population health.

Table J-3. Tennessee's population health activities

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Vital Signs	Statewide	• Vital Signs were rolled out statewide, and a publicly available dashboard was disseminated. • Vital Signs Actions Guides were developed.	• TDH will continue to update the Vital Signs dashboard. • Vital Signs Action Guides will be used to inform TDH's strategic planning process.
CHA	2019: 16 pilot counties 2020: 27 additional pilot counties	• The CHA process was rolled out to the pilot counties.	• TDH will continue to monitor the pilot CHA process and eventually roll out the process statewide. • CHAs will be used to inform TDH's strategic planning process.

Note: CHA = County Health Assessment; SIM = State Innovation Model; TDH = Tennessee Department of Health.
Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Vital Sign Measures (TN Department of Health, n.d.-b)

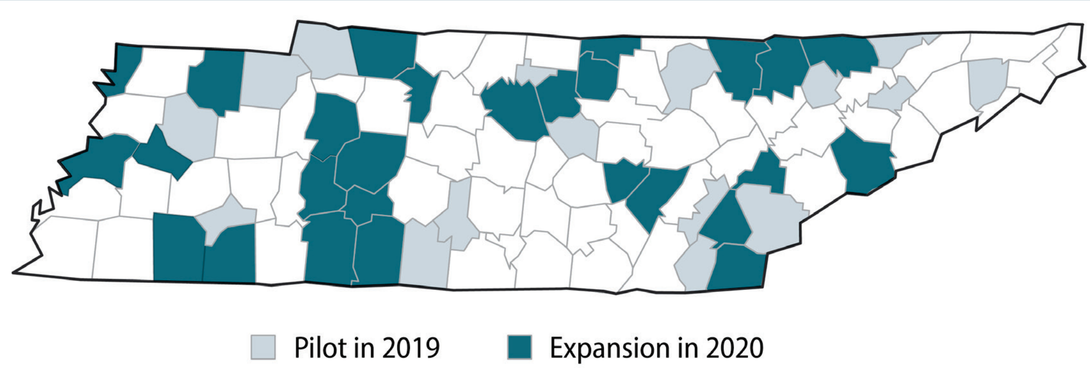
- Youth obesity;
- Physical activity;
- Youth nicotine use;
- Drug overdose;
- Infant mortality;
- Teen births;
- Community water fluoridation;
- Frequent mental distress;
- 3rd grade reading level;
- Preventable hospitalizations;
- Per capita personal income; and
- Access to parks and greenways.

The first population health strategy included development of Vital Signs measures and the dissemination of the Vital Signs Actions guides. In the first six months of 2018, the state utilized stakeholder forums to collect input on the proposed framework of the CHA process to highlight population health efforts. The state also solicited feedback on the public health Vital Signs measures (see box), and the Vital Signs Actions, evidence-based interventions for quality improvement on Vital Signs measures. In fall 2018, TDH publicly released the Vital Signs Dashboard on the Department's website and shared resources and data with local County Health Councils (CHCs) (TN Department of Health, n.d.-b), which were multidisciplinary community-based councils located in all 89 rural counties plus the six metro counties. The data packages contained county demographic profiles and information on county performance on the 12 Vital Signs metrics, as well as performance on additional priority metrics. TDH began developing Vital Signs Action guides in 2019, which also served as an important resource to counties—covering programming options, funding opportunities, and community education and awareness strategies. The Vital Signs measures and action guides were intended to guide state and local conversations and inform TDH's continued strategic planning process. The Vital Signs tools played an important role in the second component of Tennessee's population health strategy under the SIM initiative—the CHA. To implement the CHA process, TDH leveraged CHCs. The CHCs are a coalition of stakeholders composed of representatives from health care and non-health care fields such as transportation, education, faith communities, and planning and zoning.

In 2019, 16 CHCs were selected to participate in a CHA pilot. This process included identifying and collaborating with stakeholders, reviewing data, incorporating community feedback, identifying areas of improvement within the 12 Vital Signs and developing a three-year action plan to address one or more of these areas. While the CHCs received support from the local health department, each CHC was responsible for identifying their county's priorities based on the Vital Signs measures and owning the resulting action plan. TDH provided support to the CHCs through TA and online resources, including worksheets and how-to guides, such as how to conduct a listening session. As of February 2020, TDH was in the process of reviewing the initial 16 action plans and identifying common themes and needs. Initial review found that specific action plan items ranged widely in seeking to address identified needs as varied as substance use and adverse childhood experiences. State officials from the TDH expressed hope that the CHA process would provide the structure and accountability needed to spur local action and implement positive change. In 2020, this process was expanded to an additional 27 counties (see ***Exhibit J-8***).

> "We own these challenges, and it's going to take cultural change at a local level to start to change the state health outcomes that we see … the strength of a health council is in being a health coalition that can continue to advocate for cultural change in the community."
>
> —Tennessee state official

Exhibit J-8. **County Health Assessment pilot began in 16 counties in 2019 and expanded to an additional 27 counties in 2020**



Note: CHA = County Health Assessment.

Sources: TennCare CHA; slides presented at the 2019 site visit.

The CHA process experienced some challenges. TDH needed to develop a process that worked for both large cities as well as small rural counties with a few thousand residents. A common challenge across counties was community engagement, particularly with vulnerable populations. Every CHC was organized differently and had varying capabilities. For example, not all CHCs were incorporated as a nonprofit and most were not able to act as their own fiscal agent, which could make grant applications and funding opportunities difficult. In response, TDH connected CHCs with development districts, identified people at the local level to provide grant writing support, and provided TA on fiscal issues.

Moving forward, TDH planned to roll out the CHA process statewide and use the CHAs as a foundation for local efforts that would lead to aggregate changes across the state. TDH planned to add two dedicated staff members to coordinate the CHA process, provide TA, and work closely with, CHCs. TDH also planned discussions with TennCare's MCOs about developing a collaboration between the MCOs and CHCs in implementing the CHA initiatives. The state planned continue to its focus on stakeholder engagement and the integration of local expertise into state-level decision making.

J.3 Sustainability

Key Results
• All components of Tennessee's SIM Initiative were developed with sustainability in mind. The state was committed to continuing SIM-funded programs beyond the award period. • As of January 2019, TennCare contractually shifted management responsibility for PCMH and Health Link management to MCOs. As of January 2020, responsibility for PCMH and Health Link provider onsite support, training, and education was also contractually shifted to MCOs. • Sustainability was supported through ongoing stakeholder engagement, MCO contractual infrastructure, integrating state oversight within operational units within TennCare, and continued state funding streams.

J.3.1 Overall/major takeaways

Tennessee designed the state's SIM Initiative work to be sustainable, as illustrated in ***Table J-4*** and ***Exhibit J-9***. This was evident in the state's decision to use SIM Initiative funds primarily for design and initial support of strategies, with support and oversight then transferred to the payers' domain. As one example, the MCOs always oversaw the EOC program, including developing provider performance reports and calculating and providing risk- and gain-sharing payments. Tennessee's fully managed care TennCare environment, strong working relationships between the state and the MCOs, and the state's willingness to leverage MCO contracts to sustain policy improvements all combined to make this longer term strategy possible. Multiple stakeholders expressed confidence that the transition of funding and oversight of the delivery system and payment reform models at the end of the SIM Initiative would be smooth. Explained one state official, “I don’t think we’ll miss a beat.”

Exhibit J-9. Tennessee designed its SIM Initiative work to be sustainable

FINANCING

- Continued state funding of PCMH, Health Link, EOC programs
- QuILTSS value-based purchasing methodology embedded into Medicaid regulation to ensure sustainability
- Health Link supported via TennCare State Plan amendment
- Continued state funding of CCT

STRUCTURE

- State oversight integrated within TennCare operational units
- State contracts with Medicaid managed care include oversight of PCMH and Health Link

ACTIVITIES

- TennCare partners with Tennessee Board of Regents to accredit QuILTSS workforce training curriculum
- Practice transformation supports for PCMH and Health Link through MCOs
- Tennessee Department of Health to roll out CHAs statewide
- Ongoing stakeholder involvement

Note: CCT = care coordination tool; CHA = County Health Assessment; EOC = episode of care; MCO = managed care organization; PCMH = patient-centered medical home; QuILTSS = Quality Improvement in Long-Term Services and Supports; SIM = State Innovation Model.

Source: Federal Evaluation Team review of state documents.

The state approached its goal to increase the percent of health care delivered under VBP arrangements in the TennCare population to 80 percent, through a combination of EOC, PCMH, Health Link, and LTSS models. While state officials and some payers were satisfied with the progress, other payers were unsure about their ability to achieve that goal by the end of the SIM Initiative, noting that it would depend upon the population(s) included in the calculation.

Table J-4. Sustainability of Tennessee's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/payment system	PCMH	Yes	MCOs contractually assumed oversight.
	Health Link	Yes	MCOs contractually assumed oversight.
	EOC model	Yes	MCOs will continue to monitor, distribute providers' performance reports, and calculate risk- and gain-sharing payments each year.
	LTSS	Yes	State funding.
Population health	Vital Signs dashboard	Yes	TDH will continue to update.
	CHA pilot	Yes	TDH will monitor for statewide rollout.
Practice transformation	Practice transformation assistance	Yes	State had funded training and TA through January 2020, after which MCOs contractually assumed responsibility for Learning Collaboratives, training, and provider TA. State funding would pay for NCQA PCMH recognition extended to 2023.
Workforce	LTSS workforce training	Yes	State funding for contractor-conducted training sessions.
Health IT	CCT	Yes	State funding.
Data analytics	Quality measure alignment	Yes	MCOs will monitor and provide data and TA.

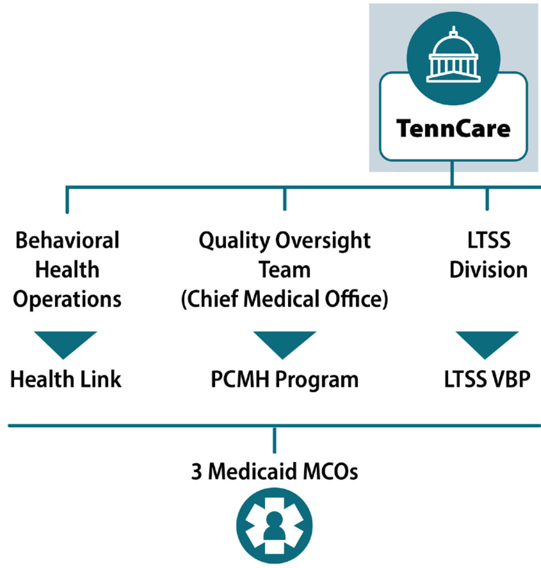
Note: CCT = care coordination tool; CHA = County Health Assessment; EOC = episode of care; health IT = health information technology; LTSS = long-term services and supports; MCO = managed care organization; NCQA = National Committee for Quality Assurance; PCMH = patient-centered medical home; SIM = State Innovation Model; TA = technical assistance; TDH = Tennessee Department of Health.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

J.3.2 Stakeholder responsibilities

The state's SIM Initiative Team transitioned long-term responsibility of SIM Initiative–related activities to Operational Teams within TennCare and to key external stakeholders in January 2019 (see ***Exhibit J-10***). Shifting responsibility and integrating the operation of these programs, along with stakeholder meetings to the logical bureau or office within state government, enabled these initiatives to be increasingly viewed as "business as usual," rather than distinct initiatives. Within TennCare, the Behavioral Health Operations group as of January 2019 managed the Health Link program; the Quality Oversight Team (within the Chief Medical Office) managed implementation of the PCMH program; and the eHealth group oversaw the CCT (including the ADT feeds). TennCare's LTSS division managed the LTSS VBP methodologies through contractual arrangements with health plans and providers. The Division of Strategic Development and Innovation would continue to manage implementation of the EOC program.

Exhibit J-10. Tennessee's SIM Initiative Team transitioned long-term responsibility of activities to Operational Teams



Note: CCT = care coordination tool; EOC = episode of care; LTSS = long-term services and supports; MCO = managed care organization; PCMH = patient-centered medical home; SIM = State Innovation Model; VBP = value-based payment.

Source: Federal Evaluation Team review of state documents.

In transferring operations for sustainability, some aspects of SIM Initiative–designed programs changed. Specifically, the state originally set the eligibility criteria and selected practices for PCMH participation. Effective with the MCOs' 2019 contract, the MCOs assumed responsibility for setting the eligibility criteria and selecting the Wave 3 in 2019 and future enrollments of PCMH practices. MCOs took this transition as an opportunity to re-examine PCMH practices and consider eligibility criteria that would best meet program needs. Starting with Wave 3's enrollment of providers, each MCO set its own criteria, which included minimum membership size and quality metrics. Both state officials and MCOs expressed satisfaction with the new process, viewing this shift in program responsibility as a step toward program sustainability. The TA contractor support in providing educational offerings, onsite support, webinars, and conferences for both PCMH and Health Link providers transitioned to MCOs in January 2020.

J.3.3 State funding

In addition to shifting responsibilities to the MCOs and various teams within and outside TennCare, funding was an important aspect of the state's sustainability plan. Most of the SIM Initiative funding went towards design and initial implementation, with ongoing costs either shouldered by payers or included in the state's annual budget. The end of the SIM Initiative funding on January 31, 2020 would therefore cause minimal disruption to these programs.

One state official confirmed that “Our sustainability model is, we’ve baked it into our program. … There’s not a secret sauce, it’s just baked it into our program and our base budget.” While payers would fund ongoing PCMH and Health Link work—including provider support and TA after the end of the contractor’s assignment—the state would provide funding to maintain other parts of the SIM Initiative. This included the CCT, which received federal HITECH funding for health IT systems development, and a 90–10 federal-to-state Medicaid Administrative funds match.

> “We’re invested in it no matter what … We just believe in it. We’re just going to keep doing it.”
>
> —Tennessee state official

Multiple state officials noted the administration’s commitment to ensuring that SIM Initiative programs were sustained through state dollars beyond the end of the SIM Initiative. One official noted that the two-fold result of driving quality and reducing system costs provided excellent justification for the state’s investment in delivery and payment system reform, both of which the Governor supported. This official concluded, “The SIM money is almost gone, but we’re in it for the long haul.”

J.4 Implications of Findings/Lessons Learned

TennCare intentionally built sustainability into the state’s SIM Initiative from the very start. This forward planning facilitated a smooth transition to the post-award period. The fully managed care TennCare environment, and the state’s commitment to include needed funding in the state budget moving forward, also supported sustainability.

Throughout the SIM Initiative, TennCare established a strong system of stakeholder engagement and transparency, demonstrating a willingness to adjust programs based on stakeholder feedback. This engagement and responsiveness resulted in robust stakeholder investment in the program and respect for the SIM Initiative’s state officials.

Medicaid programs and APMs might need major modifications to be successfully rolled out in commercial markets. Tennessee’s EOC model made a significant impact within the TennCare population, but gained little traction in the commercial market, even after the state modified the model to be voluntary and include only upside risk.

Measure alignment proved effective in the PCMH and Health Link programs—promoting increased communication, referrals, and understanding between primary care and behavioral health providers.

Addendum

Table J-5. Tennessee's Health Link (Category 1) had unfavorable impacts on spending and hospital use, and favorable impacts on behavioral health visits and primary care visits in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: TN HL Category 1	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)	↑	↓	**213.87‡** (198.52, 229.23)	24.8	<0.001
Inpatient Admissions per 1,000 Population	↑	↓	**36.97‡** (30.26, 43.67)	15.6	<0.001
ED Visits per 1,000 Population	↑	↓	**396.88‡** (340.83, 452.93)	15.2	<0.001
Behavioral Health-Related Total Spending PBPM ($)	↑	↓	**121.72†** (109.40, 134.03)	40.4	<0.001
Behavioral Health Visits per Beneficiary	↑	⊖	**7.19†** (6.22, 8.15)	51.0	<0.001
Behavioral Health-Related Inpatient Admissions per 1,000 Population	↑	↓	**27.12‡** (19.75, 34.48)	19.3	<0.001
Behavioral Health-Related ED Visits per 1,000 Population	↑	↓	**30.47‡** (24.64, 36.30)	25.4	<0.001
Primary Care Provider Visits	↑	⊖	**0.30†** (0.20, 0.41)	6.2	<0.001

† Significant change in expected direction
‡ Significant change in unexpected direction
⊖ No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table. Eligibility for Health Link Category 1 includes those who meet the diagnostic criteria that indicate serious mental illness.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HL = Health Link; PBPM = per beneficiary per month; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Table J-6. Tennessee's Health Link (Categories 1, 2, and 3) had unfavorable impacts on spending and hospital use, and favorable impacts on behavioral health visits and primary care visits in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: TN HL Categories 1, 2, 3	Pre–Post estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($) (Category 1)	↑	**120.31‡** (108.30, 132.32)	14.1	<0.001
Total Spending PBPM ($) (Category 2)	↑	**185.10‡** (151.30, 218.89)	28.6	<0.001
Total Spending PBPM ($) (Category 3)	↑	**57.11‡** (48.54, 65.68)	13.5	<0.001
Inpatient Admissions per 1,000 Population (Category 1)	↑	**10.86‡** (4.42, 17.30)	4.6	0.002
Inpatient Admissions per 1,000 Population (Category 2)	↑	**60.37‡** (44.89, 75.85)	28.4	<0.001
Inpatient Admissions per 1,000 Population (Category 3)	↓	**-26.44†** (-28.61, -24.28)	-38.3	<0.001
ED Visits per 1,000 Population (Category 1)	↓	**-79.01†** (-151.06, -6.95)	-2.9	0.04
ED Visits per 1,000 Population (Category 2)	⊖	-0.88 (-129.90, 128.14)	0.0	0.99
ED Visits per 1,000 Population (Category 3)	↓	**-226.17†** (-257.72, -194.62)	-16.8	<0.001
Behavioral Health-Related Total Spending PBPM ($) (Category 1)	↑	**102.41†** (90.95, 113.87)	34.0	<0.001
Behavioral Health-Related Total Spending PBPM ($) (Category 2)	↑	**154.25†** (138.11, 170.40)	95.5	<0.001
Behavioral Health-Related Total Spending PBPM ($) (Category 3)	↑	**97.28†** (90.38, 104.17)	95.3	<0.001
Behavioral Health Visits per Beneficiary (Category 1)	↑	**4.05†** (3.54, 4.57)	27.9	<0.001
Behavioral Health Visits per Beneficiary (Category 2)	↑	**7.15†** (6.48, 7.82)	83.3	<0.001
Behavioral Health Visits per Beneficiary (Category 3)	↑	**6.41†** (5.96, 6.87)	73.4	<0.001

(continued)

Table J-6. Tennessee's Health Link (Categories 1, 2, and 3) had unfavorable impacts on spending and hospital use, and favorable impacts on behavioral health visits and primary care visits in its first two years (continued)

Selected outcomes	Change in outcome from baseline to implementation period: TN HL Categories 1, 2, 3	Pre–Post estimate (90% CI)	Relative difference (%)	p-value
Behavioral Health-Related Inpatient Admissions per 1,000 Population (Category 1)	↑	**23.36‡** (16.26, 30.46)	16.6	<0.001
Behavioral Health-Related Inpatient Admissions per 1,000 Population (Category 2)	↑	**53.90‡** (39.93, 67.86)	66.2	<0.001
Behavioral Health-Related Inpatient Admissions per 1,000 Population (Category 3)	↓	**-8.88†** (-9.69, -8.07)	-89.2	<0.001
Behavioral Health-Related ED Visits per 1,000 Population (Category 1)	↑	3.76 (-1.73, 9.25)	3.1	0.21
Behavioral Health-Related ED Visits per 1,000 Population (Category 2)	↑	**26.94‡** (14.38, 39.49)	30.4	<0.001
Behavioral Health-Related ED Visits per 1,000 Population (Category 3)	↓	**-8.26†** (-9.49, -7.04)	-40.2	<0.001
Primary Care Provider Visits per 1,000 Population (Category 1)	↑	**0.40†** (0.29, 0.50)	7.7	<0.001
Primary Care Provider Visits per 1,000 Population (Category 2)	↑	**0.41†** (0.27, 0.56)	8.4	<0.001
Primary Care Provider Visits per 1,000 Population (Category 3)	⊖	-0.01 (-0.09, 0.07)	-0.2	0.82

† Significant change in expected direction
‡ Significant change in unexpected direction
⊖ No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table. Eligibility for Health Link Category 1 includes those who meet the diagnostic criteria that indicate serious mental illness. Eligibility for Health Link Category 2 includes those who meet the utilization criteria for specific behavioral health diagnoses. Eligibility for Health Link Category 3 includes those who have provider documentation of a functional need.

CI = confidence interval; ED = emergency department; HL = Health Link; PBPM = per beneficiary per month; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Table J-7. Tennessee's perinatal episode of care had a favorable impact on cesarean sections in its four years, and its asthma episode of care had unfavorable impacts in its first five years

Selected outcomes	Change in outcome from baseline to implementation period: TN EOC	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Percentage of Episodes with a Cesarean Section	↓	↓	**-1.07†** (-1.62, -0.52)	-3.4	0.001
Percentage of Episodes with a Post-Delivery Follow-Up Visit Within 60 Days	↓	↑	**-1.21‡** (-1.63, -0.79)	-1.6	<0.001
Percentage of Asthma Episodes with Follow-Up Care Within the Post-Trigger Window	⊖	↑	**-2.14‡** (-3.24, -1.03)	-5.1	0.001
Percentage of Asthma Episodes with Receipt of Appropriate Asthma Medication	↑	↑	**-5.93‡** (-7.94, -3.92)	-10.7	<0.001
Percentage of Asthma Episodes with Repeat Acute Asthma Exacerbation	↑	↓	**0.90‡** (0.61, 1.20)	13.1	<0.001

† Significant change in expected direction
‡ Significant change in unexpected direction
⊖ No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table. The results are based on a claims-based analysis in which implementation of the asthma and perinatal EOCs were tied to provider payments.

CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

Table J-8. Tennessee's SIM Initiative had unfavorable statewide impacts on utilization outcomes relative to an out-of-state comparison group

Selected outcomes	Change in outcome from baseline to implementation period: TN Statewide	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Inpatient Admissions per 1,000 Beneficiaries	↓	↓	**5.37‡** (3.93, 6.81)	7.6	<0.001
Emergency Department Visits per 1,000 Beneficiaries	↓	↓	**144.19‡** (121.68, 166.70)	16.4	<0.001
Readmissions per 1,000 Discharges	↑	↓	**38.20‡** (30.21, 46.18)	25.4	<0.001

†	Significant change in expected direction	↑	Favorable increase	↓	Favorable decrease
‡	Significant change in unexpected direction	↑	Unfavorable increase	↓	Unfavorable decrease
	No change	↑	Increase from baseline through implementation	↓	Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

Appendix J-1: Tennessee Health Link Impact Results

J-1.1 Overview

On December 1, 2016, Tennessee launched Health Link with the goal of improving coordination of health care services for Medicaid beneficiaries with the highest behavioral health needs. The Health Link program is designed to improve care and health outcomes for participating members and to impose greater provider accountability and flexibility.

All Tennessee Medicaid beneficiaries are enrolled in one of three managed care organizations (MCOs). Under Health Link, Tennessee leveraged the enhanced federal match to offer prospective payments for care coordination and case management for participating providers for two years, SIM-supported training and capacity building, and quarterly cost and quality reporting. Beneficiaries are eligible for Health Link if they meet the criteria in at least one of the following categories:

1. Diagnostic criteria that indicate serious mental illness (Category 1);
2. Utilization criteria for specific behavioral health diagnoses (Category 2); and
3. Provider documentation of a functional need (Category 3).

An organization is eligible to participate in Health Link if it is a recognized community mental health center (CMHC) or other provider that offers behavioral health treatment on-site with a panel of at least 250 Tennessee Medicaid beneficiaries. Health Link practices must also include a care team that includes clinical care coordinators and case managers. Health Link providers receive prospective payments for care coordination and case management services, and starting in the second year, top performing practices were eligible for bonus payments tied to process and outcome measures of quality and utilization.

Health Link's focus on integrating physical and behavioral care builds on existing efforts at Federal Qualified Health Centers and CMHCs in the state. In 2007, Tennessee Medicaid sought to encourage an integrated approach by combining physical and behavioral health administration within every MCO. With Health Link, the state moved all targeted case management activity under the health home umbrella and expanded the scope of services provided. Behavioral health case managers are no longer required to make face-to-face encounters to be paid, and they can be paid for getting their clients' physical health needs addressed.

J-1.1.1 Primary research question and hypotheses

To evaluate the impact of the Health Link program, the analysis addressed the following research question:

- To what extent did participating in the Health Link program result in changes in health care spending, utilization, and quality of care outcomes?

The hypothesis for this analysis was that improved behavioral health integration would slow total spending growth, increase behavioral health–specific spending, and improve quality of care. Hypothesized changes in utilization vary depending on the metric. For example, there may be reductions in total and behavioral health–related inpatient admissions and emergency department (ED) visits as practices invest in care coordination and other practice transformation activities targeted to high utilizers. In contrast, increases in behavioral health visits may be seen if more patient-centered care leads to more identification and referral of needed services. Health Link's effects on primary care were more difficult to predict. On one hand, behavioral health integration and practice transformation may lead to more primary care use as stigma for behavioral health treatment wanes and patients seek more care for mental health within primary care. On the other hand, principles of practice transformation that embrace team-based care and alternative modes of communication (e.g., use of a patient portal or email consults) may lead to reductions in office-based primary care visits. The hypothesis for the analysis of the impact for beneficiaries who were enrolled in both the Health Link and patient-centered medical home (PCMH) was that any improvements in spending, avoidable utilization, and behavioral health visits would be enhanced by participation in both models.

Table J-1-1 provides a snapshot of the study methods.

Table J-1-1. Methods snapshot

Method	Description
Participating practices	An organization is eligible to participate in Health Link if it is a recognized community mental health center or other provider that offers behavioral health treatment on-site with a panel of at least 250 Tennessee Medicaid beneficiaries.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for Category 1 intervention and comparison group differences. Pre–post design for a stratified analysis of Category 1, Category 2, and Category 3 beneficiaries.
Data	Medicaid claims data provided by TennCare, Tennessee's Medicaid agency.
Sample	The D-in-D analytic sample included 66,452 Medicaid beneficiaries who were eligible for Health Link through Category 1 who were either participating in Health Link (n=34,487) or who chose not to participate (n=31,965). The intervention group was made up of Medicaid beneficiaries attributed to and enrolled in Health Link. The comparison group included similar TN Medicaid beneficiaries who were attributed to Health Link but who did not participate in Health Link. Approximately half of beneficiaries who were attributed to Health Link ultimately participated in the model. Because of selection bias in those who chose to participate, there was no comparable group of beneficiaries who were eligible for Health Link through Category 2 and Category 3, however. The pre–post analytic sample includes Medicaid beneficiaries participating in Health Link who were eligible through Category 1 (n=34,487), Category 2 (n=3,908), and Category 3 (n=34,826), stratified by category.

(continued)

Table J-1-1. Methods snapshot (continued)

Method	Description
Timeframe	The timeframe for the impact analysis was December 2013, through December 2018, which includes three baseline years (December 2013–November 2016) and two intervention years (December 2016-December 2018).
Measures	The analysis assessed the D-in-D effects of Health Link on core outcomes including total spending PBPM, inpatient admissions, outpatient ED visits, and readmissions for Category 1 enrollees only. Additional outcomes examined included inpatient, ED, professional, prescription, and behavioral health spending; behavioral health–related utilization; PCP visits, HbA1c and retinal eye exams for diabetes, use of antidepressant and antipsychotic medications, and mental health follow-up visits after a mental health inpatient admission. All of the quality metrics chosen are included as metrics in the Health Link program. The pre–post analysis assessed changes between the baseline and intervention period separately for Categories 1, 2, and 3, for the same set of spending, utilization, and quality outcomes included in the D-in-D analysis.
Statistical analysis	Logistic regression for binary outcomes, negative binomial regression for count outcomes, and ordinary least squares models for continuous outcomes were used. For the D-in-D models using only Category 1 enrollees and their comparison group, analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. For the pre–post models using Categories 1, 2, and 3 separately, analytic weights were the fraction of time a person was enrolled in Medicaid. Standard errors for these D-in-D models were clustered at the county level to account for correlation in outcomes across time. Both D-in-D and pre–post models included controls for demographic, health status, and socioeconomic county-level variables.

Note: D-in-D = difference-in-differences; ED = emergency department; HbA1c = hemoglobin A1c; PCP = primary care provider.

This chapter reports on the impact of the Health Link model on spending, utilization, and quality for unique Category 1 beneficiaries who were attributed and enrolled in the Health Link model relative to beneficiaries who were attributed but not enrolled (comparison beneficiaries). This approach to comparison group selection contrasts with that for several other SIM analyses, in which the comparison group is identified by selecting beneficiaries attributed to practices not participating in the SIM model. The Health Link analysis takes a different approach because all eligible practices participated in Health Link, so a comparison group could not be constructed from similar beneficiaries attributed to non-Health Link practices. This method may lead to selection bias because beneficiaries who were eligible for Health Link but did not participate may be systematically different than those who did participate. Beneficiaries who did not participate either could not be reached by the Health Link practices or declined enrollment into the program. As such, non-participants were likely less engaged in the CMHCs at baseline and may be less likely to use regular behavioral health services. The non-participants may also be more transient and thus harder to reach. If Health Link participants in Category 1 were more likely to use the health care system in general, the selection bias could dampen the impact of

Health Link on spending and non-preventable utilization and strengthen the impact on behavioral health visits and primary care visits.

Tennessee's primary care transformation also included PCMHs (primary care clinics that achieved or were actively working toward National Committee for Quality Assurance (NCQA) accreditation). The PCMH program had made progress in the integration of behavioral health with physical care by strengthening relationships and information-sharing capabilities with Health Link providers. The analysis included a difference-in-difference-in-differences (DDD) model comparing Medicaid beneficiaries who participated in both the Health Link and the PCMH programs and those who only participated in the Health Link program to assess whether there was an increased impact from participating in both programs.

Additionally, this chapter reports on pre–post analyses for Category 1, 2, and 3 separately. The analysis used a pre–post design because the baseline utilization patterns for Health Link participants and the comparison group in Categories 2 and 3 were so different that a difference-in-differences (D-in-D) analysis was not possible. The pre–post analysis was stratified because of the different utilization patterns for beneficiaries in each category. Beneficiaries who qualified for Health Link through Category 1 had serious mental illness and high utilization, whereas beneficiaries who qualified through Category 3 were more likely to be children and had lower baseline rates of utilization.

A full description of the Health Link program and a summary of the key impact analysis findings are available in ***Appendix J***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections provide detailed information on the Health Link model's impact findings in tables and figures:

- ***Section J-1.2*** presents results of D-in-D and pre–post analyses for Health Link Medicaid beneficiaries and their comparison group;
- ***Section J-1.3*** presents results of D-in-D analyses separately for beneficiaries enrolled in both Tennessee's PCMH program and Health Link for the five key outcomes;
- ***Section J-1.4*** provides information on annual covariate balance between the Health Link and comparison groups before and after propensity-score weighting;
- ***Section J-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section J-1.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for core outcomes change when Health Link and comparison group trends are assumed to be on non-parallel paths beginning in the baseline period.

J-1.2 Estimates of Tennessee Health Link's Impact on Spending, Utilization, Behavioral Health Outcomes, and Quality

Tables J-1-2 through ***J-1-13*** show annual and overall estimates of TN Health Link impact on health care spending, utilization, behavioral health outcomes, and quality for TN Health Link beneficiaries. These impact estimates come from D-in-D models (for beneficiaries eligible for Health Link under Category 1) and pre–post models (for beneficiaries eligible for Health Link under Category 1, 2, and 3 separately), described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following for the D-in-D models are presented:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the TN Health Link impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

In addition, the following are presented for each outcome for the pre–post models:

- Regression-adjusted means for the Health Link group during the baseline period and the intervention period;
- Pre–post estimates of the TN Health Link impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the pre–post estimates are statistically significant.

J-1.2.1 Estimates of Tennessee Health Link's impact on core outcomes

Category 1: Difference-in-differences estimates

Table J-1-2 shows the estimates of the TN Health Link on total spending per beneficiary per month (PBPM), inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries participating in TN Health Link through Category 1 relative to comparison beneficiaries.

- Total spending PBPM increased in the Health Link group and decreased in the comparison group, leading to a relative increase of $213.87 more for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).
- Inpatient admissions increased in the Health Link group and decreased in the comparison group, leading to a relative increase of 36.97 more admissions per 1,000

population for Medicaid beneficiaries participating in Health Link during the Health Link intervention period ($p<0.001$).

- ED visits increased in the Health Link group and decreased in the comparison group, leading to a relative increase of 396.88 more visits per 1,000 population for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).

- Readmissions within 30 days of discharge increased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but increased by 26.66 fewer readmissions per 1,000 discharges for the Health Link group during the first two years of implementation ($p=0.02$).

Table J-1-2. Difference-in-differences estimates for total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	861.28	732.22	1023.11	684.49	209.55 (190.95, 228.16)	24.3	<0.001
Year 2	861.28	732.22	909.54	560.34	220.14 (193.91, 246.37)	25.6	<0.001
Overall	861.28	732.22	976.77	633.98	213.87 (198.52, 229.23)	24.8	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	236.71	242.99	274.03	240.31	41.55 (31.23, 51.88)	17.6	<0.001
Year 2	236.71	242.99	207.21	183.67	30.32 (23.57, 37.06)	12.8	<0.001
Overall	236.71	242.99	246.77	217.27	36.97 (30.26, 43.67)	15.6	<0.001
ED visits per 1,000 population							
Year 1	2614.16	2743.47	2937.59	2664.94	411.75 (334.01, 489.49)	15.8	<0.001
Year 2	2614.16	2743.47	2511.36	2270.04	375.30 (296.90, 453.71)	14.4	<0.001
Overall	2614.16	2743.47	2763.68	2504.28	396.88 (340.83, 452.93)	15.2	<0.001
All-cause 30-day readmissions per 1,000 discharges							
Year 1	189.45	151.37	212.00	202.84	-34.99 (-54.91, -15.07)	-18.5	0.004
Year 2	189.45	151.37	212.55	180.71	-11.08 (-48.96, 26.79)	-5.9	0.63
Overall	189.45	151.37	212.20	195.11	-26.66 (-45.17, -8.15)	-14.1	0.02

(continued)

Table J-1-2. Difference-in-differences estimates for total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used an OLS model to obtain D-in-D estimates for spending outcomes, a negative binomial model to obtain the D-in-D estimate for ED visits per 1,000 population, and a logistic regression model to obtain D-in-D estimates for inpatient admissions per 1,000 population and 30-day readmissions per 1,000 discharges. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models except readmissions assume that TN Health Link and comparison group outcome trends are parallel during the baseline period. The 30-day readmission model includes a differential trend between the Health Link and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmissions outcome is 287,592; the weighted N for the readmission outcome is 104,437. These numbers include all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-3 shows the pre–post estimates of the TN Health Link on total spending PBPM, inpatient admissions, ED visits, and readmissions for Medicaid beneficiaries participating in the TN Health Link model for the intervention period relative to the baseline period, stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- Total spending PBPM increased by $120.31 for Medicaid beneficiaries participating in TN Health Link who were eligible through Category 1 (p<0.001), $185.10 for those eligible through Category 2 (p<0.001), and $57.11 for those eligible through Category 3 (p<0.001) during the first two years of Health Link implementation.
- Inpatient admissions increased by 10.86 admissions per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 (p=0.002) and by 60.37 admissions per 1,000 population for those eligible Health Link through Category 2 (p<0.001) during the first two years of Health Link implementation. Inpatient admissions decreased by 26.44 admissions per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible Health Link through Category 3 during the first two years of Health Link implementation (p<0.001).
- ED visits decreased by 79.01 visits per 1,000 population for Medicaid beneficiaries participating in TN Health Link who were eligible through Category 1 (p=0.04) and by 226.17 visits per 1,000 population for those eligible through Category 3 (p<0.001) during the first two years of Health Link implementation. ED visits for Medicaid beneficiaries participating in Health Link and eligible through Category 2 did not change during the first two years of Health Link implementation.
- Readmissions within 30 days of discharge increased by 19.58 readmissions per 1,000 discharges for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 (p<0.001), 24.33 readmissions per 1,000 discharges for those eligible through Category 2 (p=0.043), and 27.9 readmissions per 1,000 discharges for those eligible through Category 3 (p<0.001) during the first two years of Health Link implementation.

Table J-1-3. Pre–post changes in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)					
Category 1	855.22	975.53	120.31 (108.30, 132.32)	14.1	<0.001
Category 2	647.82	832.92	185.10 (151.30, 218.89)	28.6	<0.001
Category 3	423.79	480.90	57.11 (48.54, 65.68)	13.5	<0.001
Inpatient admissions per 1,000 population					
Category 1	235.69	246.55	10.86 (4.42, 17.30)	4.6	0.002
Category 2	212.71	273.08	60.37 (44.89, 75.85)	28.4	<0.001
Category 3	69.08	42.64	-26.44 (-28.61, -24.28)	-38.3	<0.001
ED visits per 1,000 population					
Category 1	2701.12	2622.11	-79.01 (-151.06, -6.95)	-2.9	0.04
Category 2	2454.49	2453.61	-0.88 (-129.90, 128.14)	0.0	0.99
Category 3	1342.73	1116.56	-226.17 (-257.72, -194.62)	-16.8	<0.001
Readmissions per 1,000 discharges					
Category 1	186.21	205.79	19.58 (10.15, 29.01)	10.5	<0.001
Category 2	111.46	135.78	24.33 (2.33, 46.32)	21.8	0.04
Category 3	76.73	104.63	27.90 (14.22, 41.57)	36.4	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

(continued)

Table J-1-3. Pre–post changes in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3 (continued)

Methods: The analysis used an OLS model to obtain pre–post estimates for spending outcomes, a negative binomial model to obtain the pre–post estimate for ED visits per 1,000 population, and a logistic regression model to obtain pre–post estimates for inpatient admissions per 1,000 population and 30-day readmissions per 1,000 discharges. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N is 155,815 for Category 1; 17,314 for Category 2; and 155,971 for Category 3. These numbers include all person-year observations for the respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.2.2 Estimates of Tennessee Health Link's impact on spending categories

Category 1: Difference-in-differences estimates

Table J-1-4 shows the estimates of Health Link's impact on inpatient, ED, professional, and prescription drug spending PBPM for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries.

- Inpatient spending PBPM increased in the Health Link group and decreased in the comparison group, leading to a relative increase of $33.49 for Medicaid beneficiaries participating in TN Health Link during the first two years of Health Link implementation ($p<0.001$).
- ED spending PBPM decreased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but decreased by $7.12 less for the Health Link group during the first two years of implementation ($p<0.001$).
- Professional spending PBPM increased in the Health Link group and decreased in the comparison group, leading to a relative increase of $118.82 for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).
- Prescription drug spending PBPM increased in the Health Link group and decreased in the comparison group, leading to a relative increase of $42.55 for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).

Table J-1-4. Difference-in-differences estimates for inpatient spending, emergency department spending, professional spending, and prescription drug spending for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	187.00	201.81	228.27	214.69	28.41 (14.84, 41.97)	15.2	<0.001
Year 2	187.00	201.81	165.91	139.86	40.87 (27.95, 53.79)	21.9	<0.001
Overall	187.00	201.81	202.83	184.24	33.49 (23.89, 43.10)	17.9	<0.001
ED spending PBPM ($)							
Year 1	59.43	63.42	59.60	56.54	7.06 (5.28, 8.83)	11.9	<0.001
Year 2	59.43	63.42	49.54	46.34	7.20 (4.73, 9.68)	12.1	<0.001
Overall	59.43	63.42	55.50	52.39	7.12 (5.66, 8.57)	12.0	<0.001
Professional spending PBPM ($)							
Year 1	319.15	208.37	412.05	177.45	123.81 (108.53, 139.09)	38.8	<0.001
Year 2	319.15	208.37	375.97	153.60	111.59 (92.98, 130.20)	35.0	<0.001
Overall	319.15	208.37	397.33	167.75	118.82 (107.01, 130.63)	37.2	<0.001

(continued)

Table J-1-4. Difference-in-differences estimates for inpatient spending, emergency department spending, professional spending, and prescription drug spending for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Prescription drug spending PBPM ($)							
Year 1	232.49	192.96	252.09	175.32	37.23 (30.09, 44.38)	16.0	<0.001
Year 2	232.49	192.96	262.27	172.47	50.26 (39.04, 61.48)	21.6	<0.001
Overall	232.49	192.96	256.25	174.16	42.55 (36.32, 48.78)	18.3	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models assume that TN Health Link and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all outcome models is 287,592. This number includes all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-5 shows the estimates of the TN Health Link on inpatient, ED, professional, and prescription drug spending PBPM for Medicaid beneficiaries participating in the TN Health Link model for the intervention period relative to the baseline period, stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- Inpatient spending PBPM increased by $23.78 for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 and by $63.51 for those eligible through Category 2 during the first two years of Health Link implementation (p<0.001). Inpatient spending PBPM decreased by $24.75 for Medicaid beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation (p<0.001).
- ED spending PBPM decreased by $3.31 for Medicaid beneficiaries participating in TN Health Link who were eligible through Category 1 (p=0.001) and by $6.65 for those eligible through Category 3 (p<0.001) during the first two years of Health Link implementation. However, ED expenditures PBPM did not change for Medicaid beneficiaries participating in Health Link who were eligible through Category 2 during the first two years of Health Link implementation.
- Professional spending PBPM increased by $74.63 for Medicaid beneficiaries participating in Health Link who were eligible through Category 1, by $102.85 for those eligible through Category 2, and by $94.30 for those eligible through Category 3 during the first two years of Health Link implementation (p<0.001).
- Prescription drug spending PBPM increased by $22.80 for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 in the intervention period (p<0.001). However, prescription drug expenditures PBPM did not change for Medicaid beneficiaries participating in Health Link who were eligible through Category 2 and Category 3 during the first two years of Health Link implementation.

Table J-1-5. Pre–post changes in inpatient, emergency department, professional, and prescription drug spending for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)					
Category 1	181.28	205.05	23.78 (13.92, 33.63)	13.1	<0.001
Category 2	168.23	231.74	63.51 (39.96, 87.06)	37.7	<0.001
Category 3	48.30	23.55	-24.75 (-27.44, -22.05)	-51.2	<0.001
ED spending PBPM ($)					
Category 1	58.43	55.12	-3.31 (-4.87, -1.74)	-5.7	0.001
Category 2	57.22	57.59	0.37 (-3.39, 4.14)	0.6	0.87
Category 3	27.27	20.62	-6.65 (-7.27, -6.04)	-24.4	<0.001
Professional spending PBPM ($)					
Category 1	319.11	393.74	74.63 (60.09, 89.17)	23.4	<0.001
Category 2	228.89	331.73	102.85 (94.18, 111.51)	44.9	<0.001
Category 3	188.37	282.68	94.30 (87.98, 100.62)	50.1	<0.001
Prescription drug spending PBPM ($)					
Category 1	231.48	254.28	22.80 (13.68, 31.93)	9.9	<0.001
Category 2	135.97	142.28	6.31 (-4.71, 17.32)	4.6	0.34
Category 3	122.34	124.10	1.76 (-1.28, 4.80)	1.4	0.34

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used an OLS model to obtain pre–post estimates for all outcomes. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

(continued)

Table J-1-5. Pre–post changes in inpatient, emergency department, professional, and prescription drug spending for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3 (continued)

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N is 155,815 for Category 1; 17,314 for Category 2; and 155,971 for Category 3. These numbers include all person-year observations for the respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.2.3 Estimates of Tennessee Health Link's impact on behavioral health–related spending outcomes

Category 1: Difference-in-differences estimates

Table J-1-6 shows the estimates of the Health Link model's impact on total behavioral health spending PBPM, behavioral health–related inpatient spending, and spending for behavioral health–related ED visits for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries.

- Behavioral health–related total spending PBPM increased in the Health Link group and decreased in the comparison group, leading to a relative increase of $121.72 for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related inpatient spending PBPM increased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but increased by $16.38 more for the Health Link group during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related ED spending PBPM decreased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but decreased by $1.11 less for the Health Link group during the first two years of Health Link implementation ($p<0.001$).

Table J-1-6. Difference-in-differences estimates for the behavioral health–related spending (total, inpatient, emergency department) for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
BH-related total spending PBPM ($)							
Year 1	301.03	156.81	441.48	164.04	133.22 (117.97, 148.47)	44.3	<0.001
Year 2	301.03	156.81	360.81	111.57	105.02 (84.50, 125.55)	34.9	<0.001
Overall	301.03	156.81	408.57	142.69	121.72 (109.40, 134.03)	40.4	<0.001
BH-related inpatient spending PBPM ($)							
Year 1	101.28	78.97	141.26	100.68	18.27 (11.23, 25.32)	18.0	<0.001
Year 2	101.28	78.97	97.01	61.06	13.64 (5.39, 21.89)	13.5	0.01
Overall	101.28	78.97	123.20	84.56	16.38 (11.02, 21.74)	16.2	<0.001
BH-related ED spending PBPM ($)							
Year 1	3.91	3.65	4.44	2.84	1.34 (1.05, 1.63)	34.4	<0.001
Year 2	3.91	3.65	2.98	1.94	0.78 (0.48, 1.09)	20.0	<0.001
Overall	3.91	3.65	3.84	2.47	1.11 (0.90, 1.33)	28.5	<0.001

Notes: BH = behavioral health; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

(continued)

Table J-1-6. Difference-in-differences estimates for the behavioral health–related spending (total, inpatient, emergency department) for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models assume that TN Health Link and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 287,592. This number includes all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-7 shows the pre–post estimates of the Health Link model's impact on total behavioral health spending PBPM, behavioral health–related inpatient spending, and behavioral health–related ED spending for Medicaid beneficiaries participating in the Health Link model for the intervention period relative to the baseline period, stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- Total behavioral health spending PBPM increased by $102.41 for Medicaid beneficiaries participating in Health Link who were eligible through Category 1, $154.25 for those eligible through Category 2, and $97.28 for those eligible through Category 3 Health Link during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related inpatient spending PBPM increased by $21.72 for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 and by $40.62 for those eligible through Category 2 during the first two years of Health Link implementation ($p<0.001$). Behavioral health–related inpatient spending PBPM decreased by $4.36 for Medicaid beneficiaries participating in Health Link who were eligible Health Link through Category 3 during the first two years of implementation ($p<0.001$).
- Behavioral health–related ED spending PBPM did not change for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 or Category 2 during the first two years of Health Link implementation. Behavioral health–related ED spending PBPM decreased by $0.26 for Medicaid beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation ($p<0.001$).

Table J-1-7. Pre–post change in the behavioral health–related spending (total, inpatient, emergency department) for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
BH-related total spending PBPM ($)					
Category 1	301.30	403.71	102.41 (90.95, 113.87)	34.0	<0.001
Category 2	161.49	315.74	154.25 (138.11, 170.40)	95.5	<0.001
Category 3	102.12	199.40	97.28 (90.38, 104.17)	95.3	<0.001
BH-related inpatient spending PBPM ($)					
Category 1	99.21	120.93	21.72 (14.65, 28.79)	21.9	<0.001
Category 2	56.20	96.82	40.62 (29.22, 52.01)	72.3	<0.001
Category 3	7.07	2.70	-4.36 (-5.48, -3.24)	-61.7	<0.001
BH-related ED spending PBPM ($)					
Category 1	3.76	3.78	0.01 (-0.24, 0.27)	0.3	0.93
Category 2	2.59	3.13	0.53 (-0.08, 1.15)	20.6	0.16
Category 3	0.49	0.23	-0.26 (-0.31, -0.22)	-53.6	<0.001

Notes: BH = behavioral health; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used an OLS model to obtain pre–post estimates for total PBPM spending. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N is 155,815 for Category 1; 17,314 for Category 2; and 155,971 for Category 3. These numbers include all person-year observations for the respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.2.4 Estimates of Tennessee Health Link's impact on behavioral health–related utilization outcomes

Category 1: Difference-in-differences estimates

Table J-1-8 shows the estimates of the Health Link model's impact on behavioral health inpatient admissions, behavioral health–related ED visits, and visits to a behavioral health provider for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries.

- Behavioral health visits increased in the Health Link group and remained almost unchanged in the comparison group, leading to a relative increase of 7.19 more visits for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related inpatient admissions increased in the Health Link group and decreased in the comparison group, leading to a relative increase of 27.12 admissions per 1,000 population for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related ED visits increased in the Health Link group and decreased in the comparison group, leading to a relative increase of 30.47 visits per 1,000 population for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation ($p<0.001$).

Table J-1-8. Difference-in-differences estimates for the behavioral health–related utilization outcomes (behavioral health specialist visits, inpatient admissions, and emergency department visits) for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
BH visits, per beneficiary							
Year 1	14.09	6.66	22.53	6.93	7.99 (6.74, 9.24)	56.7	<0.001
Year 2	14.09	6.66	18.33	5.92	6.01 (4.48, 7.55)	42.7	<0.001
Overall	14.09	6.66	20.82	6.52	7.19 (6.22, 8.15)	51.0	<0.001
BH–related inpatient admissions per 1,000 population							
Year 1	140.55	118.13	189.48	137.76	26.86 (16.42, 37.30)	19.1	<0.001
Year 2	140.55	118.13	128.41	84.60	27.49 (17.69, 37.29)	19.6	<0.001
Overall	140.55	118.13	164.56	116.14	27.12 (19.75, 34.48)	19.3	<0.001
BH–related ED visits per 1,000 population							
Year 1	119.84	112.79	139.24	99.32	34.35 (26.02, 42.68)	28.7	<0.001
Year 2	119.84	112.79	101.57	72.40	24.84 (17.23, 32.44)	20.7	<0.001
Overall	119.84	112.79	123.87	88.37	30.47 (24.64, 36.30)	25.4	<0.001

Notes: BH = behavioral health; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PCP = primary care provider; TN = Tennessee.

(continued)

Table J-1-8. Difference-in-differences estimates for the behavioral health–related utilization outcomes (behavioral health specialist visits, inpatient admissions, and emergency department visits) for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Methods: The analysis used a negative binomial model to obtain the D-in-D estimate for BH visits and a logistic regression model to obtain D-in-D estimates for BH–related inpatient admissions per 1,000 population and BH–related ED visits per 1,000 population. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models assume that TN Health Link and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 287,592. This number includes all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-9 shows the estimates of the Health Link model's impact on behavioral health inpatient admissions, behavioral health–related ED visits, and visits to a behavioral health provider for Medicaid beneficiaries participating in the TN Health Link model for the intervention period relative to the baseline period, stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- Behavioral health visits increased by 4.05 visits for Medicaid beneficiaries participating in Health Link who were eligible through Category 1, by 7.15 visits for those eligible through Category 2, and by 6.41 visits for those eligible through Category 3 Health Link during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related inpatient admissions increased by 23.36 admissions per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 and by 53.9 admissions per 1,000 population for those eligible through Category 2 during the first two years of Health Link implementation ($p<0.001$). Behavioral health–related inpatient admissions decreased by 8.88 admissions per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation ($p<0.001$).
- Behavioral health–related ED visits did not change for Medicaid beneficiaries participating in Health Link and eligible through Category 1 during the first two years of Health Link implementation. For beneficiaries eligible through Category 2, behavioral health–related ED visits increased by 26.94 visits per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible through Category 2 ($p<0.001$) during the first two years of Health Link implementation. Behavioral health–related ED visits decreased by 8.26 visits per 1,000 population for Medicaid beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation ($p<0.001$).

Table J-1-9. Pre–post change in the behavioral health–related utilization outcomes (behavioral health specialist visits, inpatient admissions, and emergency department visits) for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
BH visits, per beneficiary					
Category 1	14.52	18.57	4.05 (3.54, 4.57)	27.9	<0.001
Category 2	8.59	15.74	7.15 (6.48, 7.82)	83.3	<0.001
Category 3	8.73	15.15	6.41 (5.96, 6.87)	73.4	<0.001
BH–related inpatient admissions per 1,000 population					
Category 1	140.78	164.14	23.36 (16.26, 30.46)	16.6	<0.001
Category 2	81.47	135.37	53.90 (39.93, 67.86)	66.2	<0.001
Category 3	9.96	1.08	-8.88 (-9.69, -8.07)	-89.2	<0.001
BH–related ED visits per 1,000 population					
Category 1	119.50	123.26	3.76 (-1.73, 9.25)	3.1	0.21
Category 2	88.50	115.44	26.94 (14.38, 39.49)	30.4	<0.001
Category 3	20.57	12.31	-8.26 (-9.49, -7.04)	-40.2	<0.001

Notes: BH = behavioral health; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; ED = emergency department; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used a negative binomial model to obtain the pre–post estimate for visits to a BH specialist and a logistic regression model to obtain pre–post estimates for BH–related inpatient admissions per 1,000 population and BH–related ED visits per 1,000 population. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N is 155,815 for Category 1; 17,314 for Category 2; and 155,971 for Category 3. These numbers include all person-year observations for the respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.2.5 Estimates of Tennessee Health Link's impact on utilization

Category 1: Difference-in-differences estimates

Table J-1-10 shows the estimates of the Health Link model's impact on visits to a primary care provider (PCP) for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries.

- Visits to a PCP increased in the Health Link group and remained almost unchanged in the comparison group, leading to a relative increase of 0.30 visits for Medicaid beneficiaries participating in Health Link during the first two years of implementation ($p<0.001$).

Table J-1-10. Difference-in-differences estimates for primary care provider visits for Medicaid beneficiaries in Tennessee Health Link <u>Category 1</u> and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
PCP visits, per beneficiary							
Year 1	4.92	5.39	5.38	5.36	0.56 (0.45, 0.68)	11.4	<0.001
Year 2	4.92	5.39	4.80	5.33	-0.07 (-0.27, 0.13)	-1.4	0.57
Overall	4.92	5.39	5.14	5.35	0.30 (0.20, 0.41)	6.2	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; PCP = primary care provider; TN = Tennessee.

<u>Methods</u>: The analysis used a negative binomial model to obtain the D-in-D estimate for PCP visits. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). The outcome model assumes that TN Health Link and comparison group outcome trends are not parallel during the baseline period.

<u>How to interpret the findings</u>: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

(continued)

Table J-1-10. Difference-in-differences estimates for primary care provider visits for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models is 287,592. This number includes all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-11 shows the estimates of the Health Link model's impact on visits to a PCP for Medicaid beneficiaries participating in the TN Health Link model for the intervention period relative to the baseline period, stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- Visits to a PCP increased by 0.40 visits for Medicaid beneficiaries participating in Health Link who were eligible through Category 1 and by 0.41 visits for those eligible through Category 2 during the first two years of Health Link implementation ($p<0.001$). Visits to a PCP did not change for beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation.

Table J-1-11. Pre–post changes in primary care provider visits for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
PCP visits, per beneficiary					
Category 1	5.17	5.57	0.40 (0.29, 0.50)	7.7	<0.001
Category 2	4.91	5.32	0.41 (0.27, 0.56)	8.4	<0.001
Category 3	4.32	4.31	-0.01 (-0.09, 0.07)	-0.2	0.82

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used a negative binomial model to obtain the pre–post estimate for PCP visits. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N is 155,815 for Category 1; 17,314 for Category 2; and 155,971 for Category 3. These numbers include all person-year observations for the respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.2.6 Estimates of Tennessee Health Link's impact on quality outcomes

Category 1: Difference-in-differences estimates

Table J-1-12 shows the estimates of the Health Link model's impact on quality of care for Medicaid beneficiaries participating in the TN Health Link model and the comparison group for the intervention period relative to the baseline period, including comprehensive diabetes care, including hemoglobin A1c (HbA1c) testing rates and retinal eye exam rates; antidepressant medication adherence rates for adults and multiple concurrent antipsychotics in children and adolescents; and rates of follow-up visits within seven and 30 days after a mental illness–related acute admission.

- Changes to HbA1c testing and rates of retinal eye exams did not differ between Medicaid beneficiaries participating TN Health Link and comparison beneficiaries during the first two years of Health Link implementation.
- Changes to the rate of patients aged 18 years and older diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least 12 weeks or six months, did not differ between Medicaid beneficiaries participating in Health Link and comparison beneficiaries during the first two years of Health Link implementation.
- Changes to the use of multiple concurrent antipsychotics in children and adolescents did not differ between Medicaid beneficiaries participating in Health Link and comparison beneficiaries during the first two years of Health Link implementation.
- Changes to the percentage of mental illness–related acute inpatient admissions with follow-up visits within seven days did not differ between Medicaid beneficiaries participating in Health Link and comparison beneficiaries in the first two years of Health Link implementation.
- The percentage of mental illness–related acute inpatient admissions with follow-up visits within 30 days decreased for both Medicaid beneficiaries participating in Health Link and comparison beneficiaries but decreased by 2.24 percentage points more for the Health Link group during the first two years of Health Link implementation ($p<0.001$).

Table J-1-12. Difference-in-differences estimates for quality metrics for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of Medicaid beneficiaries with diabetes who received HbA1c testing							
Year 1	67.76	64.46	69.21	63.28	2.51 (-0.30, 5.32)	3.7	0.14
Year 2	67.76	64.46	66.95	61.83	1.63 (-3.70, 6.97)	2.4	0.61
Overall	67.76	64.46	68.30	62.70	2.16 (-0.57, 4.88)	3.2	0.19
Percentage of Medicaid beneficiaries with diabetes who received a retinal eye exam							
Year 1	28.81	26.97	31.71	28.08	1.82 (-2.77, 6.40)	6.3	0.51
Year 2	28.81	26.97	29.00	29.59	-2.69 (-8.99, 3.62)	-9.3	0.48
Overall	28.81	26.97	30.62	28.69	0.01 (-3.73, 3.74)	0.02	0.998
Percentage of patients aged >18 years diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least 12 weeks							
Year 1	44.68	42.77	46.26	43.12	1.23 (-3.69, 6.16)	2.8	0.68
Year 2	44.68	42.77	36.22	36.98	-2.72 (-11.34, 5.90)	-6.1	0.60
Overall	44.68	42.77	43.25	41.28	0.05 (-4.26, 4.36)	0.1	0.99

(continued)

Table J-1-12. Difference-in-differences estimates for quality metrics for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of patients aged >18 years diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least six months							
Year 1	29.22	28.16	28.97	25.65	2.57 (-1.82, 6.96)	8.8	0.34
Year 2	29.22	28.16	20.25	21.94	-3.07 (-11.39, 5.25)	-10.5	0.54
Overall	29.22	28.16	26.35	24.54	0.88 (-3.08, 4.84)	3.0	0.72
Percentage of children and adolescents using multiple concurrent antipsychotics							
Year 1	4.82	4.14	4.30	3.73	-0.03 (-1.78, 1.71)	-0.7	0.98
Year 2	4.82	4.14	5.86	3.07	1.54 (-0.50, 3.58)	32.0	0.21
Overall	4.82	4.14	4.77	3.53	0.44 (-0.92, 1.81)	9.2	0.59
Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within seven days							
Year 1	47.45	49.57	39.67	39.88	1.90 (-0.97, 4.76)	4.0	0.28
Year 2	47.45	49.57	30.79	34.83	-2.43 (-7.61, 2.75)	-5.1	0.44
Overall	47.45	49.57	36.95	38.32	0.57 (-1.97, 3.11)	1.2	0.71

(continued)

Table J-1-12. Difference-in-differences estimates for quality metrics for Medicaid beneficiaries in Tennessee Health Link Category 1 and the comparison group (continued)

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of mental illness–related acute inpatient hospital admissions with a mental health follow-up visit within 30 days							
Year 1	69.13	70.37	60.03	62.35	-0.64 (-2.93, 1.66)	-0.9	0.65
Year 2	69.13	70.37	48.16	57.69	-5.86 (-9.67, -2.05)	-8.5	0.01
Overall	69.13	70.37	56.40	60.92	-2.24 (-4.21, -0.26)	-3.2	0.06

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; HbA1c = hemoglobin A1c; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to produce percentages. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models include a differential trend between the TN Health Link and comparison groups beginning in the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the diabetes models is 36,210. The total weighted N for the antidepressant medication models is 18,193; the weighted N for the multiple concurrent antipsychotics models is 12,200. The total weighted N for the percentage of mental illness-related acute inpatient hospital admissions with a mental health follow-up visit within seven or 30 days is 51,332. This number includes all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Categories 1, 2, and 3: Pre–post estimates

Table J-1-13 shows the estimates of the Health Link model's impact on quality of care for Medicaid beneficiaries participating in the TN Health Link model for the intervention period relative to the baseline period, including comprehensive diabetes care, including HbA1c testing rates and retinal eye exam rates; antidepressant medication adherence rates for adults and multiple concurrent antipsychotics in children and adolescents; and rates of follow-up visits within seven and 30 days after a mental illness–related acute admission. The outcomes were stratified by whether they were eligible for Health Link through Category 1, Category 2, and Category 3.

- HbA1c testing did not change for Medicaid beneficiaries participating in Health Link who were eligible through any category during the first two years of Health Link implementation.
- Rates of retinal eye exams increased by 3.10 percentage points for Medicaid beneficiaries participating in TN Health Link who were eligible through Category 1 ($p<0.001$), by 6.31 percentage points for those eligible through Category 2 ($p=0.06$), and by 2.10 percentage points for those eligible through Category 3 ($p=0.06$) during the first two years of Health Link implementation.
- The rate of patients aged over 18 years diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least 12 weeks did not change for Medicaid beneficiaries participating in Health Link who were eligible for any category during the first two years of Health Link implementation.
- Likewise, the rate of antidepressant medication adherence after six months did not differ between the baseline and intervention periods for Medicaid beneficiaries participating in TN Health Link who were eligible for Health Link through Category 1 or Category 2. Antidepressant medication adherence after six months decreased by 3.15 percentage points for Medicaid beneficiaries participating in Health Link who were eligible through Category 3 during the first two years of Health Link implementation ($p=0.02$).
- Use of multiple concurrent antipsychotics in children and adolescents did not change for Medicaid beneficiaries in Health Link who were eligible for any category during the first two years of Health Link implementation.
- The percentage of mental illness–related acute inpatient admissions with follow-up visits within seven and 30 days after a mental illness–related acute admission did not change for Medicaid beneficiaries participating in Health Link during the first two years of Health Link implementation.

Table J-1-13. Pre–post changes in quality metrics for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
Percentage of Medicaid beneficiaries with diabetes who received HbA1c testing					
Category 1	68.50	69.81	1.31 (-0.16, 2.77)	1.9	0.10
Category 2	71.24	75.73	4.48 (-0.77, 9.74)	6.3	0.12
Category 3	71.65	71.57	-0.08 (-1.71, 1.54)	-0.1	0.93
Percentage of Medicaid beneficiaries with diabetes who received a retinal eye exam					
Category 1	30.23	33.33	3.10 (1.90, 4.30)	10.3	<0.001
Category 2	29.42	35.73	6.31 (0.24, 12.39)	21.5	0.06
Category 3	35.25	37.35	2.10 (0.08, 4.13)	6.0	0.06
Percentage of patients aged >18 years diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least 12 weeks					
Category 1	47.49	49.46	1.97 (-0.48, 4.42)	4.1	0.14
Category 2	46.75	47.97	1.23 (-5.09, 7.54)	2.6	0.72
Category 3	47.76	46.92	-0.84 (-3.81, 2.12)	-1.8	0.60
Percentage of patients aged >18 years diagnosed with a new episode of major depression and treated with antidepressant medication, who remained on medication treatment at least six months					
Category 1	32.28	33.14	0.86 (-1.42, 3.14)	2.7	0.49
Category 2	31.47	27.91	-3.56 (-8.30, 1.17)	-11.3	0.17
Category 3	34.23	31.08	-3.15 (-5.57, -0.73)	-9.2	0.02
Percentage of children and adolescents using multiple concurrent antipsychotics					
Category 1	4.06	3.24	-0.82 (-1.80, 0.15)	-20.3	0.12
Category 2	1.51	2.32	0.81 (-1.14, 2.76)	53.7	0.45
Category 3	1.76	2.17	0.40 (-0.65, 1.46)	22.9	0.48

(continued)

Table J-1-13. Pre–post changes in quality metrics for Medicaid beneficiaries in Tennessee Health Link for Health Link Categories 1, 2, and 3 (continued)

Outcome	Baseline period adjusted mean	Intervention period adjusted mean	Regression-adjusted pre–post marginal effect (90% CI)	Relative difference (%)	p-value
Percentage of mental illness-related acute inpatient hospital admissions with a mental health follow-up visit within seven days					
Category 1	55.06	53.52	-1.54 (-4.53, 1.44)	-2.8	0.34
Category 2	58.53	57.24	-1.30 (-8.74, 6.14)	-2.2	0.75
Category 3	59.15	50.79	-8.37 (-24.32, 7.59)	-14.1	0.34
Percentage of mental illness-related acute inpatient hospital admissions with a mental health follow-up visit within 30 days					
Category 1	78.14	77.95	-0.18 (-1.57, 1.20)	-0.2	0.81
Category 2	81.57	80.08	-1.48 (-6.71, 3.74)	-1.8	0.60
Category 3	81.33	76.66	-4.67 (-17.83, 8.49)	-5.7	0.52

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; HbA1c = hemoglobin A1c; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used a logistic model to obtain the pre–post estimate for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to produce percentages. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: The relative difference is the pre–post estimate as a percentage of the TN Health Link baseline period adjusted mean.

The total weighted N for all outcome models is 18,069 for Category 1; 690 for Category 2; and 7,857 for Category 3. The total weighted N for antidepressant medication models is 9,097 for Category 1; 1,156 for Category 2; and 6,190 for Category 3. The total weighted N for multiple concurrent antipsychotics models is 6,085 for Category 1; 725 for Category 2; and 4,546 for Category 3. The total weighted N for the mental illness-related acute inpatient hospital admissions with a follow-up within seven or 30 days outcome models is 25,551 for Category 1; 761 for Category 2; and 795 for Category 3. These numbers includes all person-year observations for the Health Link respective TN Health Link categories.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.3 Estimates of Differences of Tennessee Health Link's Impact for Beneficiaries Who Also Participated in Tennessee's Patient-Centered Medical Home Program

Tennessee's primary care transformation comprised PCMHs (primary care clinics that achieved or were actively working toward NCQA accreditation), Health Link, and a care coordination tool intended to allow PCMH and Health Link providers to identify and track gaps in care through ADT feeds and MCO claims. The PCMH program made progress in the integration of behavioral health with physical care by strengthening relationships and information-sharing capabilities with Health Link providers, resulting in approximately 90 percent of behavioral health referrals by PCMHs being made to Health Link practices, according to an MCO official. As such, beneficiaries who participated in both the PCMH and the Health Link programs may have had stronger impacts on spending and utilization than those who only participated in Health Link.

A DDD analysis comparing Medicaid beneficiaries who participated in both the Health Link and the PCMH programs and those who only participated in the Health Link program was used to assess whether there were stronger impacts for PCMH participants. ***Table J-1-14*** presents results from the DDD analysis. The table reports D-in-D estimates derived from the DDD model for each subgroup relative to its comparison group counterpart (i.e., differences in change for Health Link and comparison group beneficiaries participating in the PCMH model and for Health Link and comparison group beneficiaries not participating in the PCMH model), and the statistical test (p-value) for the equality of the D-in-D estimates for the subgroups (i.e., the statistical significance of the DDD estimate or the difference in Health Link impacts between subgroups). The table also shows the difference in the change between Health Link and the comparison group for each subpopulation. The interpretation and discussion focus primarily on the statistical significance of the DDD estimate.

- The increase in total spending PBPM for Medicaid beneficiaries participating in Health Link relative to their comparison group was larger for the beneficiaries were also participating in the PCMH program ($p<0.10$).
- The increase in the inpatient admission rate for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries was larger for beneficiaries participating in both Health Link and PCMH than for those who were only participating in Health Link ($p<0.05$).
- The increase in ED visits per 1,000 population for Medicaid beneficiaries participating in Health Link relative to their comparison group did not differ by whether the beneficiaries were also participating in the PCMH program.
- The increase in behavioral health visits for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries was larger for beneficiaries

participating in both Health Link and PCMH than for those who were only participating in Health Link ($p<0.10$).

- The increase in primary care visits for Medicaid beneficiaries participating in Health Link relative to comparison beneficiaries was larger for beneficiaries participating in both Health Link and PCMH than for those who were only participating in Health Link ($p<0.05$). However, the baseline rate of primary care visits was lower for beneficiaries who were participating in both the Health Link and PCMH programs than for those who were only participating in Health Link.

Table J-1-14. Impacts on key outcomes by patient-centered medical home participation status

Outcome	Baseline period adjusted mean, TN Health Link	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN Health Link	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value	p-value for test of equality across subgroups
Total spending PBPM ($)								
No PCMH (N=203,991)	858.48	714.32	950.60	606.11	199.90 (181.80, 218.01)	23.3	<0.001	
PCMH (N=83,601)	868.89	775.76	1040.64	703.02	246.22 (222.23, 270.21)	28.3	<0.001	**<0.10**
All-cause acute inpatient admissions per 1,000 population								
No PCMH (N=203,991)	242.30	247.03	242.38	220.13	27.52 (20.46, 34.58)	11.4	<0.001	
PCMH (N=83,601)	223.20	232.90	257.00	210.19	59.78 (48.54, 71.02)	26.8	<0.001	**<0.05**
ED visits per 1,000 population								
No PCMH (N=203,991)	2632.84	2771.45	2734.29	2497.58	376.82 (315.44, 438.20)	14.3	<0.001	
PCMH (N=83,601)	2567.98	2673.76	2832.25	2521.75	439.24 (339.13, 539.35)	17.1	<0.001	NS
BH visits, per beneficiary								
No PCMH (N=203,991)	15.01	7.08	21.58	6.90	7.07 (6.19, 7.95)	47.1	<0.001	
PCMH (N=83,601)	11.87	5.64	18.74	5.56	7.28 (5.89, 8.68)	61.4	<0.001	**<0.10**
PCP visits, per beneficiary								
No PCMH (N=203,991)	5.22	5.73	5.47	5.80	0.21 (0.08, 0.35)	4.1	0.01	
PCMH (N=83,601)	4.18	4.56	4.35	4.26	0.54 (0.41, 0.67)	12.9	<0.001	**<0.05**

(continued)

Table J-1-14. Impacts on key outcomes by patient-centered medical home participation status (continued)

Notes: BH = behavioral health; CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; NS = not significant; OLS = ordinary least squares; PBPM = per beneficiary per month; PCMH = patient-centered medical home; PCP = primary care provider; TN = Tennessee.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total PBPM spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions per 1,000 population, and a negative binomial model to obtain the D-in-D estimate for ED visits per 1,000 population, BH visits, and primary care visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers). All outcome models except the primary care visit outcome assume that TN Health Link and comparison group outcome trends are parallel during the baseline period. The primary care visit model assumes that TN Health Link and comparison group outcome trends are not parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean. A p-value less than 0.10 for the test of equality across subgroups indicates a statistically significant difference in the D-in-D estimate between the subgroups.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 287,592; the weighted N for beneficiaries who did not participate in PCMH is 203,991; the weighted N for beneficiaries who did participate in PCMH is 83,601. These numbers include all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.4 Annual Covariate Balance Between the Health Link and Comparison Groups

As described in ***Appendix L***, annual propensity scores were created for the overall comparison sample at the person-year level and at the inpatient discharge level and for any condition-specific subgroups. These condition-specific subgroups were created for quality outcomes.

Table J-1-15 shows covariate balance between the Health Link and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The table includes the following:

- The covariate means for the Health Link and comparison groups without propensity score weighting;
- The standardized difference between the Health Link and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the Health Link group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the Health Link group. Although propensity scores were calculated in each analysis year, means and standardized differences are similar across years, so tables are presented for the last baseline year only.

The analysis included all covariates in ***Table J-1-15*** in the propensity score models. Additional details about propensity score covariate selection, propensity score model specification, and calculation of standardized differences are available in ***Appendix L***.

Table J-1-15 shows balance between Health Link and comparison group covariates before and after applying weights to person-year observations for all Medicaid beneficiaries. Prior to propensity score weighting, standardized differences were greater than 0.10 for two person-level characteristics (percentage of beneficiaries who were disabled and percentage of beneficiaries that had a missing value for race) and for one county-level characteristic, hospital beds per 1,000 population. After propensity score weighting, standardized differences were lower than the 0.10 threshold, indicating an acceptable level of covariate balance.

Table J-1-15. Covariate balance between intervention and comparison groups in the last baseline year, Medicaid beneficiaries attributed to Health Link who were eligible through Category 1

Variable	Unweighted mean or percentage, TN Health Link	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	64.2	65.95	0.04	64.01	0.004
Age in years	35.1	34.9	0.02	34.9	0.014
Percentage of people who are disabled	55.7	43.34	0.25	55.86	0.003
Percentage of people who are non-white	58.25	55.58	0.05	58.27	0.0004
Percentage of people who are missing race	18.05	22.9	0.12	18.08	0.001
Total months of enrollment during year	11.3	11.2	0.05	11.3	0.001
Percentage of people who are dually enrolled at any month in the year	19.66	16.21	0.09	19.28	0.010
CDPS risk score, logged[a]	0.7	0.7	0.08	0.7	0.001
County level					
Percentage of people who reside in a Metropolitan Statistical Area	72.12	72.91	0.002	71.37	0.0002
Percentage of people who are living in poverty	16.3	16.9	0.001	16.3	0.00004
Hospital beds per 1,000 people [2015]	3.4	3.4	0.0001	3.4	0.0002
Median age in years	38.2	38.3	0.0004	38.3	0.00002
Percentage of people without health insurance (aged under 65 years)	10.9	10.9	0.001	11	0.0001
PCPs per 1,000 people [2016]	0.7	0.7	0.0001	0.7	0.0001
Number of community mental health centers	1.26	0.82	0.0004	1.23	0.00003

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities

CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; PCP = primary care provider; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

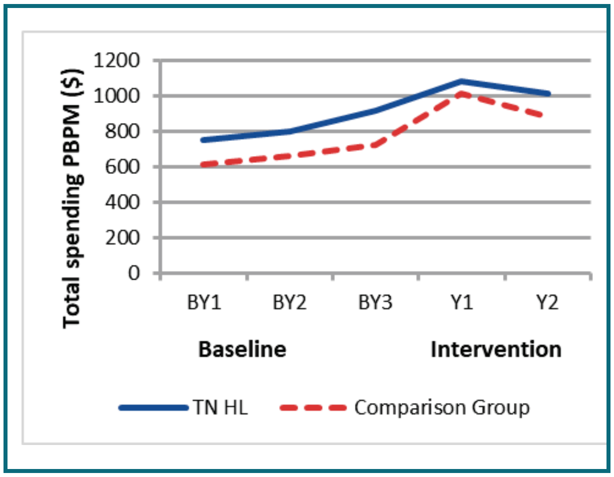
J-1.5 Trends in Core Health Care Spending and Utilization Outcomes

Figures J-1-1 through ***J-1-4*** show propensity score-weighted trends for all analysis years for the core D-in-D outcomes (total spending PBPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries who were attributed and enrolled in Health Link and comparison groups. All outcomes, except for readmissions within 30 days of discharge, appeared to exhibit parallel trends during the baseline period. As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the intervention and comparison groups to determine the specification of our D-in-D models.

The findings are as follows:

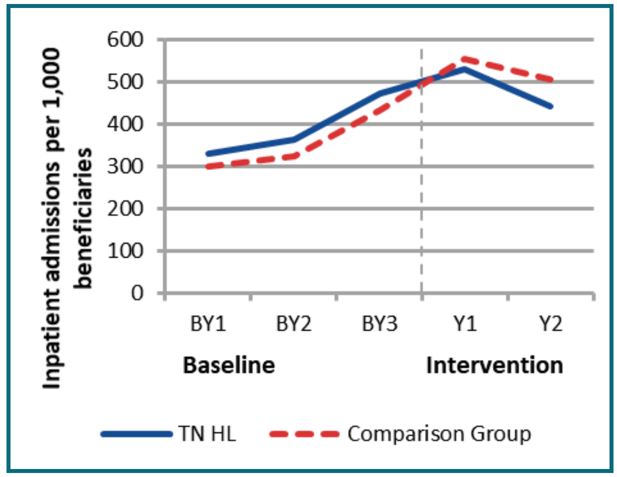
- Total spending PBPM increased during the baseline period and decreased during the second year of the intervention period for both the Health Link and the comparison groups. The rate was consistently lower in the comparison group than in the intervention group (***Figure J-1-1***). The trends appear to be parallel during the baseline period.
- Inpatient admissions increased during the baseline period and decreased during the second year of the intervention period for both the Health Link and comparison groups. Although the Health Link group rates were higher than the comparison group rates during the baseline period, this trend reversed during the intervention period (***Figure J-1-2***). The trends appear to be parallel during the baseline period.
- ED visits increased during the baseline period and decreased during the second year of the intervention period for both the Health Link and the comparison groups. Health Link and comparison group rates were nearly equivalent during the baseline period, although the Health Link group had slightly lower rates during the intervention period (***Figure J-1-3***). The trends appear to be parallel during the baseline period.
- Readmissions within 30 days per 1,000 discharges generally increased in the baseline period for Medicaid beneficiaries participating in Health Link, declined in Year 1 of the intervention period, and increased again in Year 2. For comparison beneficiaries, the readmission rate generally increased through the first year of the intervention period before declining slightly in the second intervention year (***Figure J-1-4***). The trends do not appear parallel during the baseline period.

Figure J-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the Health Link and comparison groups



Note: BY = baseline year; HL = Health Link; PBPM = per beneficiary per month; TN = Tennessee; Y = year.

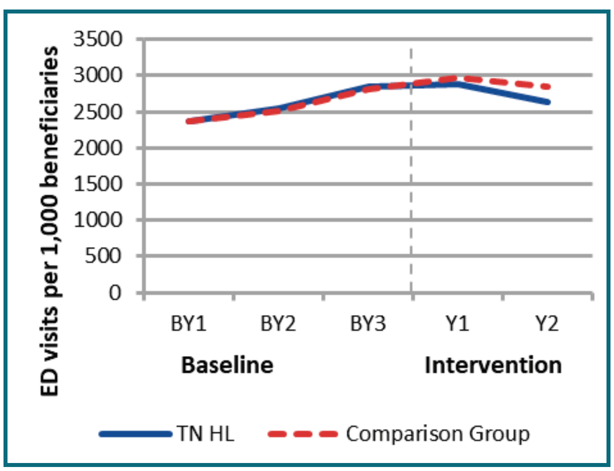
Figure J-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Health Link and comparison groups



Note: BY = baseline year; HL = Health Link; TN = Tennessee; Y = year.

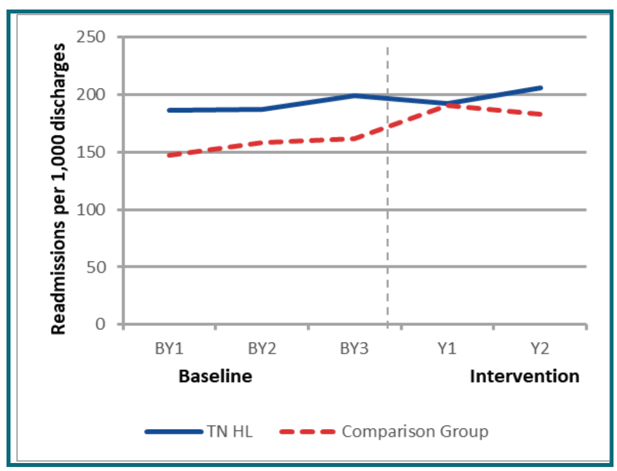
Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Figure J-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Health Link and comparison groups



Note: BY = baseline year; ED = emergency department; HL = Health Link; TN = Tennessee; Y = year.

Figure J-1-4. Trends in readmissions per 1,000 discharges in the Health Link and comparison groups



Note: BY = baseline year; HL = Health Link; TN = Tennessee; Y = year.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

J-1.6 Sensitivity Analyses

Table J-1-16 shows how the impact estimates for the Health Link for the core outcomes differ when our D-in-D models assume (1) parallel trends in outcomes between the Health Link and comparison groups beginning in baseline period for readmissions within 30 days or (2) differential trends beginning in the baseline period for all other outcomes (sensitivity analysis). The findings for total spending PBPM, inpatient admissions, ED visits, and readmissions were robust to the inclusion or exclusion of a differential trend between the Health Link and comparison groups beginning in the baseline period.

- The overall total spending PBPM D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming differential trends, found a smaller estimate (in absolute value).
- The overall inpatient admissions per 1,000 population D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming differential trends, found a larger estimate (in absolute value).
- The overall ED visits per 1,000 population D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming differential trends, found similar estimates.
- The overall 30-day readmissions per 1,000 discharges D-in-D estimates were in the same direction and significance across the two approaches. Moreover, the sensitivity analysis, assuming parallel trends, found similar estimates.

Table J-1-16. Difference in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link and the comparison group

Outcome	Parallel trends assumption	Main analysis: Regression-adjusted D-in-D (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D (90% CI)
Total spending PBPM	Main: Parallel Sensitivity: Not parallel		
Year 1		209.55*** (190.95, 228.16)	155.04*** (129.19, 180.88)
Year 2		220.14*** (193.91, 246.37)	137.64*** (94.37, 180.90)
Overall		213.87*** (198.52, 229.23)	147.94*** (124.58, 171.29)
Inpatient admissions per 1,000 population	Main: Parallel Sensitivity: Not parallel		
Year 1		41.55*** (31.23, 51.88)	49.93*** (36.50, 63.35)
Year 2		30.32*** (23.57, 37.06)	41.04*** (29.40, 52.69)
Overall		36.97*** (30.26, 43.67)	46.30*** (37.04, 55.56)
ED visits per 1,000 population	Main: Parallel Sensitivity: Not parallel		
Year 1		411.75*** (334.01, 489.49)	378.32*** (264.81, 491.84)
Year 2		375.30*** (296.90, 453.71)	330.11*** (182.41, 477.81)
Overall		396.88*** (340.83, 452.93)	358.65*** (268.39, 448.92)
Readmissions per 1,000 discharges	Main: Not parallel Sensitivity: Parallel		
Year 1		-34.99*** (-54.91, -15.07)	-37.84*** (-56.21, -19.48)
Year 2		-11.08 (-48.96, 26.79)	-15.39 (-35.05, 4.27)
Overall		-26.66** (-45.17, -8.15)	-30.02*** (-43.80, -16.23)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PBPM = per beneficiary per month; PCP = primary care provider; TN = Tennessee.

(continued)

Table J-1-16. Difference in the pre–post change in total spending, inpatient admissions, emergency department visits, and readmissions for Medicaid beneficiaries in Tennessee Health Link and the comparison group (continued)

Methods: The analysis used an OLS model to obtain D-in-D estimates for total PBPM spending, a negative binomial model to obtain the D-in-D estimate for ED visits per 1,000 population, and a logistic regression model to obtain D-in-D estimates for inpatient admissions per 1,000 population and 30-day readmissions per 1,000 discharges. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 population. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models are adjusted for person-level variables (gender, age, reason for Medicaid entitlement based on disability, race, a count of total months enrolled in the measurement year, being dually enrolled in Medicare, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, PCPs per 1,000 population, and number of community mental health centers).

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of TN Health Link relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN Health Link group relative to the comparison group after TN Health Link implementation. The relative difference is the D-in-D estimate as a percentage of the TN Health Link baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmissions outcome is 287,592; the weighted N for the readmission outcome is 104,437. These numbers include all person-year observations for both the TN Health Link and comparison groups.

Source: Federal Evaluation Team analysis of TN Medicaid claims data from TennCare.

Appendix J-2: Tennessee Episodes of Care Impact Results

J-2.1 Overview

The Tennessee episodes of care (EOCs) initiative covered all health care delivered by multiple providers for the given acute health event. In Tennessee's EOC model, the Principal Accountable Providers (PAPs) or "Quarterbacks" were those who initiate the episode and had the most accountability for the cost of care of the episode. For Tennessee Medicaid providers, participation in EOC was mandatory. Although the EOC model's predominant impact was on Medicaid, it also encompassed state employee and commercial plans.

In Tennessee Medicaid, Quarterbacks were eligible for gain-sharing payments when all quality metrics for an episode were met and were at risk of penalty payments when metrics were not met. During the SIM Initiative award period, 48 episodes were implemented in Medicaid, with mandatory participation and risk- or gain-sharing. Twelve episodes were implemented in state employee plans, with voluntary participation and gain-sharing, but without downside risk.

The EOC impact analysis focused on the impact of the perinatal and asthma exacerbation episodes on select quality metrics. These episodes were selected because (1) they represented two of the three episodes first linked to payment and (2) perinatal care represented a key health policy interest. Providers began making penalty payments and receiving gain-sharing payments in August 2016 for acute asthma exacerbation and perinatal episodes, for the performance period that began in calendar year 2015. Thus, the intervention period for the EOC analyses began on January 1, 2015, when Tennessee Medicaid first tied performance on perinatal and asthma episode quality measures and spending to financial awards and penalties.

The analysis addressed the following research question:

- To what extent did the EOC payment reform result in changes in quality-of-care outcomes for asthma and perinatal episodes in Tennessee Medicaid?

It was expected that the Tennessee EOCs should be associated with improvements among the tracked quality measures.

Table J-2-1 provides a snapshot of the study methods.

Table J-2-1. Methods snapshot

Method	Description
Participating providers	The EOC model was mandatory for all providers that accepted Medicaid in Tennessee. For the acute asthma exacerbation episode, the PAPs were facilities that treated patients with an acute asthma exacerbation in an emergency department or inpatient setting. For the perinatal episode, the PAPs were either individual physicians or practices that billed for the delivery of newborns (TN Division of Health Care Finance & Administration, n.d.).
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences. Separate analyses were conducted for the perinatal and acute asthma exacerbation episodes.
Data	MAX and TAF data for January 2013 through December 2019.[103]
Sample	For both the perinatal and acute asthma exacerbation analyses, the intervention group included all perinatal and acute asthma exacerbation episodes in Tennessee within the analysis timeframe. The comparison group included perinatal and acute asthma exacerbation episodes in Kansas, Kentucky, and South Carolina. For perinatal episodes, the total weighted N is 233,798 for the cesarean section outcome model and 236,519 for follow up provider visits after delivery. For asthma episodes, the total weighted N for the follow-up visit and appropriate medication outcomes is 215,265, and the total weighted N for the repeat exacerbation outcome is 215,233.
Episode definitions	Perinatal episodes were triggered by a live birth in a health care setting. The live birth was reported on a professional claim and usually had a corresponding facility claim. Perinatal episodes began 280 days before the delivery and ended 60 days after the delivery. Individuals were excluded from the perinatal episode analysis if they had a total of 27 or more diagnosed health risk factors, were less than 12 years old or more than 49 years old, were dual Medicare-Medicaid enrollees, did not have full Medicaid benefits, left the birth facility against medical advice, had a hospitalization lasting more than 30 days during the episode period, were receiving cancer treatment or died. Acute asthma exacerbation episodes were triggered by an inpatient admission or an ED visit with a primary asthma diagnosis or a contingent asthma primary diagnosis (with a confirmatory asthma diagnosis in any claims 365 days before the trigger claim or 30 days afterwards). Asthma exacerbation episodes began on the day that an individual used inpatient or ED services for an asthma exacerbation. The asthma episode ended 30 days after being discharged from the facility that provided care during the initial asthma exacerbation event. Individuals with an asthma exacerbation event were excluded from the analysis if they were less than 2 or more than 64 years old, did not have full Medicaid benefits, and had certain comorbidities. The episode definitions and exclusions were based on documentation provided on the Ohio and Tennessee Medicaid websites (TN Department of Health, n.d.-a). Ohio was the other SIM Round 2 state with an EOC model. Because the Ohio and Tennessee episode definitions were very similar, differences were resolved across the episode definitions, so episodes for the Ohio and Tennessee analyses were constructed in the same way.

(continued)

[103] During the analysis timeframe, the Centers for Medicare and Medicaid Services transitioned from producing Medicaid data in the MAX format to the TAF format. The exact date of the transition from MAX to TAF varies by state. For more information about this transition, see ***Appendix L***.

Table J-2-1. Methods snapshot (continued)

Method	Description
Timeframe	The timeframe for the impact analysis was January 1, 2014, through December 31, 2018, for perinatal episodes and January 1, 2013 through December 31, 2019, for asthma episodes. The timeframe for the perinatal episodes is shorter because of data issues for perinatal episodes in Tennessee and comparison states in 2013 and 2019. The perinatal episodes also exclude 2016 because of data issues. The intervention period began on January 1, 2015, when Tennessee Medicaid first tied performance on perinatal and asthma episode quality measures and spending to financial awards and penalties.
Measures	The analysis assessed the effects of the EOC model on several outcomes. For the perinatal EOC, the outcomes were cesarean section rates and follow-up provider visits within 60-days of delivery. For the asthma EOC, the outcomes were rates of relevant follow-up care within the post-trigger window, rates of receipt of appropriate asthma medication, and rates of repeat acute asthma exacerbation within the post-trigger window.[104]
Statistical analysis	All perinatal and asthma outcomes were binary and modeled with logistic regression models. All observations in the comparison group were multiplied by a propensity score weight. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables. All models also included state dummy variables to account for differences in Medicaid programs across states.

Note: D-in-D = difference-in-differences; EOC = episode of care; MAX = Medicaid Analytic eXtract; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files.

A full description of the Tennessee EOC model and a summary of the key impact analysis findings are available in ***Appendix J***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix J-2*** provide detailed information regarding EOC impact findings in tables and figures:

- ***Section J-2.2*** presents results of difference-in-differences (D-in-D) analyses for perinatal and acute asthma exacerbation EOCs;
- ***Section J-2.3*** presents results of D-in-D analyses separately for children and adults for the acute asthma exacerbation EOC;
- ***Section J-2.4*** provides information on covariate balance between the Tennessee EOCs and comparison groups before and after propensity score weighting;
- ***Section J-2.5*** describes trends in perinatal and acute asthma exacerbation outcomes over the analysis timeframe; and

[104] Because 100 percent of Tennessee's Medicaid population is in Medicaid managed care, it is not possible to construct reliable spending outcomes for Tennessee in MAX and TAF data. Medicaid managed care plans' payments to providers were zeroed out in MAX data and were not well-populated in TAF data. As a result, it was not possible to construct episode-level spending outcomes.

- ***Section J-2.6*** presents results from a sensitivity analysis that shows how D-in-D estimates for acute asthma exacerbation outcomes when assumptions about Tennessee EOC and comparison group trends change.

J-2.2 Estimates of the Episodes of Care Model's Impact on Perinatal and Asthma Outcomes

Tables J-2-2 and ***J-2-3*** show annual and overall estimates of the Tennessee EOC model's impact on perinatal and asthma outcomes for Tennessee Medicaid beneficiaries. The D-in-D impact estimates come from statistical models described in ***Appendix L.*** For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the EOC and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of the EOC impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

J-2.2.1 Estimates of the episodes of care model's impact on perinatal outcomes

Table J-2-2 shows the estimates of the EOC model's impact on outcomes for Tennessee Medicaid beneficiaries with a perinatal episode relative to out-of-state beneficiaries with a perinatal episode.[105] The findings are as follows:

- The percentage of perinatal episodes with a delivery by cesarean section (C-section) decreased for both Tennessee Medicaid beneficiaries and comparison beneficiaries but decreased by 1.07 percentage points more for the Tennessee EOC group during the first four years in which EOCs were linked to provider payments (p=0.001).
- The percentage of perinatal episodes with a follow up visit within 60 days post-discharge from the delivery inpatient stay decreased for Tennessee Medicaid beneficiaries and increased in the comparison group, leading to a relative decrease of 1.21 percentage points for the Tennessee EOC group during the first four years in which EOCs were linked to provider payments ($p<0.001$).

[105] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

Table J-2-2. Differences in the pre–post change in outcomes for Tennessee Medicaid beneficiaries and comparison beneficiaries with a perinatal episode of care

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of perinatal episodes with a delivery by cesarean section							
Year 1	31.7	33.2	29.8	32.4	-1.11 (-1.87, -0.35)	-3.5	0.02
Year 2	31.7	33.2	30.3	32.6	-0.77 (-1.75, 0.21)	-2.4	0.19
Year 3	31.7	33.2	29.2	32.0	-1.33 (-2.42, -0.24)	-4.2	0.04
Overall	31.7	33.2	29.8	32.3	-1.07 (-1.62, -0.52)	-3.4	0.001
Percentage of perinatal episodes with a follow up visit within 60 days after delivery							
Year 1	74.3	73.3	72.9	73.9	-1.97 (-2.27, -1.67)	-2.7	<0.001
Year 2	74.3	73.3	73.1	73.1	-0.99 (-2.11, 0.13)	-1.3	0.14
Year 3	74.3	73.3	74.0	73.6	-0.64 (-1.11, -0.17)	-0.9	0.03
Overall	74.3	73.3	73.3	73.6	-1.21 (-1.63, -0.79)	-1.6	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

(continued)

Table J-2-2. Differences in the pre–post change in outcomes for Tennessee Medicaid beneficiaries and comparison beneficiaries with a perinatal episode of care (continued)

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs. All outcome models assume that TN EOC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN EOC group.

The same baseline period was used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean was the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D was calculated as an average marginal effect.

The total weighted N was 233,798 for the cesarean section outcome model and 236,519 for the follow up visit outcome model, because KY was excluded from the comparison group. These numbers included all episode-level observations for both the TN EOC and comparison groups.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and TAF.

J-2.2.2 Estimates of the episodes of care model's impact on acute asthma exacerbation outcomes

Table J-2-3 shows the estimates of the EOC model's impact on outcomes for Tennessee Medicaid beneficiaries with an asthma episode relative to comparison beneficiaries with an asthma episode. The findings are as follows:

- The percentage of asthma episodes that included a follow-up visit within the post-trigger window remained almost unchanged for Tennessee Medicaid beneficiaries and increased for comparison beneficiaries, leading to a relative decrease of 2.14 percentage points the Tennessee EOC group during the first five years in which EOCs were linked to provider payments ($p=0.001$).
- The percentage of asthma episodes that included appropriate medications remained almost unchanged for Tennessee Medicaid beneficiaries but increased in the comparison beneficiaries, leading to a relative decrease of 5.93 percentage points for the Tennessee EOC group during the first five years in which EOCs were linked to provider payments ($p<0.001$).
- The percentage of asthma episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window increased for Tennessee Medicaid beneficiaries and decreased for the comparison beneficiaries, leading to a relative increase of 0.90 percentage points for the Tennessee EOC group during the first five years in which EOCs were linked to provider payments ($p<0.001$).

Table J-2-3. Differences in the pre–post change in outcomes for Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	42.00	39.96	40.51	41.01	-2.55 (-4.92, -0.18)	-6.1	0.08
Year 2	42.00	39.96	41.79	43.20	-3.48 (-6.03, -0.93)	-8.3	0.02
Year 3	42.00	39.96	43.43	43.09	-1.76 (-3.93, 0.41)	-4.2	0.18
Year 4	42.00	39.96	44.77	42.93	-0.26 (-2.78, 2.26)	-0.6	0.86
Year 5	42.00	39.96	41.58	42.27	-2.77 (-5.60, 0.05)	-6.6	0.11
Overall	42.00	39.96	42.44	42.46	-2.14 (-3.24, -1.03)	-5.1	0.001
Percentage of episodes with appropriate asthma medications dispensed within the trigger or post-trigger window							
Year 1	55.61	55.14	54.88	68.06	-13.51 (-17.13, -9.88)	-24.3	<0.001
Year 2	55.61	55.14	54.39	68.61	-14.50 (-19.00, -10.01)	-26.1	<0.001
Year 3	55.61	55.14	70.95	71.48	-0.98 (-5.71, 3.74)	-1.8	0.73
Year 4	55.61	55.14	70.61	70.16	-0.06 (-4.40, 4.28)	-0.1	0.98
Year 5	55.61	55.14	68.73	67.91	0.28 (-5.10, 5.66)	0.5	0.93
Overall	55.61	55.14	63.79	69.22	-5.93 (-7.94, -3.92)	-10.7	<0.001

(continued)

Table J-2-3. Differences in the pre–post change in outcomes for Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window							
Year 1	6.90	7.79	7.45	7.33	1.00 (0.28, 1.71)	14.5	0.02
Year 2	6.90	7.79	7.22	7.23	0.86 (0.35, 1.37)	12.4	0.01
Year 3	6.90	7.79	7.31	7.47	0.73 (0.16, 1.29)	10.5	0.04
Year 4	6.90	7.79	7.43	7.27	1.03 (0.24, 1.83)	15.0	0.03
Year 5	6.90	7.79	7.47	7.46	0.91 (0.26, 1.55)	13.2	0.02
Overall	6.90	7.79	7.37	7.35	0.90 (0.61, 1.20)	13.1	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assumed that TN EOC and comparison group outcome trends are parallel during the baseline period. Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs. The percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window outcome excludes KS from the comparison group.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN EOC group.

(continued)

Table J-2-3. Differences in the pre–post change in outcomes for Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

The same baseline period was used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean was the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D was calculated as an average marginal effect.

The total weighted N for the percentage of episodes with follow-up care and appropriate medication models was 215,265. The total weighted N for the percentage of episodes with a repeat acute exacerbation was 215,233. These numbers included all episode-level observations for both the TN EOC and comparison groups.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and TAF.

J-2.3 Estimates of the Episodes of Care Model's Impact on Acute Asthma Exacerbation Outcomes for Adults and Children

The analysis assessed the EOC model's impacts on asthma outcomes for adults and children separately. Because the health care needs of adults and children differ, the EOC model could produce differential impacts for these groups. However, EOC model implementation did not differ for adult and pediatric populations.

J-2.3.1 Estimates of the episodes of care model's impact on acute asthma exacerbation outcomes for adults

Table J-2-4 shows the estimates of the EOC model's impact on outcomes for adult Medicaid beneficiaries with an asthma episode relative to adult comparison beneficiaries with an asthma episode. The findings are as follows:

- The percentage of asthma episodes that included a follow-up visit within the post-trigger window decreased for adult Tennessee Medicaid beneficiaries and increased for comparison beneficiaries, leading to a relative decrease of 3.49 percentage points for the adult EOC group in Tennessee during the first five years in which EOCs were linked to provider payments ($p<0.001$).
- The percentage of asthma episodes that included appropriate medications increased for both adult Tennessee Medicaid beneficiaries and the comparison group but increased by 9.22 percentage points less for adult Medicaid beneficiaries in Tennessee during the first five years in which EOCs were linked to provider payments ($p<0.001$).
- Changes to the percentage of asthma episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window did not differ between adults Medicaid beneficiaries in Tennessee and the comparison group during the first five years in which EOCs were linked to provider payments.

Table J-2-4. Differences in the pre–post change in outcomes for adult Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	41.35	36.64	38.06	36.90	-3.49 (-4.79, -2.20)	-8.4	<0.001
Year 2	41.35	36.64	38.99	38.75	-4.44 (-6.13, -2.76)	-10.7	<0.001
Year 3	41.35	36.64	41.06	39.00	-2.73 (-4.40, -1.05)	-6.6	0.01
Year 4	41.35	36.64	41.53	38.73	-2.00 (-3.74, -0.25)	-4.8	0.06
Year 5	41.35	36.64	38.19	38.58	-5.17 (-7.01, -3.33)	-12.5	<0.001
Overall	41.35	36.64	39.64	38.34	-3.49 (-4.23, -2.75)	-8.5	<0.001
Percentage of episodes with appropriate asthma medications dispensed within the trigger or post-trigger window							
Year 1	63.94	57.61	62.26	72.72	-14.86 (-17.42, -12.30)	-23.2	<0.001
Year 2	63.94	57.61	58.06	69.62	-16.71 (-19.39, -14.02)	-26.1	<0.001
Year 3	63.94	57.61	69.93	70.32	-5.64 (-8.45, -2.83)	-8.8	<0.001
Year 4	63.94	57.61	70.40	69.38	-4.44 (-6.98, -1.90)	-7.0	0.00
Year 5	63.94	57.61	69.89	68.83	-4.48 (-7.72, -1.25)	-7.0	0.02
Overall	63.94	57.61	66.14	70.27	-9.22 (-10.45, -7.99)	-14.4	<0.001

(continued)

Table J-2-4. Differences in the pre–post change in outcomes for adult Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window							
Year 1	9.95	10.40	9.70	9.89	0.17 (-1.01, 1.35)	1.7	0.81
Year 2	9.95	10.40	9.73	9.75	0.33 (-0.84, 1.51)	3.4	0.64
Year 3	9.95	10.40	9.57	10.20	-0.25 (-1.39, 0.88)	-2.6	0.71
Year 4	9.95	10.40	10.34	10.13	0.58 (-1.03, 2.19)	5.8	0.55
Year 5	9.95	10.40	9.67	10.79	-0.73 (-2.08, 0.63)	-7.3	0.38
Overall	9.95	10.40	9.81	10.12	0.04 (-0.54, 0.63)	0.4	0.91

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assume that TN EOC and comparison group outcome trends are parallel during the baseline period. Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs. The percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window outcome excludes KS from the comparison group.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN EOC group.

(continued)

Table J-2-4. Differences in the pre–post change in outcomes for adult Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

The same baseline period was used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean was the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D was calculated as an average marginal effect.

The total weighted N for the percentage of episodes with follow-up care and appropriate medication models was 78,286. The total weighted N for the percentage of episodes with a repeat acute exacerbation was 78,308. These numbers included all episode-level observations for both the TN EOC and comparison groups.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

J-2.3.2 Estimates of the episodes of care model’s impact on acute asthma exacerbation outcomes for children

Table J-2-5 shows the estimates of the EOC model’s impact on outcomes for child Medicaid beneficiaries with an asthma episode relative to child comparison beneficiaries with an asthma episode. The findings are as follows:

- Changes to the percentage of asthma episodes that included a follow-up visit within the post-trigger window did not differ between child Medicaid beneficiaries in Tennessee and the comparison group during the first five years in which EOCs were linked to provider payments.
- The percentage of asthma episodes that included appropriate medications increased for both child Medicaid beneficiaries in Tennessee and the comparison group but increased by 4.36 percentage points less for child Medicaid beneficiaries in Tennessee during the first five years in which EOCs were linked to provider payments ($p=0.01$).
- The percentage of asthma episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window increased in Tennessee and decreased in the comparison group, leading to a relative increase of 1.40 percentage points for children in Tennessee during the first five years in which EOCs were linked to provider payments ($p<0.001$).

Table J-2-5. Differences in the pre–post change in outcomes for child Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient receives follow-up care within the post-trigger window							
Year 1	42.50	42.16	41.83	43.40	-1.90 (-5.48, 1.67)	-4.5	0.38
Year 2	42.50	42.16	43.51	45.54	-2.37 (-6.13, 1.39)	-5.6	0.30
Year 3	42.50	42.16	44.51	45.52	-1.36 (-5.04, 2.32)	-3.2	0.54
Year 4	42.50	42.16	46.22	45.61	0.26 (-3.35, 3.88)	0.6	0.90
Year 5	42.50	42.16	43.41	44.55	-1.47 (-5.36, 2.41)	-3.5	0.53
Overall	42.50	42.16	43.88	44.89	-1.38 (-3.03, 0.28)	-3.2	0.17
Percentage of episodes with appropriate asthma medications dispensed within the trigger or post-trigger window							
Year 1	51.38	53.41	50.50	65.04	-12.62 (-17.39, -7.85)	-24.6	<0.001
Year 2	51.38	53.41	52.31	67.59	-13.37 (-19.47, -7.27)	-26.0	<0.001
Year 3	51.38	53.41	71.51	71.90	1.26 (-5.06, 7.58)	2.4	0.74
Year 4	51.38	53.41	70.87	70.54	2.01 (-4.26, 8.29)	3.9	0.60
Year 5	51.38	53.41	68.00	67.30	2.46 (-4.85, 9.77)	4.8	0.58
Overall	51.38	53.41	62.35	68.37	-4.36 (-7.09, -1.62)	-8.5	0.01

(continued)

Table J-2-5. Differences in the pre–post change in outcomes for child Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

Outcome	Baseline period adjusted mean, TN EOC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN EOC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window							
Year 1	5.27	6.20	6.21	5.66	1.51 (0.80, 2.21)	28.6	<0.001
Year 2	5.27	6.20	5.84	5.62	1.12 (0.61, 1.63)	21.3	<0.001
Year 3	5.27	6.20	6.07	5.81	1.19 (0.60, 1.77)	22.6	<0.001
Year 4	5.27	6.20	5.78	5.43	1.22 (0.65, 1.79)	23.1	<0.001
Year 5	5.27	6.20	6.33	5.15	2.06 (1.51, 2.62)	39.1	<0.001
Overall	5.27	6.20	6.04	5.56	1.40 (1.13, 1.66)	26.5	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, child indicator, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). All outcome models assumed that TN EOC and comparison group outcome trends were parallel during the baseline period. Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs. The percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window outcome excluded KS from the comparison group.

(continued)

Table J-2-5. Differences in the pre–post change in outcomes for child Tennessee Medicaid beneficiaries and the comparison beneficiaries with an acute asthma exacerbation episode (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the percentage of episodes with follow-up care and appropriate medication models is 137,019. The total weighted N for the percentage of episodes with a repeat acute exacerbation is 137,005. These numbers include all episode-level observations for both the TN EOC and comparison groups.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

J-2.4 Covariate Balance Between the Episodes of Care and Comparison Groups

As described in ***Appendix L***, the analysis created propensity scores for the comparison sample at the episode level and for the comparison subgroups of adults and children. Different propensity scores were created for both perinatal outcomes because of the slightly different samples for each outcome.

Table J-2-6 shows covariate balance for the percentage of perinatal episodes with a C-section. Covariate balance for this outcome is illustrative of that for follow-up visits within 60 days of delivery, for which covariate balance is not shown. ***Table J-2-7*** shows covariate balance between the Tennessee EOC and comparison groups for the acute asthma exacerbation episodes. Covariate balance for the adult and child samples for the asthma episode analysis are not shown.[106] The tables include the following:

- The covariate means for the EOC and comparison groups without propensity score weighting;
- The standardized difference between the EOC and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity-score weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the EOC group means and the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores were estimated using logistic regressions in which the dependent variable was an indicator of inclusion in the EOC group.

All covariates in ***Table J-2-6*** were included in the perinatal propensity score models. All covariates in ***Table J-2-7*** were included in the asthma propensity score model, except for the percentage of the population in poverty, beds per 1,000 population, median age, and percentage without insurance. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Tables J-2-6 and ***Table J-2-7*** shows balance between the EOC and comparison group covariates before and after applying weights to episode-level observations for Medicaid beneficiaries. ***Table J-2-6*** shows that, for the cesarean section outcome, the standardized differences before weighting reflected poor balance between the groups with regard to living in

[106] Unlike other analyses in this report which used annual propensity scores, the propensity scores for the comparison groups in the Ohio and Tennessee EOC analyses were based on the full study period. Few individuals in the sample for the perinatal and asthma EOC analyses had more than one episode, so a single set of propensity scores based on the entire study sample allowed more alignment/common support between the EOC (treatment) and comparison groups. In other model-specific analyses in this report, many individuals were in the sample in multiple years so annual scores were used to account for evolution of the sample over time.

Metropolitan Statistical Areas and primary care provider supply. After weighting, all of the standardized differences were well below the 0.1 threshold considered to indicate acceptable balance for these analyses.

Table J-2-7 indicates that, for the asthma EOC analysis, there was an acceptable level of balance for individual-level covariates and poor balance for county-level covariates prior to propensity score weighting. After weighting, all of the individual level remained well below the 0.10 threshold and most county level variables were balanced. However, the standardized differences for the percentage of people who are living in poverty and the percentage of people without health insurance remained above the 0.10 threshold. This is likely due to lack of variation in county level variables, and the absolute difference remained small.

Table J-2-6. Covariate balance between the perinatal and episode of care comparison groups for the cesarean section outcome

Variable	Unweighted mean or percentage, TN EOC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Age in years	25.30	25.40	0.01	25.40	0.003
Percentage of people who are disabled	1.80	1.70	0.01	1.77	0.002
CDPS risk score, logged[a]	0.70	0.70	0.07	0.70	0.001
County level					
Percentage of people residing in a Metropolitan Statistical Area	75.39	66.75	0.19	75.32	0.002
Percentage of people living in poverty [2016]	16.70	17.10	0.08	16.60	0.024
Hospital beds per 1,000 people [2015]	3.50	3.40	0.02	3.40	0.018
Median age in years [2010]	37.90	37.70	0.07	37.90	0.019
Primary care providers per 1,000 people [2016]	0.70	0.70	0.12	0.70	0.031

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; EOC = episode of care; ICD = International Classification of Diseases; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

Table J-2-7. Covariate balance between the asthma and episode of care comparison groups

Variable	Unweighted mean or percentage, TN EOC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	53.13	52.81	0.01	53.3	0.003
Age in years	16.8	18.2	0.09	16.9	0.004
Age in years, squared	478.4	546.4	0.09	480.3	0.003
Percentage of people who are children	63.68	61.44	0.05	63.5	0.004
Percentage of people who are disabled	14.22	14.48	0.01	14.29	0.002
Number of months enrolled in year of episode start date	11.6	11.4	0.10	11.6	0.009
CDPS risk score, logged[a]	0.3	0.3	0.04	0.3	0.004
County level					
Percentage of people residing in a Metropolitan Statistical Area	85.16	72.79	0.31	84.81	0.010
Percentage of people living in poverty [2016]	17.1	16.9	0.05	15.9	0.27
Hospital beds per 1,000 people [2015]	4	3.6	0.19	3.8	0.09
Median age in years [2010]	36.8	37.5	0.21	37.1	0.09
Percentage of people (under 65) without health insurance [2016]	11.1	9.4	0.63	9.3	0.67
PCPs per 1,000 people [2016]	0.8	0.7	0.27	0.8	0.02

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; EOC = episode of care; ICD = International Classification of Diseases; PCP = primary care provider; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

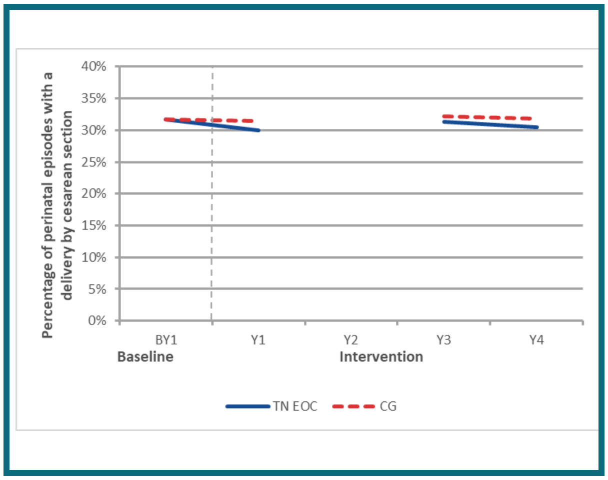
J-2.5 Trends in Perinatal and Asthma Outcomes

Figures J-2-1 through ***J-2-5*** show propensity score-weighted trends for the perinatal and asthma outcomes for the Tennessee EOC and comparison groups. As described in ***Appendix L***, the analysis examined outcomes trends during baseline for the Tennessee EOC and comparison groups to determine the specification of the D-in-D models.

J-2.5.1 Trends in perinatal outcomes

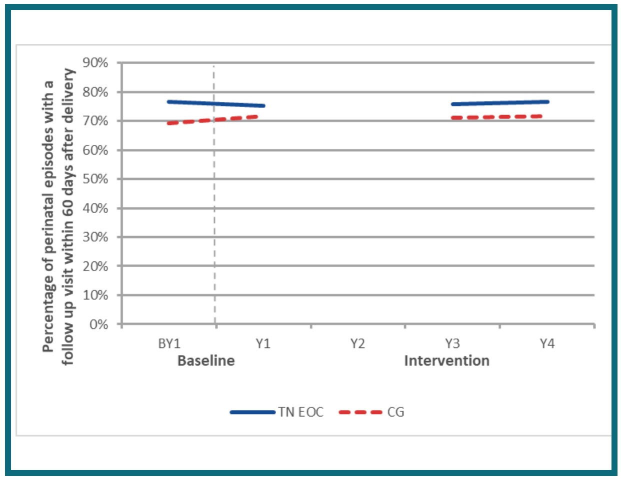
- Data limitations prevented observation of values for 2016 (***Figure J-2-1***). Due to only one year of baseline data, trends for both groups are assumed to be parallel during the baseline period. Cesarean section rates are similar for both the Tennessee EOC and comparison groups over time.
- Data limitations prevented observation of values for 2016 (***Figure J-2-2***). Due to only one year of baseline data, trends for both groups are assumed to be parallel during the baseline period. The Tennessee EOC group began with a higher follow up visit rate that fell slightly in year one before stabilizing, while the comparison group started with a low rate that increased in year one then stabilized.

Figure J-2-1. Trends in the percentage of deliveries with a cesarean section for Medicaid beneficiaries in the Tennessee episode of care and comparison groups



Note: BY = baseline year; CG = comparison group; EOC = episode of care; TN = Tennessee; Y = year.

Figure J-2-2. Trends in the percentage of follow up visits after delivery for Medicaid beneficiaries in the Tennessee episode of care and comparison groups



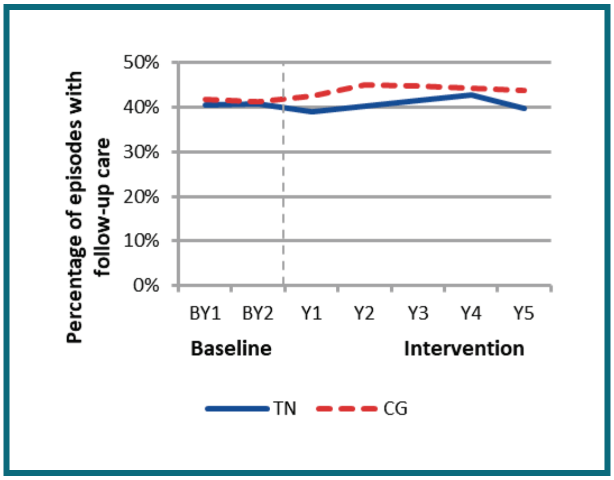
Note: BY = baseline year; CG = comparison group; EOC = episode of care; TN = Tennessee; Y = year.

Source: Federal Evaluation Team analysis of Tennessee, Kansas, Kentucky, and South Carolina claims data from the Medicaid Analytic eXtract (MAX) and Transformed Medicaid Statistical Information System Analytic Files (TAF).

J-2.5.1 Trends in acute asthma exacerbation outcomes

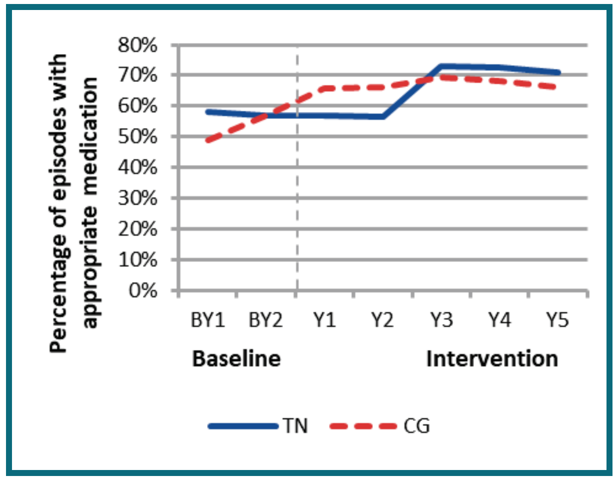
- Trends for the percentage of episodes that included follow-up care within the post-trigger window appeared to be parallel in the Tennessee EOC and comparison groups during the baseline period (***Figure J-2-3***). During the intervention period, the follow-up visit percentage declined in the Tennessee EOC group in the first year then increased through the fourth year before declining slightly in Year 5. The comparison group increased in the first two years then remains steady.
- Trends for the percentage of episodes with appropriate medication dispensed remained steady in Tennessee until two years after intervention at which point it increased sharply before leveling out (***Figure J-2-4***). In contrast, the trends for the comparison group increased until one year after the intervention then it leveled out. The trends for both groups were not parallel during the baseline period, but we modeled this outcome assuming a parallel trend. As noted in ***Section J-2.6***, the D-in-D model that included a differential trend beginning in the baseline period did not appear to be a good fit for the data.
- The percentage of episodes that included a repeat exacerbation increased slightly in the Tennessee EOC group while decreasing slightly in the comparison group in the first year of the intervention period (***Figure J-2-5***). Trends in both groups remained steady for the remainder of the intervention period. The trends appeared to be parallel during the baseline period.

Figure J-2-3. Trends in the percentage of asthma episode of care that included a follow-up visit for Tennessee and the comparison group



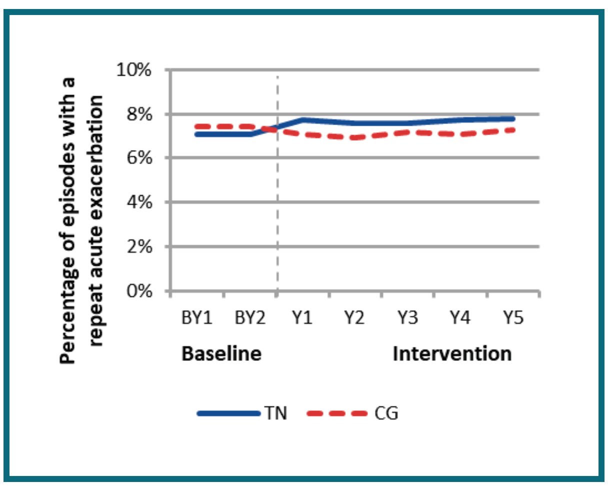
Note: BY = baseline year; CG = comparison group; TN = Tennessee; Y = year.

Figure J-2-4. Trends in the percentage of asthma episode of care that included appropriate asthma medication for Tennessee and the comparison group



Note: BY = baseline year; CG = comparison group; TN = Tennessee; Y = year.

Figure J-2-5. Trends in the percentage of asthma episode of care that included a repeat acute exacerbation for Tennessee and the comparison group



Note: BY = baseline year; CG = comparison group; TN = Tennessee; Y = year.

Source: Federal Evaluation Team analysis of Tennessee, Kansas, Kentucky, and South Carolina claims data from the Medicaid Analytic eXtract (MAX) and Transformed Medicaid Statistical Information System Analytic Files (TAF).

J-2.6 Sensitivity Analysis

Table J-2-8 shows how the impact estimates for Tennessee EOC for selected asthma outcomes differ when the D-in-D models assume (1) parallel trends in outcomes between the Tennessee EOC and comparison groups beginning in baseline period (same as the main analysis reported in ***Table J-2-2***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). As noted below, the findings for the asthma EOC outcomes were not robust to the inclusion of a differential trend. No sensitivity analysis is presented for the perinatal outcomes because the limited baseline data, which were limited to one full year of perinatal episodes, did not allow for analyses assuming differential trends.

- With the inclusion of the linear trend, the change in the percentage of episodes that included a follow-up visit within the post-trigger window did not differ between Tennessee Medicaid beneficiaries and comparison beneficiaries.
- Unlike the main findings, the percentage of episodes with appropriate medications increased more for Tennessee than for the comparison group with the inclusion of the linear trend. However, these findings had no face validity as the adjusted mean values differed widely from the descriptive trends, suggesting that this model was not a good fit to the data.
- With the inclusion of the linear trend, the changes to the percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window did not differ between Tennessee Medicaid beneficiaries and the comparison beneficiaries.

Table J-2-8. Differences in the pre–post change in asthma outcomes for Medicaid beneficiaries in Tennessee episode of care and comparison groups

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Percentage of episodes where the patient receives follow-up care within the post-trigger window		
Year 1	-2.55* (-4.92, -0.18)	-1.59 (-4.88, 1.71)
Year 2	-3.48** (-6.03, -0.93)	-1.84 (-7.68, 4.00)
Year 3	-1.76 (-3.93, 0.41)	0.55 (-8.13, 9.23)
Year 4	-0.26 (-2.78, 2.26)	2.71 (-8.25, 13.66)
Year 5	-2.77 (-5.60, 0.05)	0.84 (-12.33, 14.01)
Overall	-2.14*** (-3.24, -1.03)	0.11 (-3.81, 4.03)

(continued)

Table J-2-8. Differences in the pre–post change in asthma outcomes for Medicaid beneficiaries in Tennessee episode of care and comparison groups (continued)

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Percentage of patients on appropriate asthma medications within the trigger or post-trigger window		
Year 1	-13.51*** (-17.13, -9.88)	-1.58 (-5.58, 2.42)
Year 2	-14.50*** (-19.00, -10.01)	6.17* (0.12, 12.22)
Year 3	-0.98 (-5.71, 3.74)	27.91*** (19.21, 36.61)
Year 4	-0.06 (-4.40, 4.28)	37.70*** (29.02, 46.37)
Year 5	0.28 (-5.10, 5.66)	45.66*** (37.02, 54.29)
Overall	-5.93*** (-7.94, -3.92)	22.34*** (19.04, 25.65)
Percentage of episodes where the patient had a repeat asthma acute exacerbation within the post-trigger window		
Year 1	1.00** (0.28, 1.71)	0.66 (-0.54, 1.87)
Year 2	0.86*** (0.35, 1.37)	0.29 (-1.42, 1.99)
Year 3	0.73** (0.16, 1.29)	-0.11 (-2.61, 2.39)
Year 4	1.03** (0.24, 1.83)	-0.03 (-3.36, 3.30)
Year 5	0.91** (0.26, 1.55)	-0.45 (-4.52, 3.62)
Overall	0.90*** (0.61, 1.20)	0.09 (-1.10, 1.28)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; EOC = episode of care; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used logistic regression models to obtain D-in-D estimates for all outcomes. The estimated probabilities of all outcomes were multiplied by 100 to obtain a percentage. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured). Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs.

(continued)

Table J-2-8. Differences in the pre–post change in asthma outcomes for Medicaid beneficiaries in Tennessee episode of care and comparison groups (continued)

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the TN EOC group relative to the comparison group after EOC model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN EOC group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for the percentage of episodes with follow-up care and appropriate medication models is 215,265. The total weighted N for the percentage of episodes with a repeat acute exacerbation is 215,233. These numbers include all episode-level observations for both the TN EOC and comparison groups.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

Appendix J-3: Tennessee Statewide Results

J-3.1 Overview

The Federal Evaluation Team included statewide impact analyses for Ohio and Tennessee, the two SIM Round 2 states that met the following two criteria:

1. The state rolled out more than one health care payment or delivery model for a payer population. In a state that only launched one payment or delivery model via the SIM Initiative, the model-specific analyses describe the impact of that model. For states with more than one SIM payment or delivery model, the statewide analyses were an opportunity to examine the aggregate effects of more than one initiative.

2. The model-specific analyses for these states showed statistically significant impacts.

Ohio and Tennessee were two candidates that met these criteria. Under the SIM award, Tennessee launched patient-centered medical homes (PCMHs), health homes for Medicaid beneficiaries with acute behavioral health needs (Health Link), a long-term services and supports (LTSS) model, and the episode of care (EOC) initiative. The Tennessee model-specific analyses focused on the Medicaid population and evaluated the impacts of Health Link and perinatal and asthma episodes. Although the Tennessee Health Link analysis produced favorable increases in access to behavioral health services, the impacts on utilization were generally unfavorable for Tennessee Medicaid beneficiaries in the Tennessee Health Link model relative to an in-state comparison group. Findings for the EOC analysis were only favorable for one perinatal outcome and were unfavorable for all other perinatal and asthma outcomes. The model-specific analyses are summarized in ***Appendix J*** and more detailed information about model impacts is available in ***Appendices J-1*** and ***J-2***.

The specific research question for the Tennessee statewide impact analyses was:

- Is there evidence of SIM Initiative impacts on admissions, emergency department (ED) visits, and 30-day readmissions?

Table J-3-1 provides a snapshot of the study methods.

Table J-3-1. Methods snapshot

Method	Description
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	MAX and TAF data for January 2013 through December 2019.[107] Due to data anomalies, 2016 was excluded from the analysis.
Sample	All non-dual Medicaid beneficiaries with full benefits who were enrolled in Medicaid in Tennessee or a comparison state (Kansas, Kentucky, or South Carolina) during the study period were included in the sample. The total weighted Ns for inpatient admissions and ED visits models are 14,651,485 and 1,094,847 for the readmissions model.
Timeframe	The timeframe for the impact analysis was January 1, 2013, through December 31, 2019, excluding January 1 through December 31, 2016. The intervention period began on January 1, 2015, when Tennessee Medicaid first tied performance on perinatal and asthma episode quality measures and spending to financial awards and penalties.
Measures	The measures for the statewide impact analyses included the utilization core measures for the federal evaluation of Round 2 of the SIM Initiative, admissions, outpatient ED visits, and readmissions.
Statistical analysis	Inpatient admissions and readmissions were binary and modeled with logistic regression models. The ED visits outcome was a count variable and modeled with a negative binomial model. All observations in the comparison group were multiplied by a propensity score weight and the eligibility fraction. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables, and comparison state indicator variables.

Note: D-in-D = difference-in-differences; ED = emergency department; MAX = Medicaid Analytic eXtract; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files.

A full description of each model and a summary of the key impact analysis findings are available in ***Appendix J***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. The following sections of ***Appendix J-3*** provide detailed information regarding statewide impact findings in tables and figures:

- ***Section J-3.2*** presents results of difference-in-differences (D-in-D) analyses for the utilization outcomes;
- ***Section J-3.3*** provides information on covariate balance between Medicaid beneficiaries in Tennessee and out-of-state comparison beneficiaries before and after propensity score weighting;
- ***Section J-3.4*** describes trends in utilization outcomes over the analysis timeframe; and

[107] During the analysis timeframe, the Centers for Medicare and Medicaid Services transitioned from producing Medicaid data in the MAX format to the TAF format. The exact date of the transition from MAX to TAF varies by state. For more information about this transition, see ***Appendix L***.

- ***Section J-3.5*** presents results from a sensitivity analysis that shows how D-in-D estimates for utilization outcomes when assumptions about Tennessee and comparison group trends change.

J-3.2 Estimates of Statewide Impact on Utilization Outcomes

Table J-3-2 show annual and overall estimates of the Tennessee's statewide impact on utilization outcomes for Tennessee Medicaid beneficiaries. These impact estimates come from D-in-D models, which are described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for Medicaid beneficiaries in Tennessee and out-of-state comparison beneficiaries during the baseline period and the intervention period;
- D-in-D estimates of the statewide impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

J-3.2.1 Estimates of the statewide impact on utilization outcomes

Table J-3-2 shows the statewide estimates of the impact on outcomes for Tennessee Medicaid beneficiaries relative to out-of-state beneficiaries. The findings are as follows:

- Inpatient admissions decreased for both Medicaid beneficiaries in Tennessee and comparison beneficiaries but decreased by 5.37 fewer admissions per 1,000 beneficiaries in Tennessee during the first four years following SIM payment model implementation ($p<0.001$).
- ED visits decreased for both Medicaid beneficiaries in Tennessee and comparison beneficiaries but decreased by 144.19 fewer visits per 1,000 beneficiaries in Tennessee during the first four years following SIM payment model implementation ($p<0.001$).
- 30-day readmissions increased among Tennessee Medicaid beneficiaries and decreased among comparison beneficiaries, leading to a relative increase of 38.20 readmissions per 1,000 discharges for Tennessee during the first four years following SIM payment model implementation ($p<0.001$).

Table J-3-2. Differences in the pre–post change in outcomes for Tennessee Medicaid beneficiaries and comparison state beneficiaries

Outcome	Baseline period adjusted mean, TN	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient admissions per 1,000 beneficiaries							
Year 1	70.74	85.12	68.15	85.32	-2.72 (-5.29, -0.15)	-3.8	0.08
Year 2	70.74	85.12	70.06	74.70	8.56 (5.14, 11.98)	12.1	<0.001
Year 3	70.74	85.12	67.99	74.43	6.98 (4.09, 9.87)	9.9	<0.001
Year 4	70.74	85.12	67.78	71.19	8.60 (6.02, 11.18)	12.2	<0.001
Overall	70.74	85.12	68.50	76.39	5.37 (3.93, 6.81)	7.6	<0.001
ED visits per 1,000 beneficiaries							
Year 1	877.92	1042.12	909.09	938.05	124.50 (100.04, 148.95)	14.2	<0.001
Year 2	877.92	1042.12	851.58	856.41	138.87 (93.92, 183.81)	15.8	<0.001
Year 3	877.92	1042.12	797.66	793.16	141.78 (91.20, 192.37)	16.1	<0.001
Year 4	877.92	1042.12	806.57	761.38	170.98 (117.06, 224.89)	19.5	<0.001
Overall	877.92	1042.12	841.24	837.14	144.19 (121.68, 166.70)	16.4	<0.001

(continued)

Table J-3-2. Differences in the pre–post change in outcomes for Tennessee Medicaid beneficiaries and comparison state beneficiaries (continued)

Outcome	Baseline period adjusted mean, TN	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, TN	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
30-day readmissions per 1,000 discharges							
Year 1	150.20	161.50	159.69	145.83	24.72 (10.75, 38.70)	16.5	0.004
Year 2	150.20	161.50	169.20	136.48	42.72 (27.19, 58.25)	28.4	<0.001
Year 3	150.20	161.50	166.28	140.98	36.10 (19.25, 52.95)	24.0	<0.001
Year 4	150.20	161.50	180.39	140.90	49.14 (32.15, 66.13)	32.7	<0.001
Overall	150.20	161.50	168.72	141.19	38.20 (30.21, 46.18)	25.4	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for inpatient admissions and 30-day readmissions and a negative binomial model for ED visits. The estimated probabilities of all outcomes were multiplied by 1,000 to obtain a rate per 1,000. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, and percentage uninsured). All outcome models assume that TN and comparison group outcome trends are parallel during the baseline period. Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the TN group relative to the comparison group after SIM model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the TN group relative to the comparison group after SIM model implementation. The relative difference is the D-in-D estimate as a percentage of the baseline period adjusted mean for the TN group.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

(continued)

Table J-3-2. Differences in the pre–post change in outcomes for Tennessee Medicaid beneficiaries and comparison state beneficiaries (continued)

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for inpatient admissions and ED visit models is 14,651,485 and 1,094,847 for the readmissions model. These numbers include all observations for both TN and the comparison group.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

J-3.3 Covariate Balance Between Tennessee and the Comparison Group

As described in ***Appendix L****,* the analysis created annual propensity scores for the comparison sample at the person-year level and the inpatient discharge level.

Table J-3-3 shows covariate balance between Tennessee Medicaid beneficiaries and the comparison group. (Covariate balance in the person-year level sample in other years and for the discharge-level sample is not shown.) The covariate balance table includes the following:

- The covariate means for Tennessee and the comparison group without propensity score weighting;
- The standardized difference between Tennessee and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between Tennessee means and the propensity-score weighted comparison group means ("weighted standardized differences").

Propensity scores were estimated using logistic regressions in which the dependent variable was an indicator of residing in Tennessee.

All covariates in ***Table J-3-3*** were included in the propensity score models, with the exception of the percentage without health insurance, which was excluded to optimize balance of the other covariates. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table J-3-3 shows balance between Tennessee and comparison group covariates before and after applying weights for Medicaid beneficiaries. The findings for the last baseline year are displayed; all years showed similar results. ***Table J-3-3*** shows that, for the Tennessee statewide analysis, the standardized differences before weighting reflected poor balance between the groups for the percentage of people who are disabled, the percentage of people residing in a Metropolitan Statistical Area, the percentage of people without health insurance, and the number of primary care physicians per 1,000 people in a person's county of residence. After weighting, all standardized differences were well below the 0.1 threshold considered to indicate acceptable balance for these analyses with the exception of the percentage of people without health insurance.

Table J-3-3. Covariate balance between Tennessee and the comparison group

Variable	Unweighted mean or percentage, TN	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Age in years	57.46	54.55	0.06	57.31	0.003
Age in years squared	18.2	19.1	0.06	18.1	0.004
Child	569.2	624.6	0.06	571.9	0.003
Percentage of people who are disabled	59.29	58.58	0.01	59.61	0.01
Number of months enrolled in year	11.42	9.36	0.07	12.28	0.027
CDPS risk score, logged[a]	11.1	9.6	0.54	10.9	0.09
County level					
Percentage of people residing in a Metropolitan Statistical Area	75.37	64.7	0.23	74.87	0.012
Percentage of people living in poverty [2016]	17.7	18.2	0.10	17.5	0.03
Hospital beds per 1,000 people [2015]	3.5	3.4	0.03	3.5	0.01
Median age in years [2010]	38	37.8	0.05	37.9	0.02
Percentage of people (under 65) without health insurance [2016]	12.4	10.1	0.86	10.1	0.89
Primary care providers per 1,000 people [2016]	0.7	0.6	0.14	0.7	0.03

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

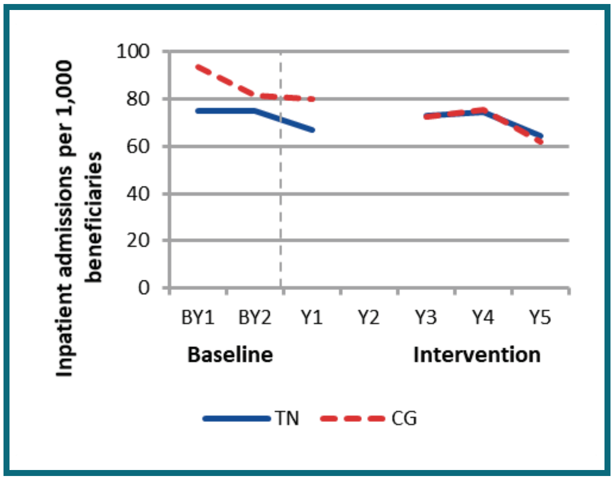
Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

J-3.4 Trends in Statewide Tennessee Outcomes

Figures J-3-1 through ***J-3-3*** show propensity score-weighted trends for utilization outcomes for Tennessee and the comparison group. Although there were some year-to-year fluctuations, trends for inpatient admissions and ED visits decline for both Tennessee and the comparison group over the study period. In contrast, the readmission rate increases in Tennessee while remaining flat in the comparison group during the study period. As described in ***Appendix L***, visual inspection of baseline trends in treatment and comparison groups was used to determine D-in-D model specification. However, because the baseline period for this analysis only has two data points, there is not enough information to determine whether the baseline trends for Tennessee and the comparison group are parallel. As a result, all D-in-D models for this analysis are specified to assume that the trends for the Tennessee and comparison group are parallel during the baseline period.

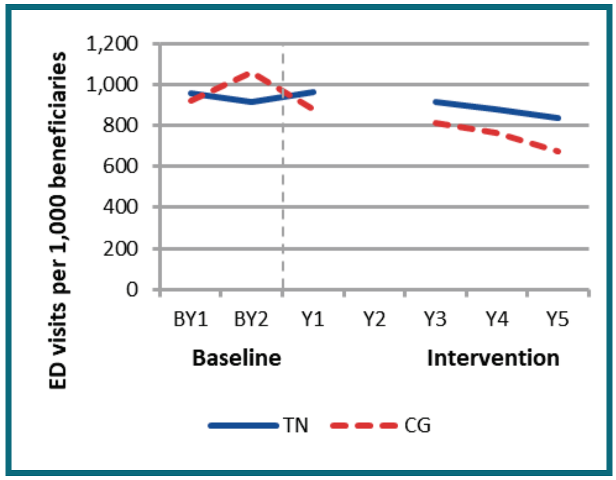
- Inpatient admissions per 1,000 beneficiaries declined from the baseline period to the intervention period for both Tennessee and the comparison group, although there is a slight increase from Year 1 to Year 3 of the intervention period for Tennessee (***Figure J-3-1***). The trend for Tennessee appears to be flat, while the trend for the comparison group declines during the baseline period.
- ED visits per 1,000 beneficiaries declined for both Tennessee and the comparison group from the baseline period to the intervention period (***Figure J-3-2***). The trend for Tennessee had a slight decline while the trend for the comparison group has a sharp increase during the baseline period.
- The 30-day readmission rate increased for Tennessee from the baseline period to the intervention period (***Figure J-3-3***). Thirty-day readmissions fluctuate slightly over the study period for the comparison group but remained relatively flat over time with a slight decline in the last year of the intervention period.

Figure J-3-1. Trends in inpatient admissions per 1,000 beneficiaries for Tennessee and the comparison group



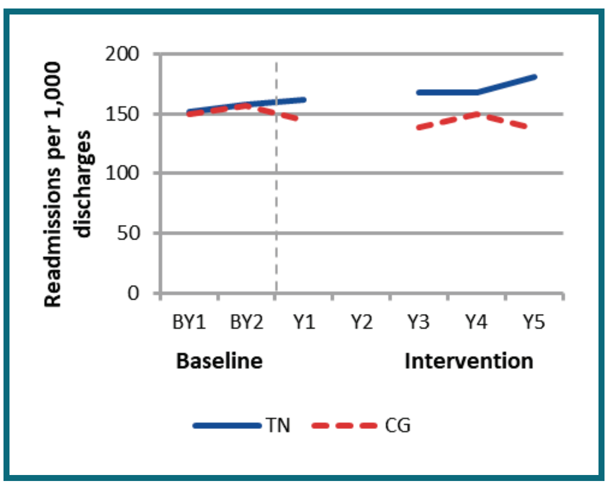
Note: BY = baseline year; CG = comparison group; TN = Tennessee; Y = year.

Figure J-3-2. Trends in the emergency department visits per 1,000 beneficiaries for Tennessee and the comparison group



Note: BY = baseline year; CG = comparison group; ED = emergency department; TN = Tennessee; Y = year.

Figure J-3-3. Trends in the rate of 30-day readmissions per 1,000 discharges for Tennessee and the comparison group



Note: BY = baseline year; CG = comparison group; TN = Tennessee; Y = year.

Source: Federal Evaluation Team analysis of Tennessee, Kansas, Kentucky, and South Carolina claims data from the Medicaid Analytic eXtract (MAX) and the Transformed Medicaid Statistical Information System Analytic Files (TAF).

J-3.5 Sensitivity Analysis

Table J-3-4 shows how the impact estimates for Tennessee for utilization outcomes differed when the D-in-D models assumed (1) parallel trends in outcomes between Tennessee and the comparison group beginning in baseline period (same as the main analysis reported in ***Table J-3-2***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). As noted below, the findings for inpatient admissions and 30-day readmissions were not robust to the inclusion of a differential trend. On the other hand, the sign and statistical significance of the overall D-in-D estimate for ED visits did not change with the inclusion of the differential trend.

- The overall inpatient admissions D-in-D estimate was positive and statistically significant in the main analysis, while the sensitivity analysis showed a statistically significant negative D-in-D estimate. However, the adjusted means produced by the sensitivity analysis had limited face validity, suggesting that a D-in-D model that includes a linear trend—as in the sensitivity analysis—did not appear to be a good fit to the data.
- The overall ED visits D-in-D estimates were in the same direction and significance across the two approaches. However, the sensitivity analysis, assuming non-parallel trends, found a larger estimate (in absolute value).
- The overall readmissions D-in-D estimate was statistically significant in the main analysis but not in the sensitivity analysis.

Table J-3-4. Differences in the pre–post change in utilization outcomes for Medicaid beneficiaries in Tennessee and the comparison group

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Inpatient admissions per 1,000 beneficiaries		
Year 1	-2.72* (-5.29, -0.15)	-25.27*** (-29.73, -20.82)
Year 2	8.56*** (5.14, 11.98)	-30.09*** (-38.22, -21.95)
Year 3	6.98*** (4.09, 9.87)	-53.59*** (-68.10, -39.07)
Year 4	8.60*** (6.02, 11.18)	-64.46*** (-84.15, -44.77)
Overall	5.37*** (3.93, 6.81)	-43.41*** (-49.99, -36.83)

(continued)

Table J-3-4. Differences in the pre–post change in utilization outcomes for Medicaid beneficiaries in Tennessee and the comparison group (continued)

Outcome	Main analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
ED visits per 1,000 beneficiaries		
Year 1	124.50*** (100.04, 148.95)	288.24*** (254.03, 322.45)
Year 2	138.87*** (93.92, 183.81)	376.47*** (329.04, 423.90)
Year 3	141.78*** (91.20, 192.37)	437.37*** (383.26, 491.47)
Year 4	170.98*** (117.06, 224.89)	494.03*** (439.66, 548.39)
Overall	144.19*** (121.68, 166.70)	399.37*** (375.24, 423.49)
30-day readmissions per 1,000 discharges		
Year 1	24.72*** (10.75, 38.70)	4.99 (-5.01, 15.00)
Year 2	42.72*** (27.19, 58.25)	10.78 (-2.66, 24.21)
Year 3	36.10*** (19.25, 52.95)	-11.88 (-31.90, 8.13)
Year 4	49.14*** (32.15, 66.13)	-12.85 (-39.64, 13.94)
Overall	38.20*** (30.21, 46.18)	-2.00 (-11.19, 7.19)

* p<0.10; ** p<0.05; *** p<0.01.

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; SC = South Carolina; SIM = State Innovation Model; TAF = Transformed Medicaid Statistical Information System Analytic Files; TN = Tennessee.

Methods: The analysis used a logistic regression model to obtain D-in-D estimates for inpatient admissions and 30-day readmissions and a negative binomial model for ED visits. The estimated probabilities of all outcomes were multiplied by 1,000 to obtain a rate per 1,000. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, and the logged CDPS score), and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, and percentage uninsured). Models also included comparison state dummy variables to account for time-invariant differences in state Medicaid programs.

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponds to a greater decrease or a smaller increase in an outcome in the TN group relative to the comparison group after SIM model implementation. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the TN group relative to the comparison group after SIM model implementation.

The total weighted N for inpatient admissions and ED visit models is 14,651,485 and 1,094,847 for the readmissions model. These numbers include all observations for both TN and the comparison group.

Source: Federal Evaluation Team analysis of TN, KS, KY, and SC claims data from the MAX and the TAF.

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Appendix K: State Innovation Model in Model Test States: Washington

Payment Model Development	• The Medicaid agency implemented Integrated Managed Care (IMC) for physical and behavioral health services in multi-county regions. • The state's Health Care Authority (HCA) leveraged its purchasing power to advance value-based payment (VBP) models through its Medicaid managed care organization and state employee health plan contracts.
Delivery Model Transformation	• Nine Accountable Communities of Health (ACHs) facilitated regional forums for collaboration among payers, providers, and other stakeholders to advance transformation goals. • A SIM funded practice transformation hub assisted providers implementing delivery system changes.
Health IT and Data Analytics	• HCA's Analytics, Research, and Measurement Team supported payment model development and produced data dashboards that state agencies and ACHs used in health planning. • The HCA established a common measure set from which the agency drew measures that were included in all Medicaid and state employee coverage contracts.
Population Health	• ACHs increased the state's capacity to address population health by working with local partners.
Sustainability	• The HCA assumed ongoing responsibility for maintaining three payment models. • The Medicaid Transformation Project (Washington's Medicaid Section 1115 Delivery System Reform Incentive Payment waiver) will support ACHs until 2023.
Implications	• The state successfully advanced its SIM initiatives through purchasing power, contracting, and state legislation. • Regional infrastructures, like ACHs, offer flexibility and drive local transformation, but challenge statewide coordination. • Claims-based analyses suggest that individuals served by IMC and Accountable Care Networks had favorable outcomes.

K.1 Key State Context and the Washington State Innovation Model Initiative

K.1.1 Pre-State Innovation Model health care in Washington

Prior to launching its SIM Initiative in February 2015, Washington had laid the groundwork for administering the state's planned transformations—with the majority of state government health care purchasing already under the control of a single state agency. Since 1993, the Washington Health Care Authority (HCA) had administered both the Medicaid program and the Public Employees Benefits Board (PEBB), the health benefits program for public employees and their families. As a result, the HCA was the largest health care purchaser in the state, spending $12 billion to purchase coverage for over two million Medicaid beneficiaries and PEBB members in 2017 (Washington State Health Care Authority, 2018, January). The HCA also had extensive experience purchasing Medicaid benefits from managed care organizations (MCOs). Washington first implemented its Medicaid managed care program in 1986, and by 2015 almost all beneficiaries were required to enroll in an MCO.[108]

In 2013, Washington, with the support of its SIM Round 1 Model Pre-Test award, engaged in an extensive, stakeholder-driven, planning process to produce the Washington State Health Care Innovation Plan. This plan, issued in January 2014, described many of the innovations Washington ultimately implemented under the SIM Initiative. The plan included the HCA's intent to lead statewide transformation by example, through the "State as first mover" approach (State of Washington Office of the Governor, 2014). House Bill 2572, signed by the Governor in April 2014, furthered the groundwork for SIM Initiative implementation by calling for the HCA to: (1) pilot Accountable Communities of Health (ACHs) to support implementation of new regionally based programs, (2) create a common measure set to provide health care purchasers with consistent metrics for measuring performance, and (3) move toward whole person care for Medicaid beneficiaries by joining the delivery of physical health and behavioral health through an Integrated Managed Care (IMC) model administered via regionally-based MCOs. The law also created an all-payer claims database (APCD) into which all payers except self-insured health purchasers were required to supply data.

The dominant payer type in a state can influence opportunities to leverage Medicaid or multi-payer activities in payment model design and implementation. The commercial health insurer market in Washington was relatively competitive. Together, commercial health insurers make up the largest share of the market, followed by Medicaid and then Medicare, in both 2014 and 2018 (see ***Exhibits 8-5*** and ***8-6***).

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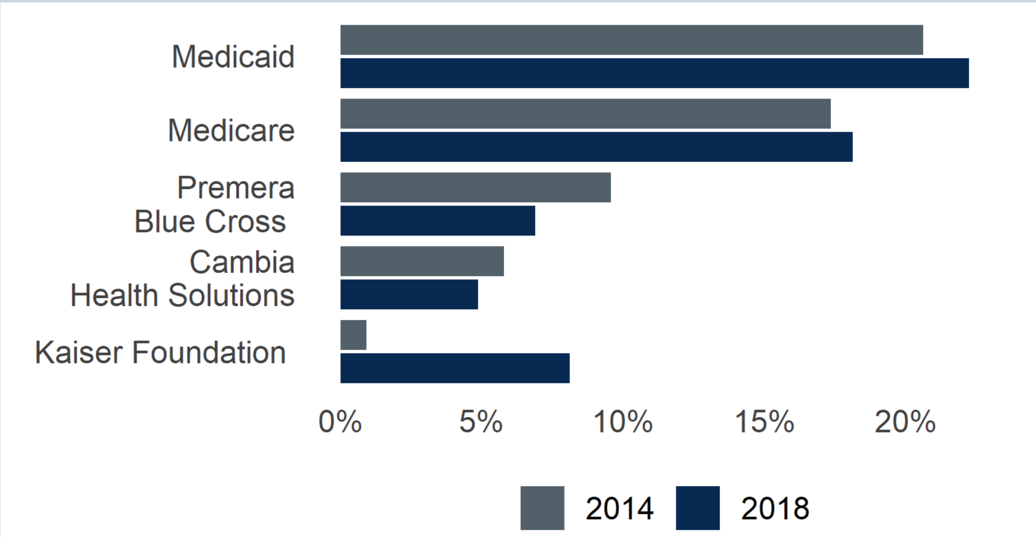
[108] Some populations of Medicaid enrollees are not required to join MCOs to receive benefits; those dually eligible for Medicare and Medicaid, children in foster care and American Indians and Alaskan Natives.

Both public payers increased the percentage of insured lives they covered over the same time period (see ***Exhibit K-1***). The commercial insurer with the largest share of covered lives changed between 2014 and 2018 (from Premera Blue Cross Group to Kaiser Foundation Group).

Most Washington practices were small and located in urban areas. In 2015, 11 percent of primary care practices were in rural areas and 59 percent of practice locations had a single provider. Twelve percent of primary care practices had an existing involvement in a Medicare fee-for-service (FFS) alternative payment model (e.g., the Medicare Shared Savings Program).[109]

Exhibit K-1. Medicare and Medicaid increased share of insured lives relative to all commercial payers, 2014–2018 (top five payers in Washington shown)



Notes: Cambia Health Solutions Inc. owns Regence.

HIC ACS = Health Insurance Coverage from the American Community Survey; NAIC = National Association of Insurance Commissioners.

Sources: Federal Evaluation Team analysis of NAIC Supplemental Health Care Exhibit Report 2014/2018; HIC ACS Historical Tables, All Persons: 2008 to 2019, civilian noninstitutionalized population.

K.1.2 State Innovation Model Initiative in Washington

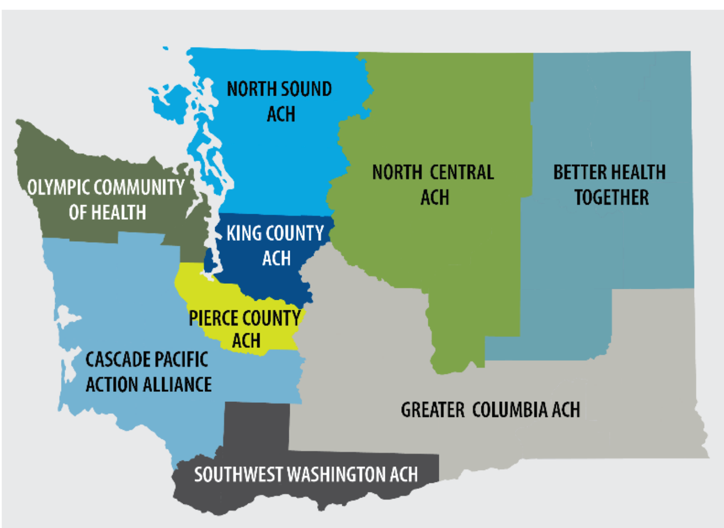
Washington used legislation and the state's own purchasing power to achieve the goals of its SIM Initiative—moving health care purchasing to value-based payment (VBP), improving population health, and delivering whole person coordinated care. With the HCA as the lead state agency, Washington planned to test five payment and delivery system reforms. Three continued

[109] Estimated characteristics of practices statewide, according to internal analysis conducted for this evaluation (see ***Appendix L***).

operation past January 1, 2019, the end of the state's SIM Initiative: (1) Medicaid IMC through regional MCOs; (2) the transition of Medicaid payments to Federally Qualified Health Centers (FQHCs) to reward value rather than volume of services (i.e., per member per month [PMPM]); and (3) an Accountable Care Program (ACP) health benefit option for public employees. A fourth payment model, to better support financially fragile critical access hospitals (CAHs), was still in development. Finally, a delivery system initiative to give provider networks claims data from multiple payers to help them succeed under VBP arrangements was tested but ultimately discontinued.

Washington also used SIM funding to develop and implement the supports payers, providers, and other stakeholders needed to carry out the state's ambitious slate of reforms. Prominently, the HCA created a statewide system of nine ACH regions to support local implementation of the statewide delivery and payment reforms (see ***Exhibit K-2***). Medicaid and ACH regions were aligned to facilitate the working relationship among MCOs, ACHs, and local stakeholders. In each region, a SIM-funded ACH organization was "tasked with building the foundational infrastructure for regional, multi-sector collaboration; developing regional health improvement plans; jointly implementing or advancing local health projects; and advising state agencies on how to best address health needs within their geographic areas" (Center for Community Health and Evaluation, 2019). ACHs focused primarily on supporting payment reform implementation—rather than their original goal of improving population health—in alignment with the state's priority, Medicaid IMC.

Exhibit K-2. Accountable Communities of Health regions served multiple purposes



9 ACH Regions

- Supporting implementation of Medicaid IMC
- Building infrastructure for collaboration
- Developing health improvement plans
- Implementing or advancing local health projects
- Advising state agencies on how to best address local health needs

Notes: ACH = Accountable Communities of Health; CMS = Centers for Medicare & Medicaid Services; HCA = Health Care Authority; IMC = Integrated Managed Care.

Source: Adapted from Accountable Communities of Health Fact Sheet, prepared by HCA for CMS.

Other supports included in Washington's SIM Initiative were data dashboards (used most notably by ACHs), a common measure set, a practice transformation hub that featured both web-based and in-practice assistance for providers, and workforce planning. The Health Innovation Leadership Network (HILN) helped accelerate health system transformation across the state, by advising the HCA during innovation implementation and serving as ambassadors for the transformation innovations. The HILN was composed of payers, providers, community-based organizations, tribal entities, and consumers, among other stakeholders.

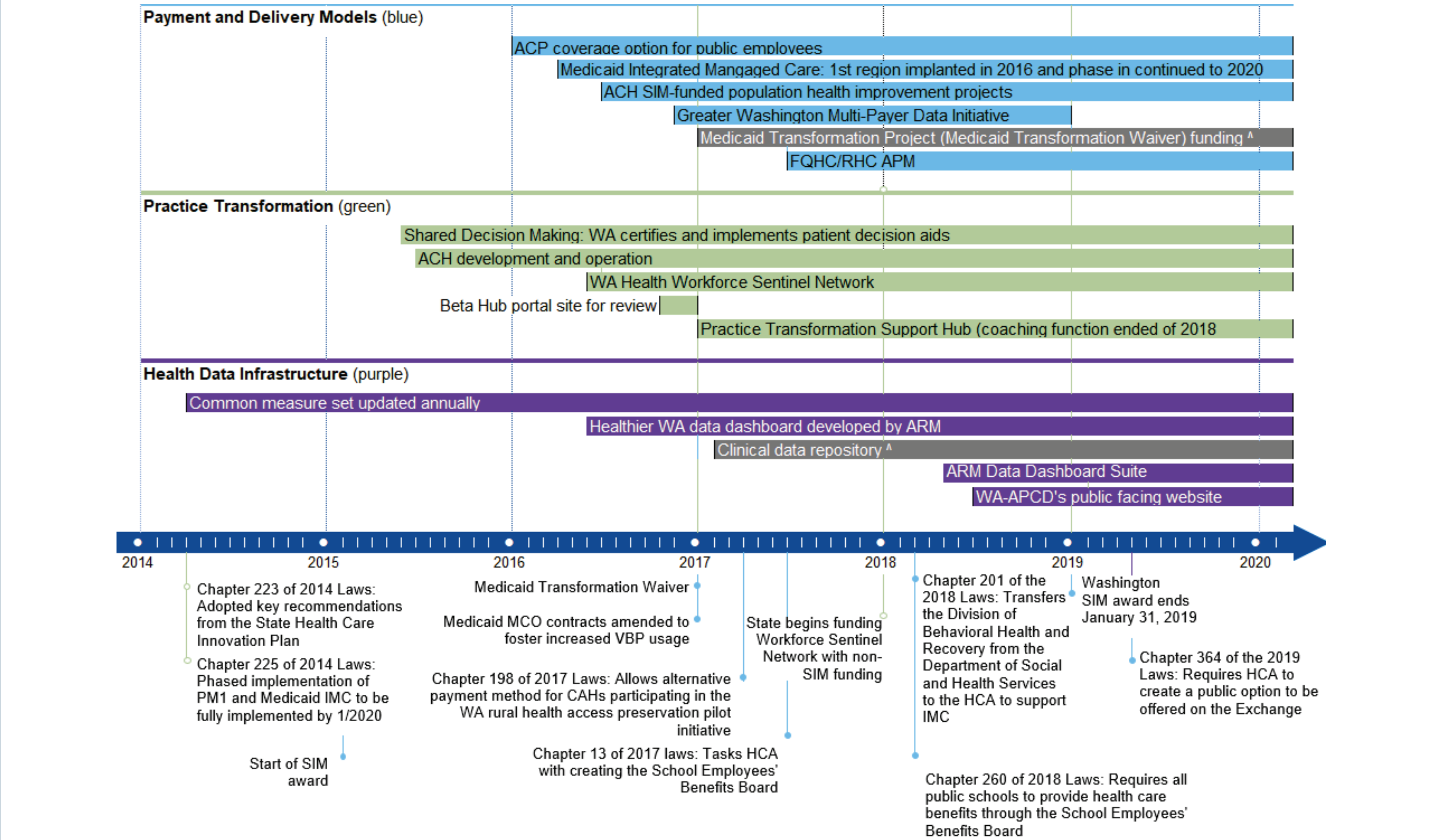
Washington braided together federal funding to support the similar goals of its SIM Initiative and the Medicaid Section 1115 Delivery System Reform Incentive Payment waiver, referred to as the Medicaid Transformation Project. Awarded in 2017 for a 5-year period, the Medicaid Transformation Project provided Washington with $1.5 billion to support Medicaid delivery system reforms. The SIM Initiative shared two of the Medicaid Transformation Project's goals (IMC and the spread of VBP).[110]

The first two years of the Medicaid Transformation Project (January 2017–December 2018) ran almost simultaneously with the final two years of the SIM Initiative (February 2017–January 2019)—making it difficult to distinguish the effect of the SIM Initiative from the effect of the Transformation Project. For example, while the ACHs were developed with SIM Initiative resources, most of their work for the last two years of the SIM Initiative was funded by the Medicaid Transformation Project. Similarly, Washington used funding from the Medicaid Transformation Project to conduct a survey to measure the uptake of VBP among Medicaid MCOs and commercially licensed health plans (and used the results to develop its *Value-based roadmap 2017–2021* (Washington State Health Care Authority, 2018, January), which presented the state's VBP goals, transformation strategy, successes, and future plans). The state also used the results of the survey in reports to CMMI on progress toward spreading VBP under the SIM Initiative.

Washington's SIM award started in February 2015 and ended in January 2019. ***Exhibit K-3*** depicts the timeline of major Washington SIM Initiative and SIM-related activities.

[110] Washington's Medicaid Transformation Demonstration provides $1.5 billion in federal funding for five years to test innovative models of service delivery. Washington implemented three initiatives under the Demonstration: Medicaid system transformation through ACHs, new long-term services and supports, and foundational community support services. *Demonstration.* Report unavailable online.

Exhibit K-3. Timeline of Washington's SIM and SIM-related activities



Notes: Gray bars (with ^) denote that the items are not SIM Initiative activities or policies but are important for context.
ACH = Accountable Community of Health; ACP = Accountable Care Program; APCD = all-payer claims database; APM = alternative payment model; ARM = Analytics, Research, and Measurement; CAH = critical access hospital; FQHC = Federally Qualified Health Center; HCA = Health Care Authority; IMC = Integrated Managed Care; MCO = managed care organization; PM1 = Payment Model 1 (Medicaid integration of physical and behavioral health services through regionally-based managed care plans); RHC = rural health clinic; SIM = State Innovation Model; WA = Washington.
Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

K.2 Accomplishments From Washington's State Innovation Model Initiative

This section summarizes Washington's SIM award activities, accomplishments, and stakeholder feedback into three subsections: delivery models and payment reform (***Section K.2.1***), enabling strategies to support health care delivery transformation (***Section K.2.2***), and population health (***Section K.2.3***). The chapter concludes by summarizing Washington's efforts to sustain SIM activities and progress on reforms after the SIM award period (***Section K.3***) and a discussion of implications and lessons learned from Washington's experience (***Section K.4***).

The federal evaluation of Washington's SIM Initiative is based on the following data sources:

- Monthly conference calls with SIM officials;
- A total of 75 interviews with state officials, primary care and behavioral health providers, Medicaid MCOs, integrated health systems, primary care provider networks, commercial plans, and other stakeholders over four annual interview rounds conducted since 2016, most recently in spring 2019;
- Focus groups with Medicaid MCO medical and behavioral health providers, PEBB providers, Medicaid patients, and behavioral health clinic directors.
- Data derived from Medicaid beneficiary and PEBB member claims for calendar years 2014–2018.

Two of Washington's SIM-supported models were selected for quantitative impact analysis. The first was the IMC. The goal of this model was to use managed care to increase integration of behavioral and physical health care for Medicaid beneficiaries in the state of Washington. The IMC model was selected for the impact analysis because Washington stakeholders considered its implementation to be a major achievement, statewide spread of the model was legislatively mandated, and the model began operating in two regions of the state early enough to allow for collection of post-implementation data. The state provided individual-level data files derived from Medicaid claims. These data provided information on health care spending and utilization for patients with behavioral health conditions who were enrolled in one of the new fully integrated Medicaid MCOs implemented as part of the BHI model. Model rollout occurred regionally, which made possible an analytic comparison group composed of Medicaid beneficiaries with behavioral health conditions living in regions of the state where a fully integrated managed care plan was not available during the study period.

The second SIM-supported model selected for quantitative impact analysis was an accountable care organization (ACO) model implemented for public employees. The two ACOs were referred to as Accountable Care Networks (ACNs), and the coverage option was referred to as Uniform Medical Plan (UMP)-Plus, to differentiate it from UMP-Classic, which did not feature an ACN. The ACN model was selected for quantitative analysis for two reasons: (1) it offered a unique opportunity to observe whether an ACO would benefit public employees, and (2) the model began operating early enough to allow for collection of post-implementation data. The state furnished individual-level data derived from health care claims, which provided information on health care spending and utilization for public employees who either formally signed up for an ACN (referred to as the "designated" group) or who did not sign up but did receive care from an ACN-affiliated primary care provider (the "attributed" group). As with the IMC model, the UMP-Plus option was initially only implemented for a subset of Washington's public employees who lived in a five-county region surrounding Seattle. This enabled an analytic comparison group of public employees who did not have the option to sign up for a UMP-Plus plan because they lived outside the five-county region—and in later years, also outside the four expansion counties. Also excluded from the comparison group were public employees who were attributed to ACN-affiliated primary care providers.

K.2.1 Delivery models and payment reforms

Key Results
• Implementing regional IMC for Medicaid beneficiaries was a major achievement of the SIM Initiative, according to stakeholders; Medicaid beneficiaries enrolled in MCOs in IMC regions, relative to similar Medicaid beneficiaries in comparison regions, had a larger increase in outpatient behavioral health care and a larger reduction in emergency department (ED) visits. • Half of the state's FQHCs implemented a new Medicaid VBP model and improved their Medicaid patients' access to services, according to state officials. • An ACN health benefit option for public employees was praised by state administrators; public employees in an ACN sought fewer ED visits than a non-ACN comparison group.

To achieve its goal to move health care purchasing from volume to value, Washington sought to spread VBP use in both the public and private sectors. By the end of the SIM Initiative, Washington had met its VBP goal for the commercial sector and was on track to meet its VBP goal in the public sector.

As described in ***Section K.1.2*** [SIM Initiative in Washington] and presented in ***Table K-1***, Washington tested five payment and delivery system reforms. The HCA modified features of these reforms, as needed, during implementation. At the end of the SIM Initiative, the HCA had implemented and planned to sustain three of the reforms (Medicaid IMC, FQHC PMPM payments, and the ACNs) and was continuing to develop payment reform for CAHs and other rural providers. The HCA had, however, ceased its effort to transmit claims data to provider networks to support VBP participation.

Table K-1. Washington's delivery system and payment reforms

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Medicaid integration of physical and BH services through managed care plans	Medicaid MCO enrollees	• The HCA developed a model contract for IMC that was used across MCOs that included VBP requirements.	• Senate Bill 6312, passed in 2014, mandated all remaining ACH regions to implement IMC by January 2020. • Through 2021, the Medicaid Transformation Project would fund foundational work, including ACHs. • Medicaid MCO contracts were anticipated to continue to include IMC.
Medicaid PMPM payment option for FQHCs and RHCs	FQHCs and RHCs	• 16 FQHCs, serving almost 300,000 MCO enrollees, began piloting PMPM Medicaid payments in 2017. No RHCs chose to participate. • Participating FQHCs were meeting their quality goals and changing the way they delivered care. • HCA and participating FQHCs reported that the model needed to be modified for long-term sustainability.	• HCA continued the pilot into 2020 and the MOU through which the model was implemented extends through December 2022.
Washington Rural Multi-Payer Demonstration	Rural providers, particularly CAHs	• In 2018, the HCA changed the focus from only CAHs to all rural hospitals and their affiliated providers, via a global budget model.	• The HCA continued to seek Medicare participation in the model as of August 2020.[a] • Legislation authorized two years of bridge funding for financially at-risk CAHs (fiscal years 2018 and 2019).
ACN option for PEBB members (public employees and their dependents)	PEBB members enrolled in, or attributed to, two ACNs serving the nine counties in and around the Seattle area	• The state contracted with two ACNs to offer an ACO-type health plan option (at risk for controlling total cost of care and improving quality). • Both ACNs achieved the maximum quality score to earn the full amount of shared savings in the first two years of their contracts.	• Enrollment increased over time to 38,852 PEBB members in 2020.[b] • The ACNs were offered as options for SEBB members and 3,887 members chose an ACN for 2021.[a]

(continued)

Table K-1. Washington's delivery system and payment reforms (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Greater Washington Multi-Payer Initiative	Providers that belonged to participating provider networks	• In 2016, the HCA contracted with two provider networks to implement the model. • Neither network, despite significant effort by all parties, was able to use the HCA data by the end of the SIM Initiative.	• This initiative was not sustained. • Changes were made to MCO contracts to facilitate future data sharing.
Increasing VBP in public and private purchasing	Payers, including Medicaid MCOs and commercial health plans	• The HCA conducted three annual surveys reporting use of VBP by MCOs, health plans, and providers, and obtained strong participation. • The state met its final goal for VBP use among commercial plans (50 percent of spending) by 2017, as well as its interim Medicaid goals in 2016 and 2017. • The HCA modified MCO contracts to require their participation in the VBP survey and incentivized their use of VBP.	• HCA continued to conduct the VBP survey, and most recently released the results of the 2020 survey of 2019 experience. • The HCA continued its efforts to increase the use of VBP with Medicaid Transformation Project support.

Note: ACH = Accountable Community of Health; ACN = Accountable Care Network; ACP = Accountable Care Program; BH = behavioral health; CAH = critical access hospital; CMS = Centers for Medicare & Medicaid Services; FQHC = Federally Qualified Health Center; HCA = Health Care Authority; IMC = Integrated Managed Care; MCO = managed care organization; MOU = memorandum of understanding; PEBB = Public Employees Benefits Board; PMPM = per member per month; RFP = Request for Proposal; RHC = rural health clinic; SEBB = School Employees Benefits Board; SIM = State Innovation Model; VBP = value-based payment.

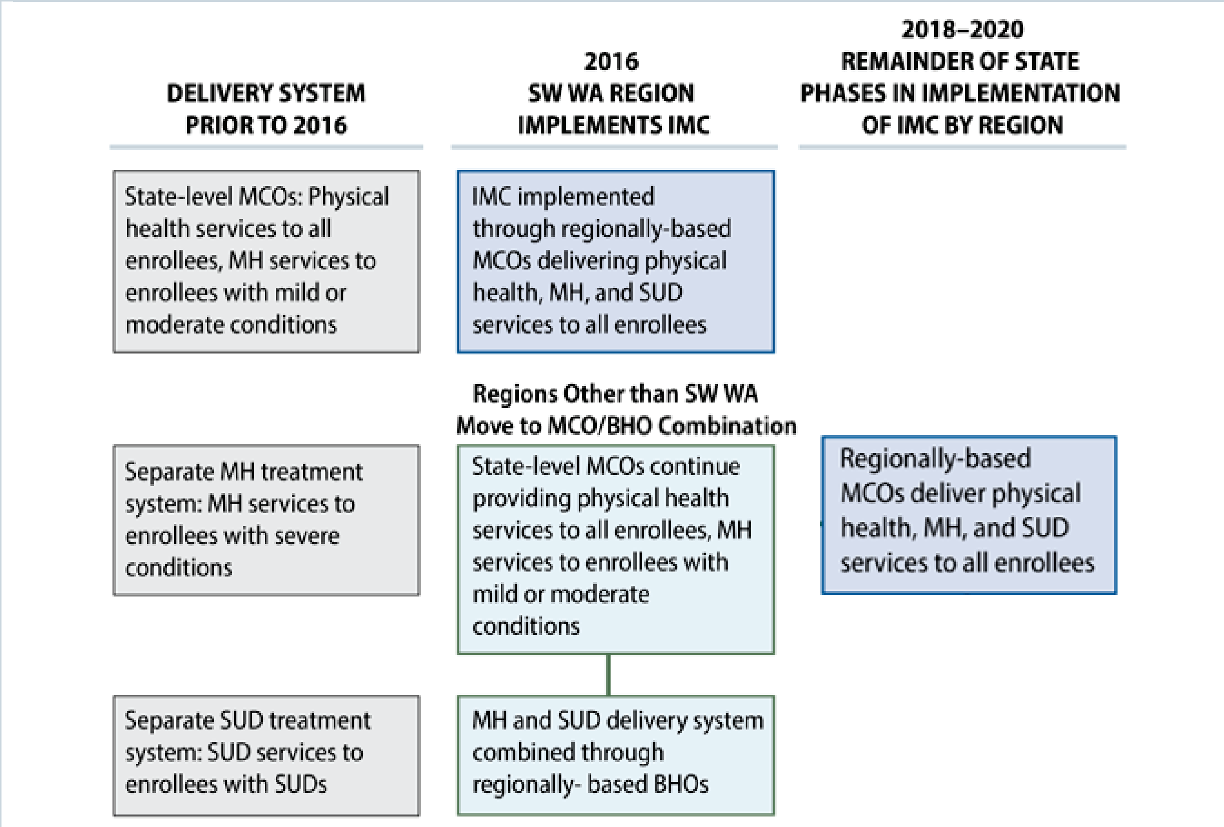
Sources: [a] SEBB enrollment report

[b] Federal Evaluation Team review of focus groups, interviews, and state documents.

Medicaid managed care integration of physical and behavioral health

Prior to 2016, all Medicaid MCO enrollees received all physical health services through their MCO, and enrollees with mild to moderate mental health conditions also received mental health services through their MCO. Enrollees with severe mental health conditions received services from the public mental health system, and those with substance use disorders (SUDs) from the SUD system. The need for people with severe mental health conditions and SUDs to navigate three separate systems to receive their health care caused Washington policymakers to be concerned about fragmented care and risk of treatment gaps, especially among those with more severe and chronic behavioral health conditions (Bittinger, Court, & Mancuso, 2019, January). The HCA implemented IMC to address these concerns, by enabling all enrollees to access an integrated network of physical and behavioral health providers under contract to a regional MCO that was directed to deliver coordinated, whole person care (***Exhibit K-4***).

Exhibit K-4. Through Integrated Managed Care, Washington reduced the number of systems that beneficiaries seeking behavioral health services needed to navigate from three to one



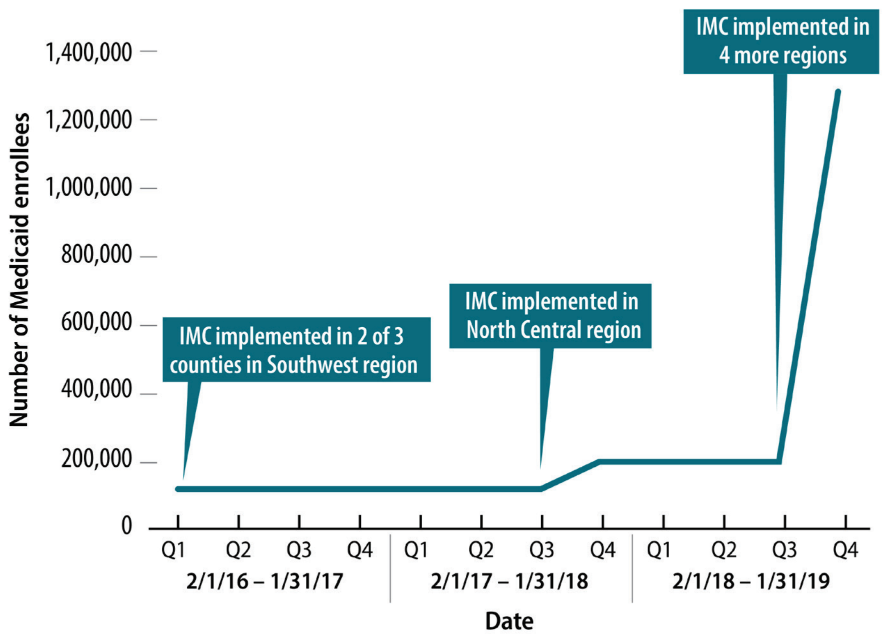
Note: BHO = behavioral health organization; HCA = Health Care Authority; IMC = Integrated Managed Care; MCO = managed care organization; MH = mental health; SUD = substance use disorder; SW = Southwest; WA = Washington.

Source: Federal Evaluation Team review of WA HCA documents.

The IMC model was implemented in the Southwest region, in Clark and Skamania Counties, in 2016. Also, in 2016, as an interim step before moving to full IMC in other regions, the HCA contracted with behavioral health organizations (BHOs) to provide mental health services to enrollees with severe health conditions and SUD services.

The other regions moved to IMC over the course of the SIM Initiative. The second region (North Central) implemented IMC in January 2018, followed by four more regions in January 2019, including the King County region (which includes Seattle). By January 2019, 70 percent of Medicaid MCO enrollees were in regionally based IMC plans that delivered both physical and behavioral health services. ***Exhibit K-5*** shows that, while initially implementation proceeded slowly, major increases in enrollment occurred during the final months of the SIM Initiative. As of January 2020, consistent with state law, all MCO enrollees were in IMC plans.

Exhibit K-5. Statewide Integrated Managed Care was phased in by region over a three-year period



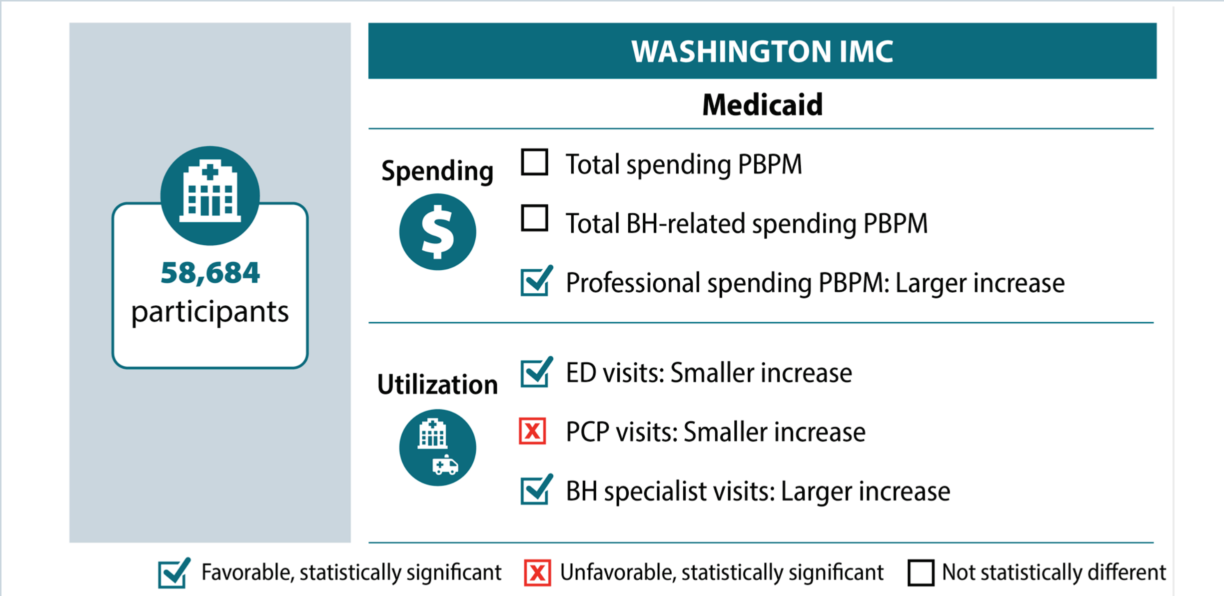
Note: HCA = Health Care Authority; IMC = Integrated Managed Care; Q= quarter.

Source: Washington HCA Final Metrics Report.

Many stakeholders considered IMC to be the major accomplishment of the SIM Initiative, and were optimistic that financial integration would lead to improved clinical integration. One state official described Washington's carving in of behavioral health into MCO contracts as part of a longer history of seeking to make improvements in administration of the state's behavioral health care system. Stakeholders, who appreciated that IMC implementation was complex, though the change from a county-led to a state-led behavioral health system could not have occurred without legislative support. Stakeholders described the SIM Initiative as a catalyst for the change, by providing staff support and acting as a convener and initial funder for the ACHs. MCOs were positive about their role implementing IMC and supportive of offering whole person care.

The quantitative analysis provides insight into the impact of the IMC model. Claims-based outcomes showed that the IMC model produced some favorable changes in health care utilization patterns—with large increases in outpatient visits to behavioral health care specialists and decreases in ED visits among Medicaid beneficiaries with behavioral health conditions who were enrolled in fully integrated managed care plans (***Exhibit K-6***). More detailed findings are described below.

Exhibit K-6. Medicaid Integrated Managed Care had favorable impacts on professional services spending, emergency department, and behavioral health specialist visits in its first two years



Notes: BH = behavioral health; ED = emergency department; IMC = Integrated Managed Care; PBPM = per beneficiary per month; PCP = primary care provider.

Changes are relative to a comparison group. A check mark indicates a favorable impact.

Source: Federal evaluation analysis of Washington Medicaid claims data, aggregated at the person year level, from Washington State Health Care Authority. See ***Appendix K-1*** for more detail.

Claims-based analyses of Washington's Medicaid IMC

For more information, see ***Tables K-4*** through ***K-7*** in the Addendum at end of this chapter. For full results describing the impact of the IMC implementation, see ***Appendix K-1***.

In line with the goals of the IMC model, the percentage of beneficiaries with a behavioral health visit increased for both in the IMC group and the comparison group, but increased more for the IMC group in the first two years of IMC implementation (10.2 percentage points). This larger increase in access to behavioral health services occurred at the same time as a smaller increase in ED visits in the IMC group. ED visits increased for both the IMC group and the comparison group, but increased less in the IMC group (-34.51 ED visits per 1,000 population). There was no overall difference in changes in inpatient admissions. Stakeholders reported that Medicaid beneficiaries had difficulty accessing behavioral health care before the IMC model was implemented. These findings suggest that the IMC model improved behavioral health patients' access to behavioral health specialists, which, in turn, might have reoriented some enrollees to receive behavioral health care through their provider rather than through an ED.

There were no changes in total health care spending per beneficiary per month (PBPM) for beneficiaries with behavioral health conditions in IMC MCOs relative to those in non-IMC MCOs—suggesting that increased use of behavioral health visits had not resulted in increased total spending. Although trends in total spending did not differ between the IMC MCO group and the non-IMC MCO group, professional spending PBPM increased for both groups, and increased more for beneficiaries with behavioral health conditions in IMC MCOs ($15.55 PBPM). The increase in professional spending was expected due to the goal of increasing access to professional services, especially since the literature shows that people with behavioral health conditions often lack access to both behavioral and physical health specialists (Roeber, McClellan, & Woodward, 2013). There were no changes in behavioral health spending, inpatient spending, ED spending, or prescription drug spending in the IMC MCO group relative to the non–IMC MCO group.

Data limitations prevented the quantitative impact analysis from investigating the IMC model's impact on quality-of-care measures. However, the state's internal evaluation of the IMC model was able to look at several quality-of-care measures for the first year of implementation in the Southwest region (April 1, 2016 to March 31, 2017). In Southwest Washington (the first region to implement the new delivery system model), IMC was associated with favorable changes among enrollees with serious mental illness (SMI) and those with co-occurring mental illness and SUDs, compared to similar individuals in the rest of the state. IMC was associated with improvements across both groups in mental health treatment penetration, cervical cancer screening, follow-up care after an ED visit for alcohol or other drug dependence, and diabetes screening for those with schizophrenia and bipolar disorder.[111] State officials attributed the increased mental health treatment penetration to MCOs bringing access to additional providers in their networks, as well as the replacement of access to care standards with access to treatment standards based on medical necessity—thus eliminating the need for prior authorization for outpatient behavioral health treatment.

[111] These results are based on a difference-in-difference methodological approach, comparing changes over time in the early adopter region compared to the balance of the state by the end of the first year of IMC implementation (March 31, 2017).

This federal quantitative evaluation included two subgroup analyses. The first subgroup included beneficiaries with SMI, similar to the population studied in the state's separate evaluation of Southwest Washington noted above. This subgroup was most impacted by the transition to fully integrated managed care—making them of particular analytic and policy interest. Prior to implementation of the IMC model, as noted, beneficiaries with mild-to-moderate mental health conditions had all their physical and behavioral health care covered under a single MCO, while beneficiaries with SMI had their behavioral health care carved out into a different system of coverage than their physical health care. In contrast to the overall sample, ED visits did not differ between the SMI subgroup and the comparison subgroup. Additionally, inpatient admissions and total spending increased for both groups, but increased more in the SMI subgroup (inpatient admissions: 12.08 inpatient admissions per 1,000 population; total spending: $86.33 PBPM). Broadly, these findings suggest that the favorable ED visit and total spending results in the overall population were unexpectedly not driven by the subgroup of beneficiaries with SMI. Instead, these results suggest that individuals with a *lower* severity of behavioral health were less likely to use the ED and have little to no change in health care spending.

The second subgroup analysis included beneficiaries with both SMI and chronic conditions. These beneficiaries were expected to be more likely to benefit from stronger physical and behavioral health care coordination, a key goal of the IMC model. Similar to the larger subgroup of beneficiaries with SMI, inpatient admission and total spending increased for both adults beneficiaries with SMI and chronic conditions in IMC and adult comparison beneficiaries, but increased more for the SMI and chronic conditions subgroup than comparisons (inpatient admissions: 14.94 inpatient admissions per 1,000 population; total spending: $86.33 PBPM).

> "… getting all these providers together under one roof and talking about barriers and access. When we were just in our own silos, we never got to do that. And so they [ACHs] have developed a lot of partnerships between us all …with other MAT [medication-assisted treatment] providers, with primary care, with hospitals."
>
> —Washington behavioral health provider focus group participant

Findings for the first implementation year (April 1, 2016 to March 31, 2017) in Southwest Washington reported by the state's internal evaluation do not offer insight into these results. While this study showed improved access to *behavioral health* services for individuals with SMI and co-occurring disorders, it did not examine whether the Medicaid MCO IMC model would improve access to appropriate use of *medical care* across the state—particularly among behavioral health populations with chronic health conditions (e.g., heart disease, chronic obstructive coronary disease [COPD]). A focus group of primary care clinicians in Southwest Washington generally said they referred their patients to mental health and SUD services as needed, but a focus group of behavioral health providers said they rarely played a role in securing physical health care for their patients because of resource limitations. The only exception was behavioral health providers who were physically co-located with medical providers.

The ACH model may have influenced the implementation and effectiveness of the IMC model, even though the HCA did not explicitly define an ACH role in implementing IMC. Stakeholders generally described the ACHs as successful, and behavioral health providers viewed the ACHs as key to fostering the partnerships needed to implement IMC. Behavioral health clinic directors, during a focus group discussion, commented that ACHs offered a structured convening mechanism for stakeholders—through which the ACHs were reportedly instrumental in fostering partnerships among different types of providers and stakeholders to address access to care issues.

But stakeholders described differences in ACHs' success, which stakeholders thought were related to each ACH's "existing organizations in their communities with a history of infrastructure, professional leadership, and competence." One payer commented, "my headline would be that once you've seen one ACH, you've seen one ACH." For example, some stakeholders commented that the ACH in the North Central region took on a leadership role in supporting the transition to IMC by managing work groups and facilitating information sharing efforts. And King County, which became an ACH region, already had a strong county infrastructure in place. In the Southwest region, in contrast, instability in the ACH's early leadership there caused the county to assume leadership of initial IMC implementation efforts.

Many stakeholders commented that, across regions, behavioral health providers—particularly SUD clinics—faced significant administrative challenges in transitioning to Medicaid funding through the new MCO arrangement. One payer commented that many of the behavioral health clinics had been operating without the infrastructure for billing and processing claims that was typical in medical practices. As a result, behavioral health providers had claims rejected because of incorrect billing codes. State officials encouraged regions to develop provider readiness workgroups to discuss the administrative changes and support technical assistance (TA). The ACHs that adopted IMC prior to 2020 received SIM-funded incentives, which they used to provide TA for their behavioral health providers. The Practice Transformation Support Hub (the Hub) also assisted behavioral health providers during the transition to IMC (See ***Section K.2.2*** for more details about the role of the Hub.)

Medicaid per member per month payments to Federally Qualified Health Centers and rural health clinics for managed care populations

Effective July 2017, 16 FQHCs (50 percent of all FQHCs in Washington), but no RHCs, moved from a per visit payment model for their Medicaid MCO population to a PMPM model that tied payment to performance. The HCA reported that, in the final year of the SIM Initiative (February 1, 2018–January 31, 2019), the 16 FQHCs served 299,481 MCO enrollees (57.6 percent of MCO enrollees served by FQHCs) (Center for Medicare and Medicaid Innovation, 2019, July). Participating FQHCs held only upside risk—no FQHC could be paid less under this new model than it would have been paid under the previous model. The HCA anticipated that the new payment model would incentivize FQHCs to improve the quality of care delivered to Medicaid beneficiaries.

Administratively, PMPM payment to FQHCs for providing services to Medicaid MCO enrollees was complicated by the requirement that the FQHCs be paid through the existing Medicaid MCO payment structure (***Exhibit K-7***). Under the existing structure, MCOs contracted with FQHCs and had flexibility to negotiate payment amounts and models that were satisfactory to both. The HCA calculated federally required FQHC minimum payments based on a per visit rate. Through an annual reconciliation, the HCA determined how much each FQHC would have been paid at the federally mandated per visit rate, and how much the FQHC was actually paid by MCOs. The HCA then paid the difference to the MCO, which was contractually required to pass on the full amount of the difference to the FQHC.

Under the new PMPM payment model the HCA still conducted a reconciliation, which now included three tasks in relation to each participating FQHC. First, as under the per-visit model, the HCA 'reconciled' the actual payment amounts the FQHC received from MCOs in the previous year with the amount the FQHC was federally entitled to receive during the same year. Second, it calculated each FQHC's quality improvement score (QIS) based on the FQHC's performance in the previous year, as measured by nine quality measures drawn from the common measure set (see ***Section K.2.2*** for more information about the common measure set). These measures included diabetes care, childhood immunization, and antidepressant medication management, among others. Third, the HCA calculated the PMPM amount to which the participating FQHC was entitled for the next year by trending the PMPM forward for inflation and adjusting the amount of increase actually awarded by the FQHC's QIS. For example, during the 2018 reconciliation, the HCA reconciled actual 2017 payments, calculated the 2017 QIS, and used the 2017 QIS to set the 2019 PMPM rate. To earn the maximum increase, an FQHC had to show improvement on all nine measures.

Exhibit K-7. Pre-existing payment structure and federal Federally Qualified Health Center payment requirements complicated the transition to a new Medicaid per member per month value-based payment model

	PRE-JULY 2017	JULY–DEC 2017	JAN–DEC 2018	JAN–DEC 2019
Medicaid payment methodology	By federal law, FQHCs required to be paid, at a minimum, a "full" encounter rate for each visit by an MCO enrollee. This requirement does not change in the PMPM model	FQHC paid 2017 PMPM for all MCO enrollees	FQHC paid 2018 PMPM for all MCO enrollees	FQHC paid 2019 PMPM for all MCO enrollees
How rate is calculated	Full encounter rate = 2008 encounter rate inflated by MEI	2017 base PMPM = (2015 FQHC encouter rate x #2015 MCO enrollee encounters)/ #MCO enrollee member months	2018 PMPM = 2017 base PMPM rate trended for MEI and adjusted by 2017 QIS; FQHCs with higher scores (better performance) get a greater share of the additional payments	2019 PMPM = 2018 PMPM rate trended for MEI and adjusted by 2018 QIS; FQHCs with higher scores (better performance) get a greater share of the additional payments
Reconciliation through MCO pass-through	HCA reconciles MCO negotiated payments with total Federally-required encounter-based payment rate. HCA calculates 2017 PMPM rate	HCA reconciles 2016 MCO negotiated payments with 2016 full encounter rate. HCA calculates QIS based on FQHC performance on 9 measures during 2016 HCA calculates 2018 PMPM rate	HCA reconciles 2017 MCO negotiated payments with 2017 PMPM rate. Payment to equal or exceed full encounter rate. HCA calculates QIS based on FQHC performance on 9 measures during 2017 HCA calculates 2019 PMPM rate	HCA reconciles 2018 MCO negotiated payments with 2018 PMPM rate. Payment to equal or exceed full encounter rate. HCA calculates QIS based on FQHC performance on 9 measures during 2018 HCA calculates 2020 PMPM rate

Note: FQHC = Federally Qualified Health Center; HCA = Health Care Authority; MCO = managed care organization; MEI = Medicare Economic Index; PMPM = per member per month; QIS = quality improvement score.

Source: Federal Evaluation Team review of Washington HCA documents.

By April 2019, the HCA had completed one reconciliation cycle under the PMPM model and was near completion of a second cycle. During the first cycle, all FQHCs earned the maximum increase. Because FQHCs were required to continue to show year-over-year improvement to earn the maximum increase, however, state officials did not expect all FQHCs would continue to earn the maximum in future years.

Participating FQHCs changed the way they delivered care to improve their performance on the nine measures that factored into the new payment structure. State officials reported that FQHCs were making greater efforts to ensure Medicaid beneficiaries obtained the services they needed, both from the clinic and from other providers. For the performance measure concerning well child visits, for example, state officials observed FQHCs increasing their outreach efforts to families. One FQHC confirmed that it had added a Quality Improvement Team and health information technology (health IT) resources to enable it to perform well under the PMPM model. This same clinic had also changed workflows to ensure it could improve (and document) performance on the payment-related measures, such as a measure on blood pressure control in diabetes management.

> "How to achieve the outcomes that you would like to achieve and remain in a cost neutral position. That's been really hard … ."
>
> —Washington state official

At the time the SIM awarded ended in January 2019 both the HCA and participating FQHCs believed that the model needed to be modified for long-term sustainability. However, the memorandum of understanding (MOU) under which the pilot operates continues through 2022 and, as of January 2021, the HCA continued to operate the program.

Rural multi-payer model

Under its SIM Initiative Washington sought to develop a VBP model to better support the most financially at-risk CAHs, envisioning both Medicaid and Medicare participation. The HCA based its initial design on the recommendations of the Washington Rural Health Access Preservation project (Washington State Hospital Association et al., 2017, January). Because the HCA was seeking Medicare's participation, officials shared the proposed model with CMS. Based on CMS feedback as well as the HCA's interest in expanding VBP in rural areas, the HCA revised the model to enable all rural hospitals and their associated providers, as well as all payers, to participate (Washington State Health Care Authority, 2018, September). The HCA continued to work on this rural multi-payer model through the end of the SIM Initiative in January 2019. However, as of August 2020, the agency was still seeking Medicare participation (Washington State Health Care Authority, 2020, August). Although Washington did not achieve its goals for this model during its SIM Initiative, state officials and other stakeholders reported that the state's receipt of the SIM award had enabled them to advance development of the model.

Accountable Care Program for public employees and their dependents

Through its SIM Initiative, the HCA contracted with two ACNs to enable the PEBB to offer an ACO option to public employees who participated in the UMP (the PEBB's self-insured plan). This new option, referred to as UMP-Plus, launched in five counties in January 2016 and expanded to four additional counties in January 2017. The option continued throughout the SIM Award and, at the end of their Award, the HCA and the two ACNs were negotiating contract extensions. Both ACNs continued into the 2020 and 2021 benefit years.

The HCA's contracts with the ACNs stipulated that they could earn a share of the savings they generated. The exact share of savings earned depended on the ACN's performance on 19 measures from the common measure set. ACNs could also be held responsible for paying a share of deficits. (See ***Section K.2.2*** for more information about the common measure set.) Both financial and quality performance were calculated separately for PEBB members who formally signed up for the ACN model (referred to as designated enrollees) and members who did not sign up but did use an ACN PCP (referred to as attributed enrollees). ACNs could earn savings based on their performance in serving both types of enrollees but were only responsible for deficits resulting from serving designated enrollees. During their first two years of operation, both ACNs' performance earned the full share of savings.

The number of PEBB members who were ACN enrollees (both designated and attributed) grew steadily in each year of the program, reaching 61,983 (30.5 percent of public employees living in an eligible county) in 2018, the final full calendar year of the SIM Initiative. State officials saw the increased enrollment, as well as the more than 90 percent retention rate, as a sign PEBB members were satisfied with the care provided by the ACNs.

> "The best marker we have for the patient experience is that we have an extremely high retention rate for the benefit option [ACNs], upwards of 90%. if people choose the plan, they stay in it."
>
> —Washington state official

Network administrators reported that the ACN requirements, as conveyed by the UMP-Plus contract, drove care delivery changes, even though the program covered less than 5 percent of their patient populations. Meeting UMP-Plus requirements was associated with accelerated improvements in the health care systems, including team-based care transitions and care management services for individuals with targeted conditions such as depression or diabetes. UMP-Plus also aligned physician quality measures with UMP-Plus goals. Across the ACNs, clinicians were described as agnostic towards their patients' health plan; and changes in care delivery that were important to the UMP-Plus contract, such as more team-based care, were implemented across payers. One network said the UMP-Plus focus on quality created opportunities for their providers to engage directly with their payers and have "relationships [with their payers] in a way that we've never had before." The quantitative impact analysis discussed next provides some support for these perceptions.

The main quantitative analysis focused on the impact of the ACN model on spending, utilization, and a small set of quality-of-care metrics. In the analyses, PEBB members—including both those designated and those who were attributed to an ACN provider—were compared to a group of PEBB UMP-Classic members. The PEBB UMP-Classic comparison group consisted

> **Claims-based analyses of Washington's Accountable Care Networks**
>
> For more information, see ***Tables K-4*** through ***K-7*** in the Addendum at end of this chapter. For full results describing the impact of the UMP-Plus ACN model, see ***Appendix K-2***.

of PEBB members who lived outside of the implementation regions, and who consequently did not have an option to enroll in an ACN. We also required that the comparison group not be attributed to an ACN primary care provider (see ***Exhibit K-8***).

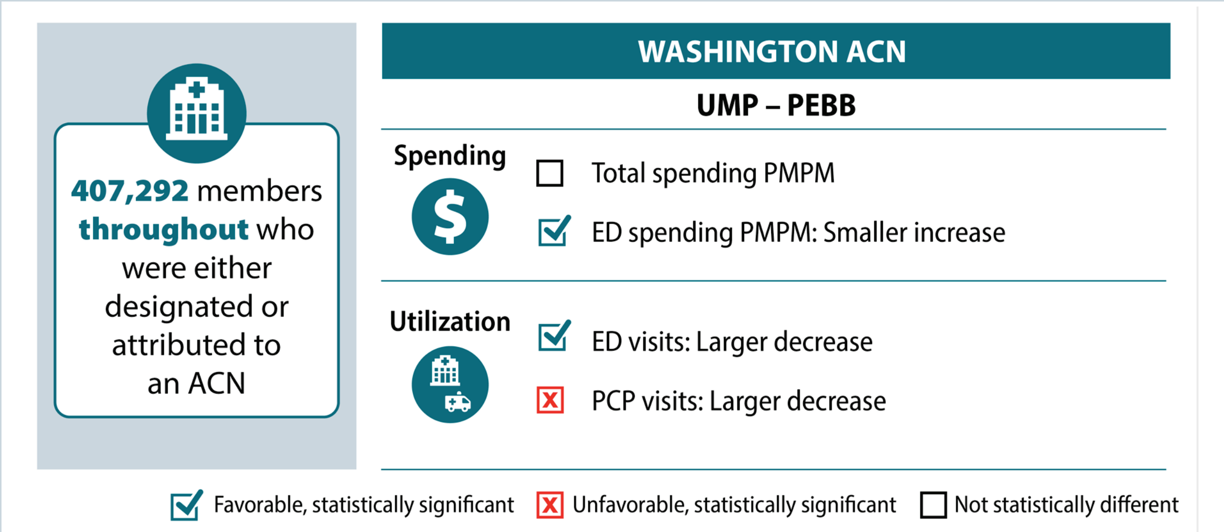
ED visits decreased for PEBB members designated or attributed to the ACN (the ACN group) and increased for the comparison group, leading to a relative decrease for the ACN group during the first three years (-14.38 ED visits per 1,000 population). This finding is consistent with reports from ACN-participating physicians, who during focus groups noted that they were increasing access to care (e.g., Saturday appointments, sufficient numbers of practitioners to handle demand, including urgent care centers in their network open seven days per week or virtual clinics available 24 hours per day) specifically to give patients an alternative to the ED.

There was no statistically significant difference in inpatient admission rates between the ACN group and the comparison group. After model implementation, primary care provider visits decreased for both the ACN and comparison groups but decreased more for the ACN group (-40.7 primary care visits per 1,000 population). The state's internal evaluation found similar changes in some outcomes, though they also found more favorable statistically significant results for two health care utilization measures (decreased probability of an inpatient admission, and increased probability of a primary care provider visit) (Coe et al., 2021).

Total spending did not significantly differ between the ACN group compared with the comparison group. But, reflecting utilization changes, ED spending PMPM increased for both the ACN and comparison groups but increased less for the ACN group in the first three years of ACN implementation (-$1.94 PBPM). For inpatient and professional spending, there were no differences in spending for the ACN group relative to the comparison group. These findings were broadly consistent with those reported by the state's internal evaluation—which also found that most health care spending categories did not change significantly. The state's evaluation did not report results from a total spending model.

Shared savings payments to the two ACNs were based on their performance on a set of 19 quality metrics, such as depression medication management. Both ACNs received the full shared savings payments for 2016 and 2017, suggesting that they met their quality-of-care benchmarks. Our data did not permit us to look at all these quality-of-care measures. Of the four that could be analyzed (screening rates for cervical cancer, breast cancer, colorectal cancer, and chlamydia), three did not show a statistically significant difference between the two groups. The state's internal evaluation had similar results, with a finding of a statistically significant decrease in cervical cancer screening. This apparent conflict likely reflects that the HCA determined whether an ACN met their quality-of-care benchmarks based on improvement relative to that ACN's past performance. In contrast, the quantitative impact analysis—as well as the state's internal analysis—measured whether ACN performance on quality of care improved more than that of a comparison group.

Exhibit K-8. Washington's state employees' Accountable Care Network health care coverage option had favorable impacts on emergency department outcomes in its first three years



Notes: ACN = Accountable Care Network; ED = emergency department; PCP = primary care provider; PEBB = Public Employees Benefits Board; PMPM = per member per month; UMP = Uniform Medical Plan.

Changes are relative to a comparison group. A check mark indicated a favorable impact.

Source: Federal Evaluation Team analysis of PEBB member and enrollment data, constructed by Milliman and provided by Washington state. See ***Appendix K-2*** for more detail.

The quantitative analysis also compared outcomes separately for those who were *designated* and those who were *attributed* to the ACNs against a common comparison group. These two parts of the intervention group are conceptually important subpopulations because ACN plan sponsors were eligible for shared savings for both groups, but only faced a risk of shared losses for the designated population. Furthermore, members of the two groups had different financial incentives. The designated group (who chose to enroll) were not only aware of their enrollment, but also paid lower co-payments than their attributed counterparts. Despite these differing incentives, few differences were identified in the spending and utilization outcomes between the two groups. These findings support ACN administrators' statements that their network providers did not deliver care differently to the attributed and designated participants (or even to non-ACN patients). The lack of fundamentally different impacts for the two groups may suggest, moreover, that shared savings without the potential of shared losses is a sufficiently effective motivator of provider behavior change.

Greater Washington Multi-Payer Data Initiative

> We still believe in the theory behind … [the Greater Washington Multi-Payer] and the fundamental premise that providers need this data."
>
> —Washington state official

The HCA had originally envisioned securing a statewide contractor to implement the Greater Washington Multi-Payer Data Initiative. The contractor would aggregate claims and clinical data from multiple payers—giving providers a single source to consult for a complete picture of all the care and costs associated with their patients. The HCA anticipated that the aggregated data would enable providers to "take on risk, improve care coordination, and more effectively manage population health" (Washington State Health Care Authority, 2019, May 1). However, due to difficulties in securing a contractor, the HCA decided to implement the initiative as a pilot program with provider networks in two areas of the state. (Neither network participated in the ACN model.)

The HCA provided each network with PEBB and Medicaid data, TA, and funding to build a data aggregation system.[112] The networks agreed to build the systems, engage their other payers, and use the data to manage patient care and financial risk, but although all parties worked to bring the vision to reality, the networks were ultimately unable to use HCA data to improve patient care and manage financial risk. State officials cited both process and technical difficulties with producing and transmitting the data and the networks reported having to do considerable work to resolve discrepancies in the HCA data. The networks were also disappointed with the limited capabilities of their data aggregation vendors.

At the end of the SIM award the effort to transmit data was discontinued. However, the HCA and at least one network expressed continued commitment to aggregating multi-payer data to manage risk and improve patient care. The HCA also reported that it had modified its MCO contracts to better support any future data aggregation efforts.

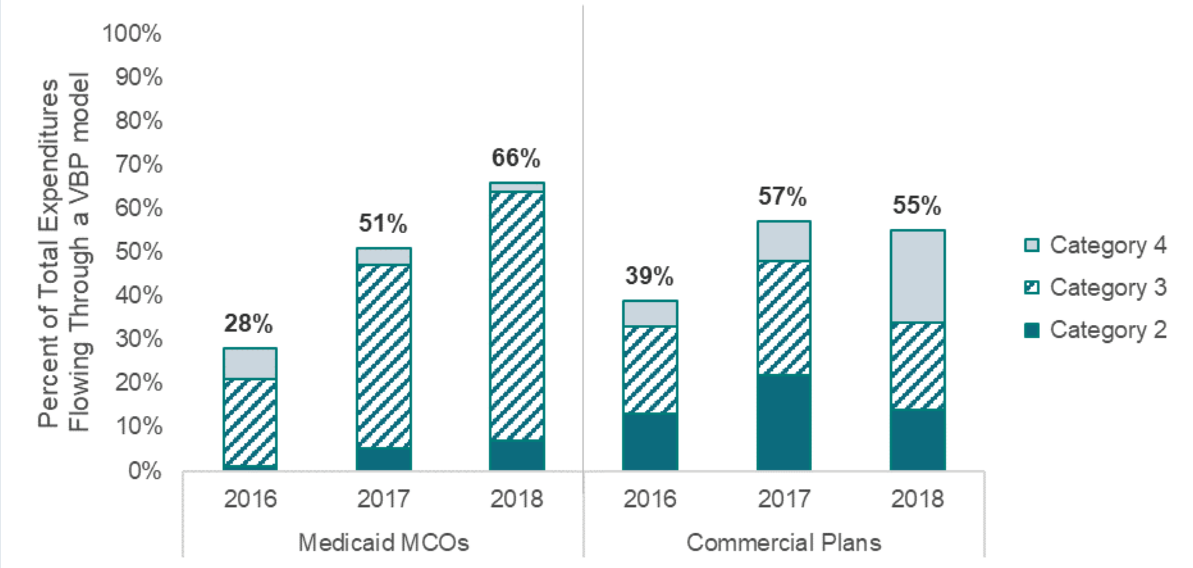
Use of value-based payment models during the State Innovation Model Initiative

A key goal of the SIM Initiative was to move toward widespread adoption of VBP approaches and a preponderance of care (80 percent) delivered in an alternative payment model. Washington also established its own VBP goal—that by 2021 "Ninety percent of state-financed health care and 50 percent of commercial health care will be in VBP arrangements (measured at the provider/practice level)" (Needham & Fischer, 2018, January 31). Washington defined VBP according to the four Health Care Payment Learning & Action Network (HCPLAN) categories: (1) FFS with no link to quality and value, (2) FFS linked to quality and value, (3) APMs built on FFS architecture, and (4) population-based payment. Washington considered any model that met

[112] A data aggregation system combines claims data from multiple payers into information that can be used by providers to improve patient care and by the networks to manage financial risk. Washington intended that the system would at first aggregate claims for services provided to the Medicaid and PEBB members served by the networks, but that later claims data from other payers would be added.

the criterion of Category 2c (pay for performance) or higher to be VBP. As shown in ***Exhibit K-9***, Washington met its goal for the commercial market in 2017. The HCA has also made significant progress on its 2021 goal for state financed care—in 2019, 75 percent of Medicaid managed care spending was paid via VBP (Fischer, n.d.).

Exhibit K-9. Value-based payment use increased between 2015 and 2019, especially among Medicaid managed care organizations, which were contractually required to increase value-based payment use



Notes: FFS = fee-for-service; HCPLAN = Health Care Payment Learning & Action Network; MCO = managed care organization; VBP = value-based payment.

HCPLAN Categories are Category 1 = FFS with no link to quality and value (not shown because it is not VBP); Category 2 = FFS with links to quality and value; Category 3 = FFS with shared risk; and Category 4 = population-based payments.

Sources: HCA. *Final metrics report*; HCA. *2019 Paying for value survey results*, undated; HCA. *2020 Paying for value survey results*, undated.

Starting in 2016, Washington measured VBP use via an annual survey of Medicaid MCOs, commercial health plans, and providers. The data from that survey informed both Washington's annual *VBP Roadmap* (Washington State Health Care Authority, 2018, October) and the state's progress reports for both the SIM Initiative and the Medicaid Transformation Project. All five MCOs and eight commercial plans (Kaiser Family Foundation, n.d.). responded to the most recent (2020) survey. MCOs were contractually required to participate in the survey, but provider and commercial plan participation was voluntary. State officials, MCOs, commercial plans, and providers credited the SIM Initiative with improving their understanding of the VBP categories.

Starting in January 2018, the HCA included a withhold of 1.5 percent in the MCO contract capitation payment. To earn the withhold, each MCO had to meet specified VBP goals (e.g., 50 percent VBP in 2018), as well as quality improvement goals (Washington State Health Care Authority, n.d.; 2018, October; and 2018, January). All MCOs, as well as some state officials and providers, reported that the withhold was the most significant catalyst in prompting the MCOs to increase their VBP use.

> "Well the first factor [is that] our premium withhold under Medicaid is tied to it [increasing VBP]."
>
> —Washington MCO representative

Building on the Medicaid MCO withhold's success, the HCA took a "One HCA" approach to using its purchasing power. Under this approach, the HCA aligned purchasing across all the programs it administered, such as using measures from the common measure set in VBP across programs. (See ***Section K.2.2*** for more information about the common measure set.) The HCA also used its purchasing power to spread VBP in the commercial market. Starting with its contract effective January 1, 2020, the PEBB UMP plan administrator was required to offer an ACN-like option to its non-PEBB customers, including self-insured employers. Also, 4 percent of the plan's administrative fees would be tied to achieving VBP targets across the plan's entire book of business (Washington State Health Care Authority, 2018, January).

The HCA anticipated that private employers would adopt VBP once the HCA demonstrated success among public employees. Thus, the agency advanced multiple strategies to move VBP, including its ACN model, into the commercial market (e.g., building a purchasers' toolkit and meeting with private purchasers). During all four rounds of site visits, however, state officials reported that employers, particularly self-insured employers, continued to express hesitancy to move into VBP—citing the competitive employment market in Washington State, lack of familiarity with VBP models, and lack of resources to implement and operate the models.

Despite these reactions, VBP use in the commercial market grew from 39 percent in 2016 to 67 percent in 2019, with both HCA's and health plans' initiatives playing a role. As health plans explained during the site visits, the plans understood the potential benefits of VBP but sought to develop and implement their own models rather than those tested by the HCA. This may partially explain why, in 2019—24 percent of commercial expenditures, but only two percent of MCO expenditures, were made via HCPLAN Category 4, population-based payments.

K.2.2 Enabling strategies to support health care delivery transformation

Key Results
• Each regional ACH developed its own unique organizational infrastructure and local collaborations, which created flexible approaches best suited to local considerations but also coordination challenges across regions. • The practice transformation hub initially led the delivery of TA to providers transitioning to new payment models. When the ACHs received additional funding to fulfill this role for Medicaid providers, the hub became a support for the ACHs. • Annually updated based on recommendations from a stakeholder panel, the HCA used the common measures in all state health care service purchasing. • HCA's Analytics, Research, and Measurement (ARM) Team supported payment model development and developed data dashboards to support health planning and assessment at both state and regional levels, even though it faced staffing challenges throughout most of the SIM Initiative.

Accountable Communities of Health

The HCA created the ACHs to be the infrastructure for Washington's collaborative regional approach, with much of their activities focusing on Medicaid transformation, and to a lesser extent, population health. During the SIM Initiative, each ACH was formed and became a legal entity, able to enter into contracts with other organizations and providers. In developing local strategies, the ACHs used data dashboards Washington's ARM Team developed (see the section on ARM below for greater detail about the data dashboards.) (See ***Table K-2*** for a brief description of Washington's strategies to support health care delivery transformation.)

Many stakeholders continued to view as positive the flexibility granted to ACHs to develop a unique approach to addressing local issues. Still, some thought it would have been helpful if the state had provided more ACH guidance on operations and administration, including: (1) clearer expectations about ways the ACHs could work collectively to promote a consistent approach toward initiatives that would ultimately benefit from statewide coordination, such as health IT and telehealth; and (2) criteria to develop state and local roles in decision making.

Several stakeholders mentioned that during the final year (February 2018–January 2019) of the SIM Initiative, ACHs focused on formalizing and structuring their joint efforts going forward. Using SIM Initiative resources and state support, the ACHs hired a neutral convener to facilitate the drafting of a charter to more clearly define their roles around certain projects, and coordinate their work with MCOs. King County ACH took on a leadership role in coordinating health data improvements across ACHs, drawing on a long history of analyzing social determinants of health (SDoH) and other types of health data. Together, the ACHs identified a vendor to help ensure health IT investments were aligned across ACHs statewide and not duplicative; and hired consultants to assist with sustainability. One stakeholder thought coordinating improvements in using health data was particularly critical, because some ACHs lacked the technical skills to do such work on their own.

Table K-2. Washington's enabling strategies to support health care delivery transformation

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
ACHs	Health care payers, providers, and other community stakeholders	• Each ACH developed its own organizational infrastructure and became independent of its initial "backbone" organization. • ACHs implemented projects funded by the SIM Initiative and by the Medicaid Transformation Project. • Convened and built trust among local stakeholders to support collective decisions about system transformation.	• ACHs were to receive funding through the Medicaid Transformation Project through 2023. • The HCA had not committed to providing future funding to ACHs. Each ACH would need to prove its value in its community to receive support from its local partners.
Practice Transformation Hub	Primary care and BH practices	• Enrolled more than 180 practices in coaching services. • Developed a BH agency IT toolkit. • Offered the VBP Practice Transformation Academy learning series.	• The Hub resource portal was to continue as the Healthier Washington Collaboration Portal, in partnership with UW and DOH.
ARM Team	ACHs, local health jurisdictions, FQHCs implementing the PMPM model, Greater WA Multi-Payer Initiative networks, and members of the public	• Produced a series of dashboards to inform health planning and assessment. • Supported development of new payment models. • ARM had difficulty recruiting and retaining staff throughout the SIM Initiative.	• The ARM Team continued to provide analytic support to the HCA through state funding, including support for the Medicaid Transformation waiver.
WA-APCD	All providers, payers, and members of the public	• Contained claims from commercial payers, Medicaid, Medicare Advantage, Medicare FFS, and Workers Compensation. • Developed a public website that enabled stakeholders to compare provider performance and price. • Enabled researchers to conduct independent analyses of the claims data.	• In April 2019, the legislature approved funding to sustain the WA-APCD, and directed OFM to transfer WA-APCD oversight to the HCA.

(continued)

Table K-2. Washington's enabling strategies to support health care delivery transformation (continued)

Activity	Target population	Key accomplishments and challenges	Post-SIM Initiative sustainability
Common measure set	All payers, HCA contractors, providers, and members of the public	• The PMCC developed, annually approved, and updated a set of performance measures. • The HCA used selected measures in all its VBP contracts, and there were indications that other payers were adopting such measures. • All members of the public could compare provider performance on the measures via a public website.	• The HCA was committed to maintaining the measure set and the PMCC produced 2020 and 2021 updates of the set.
CHW Taskforce	Policymakers, ACHs, employers, and others	• Issued its recommendations in February 2016.	Not applicable.
Sentinel Network	Policymakers, ACHs, employers, and others	• Supported development and launch of the WA Health Workforce Sentinel Network.	• WA was to continue funding the Sentinel Network.
Shared decision making	All patients and their providers considering treatment options for certain conditions	• The HCA created a certification program that certified 36 decision aids. • The HCA advanced use of the decision aids via ACN and bundled payment contracts. • The HCA trained more than 400 providers in decision aid use.	• Since 2018, the HCA's certification program had been self-supporting through developer fees. • The HCA planned to further spread use of decision aids.

Note: ACH = Accountable Community of Health; ACN = Accountable Care Network; AIM = Analytics, Interoperability, and Measurement; ARM = Analytics, Research, and Measurement; BH = behavioral health; CHW = community health worker; DOH = Department of Health; HCA = Health Care Authority; health IT = health information technology; Hub = Practice Transformation Support Hub; IT = information technology; OFM = Office of Financial Management; PMCC= Performance Measures Coordinating Committee; Sentinel Network = Washington Health Workforce Sentinel Network; SIM = State Innovation Model; UW = University of Washington; VBP = value-based payment; WA = Washington; WA-APCD = Washington All-Payer Claims Database.

Source: Federal Evaluation Team analysis of focus groups, interviews, and state documents.

Practice transformation

Hub activities and services during the SIM Initiative

- Portal: 11,754 users
- Webinars: 6, attended by more than 400 participants
- Group trainings: 6, attended by 57 organizations
- Live events: 10, attended by nearly 900 individuals
- Coaching: 183 practices, 50 percent behavioral health providers, 50 percent PCPs

Washington's SIM Initiative recognized that providers needed support to transition to SIM Initiative VBP models. Although state officials anticipated that MCOs would help their contracted providers shift to the new models, officials also saw a need for a neutral, outside resource. Thus, the Department of Health (DOH) was tasked with creating the Hub to provide transition assistance to providers. In 2016, the DOH partnered with the University of Washington (UW) to develop an online resource portal. The DOH also secured a contractor to provide a health connector in each ACH region, practice coaching, facilitation, and training. By early 2017, the resource portal, connector, and practice coaching were all in operation.

The Medicaid Transformation Waiver affected the Hub's role. Major planning for the Hub occurred in 2015 and early 2016. However, with the approval of the Medicaid Transformation Project in January 2017, as previously described, the ACHs ultimately took on a major role in helping both primary care and behavioral health practices with IMC—a role the Hub had been planned to fill. In response, state officials modified the Hub's role to strengthen ACH support; fostered connections between Hub coaches and the ACHs; and over time, evolved the Hub's role to fill additional transformation needs.

Over the SIM Initiative, state officials added new Hub capacities to fulfill a variety of needs. The Hub helped 23 behavioral health providers, in the first three regions transitioning to IMC, to assess their health IT needs. Based on the Hub experience, Hub staff developed a billing and health IT toolkit to help other behavioral health agencies transition to IMC (Healthier Washington et al., 2018, January). The Hub also added group support programs for providers seeking to address a common issue. For example, the Hub offered the VBP Practice Transformation Academy—a learning series that concluded in August 2018 after helping 20 behavioral health agencies navigate issues related to VBP arrangements. In addition, Hub administrators noted that the virtual teams they fostered needed support to better work together; the Hub launched for the virtual teams a secure collaborative space that, as of January 2019, had been used by more than 200 teams. Another capacity added to the Hub to support elements of the SIM Initiative was the *Population Health Planning Guide*, which was added to the resource portal to help local coalitions address population health priorities.

The Hub ultimately offered support to thousands of providers transitioning to new payment models (text box). The most intensive support (practice coaching) was accessed equally by both PCPs and behavioral health providers. One state official shared that the Hub was vital for unifying SIM Initiative implementation efforts and making them work for the provider. Another official shared that the availability of coaches to explain and answer questions about policy changes allayed providers' anxiety.

In the final year of the SIM award (February 2018–January 2019) the Hub focused on transitioning its functions with an eye to sustainability. The Hub stopped recruiting new practices for practice coaching, and worked only with earlier engaged practices to complete their transitions. The Hub, with the ACHs, transitioned practices that could not achieve their goals before the SIM Initiative's end to ACH support. In turn, some ACHs increased their training and TA capacity through strategies such as hiring a Hub coach. The resource portal, which had become the Healthier WA Collaboration Portal, has been supported by the DOH–UW partnership since August 2019, continues to add new resources and offer virtual teams a secure space in which to do their work.

Common measure set

In 2014, Washington released the first iteration of the common measure set. This comprehensive set of quality measures was updated annually based on recommendations of the Washington State Performance Measures Coordinating Committee (PMCC). The PMCC continued to update the set after the end of the SIM Award. The 2021 version of the set included 46 measures that could be used both in VBP contracting and population health monitoring, and 17 measures specific to population health monitoring (State of Washington, 2020, October).

The HCA's Medicaid and PEBB VBP models used the common measure set; evidence indicated that other payers were also using the set. Starting in 2016, the HCA had incorporated five measures from the common measure set into all its VBP contracts. Medicaid contracts, including MCO and FQHC agreements, generally included two additional measures. The PEBB ACN contract tied payment to performance on the five common measures plus 10 additional measures. The five common measures addressed antidepressant medication management (two measures), asthma medication management, high blood pressure control, diabetes care (two measures), and childhood immunizations. The HCA also made efforts to get other payers to use the common measure set, such as issuing a fact sheet for employers. Stakeholders were generally positive about the common measure set, noting the value of having a specific reference point to look to for achieving value and health care transformation. One payer noted that, although the HCA used measures from the common measure set, the agency also continued to require other measures. A few stakeholders reported that other payers and employers across the state had begun to use some of the measures from the common measure set in their own VBP contracts.

Analytics, Research, and Measurement Team

Despite staffing challenges, the ARM Team became an ongoing analytic resource within the HCA. ARM (formerly Analytics, Interoperability, and Measurement [AIM]), created at the start of the SIM Initiative, was envisioned as an in-house Analytic Team to manage large-scale data projects. A key ARM goal was to use the data the HCA and other state agencies collected (e.g., Medicaid claims data and DOH birth data) in designing, building, and testing new ways of delivering and paying for health services. The ARM Team included staff with analytics infrastructure management, epidemiology, and program management skills. Maintaining staff with these skills proved challenging, however. As discussed in previous reports, stakeholders reported that Olympia's proximity to Seattle's big technology companies made it difficult to retain IT talent, and the ARM Team experienced hiring delays and significant staff turnover. Some stakeholders felt that staffing challenges hampered the ARM Team's ability to fully achieve the original vision. Despite these challenges, ARM was able to provide analytic support for development and evaluations of the payment models—as well as produce, maintain, and update two data dashboards to assist the ACHs and other local planning efforts (Washington State Health Care Authority, n.d.). After the SIM Initiative ended, ARM continued to provide analytic support to the HCA, including support for the Medicaid Transformation Project.

The ACH (which became Healthier Washington) dashboards grew into an interactive, comprehensive source of information to assist stakeholders in health assessment and planning. First released in June 2016, the ACH dashboards were intended to help ACHs and local jurisdictions plan their activities. Information in the dashboards was expanded during the SIM Initiative to include Medicaid claims and immunization data to report performance on six measures from the common measure set, as well as data from the Behavioral Risk Factor Surveillance System. Functionality improvements (e.g., a "trends" feature) were added. In April 2019, the 11th version of the dashboard was released and became available to the public via the Healthier Washington website. Several stakeholders described the dashboards as helpful in planning. But one ACH representative noted that the dashboards did not meet all ACH data needs, and that ACH staff needed to complement dashboard information with other information from local sources. Another state official noted that ACHs varied in how far along they were in their transformation effort and their ability to utilize the data they received.

Washington All-Payer Claims Database

In 2014, the Washington legislature directed its Office of Financial Management (OFM) to implement an APCD funded partially by the SIM Initiative, with mandatory payer participation except for employers who self-insured.[113] The Washington All-Payer Claims Database (WA-APCD) began accepting claims data in 2017, and as of July 2019, contained claims from commercial payers, Medicaid, Medicare Advantage, Medicare FFS, and Workers Compensation. APCD data was used to populate a public website (Washington HealthCareCompare) to enable members of the public to compare provider performance on measures drawn from the common measure set, as well as the prices of many medical procedures (Washington HealthCareCompare, 2021). The data was also made available to approved

[113] SIM funding was used for initial planning, but the WA-APCD was built largely without SIM funding. It did draw on the common measure set and support SIM activities. Source: Washington Final Report.

researchers, including ACHs, seeking to conduct their own analyses. Effective January 1, 2020, at the direction of the state legislature, WA-APCD operations were transferred from the OFM to the HCA. As of January 2021, the HCA continued to operate the APCD and reported that the APCD contained claims for approximately 75 percent of the population (Washington State Health Care Authority, 2021, January 6).

Workforce development

Health workforce development, which was not a major focus of Washington's SIM Initiative award, consisted of two SIM-funded projects. The Community Health Worker (CHW) Task Force, convened in 2015, issued its recommendations in February 2016. The Washington Health Workforce Sentinel Network launched in 2016.

> "… they [the Sentinel Network] definitely have done a lot of good work, and [are] who we count on to tell us where are our biggest [workforce] problems."
>
> —Washington state legislator

Although both workforce projects stopped receiving SIM funding in 2017, Washington continued to build upon project accomplishments with other funding. ACHs considered the CHW Task Force recommendations in their planning activities, and a few chose to conduct projects that supported CHW use in their region. The Washington Health Workforce Sentinel Network relied on volunteer "sentinels" (human resources staff who worked for providers and health systems) to provide information about their workforce needs. The Sentinel Network then combined input from across the sentinels to produce findings that examined workforce needs by occupation, industry, and ACH region. Policymakers, ACHs, and others used this information for planning. As of January 2021, the Sentinel Network had issued findings through fall 2020 (Washington's Health Workforce Sentinel Network, n.d.).

Shared decision making

As of January 2021, Washington continued to be the only state to certify patient decision aids (tools to assist patient and provider discussions concerning treatment options and support patients in making informed choices among treatment options). A 2007 state law (State of Washington 60th Legislature 2007 Regular Session, 2007) increased legal protection for physicians whose patients signed an informed consent that patient decision aids would be used, and authorized the HCA to certify decision aids. The HCA used SIM Initiative funding to establish the certification process. The HCA required ACN providers to incorporate the aids into their workflows and trained 400 providers on their use. The HCA certified its first decision aids in 2016. By January 2019, HCA had certified 36 decision aids—related to maternity care, joint replacement/spine care, and end-of-life care. In 2018, the HCA began charging developers a fee to certify their decision aids, resulting in the program becoming self-supporting.

K.2.3 Population health

Key Results
• By collaborating with local partners, including local health departments, Accountable Communities of Health increased the state's capacity to address population health issues and SDoH.

The DOH, in strong partnership with the HCA, led population health efforts through Washington's SIM Initiative. The ACHs, with DOH's leadership in developing the Plan for Improving Population Health (P4IPH), served as key mechanisms for advancing the state's population health improvement work.

Many stakeholders expressed that, over the SIM Initiative, the ACHs had demonstrated their importance as a convener for formal, cross-sector stakeholder collaboration on population health issues (e.g., creating a regional health needs inventory of local health priorities). State officials commented that the ACHs had significantly helped the state build capacity to address population health issues, by enhancing community-level connections among stakeholders in each region. One ACH director commented that the ACHs provided a valuable opportunity for local-level decisions to be made across jurisdictions. Some stakeholders observed that ACH leaders with prior community-based work experience were often the most effective in advancing local-level collaborations to promote population health initiatives.

> "… Some [ACHs] were existing organizations in their communities with a history of infrastructure, professional leadership and competence, and others were new startups … and their leadership and the turnover of leadership has been highly variable. The vision is beautiful and the real gap that they are filling in my view is in the space of the social determinants of health."
>
> —Washington MCO representative

As discussed in ***Sections K.1.2*** and ***Section K.2.2***, the ACHs' significant role in the Medicaid Transformation Project led them to shift from focusing on the SIM Initiative's proposed emphasis on developing local population health improvement activities to implementing more clinically focused projects designed for the Medicaid population. One state official was hopeful the ACHs would eventually return to some of the original, broader population health efforts they began under the SIM Initiative. The same official noted that, since ACHs had completed their plans for projects required through their Medicaid Transformation Project funding (e.g., addressing the opioid use crisis, chronic disease prevention and control), in the future ACHs might have the capacity to develop population health strategies using their Medicaid Transformation Project wellness funds. One ACH director commented that their ACH was able to continue work on a long-acting reversible contraception project that began under the SIM Initiative, by including it in their Medicaid Transformation Project plan. Some stakeholders thought that, although more traditional population health improvement outcomes were not achieved through the SIM Initiative, ACHs helped advance discussions concerning population health issues, thereby engaging new partners at the local level, particularly MCOs.

K.3 Sustainability

Key Results
• The state's Health Care Authority sustained three SIM reforms (IMC, FQHC PMPM payment, and ACNs) and expanded ACNs to school employees and to the individual market. • Washington continued many SIM-developed enabling strategies—including ARM, the Sentinel Network, regional ACHs, the practice transformation hub, the common measure set, and the APCD. • The Medicaid Transformation Project funded the annual VBP survey and supported efforts to increase the use of VBP in Medicaid.

Washington relied on three major strategies to maintain most of the innovations developed under the SIM Initiative (see ***Table K-3*** and ***Exhibit K-10***). First, as initially planned, many of the innovations became the ongoing responsibility of the agency that had been responsible for them during the SIM Initiative. For example, the HCA's Medicaid managed care staff continued to administer IMC, as they did all other Medicaid programs. Second, the legislature provided new state funding to continue a few of the SIM initiatives, such as the Sentinel Network. Finally, several of the innovations developed under the SIM Initiative evolved to support (and be supported by) the Medicaid Transformation Project. This transition began before the end of the SIM Initiative. For example, for the last two SIM Initiative years (February 2017–January 2019), the ACHs, with support from the Medicaid Transformation Project, supported IMC implementation at the local level, by implementing projects to support providers seeking to integrate physical and behavioral health. These, and other, Medicaid Transformation projects conducted by the ACHs may continue into 2023.

Exhibit K-10. Washington was able to sustain SIM Initiative innovations through a combination of state and Medicaid Transformation Waiver resources

NEW STATE FUNDING	INTEGRATION INTO ONGOING DEPARTMENT RESPONSIBILITIES	ROLE IN MEDICAID TRANSFORMATION WAIVER
Washington authorized new funding to sustain: • the Sentinel Network • Rural Multi-Payer Demonstration (bridge funding to CAHs)	The HCA continued to be responsible for: • ACN • Integrated Managed Care • FQHC PMPM payments • P4IPH • Common Measure Set • Shared decision-making aides The DOH continued to be responsible for Hub	The waiver will continue to fund: • ACHs supported implementation of IMC • ARM team continued to support data analytics, including data dashboards • VBP survey

Note: ACN = Accountable Care Network; ARM = Analytics, Research, and Measurement; CAH = critical access hospital; DOH = Department of Health; FQHC = Federally Qualified Health Center; HCA = Health Care Authority; IMC = Integrated Managed Care; PMPM = per member per month; P4IPH = Plan for Improving Population Health; SIM = State Innovation Model; VBP = value-based payment.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

Washington sustained its efforts to increase VBP use in both the public and commercial sectors after the SIM Award's end in 2019. The Medicaid Transformation Project, which is due to end in 2021, shared the SIM goal of increasing VBP use and continued to foster VBP's spread in the Medicaid market. Medicaid Transformation Project funding also enabled the HCA to continue to administer its VBP survey and track VBP uptake in the Medicaid, Medicare, and commercial sectors. In addition, near the end of the SIM Award, the state legislature began expanding the HCA's purchasing power which, as previously described, the agency used to foster VBP uptake. Effective January 2020, the HCA began purchasing health coverage for all school employees (State of Washington 65th Legislature 2017 3rd Special Session, 2017) and the HCA implemented a new public coverage option that, effective with the open enrollment period for 2021, was offered through the state's Health Insurance Exchange alongside commercial health plans (State of Washington 66th Legislature 2019 Regular Session, 2019).

Table K-3. Sustainability of Washington's SIM Initiative activities

Activity type	Activity	Plans to sustain	Sustainability mechanism
Delivery/ payment system	Medicaid physical and BHI managed care	Yes	State funding. Legislation required all regions to join by January 2020.
	Volume to value: FQHCs and RHCs	Yes	State funding. MOUs with FQHCs. RHCs included in rural model.
	Volume to value: Washington Rural Multi-Payer Demonstration	Likely	Pursued Medicare's participation in multi-payer model. State supplied 2-year bridge funding to financially fragile CAHs.
	Public employee ACP health benefit option	Yes	State funding. Contracts with networks.
	Greater Washington Multi-Payer (Data) Initiative	No	Pilot networks might have continued some data aggregation on their own.
Population health	Plan for Improving Population Health	Yes	Sustained through plan implementation in the ACHs and the resource portal.
Practice transformation	Hub: Connector function	Yes	State funding (DOH).
	Hub: Practice coaching, facilitation, and training	No	Not applicable.
	Hub: Resource portal	Yes	State funding (DOH).
Workforce	Industry Sentinel Network	Yes	State funding.
	Community Health Worker Taskforce	Not applicable	Taskforce's work was complete.
Data analytics	WA-APCD	Yes	State funding and user fees.
	ARM Team	Yes	The Medicaid Transformation Project supports data analytics.
Other	ACHs	Yes	The Medicaid Transformation Project supports ACHs through 2023.
	HILN	Yes, if it reconvenes	HCA planned to support the HILN, but the group has not met since 2018.
	Common measure set	Yes	HCA supported the PMCC, which, as of 2021, continues to update the sets.
	Certification of shared decision aids	Yes	Process funded by developer fees.

Note: ACH = Accountable Community of Health; ACP = Accountable Care Program; ARM = Analytics, Research, and Measurement; BHI = behavioral health integration; CAH = critical access hospital; DOH = Department of Health; FQHC = Federally Qualified Health Center; HCA = Health Care Authority; HILN = Health Innovation Leadership Network; MOU = memorandum of understanding; PMCC = Performance Measures Coordinating Committee; SIM = State Innovation Model; WA-APCD = Washington All-Payer Claims Database.

Sources: Federal Evaluation Team review of interviews, focus groups, and state documents.

K.4 Implications of Findings/Lessons Learned

- Four years was sufficient to implement new VBP models, and early findings were promising. However, four years was not enough time to reveal reliable evidence on whether the models produced desired outcomes in quality and clinical care.
- Washington's SIM Initiative agenda was ambitious. State officials expressed some ambivalence about the pros and cons of the choice to implement multiple complex initiatives, wondering whether a narrower agenda might have been more effective.
- State officials described the SIM Initiative as having been effective in bringing people together to discuss the health care delivery system changes already under way. The SIM Initiative provided the groundwork for further change—for example, the larger Medicaid Transformation Project that went into effect during the SIM Initiative.
- Washington used its purchasing power to directly change how care is delivered and paid for among the populations for whom it purchased coverage. That direct action, in turn, had a broader effect in fostering change throughout the health care system. The ACNs, for example, although only a small percentage of the payments to the health care systems delivering the program, was described by stakeholders as driving change in the system overall.
- The ACH-led, regionally driven infrastructure was very useful in promoting local transformation. But state officials learned that, to function most effectively, ACHs needed state guidance and administrative coordination across regions to promote shared learning and reduce duplication of effort.
- Initiatives requiring new uses for data, including analytics and interoperability initiatives, were challenging throughout the SIM Initiative. Creating new data infrastructure took much longer than initially anticipated. For example, many of the behavioral health providers transitioning to IMC struggled to build the technological capacity necessary to successfully bill the MCOs.

Addendum

Table K-4. Washington's Medicaid Integrated Managed Care Initiative had favorable impacts on emergency department visits, visits to a behavioral health specialist, and professional spending in its first two years

Selected outcomes	Change in outcome from baseline to implementation period: WA IMC Initiative in SW or NC Region	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($)	↑	↑	22.37 (-22.40, 67.13)	5.3	0.41
Inpatient Admissions per 1,000 Population	↑	↑	1.84 (-1.24, 4.92)	2.3	0.33
ED Visits per 1,000 Population	↑	↑	**-34.51†** (-61.51, -7.50)	−4.5	0.04
Behavioral Health-Related Total Spending PBPM ($)	↑	↑	12.21 (-27.41, 51.83)	16.5	0.61
Visits to a Behavioral Health Specialist (%)	↑	↑	**10.16†** (6.52, 13.81)	46.6	<0.001
Inpatient Spending PBPM ($)	↑	↑	-9.85 (-26.00, 6.29)	-10.0	0.32
ED Spending PBPM ($)	↑	↑	-1.49 (-3.33, 0.35)	-6.3	0.18
Professional Spending PBPM ($)	↑	↑	**15.55†** (9.90, 21.20)	18.6	<0.001
Prescription Drug Spending PBPM ($)	↑	↑	-2.39 (-13.10, 8.31)	-2.2	0.71

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; IMC = Integrated Managed Care; NC = North Central; PBPM = per beneficiary per month; SW = Southwest; WA = Washington.

Source: Federal Evaluation Team analysis of WA Medicaid claims data, aggregated at the person year level, from the WA State Health Care Authority.

Table K-5. **Washington’s Medicaid Integrated Managed Care Initiative had unfavorable impacts on hospital use among adults with serious mental illness, and adults with serious mental illness and chronic conditions in its first two years**

Selected outcomes	Change in outcome from baseline to implementation period: WA IMC Initiative in SW or NC Region	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PBPM ($) [Adults with SMI]	↑	↑	**86.33‡** (40.86, 131.81)	13.6	0.002
Total Spending PBPM ($) [Adults with SMI and Chronic Conditions]	↑	↑	**106.60‡** (51.96, 161.24)	11.0	0.001
Behavioral Health-Related Total Spending PBPM ($) [Adults with SMI]	↑	↑	**55.14†** (2.40, 107.88)	54.4	0.08
Behavioral Health-Related Total Spending PBPM ($) [Adults with SMI and Chronic Conditions]	↑	↑	40.74 (−21.91, 103.38)	26.6	0.29
Inpatient Admissions per 1,000 Population [Adults with SMI and Chronic Conditions]	↑	↑	**12.08‡** (4.03, 20.13)	11.2	0.01
Inpatient Admissions per 1,000 Population [Adults with SMI and Chronic Conditions]	↑	↑	**14.94‡** (2.66, 27.22)	10.2	0.05

† Significant change in expected direction
‡ Significant change in unexpected direction
No change
↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation
↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

CI = confidence interval; D-in-D = difference-in-differences; IMC = Integrated Managed Care; NC = North Central; PBPM = per beneficiary per month; SMI = serious mental illness; SW = Southwest; WA = Washington.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

Table K-6. Washington's state employees Accountable Care Network Initiative had favorable impacts on emergency department outcomes in its first three years

Selected outcomes	Change in outcome from baseline to implementation period: WA ACN Initiative	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PMPM ($)	↑	↑	-3.40 (-13.56, 6.75)	-1.2	0.58
Inpatient Admissions per 1,000 Population	↓	↓	0.29 (-2.57, 3.16)	0.8	0.87
ED Visits per 1,000 Population	↓	↑	**-14.38†** (-20.30, -8.46)	-9.2	<0.001
Inpatient Spending PBPM ($)	↑	↑	-5.83 (-13.20, 1.54)	-6.8	0.19
ED Spending PBPM ($)	↑	↑	**-1.94†** (-3.15, -0.72)	-11.5	0.01
Professional Spending PBPM ($)	↑	↑	-0.08 (-0.58, 0.41)	-0.2	0.78
Primary Care Provider Visits per 1,000 population	↓	↓	**-40.70‡** (-7.80, -0.34)	-2.0	0.07
Cervical Cancer Screening (%)	↑	↑	**0.50†** (0.003, 1.00)	0.7	0.10
Breast Cancer Screening (%)	↓	↓	-0.62 (-1.31, 0.06)	-0.8	0.13
Colorectal Cancer Screening (%)	↓	↓	0.16 (-0.81, 1.12)	0.3	0.79
Chlamydia Screening (%)	↑	No change	2.04 (-0.42, 4.50)	4.6	0.17

† Significant change in expected direction
‡ Significant change in unexpected direction
No change

↑ Favorable increase
↑ Unfavorable increase
↑ Increase from baseline through implementation

↓ Favorable decrease
↓ Unfavorable decrease
↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PMPM = per member per month; WA = Washington.

Source: Federal Evaluation Team analysis of WA Medicaid claims data, aggregated at the person year level, from the WA State Health Care Authority.

Table K-7. Washington's state employees Accountable Care Network Initiative had favorable impacts on emergency department visits for designated and attributed public employees in its first three years

Selected outcomes	Change in outcome from baseline to implementation period: WA ACN Initiative	Change in outcome from baseline to implementation period: Comparison group	D-in-D estimate (90% CI)	Relative difference (%)	p-value
Total Spending PMPM ($) [Designated]	↑	↑	-2.70 (-13.49, 8.10)	-1.0	0.68
Total Spending PMPM ($) [Attributed]	↑	↑	-11.36 (-30.06, 7.35)	-4.2	0.32
Inpatient Admissions per 1,000 Population [Designated]	↓	↓	0.51 (-2.49, 3.52)	1.4	0.78
Inpatient Admissions per 1,000 Population [Attributed]	↓	↓	-2.18 (-5.78, 1.42)	-5.6	0.32
ED Visits per 1,000 Population [Designated]	↓	↑	**-14.73†** (-20.97, -8.49)	−9.5	<0.001
ED Visits per 1,000 Population [Attributed]	↓	↑	**-5.12†** (-9.69, -0.55)	-4.3	0.065

† Significant change in expected direction	↑ Favorable increase	↓ Favorable decrease
‡ Significant change in unexpected direction	↑ Unfavorable increase	↓ Unfavorable decrease
No change	↑ Increase from baseline through implementation	↓ Decrease from baseline through implementation

Notes: Bolded (†) or (‡) D-in-D estimate indicates statistically significant finding. The arrows and circles in the second column graphically display the information from the last three columns of the table.

ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; PMPM = per member per month; WA = Washington.

Source: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

Appendix K-1: Washington Integrated Managed Care Model Impact Results

K-1.1 Overview

Medicaid Integration of Physical and Behavioral Health Purchasing—Washington's Integrated Managed Care (IMC) model—is a regional implementation of Medicaid (Apple Health) managed care plans that fully integrates physical health and behavioral health (mental health and substance use disorder [SUD] services). Prior to implementation, Medicaid beneficiaries received only their physical health care and some behavioral health care through one of five statewide managed care organizations (MCOs); beneficiaries with more serious and persistent behavioral health care needs received their behavioral health care from providers that contracted directly with Washington's Medicaid agency. Since implementation, Medicaid beneficiaries receive all their physical and behavioral health care through the same MCO. Key goals of the Medicaid behavioral health integration model were to ensure sufficient supply of behavioral health care providers in new managed care contracts and to financially incentivize greater coordination between physical and behavioral health care providers within the managed care networks. Through the Medicaid behavioral health integration, Washington's Medicaid agency contracts with MCOs at financial risk for the full scope of Medicaid physical health, mental health, and SUD services (except for crisis services). In the resulting model, each beneficiary receives care from one regionally based MCO instead of three separate systems.

By legislative mandate, Medicaid behavioral health integration was implemented in all regions of the state by January 2020. During the study period (2013–2018), only two of nine regions were phased in. The first region, Southwest Washington, encompassing Clark and Skamania counties, was implemented in April 2016. The second region, North Central, including four counties (Chelan, Douglas, Grant, and Okanogan), was implemented in January 2018.

Other regions that implemented later are not part of this analysis: Greater Columbia, King, North Sound, Pierce, and Spokane regions implemented in January 2019, and the remainder of the state's regions implemented by January 2020.

The Medicaid behavioral health integration research questions are intended to evaluate the success of changing the Medicaid care delivery model in relation to achieving greater integration of clinical services and coordination of care. To assess the effects of Washington's IMC model on care for Medicaid beneficiaries, the following research questions were addressed:

- To what extent does IMC reduce emergency department (ED) visits, inpatient admissions, and associated spending among Medicaid beneficiaries with a behavioral health condition?

- To what extent does IMC increase access to physical and behavioral health services among Medicaid beneficiaries with a behavioral health condition?

It was hypothesized that Medicaid beneficiaries with a behavioral health condition in integrated MCOs will have lower rates of ED visits, psychiatric and physical health–related inpatient admissions, psychiatric hospital readmissions, and all-cause readmissions than similar beneficiaries in non-integrated MCOs. The analysis also hypothesized that IMC will improve access to care by contractually ensuring that integrated MCOs have a more sufficient supply of behavioral health care professionals to manage the complex needs of beneficiaries with behavioral health conditions. Thus, the analysis expected that Medicaid beneficiaries with a behavioral health condition in regions with integrated MCOs will have higher rates of physical and behavioral health use than similar beneficiaries in regions with non-integrated MCOs.

Table K-1-1 provides a snapshot of the study methods.

Table K-1-1. Methods snapshot

Method	Description
Participating plans	MCOs contracting with Washington's Medicaid agency to provide integrated physical and behavioral health.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	The Washington State HCA, which administers the state Medicaid program, provided data on health care spending and utilization for all Medicaid beneficiaries in Washington. These data were derived from Medicaid claims and aggregated to the person–year level for analyses.
Sample	The intervention group comprised Medicaid beneficiaries with a behavioral health condition in one of two regions that adopted IMC during the study period (2014–2018). The Southwest Region adopted in April 2016, and the North Central Region adopted in January 2018. The comparison group comprised Medicaid beneficiaries with a behavioral health condition who lived in other regions of the state that did not adopt IMC during the study period. The analytic sample included 58,684 Medicaid beneficiaries with behavioral health conditions who resided in intervention regions and 476,458 Medicaid beneficiaries with behavioral health conditions who resided in comparison regions.
Timeframe	The timeframe for the impact analysis was 2014 through 2018, which includes two baseline years for the Southwest Region (April 2014–March 2016), two baseline years for the North Central Region (January 2016–December 2017), two intervention years for the Southwest Region (April 2016–March 2018), and one intervention year for the North Central Region (January–December 2018).
Measures	The analysis assessed the effects of IMC on three core outcomes: total spending PBPM, inpatient admissions, and ED visits. The analysis also examined impacts on additional outcomes, including inpatient, ED, professional, and prescription drug spending; visits to primary care providers; visits to behavioral health care specialists; and behavioral health–related spending, inpatient admissions, and outpatient visits.

(continued)

Table K-1-1. Methods snapshot (continued)

Method	Description
Statistical analysis	The analysis used logistic regression for binary outcomes, Poisson regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the county level to account for correlation in outcomes within counties. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; MCO = managed care organization; OLS = ordinary least squares; PBPM = per beneficiary per month.

This chapter reports on the impact of IMC on spending and utilization for 58,684 unique beneficiaries who were exposed to the IMC model.

A full description of the IMC program and a summary of the key impact analysis findings are available in ***Appendix K***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. This appendix provides detailed information on IMC impact findings in tables and figures:

- ***Section K-1.2*** presents results of difference-in-differences (D-in-D) analyses for Washington IMC Medicaid beneficiaries and their comparison group, including behavioral health–related outcomes;
- ***Section K-1.3*** presents results of D-in-D analyses separately for adults with serious mental illness (SMI) and one or more chronic conditions for the three core outcomes;
- ***Section K-1.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity score weighting;
- ***Section K-1.5*** describes trends in core outcomes over the analysis timeframe; and
- ***Section K-1.6*** presents results from sensitivity analysis that show how D-in-D estimates for the core outcomes change when the IMC and comparison group trends are assumed to be on non-parallel paths beginning in the baseline period.

K-1.2 Estimates of Integrated Managed Care's Impact on Spending and Utilization

Tables K-1-2 through ***K-1-5*** show annual and overall estimates of IMC impact on health care spending and utilization for Washington Medicaid beneficiaries. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of IMC impacts;
- Relative differences, which measure change in the outcome from the baseline period; and
- p-values, which indicate whether the D-in-D estimates are statistically significant.

K-1.2.1 Estimates of Integrated Managed Care's impact on core outcomes

Table K-1-2 shows the estimates of IMC impact on total spending per beneficiary per month (PBPM), inpatient admissions, and ED visits for Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions relative to comparison beneficiaries.[114], [115] The findings are as follows:

- Changes to total spending PBPM did not differ between Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries during the first two years of implementation.
- Changes to inpatient admissions did not differ between Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries during the first two years of implementation.
- ED visits increased for both Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries but increased by 34.51 fewer visits per 1,000 beneficiaries for the IMC group during the first two years of implementation (p=0.04).

[114] Total spending PBPM, inpatient admissions, and ED visits include both children and adults.
[115] The Washington Medicaid agency did not furnish data on readmissions within 30 days of hospitalization. Accordingly, this outcome could not be analyzed.

Table K-1-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	422.40	380.22	643.42	589.58	8.72 (−61.41, 78.84)	2.1	0.84
Year 2	422.40	380.22	755.58	664.87	45.58 (25.81, 65.36)	10.8	<0.001
Overall	422.40	380.22	684.95	617.60	22.37 (−22.40, 67.13)	5.3	0.41
All-cause acute inpatient admissions per 1,000 population							
Year 1	81.27	73.24	111.13	99.48	0.78 (−2.53, 4.10)	1.0	0.70
Year 2	81.27	73.24	124.69	108.80	3.63 (−2.48, 9.74)	4.5	0.33
Overall	81.27	73.24	116.15	102.95	1.84 (−1.24, 4.92)	2.3	0.33
ED visits per 1,000 population							
Year 1	760.28	843.76	1053.80	1,262.69	−64.88 (−93.36, −36.40)	−8.5	<0.001
Year 2	760.28	843.76	1187.99	1,293.64	17.16 (−37.38, 71.70)	2.3	0.60
Overall	760.28	843.76	1103.48	1,274.21	−34.51 (−61.51, −7.50)	−4.5	0.04

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

(continued)

Table K-1-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries in the Integrated Managed Care and comparison groups (continued)

Methods: The analysis used an OLS model was used to obtain D-in-D estimates for spending outcomes, a Poisson model to obtain D-in-D estimates for ED outcome, and a logistic regression model to obtain D-in-D estimates for inpatient admissions. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 357,260. These numbers include all person–year observations for both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.2.2 Estimates of Integrated Managed Care's impact on behavioral health–related outcomes

Table K-1-3 shows the estimates of IMC impact on behavioral health–related total spending PBPM, the percentage of the study sample with any visit to a behavioral health specialist, behavioral health–related inpatient admissions, and behavioral health–related ED visits for Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions relative to comparison beneficiaries. The findings are as follows:

- Changes to behavioral health–related total spending PBPM did not differ between Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries during the first two years of implementation.
- The percentage of people with a visit to a behavioral health specialist increased for both Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries but increased by 10.2 percentage points more for the IMC group during the first two years of implementation ($p<0.001$).
- Changes to behavioral health–related inpatient admissions did not differ between Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries during the first two years of implementation.
- Behavioral health–related ED visits increased for both Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries but increased by 92.8 fewer visits per 1,000 beneficiaries for the IMC group during the first two years of implementation ($p=0.01$).

Table K-1-3. Differences in the pre–post change in the behavioral health–related outcomes for Medicaid beneficiaries in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Behavioral health–related total spending PBPM ($)							
Year 1	74.20	33.86	217.89	174.97	−0.10 (−60.21, 60.01)	-0.1	0.998
Year 2	74.20	33.86	269.69	193.52	33.16 (1.58, 64.73)	44.7	0.08
Overall	74.20	33.86	237.07	181.88	12.21 (−27.41, 51.83)	16.5	0.61
Percentage of people with visits to a behavioral specialist							
Year 1	21.79	16.11	37.17	18.87	11.87 (7.83, 15.90)	54.4	<0.001
Year 2	21.79	16.11	35.71	20.92	7.27 (0.22, 14.32)	33.4	0.09
Overall	21.79	16.11	36.63	19.63	10.16 (6.52, 13.81)	46.6	<0.001
Behavioral health–related inpatient admissions per 1,000 population							
Year 1	40.97	31.25	67.28	56.49	−5.96 (−16.06, 4.13)	−14.6	0.33
Year 2	40.97	31.25	80.01	62.05	−0.73 (−5.53, 4.06)	−1.8	0.80
Overall	40.97	31.25	71.99	58.56	−4.03 (−10.63, 2.58)	−9.8	0.32
Behavioral health–related ED visits per 1,000 population							
Year 1	203.13	161.78	263.98	301.08	−103.40 (−188.80, −18.00)	−50.9	0.05
Year 2	203.13	161.78	292.27	306.60	−74.71 (−136.07, −13.35)	−36.8	0.05
Overall	203.13	161.78	274.45	303.14	−92.78 (−151.16, −34.39)	−45.7	0.01

(continued)

Table K-1-3. Differences in the pre–post change in the behavioral health–related outcomes for Medicaid beneficiaries in the Integrated Managed Care and comparison groups (continued)

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

Methods: The analysis OLS model to obtain D-in-D estimates for spending outcomes, a logistic regression model for visits to a behavioral health specialist and behavioral health–related inpatient admissions, and a Poisson model to obtain D-in-D estimates for behavioral health ED visits. The estimated probability of a behavioral health–related inpatient admission and the behavioral health–related ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a visit to a behavioral specialist was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 357,260. This number includes all person–year observations for both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.2.3 Estimates of Integrated Managed Care's impact on spending categories

Table K-1-4 shows the estimates of IMC impact on inpatient spending PBPM, ED spending PBPM, professional spending PBPM, and prescription drug spending PBPM for Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions relative to comparison beneficiaries. The findings are as follows:

- Changes to inpatient spending PBPM, ED spending PBPM, and prescription drug spending PBPM did not differ between Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries during the first two years of implementation.
- Professional spending PBPM increased for both Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries but increased by $15.55 more for the IMC group during the first two years of implementation.

Table K-1-4. Differences in the pre–post change in inpatient spending, emergency department spending, professional spending, and prescription drug spending for Medicaid beneficiaries in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PBPM ($)							
Year 1	98.95	74.50	196.36	181.18	−11.08 (−36.13, 13.96)	−11.2	0.47
Year 2	98.95	74.50	220.73	202.23	−7.76 (−17.06, 1.54)	−7.8	0.17
Overall	98.95	74.50	205.38	189.02	−9.85 (−26.00, 6.29)	−10.0	0.32
ED spending PBPM ($)							
Year 1	23.67	24.76	36.53	40.50	−2.89 (−5.68, −0.09)	−12.2	0.09
Year 2	23.67	24.76	38.91	39.10	0.89 (−0.54, 2.32)	3.8	0.30
Overall	23.67	24.76	37.41	39.98	−1.49 (−3.33, 0.35)	−6.3	0.18
Professional spending PBPM ($)							
Year 1	83.66	73.61	106.16	83.65	12.31 (4.87, 19.74)	14.7	0.01
Year 2	83.66	73.61	128.48	97.21	21.07 (12.54, 29.60)	25.2	<0.001
Overall	83.66	73.61	114.42	88.69	15.55 (9.90, 21.20)	18.6	<0.001

(continued)

Table K-1-4. Differences in the pre–post change in inpatient spending, emergency department spending, professional spending, and prescription drug spending for Medicaid beneficiaries in the Integrated Managed Care and comparison groups (continued)

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Prescription drug spending PBPM ($)							
Year 1	108.79	104.16	149.29	147.31	−3.13 (−19.82, 13.55)	−2.9	0.76
Year 2	108.79	104.16	174.48	170.51	−1.14 (−6.66, 4.38)	−1.0	0.73
Overall	108.79	104.16	158.62	155.94	−2.39 (−13.10, 8.31)	−2.2	0.71

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

Methods: The analysis OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N for all models is 357,260. This number includes all person–year observations for both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.2.4 Estimates of Integrated Managed Care's impact on utilization

Table K-1-5 shows the estimates of IMC impact on primary care provider visits for Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions relative to comparison beneficiaries. The finding is as follows:

- The number of primary care provider visits increased for both Medicaid beneficiaries with behavioral health conditions in the Southwest or North Central Regions and comparison beneficiaries but increased by 334.85 fewer visits per 1,000 beneficiaries for the IMC group during the first two years of implementation ($p<0.001$).

Table K-1-5. Differences in the pre–post change in primary care provider visits for Medicaid beneficiaries in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Primary care provider visits per 1,000 population							
Year 1	2,699.92	2,662.81	2,635.15	2,846.83	−250.77 (−364.94, −136.60)	−9.3	<0.001
Year 2	2,699.92	2,662.81	2,943.93	3,420.90	−477.88 (−677.49, −278.26)	−17.7	<0.001
Overall	2,699.92	2,662.81	2,749.47	3,060.45	−334.85 (−437.96, −231.75)	−12.4	<0.001

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; HCA = Health Care Authority; IMC = Integrated Managed Care; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

Methods: The analysis used a Poisson model to obtain D-in-D estimates for all outcomes. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for any primary care provider visits is 357,260. This number includes all person–year observations for both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.3 Estimates of Integrated Managed Care's Impact on Adults with Serious Mental Illness or Serious Mental Illness Plus Chronic Conditions

The IMC model was likely to have the greatest impacts among people with SMI or people with SMI and chronic conditions. People with medium- or high-severity psychiatric conditions according to the Chronic Illness and Disability Payment System (CDPS) scoring system were considered to have SMI. Medium- or high-severity psychiatric conditions included conditions such as schizophrenia, bipolar disorders, or major depressive disorders. People with both SMI and chronic conditions had at least one diagnosis for an SMI and at least one diagnosis for a chronic condition, such as diabetes.

It was possible these two groups could have experienced greater impacts from IMC because prior to implementing IMC, beneficiaries with SMI had their care carved out under a state system. In contrast, beneficiaries with lower levels of behavioral health conditions were able to get appropriate levels of care for their needs through their MCO. Thus, the most fundamental changes in how people accessed care would have occurred among individuals with SMI. The financial integration was also expected to improve care coordination practices, and so, individuals with both SMI and chronic conditions may have benefited more from the IMC model.

K-1.3.1 Estimates of Integrated Managed Care's impact on selected outcomes for adults with serious mental illness only

Table K-1-6 shows the estimates of IMC impact on total spending PBPM, behavioral health–related total spending PBPM, all-cause inpatient admissions, behavioral health–related inpatient admissions, ED visits, and behavioral health–related ED visits for adult Medicaid beneficiaries with SMI attributed to IMC practices relative to adult comparison beneficiaries. The findings are as follows:

- Total spending increased for both adults with SMI in the Southwest or North Central Regions and adult comparison beneficiaries but increased by $86.33 more for the IMC group with SMI during the first two years of implementation (p=0.002).
- Behavioral health–related total spending PBPM increased for both adults with SMI in the Southwest or North Central Regions and adult comparison beneficiaries but increased by $55.14 more for the IMC group with SMI during the first two years of implementation (p=0.08).
- Inpatient admissions increased for both adults with SMI in the Southwest or North Central Regions and adult comparison beneficiaries but increased by 12.08 more admissions per 1,000 beneficiaries for the IMC group with SMI during the first two years of implementation (p=0.01).
- Behavioral health–related inpatient admissions increased for both adults with SMI in the Southwest or North Central Regions and adult comparison beneficiaries but

increased by 6.43 more admissions per 1,000 beneficiaries for the IMC group with SMI during the first two years of implementation (p=0.01).

- ED visits did not differ between adults with SMI in the Southwest or North Central Regions and adults with SMI in comparison regions during the first two years of implementation.

- Behavioral health–related ED visits increased for both adults with SMI in the Southwest or North Central Regions and adult comparison beneficiaries but increased by 107.87 fewer visits per 1,000 beneficiaries for the IMC group with SMI during the first two years of implementation (p=0.02).

Table K-1-6. Differences in the pre–post change in total spending, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	636.82	565.86	908.24	764.86	69.86 (0.44, 139.29)	11.0	0.10
Year 2	636.82	565.86	964.64	774.84	116.28 (94.14, 138.41)	18.3	<0.001
Overall	636.82	565.86	928.25	768.43	86.33 (40.86, 131.81)	13.6	0.002
Behavioral health–related total spending PBPM ($)							
Year 1	101.29	51.27	389.25	297.57	38.90 (−40.99, 118.79)	38.4	0.42
Year 2	101.29	51.27	428.71	291.26	84.67 (53.15, 116.18)	83.6	<0.001
Overall	101.29	51.27	403.25	295.32	55.14 (2.40, 107.88)	54.4	0.08
All-cause acute inpatient admissions per 1,000 population							
Year 1	107.71	98.33	129.41	105.80	12.59 (2.18, 23.00)	11.7	0.05
Year 2	107.71	98.33	132.22	109.92	11.16 (−1.35, 23.67)	10.4	0.14
Overall	107.71	98.33	130.40	107.27	12.08 (4.03, 20.13)	11.2	0.01

(continued)

Table K-1-6. Differences in the pre–post change in total spending, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness in the Integrated Managed Care and comparison groups (continued)

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Behavioral health–related inpatient admissions per 1,000 population							
Year 1	63.81	52.04	99.63	76.87	5.32 (−1.12, 11.75)	8.3	0.17
Year 2	63.81	52.04	105.68	79.23	8.45 (4.84, 12.06)	13.2	<0.001
Overall	63.81	52.04	101.77	77.72	6.43 (2.09, 10.77)	10.1	0.01
ED visits per 1,000 population							
Year 1	1,102.95	1,228.13	1,447.05	1,662.27	−31.47 (−62.83, −0.12)	−2.9	0.10
Year 2	1,102.95	1,228.13	1,490.94	1,648.50	11.42 (−65.35, 88.20)	1.0	0.81
Overall	1,102.95	1,228.13	1,462.63	1,657.35	−16.25 (−50.18, 17.68)	−1.5	0.431
Behavioral health–related ED visits per 1,000 population							
Year 1	329.17	292.56	499.84	578.15	−121.71 (−233.11, −10.31)	−37.0	0.07
Year 2	329.17	292.56	510.97	547.81	−82.72 (−159.33, −6.10)	−25.1	0.08
Overall	329.17	292.56	503.79	567.31	−107.87 (−184.72, −31.03)	−32.8	0.02

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

(continued)

Table K-1-6. Differences in the pre–post change in total spending, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness in the Integrated Managed Care and comparison groups (continued)

Methods: The analysis OLS model to obtain D-in-D estimates for spending outcomes, a Poisson model for ED visit outcomes, and a logistic regression model for inpatient admission outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 87,109. This number includes all person–year observations for adult Medicaid beneficiaries with SMI in both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of Washington Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.3.2 Estimates of Integrated Managed Care's impact on selected outcomes for adults with serious mental illness and one or more chronic conditions

Table K-1-7 shows the estimates of IMC impact on total spending PBPM, behavioral health–related total spending PBPM, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, ED visits, and behavioral health–related ED visits for adult Medicaid beneficiaries with SMI and one or more chronic conditions attributed to IMC practices relative to adult comparison beneficiaries. The findings are as follows:

- Total spending PBPM increased for both adults with SMI and chronic conditions in the Southwest or North Central Regions and adult comparison beneficiaries but increased by $106.60 more for the adult IMC group with SMI and chronic conditions during the first two years of implementation (p=0.001).
- Behavioral health–related total spending did not differ between adults with SMI in the Southwest or North Central Regions and adults with SMI and chronic conditions in comparison regions during the first two years of implementation.
- Inpatient admissions increased for both adults with SMI and chronic conditions in the Southwest or North Central Regions and adult comparison beneficiaries but increased by 14.94 more admissions per 1,000 beneficiaries for the adult IMC group with SMI during the first two years of implementation (p=0.05).
- Behavioral health–related inpatient admissions did not differ between adults with SMI and chronic conditions and adults with SMI and chronic conditions in comparison regions during the first two years of implementation.
- ED visits did not differ between adults with SMI and chronic conditions in the Southwest or North Central Regions and adults with SMI and chronic conditions in comparison regions during the first two years of implementation.
- Behavioral health–related ED visits increased for both adults with SMI and chronic conditions in the Southwest or North Central Regions and adult comparison beneficiaries but increased by 122.66 fewer visits per 1,000 beneficiaries for the adult IMC group with SMI and chronic conditions during the first two years of implementation (p=0.04).

Table K-1-7. Differences in the pre–post change in total spending per beneficiary per month, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness and one or more chronic conditions in the Integrated Managed Care and comparison groups

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)							
Year 1	965.13	844.00	1,333.23	1,108.50	99.68 (17.13, 182.23)	10.3	0.05
Year 2	965.13	844.00	1,354.54	1,110.32	119.17 (84.66, 153.68)	12.3	<0.001
Overall	965.13	844.00	1,340.79	1,109.15	106.60 (51.96, 161.24)	11.0	0.001
Behavioral health–related total spending PBPM ($)							
Year 1	153.23	73.38	576.67	473.45	18.92 (−74.37, 112.21)	12.3	0.74
Year 2	153.23	73.38	619.86	455.18	80.38 (31.31, 129.45)	52.5	0.007
Overall	153.23	73.38	592.00	466.88	40.74 (−21.91, 103.38)	26.6	0.29
All-cause acute inpatient admissions per 1,000 population							
Year 1	147.18	137.31	179.69	150.73	16.13 (−0.32, 32.59)	11.0	0.11
Year 2	147.18	137.31	178.27	153.41	12.78 (−4.60, 30.16)	8.7	0.23
Overall	147.18	137.31	179.19	151.70	14.94 (2.66, 27.22)	10.2	0.05

(continued)

Table K-1-7. Differences in the pre–post change in total spending per beneficiary per month, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness and one or more chronic conditions in the Integrated Managed Care and comparison groups (continued)

Outcome	Baseline period adjusted mean, WA IMC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA IMC	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Behavioral health–related inpatient admissions per 1,000 population							
Year 1	92.65	77.77	144.51	117.48	4.76 (−4.37, 13.89)	5.1	0.39
Year 2	92.65	77.77	148.13	117.75	7.89 (3.03, 12.76)	8.5	0.01
Overall	92.65	77.77	145.80	117.58	5.87 (−0.26, 12.01)	6.3	0.12
ED visits per 1,000 population							
Year 1	1,407.44	1,571.29	1,829.78	2,103.19	−36.21 (−71.81, −0.60)	−2.6	0.09
Year 2	1,407.44	1,571.29	1,813.30	2,035.53	−3.28 (−81.94, 75.38)	−0.2	0.95
Overall	1,407.44	1,571.29	1,823.93	2,078.88	−24.52 (−60.67, 11.63)	−1.7	0.26
Behavioral health–related ED visits per 1,000 population							
Year 1	405.15	374.13	664.87	785.13	−140.25 (−282.50, 1.99)	−34.6	0.10
Year 2	405.15	374.13	656.56	720.19	−90.68 (−190.71, 9.35)	−22.4	0.14
Overall	405.15	374.13	661.92	761.80	−122.66 (−221.04, −24.27)	−30.3	0.04

Notes: CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

(continued)

Table K-1-7. Differences in the pre–post change in total spending per beneficiary per month, behavioral health–related total spending, all-cause acute inpatient admissions, behavioral health–related inpatient admissions, emergency department visits, and behavioral health–related emergency department visits for adult Medicaid beneficiaries with serious mental illness and one or more chronic conditions in the Integrated Managed Care and comparison groups (continued)

Methods: The analysis OLS model to obtain D-in-D estimates for spending outcomes, a Poisson model for ED visit outcomes, and a logistic regression model for inpatient admission outcomes. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 44,006. This number includes all person–year observations for adult Medicaid beneficiaries with SMI and chronic conditions for both the IMC and comparison groups.

Source: Federal Evaluation Team analysis of Washington Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.4 Annual Covariate Balance Between the Integrated Managed Care and Comparison Groups

As described in ***Appendix L****,* annual propensity scores were created for the overall comparison sample at the person–year level and at the inpatient discharge-level and for any comparison subgroups. These subgroups included adults with SMI and adults with SMI and chronic conditions.

Table K-1-8 shows the covariate balance between the IMC and comparison groups in the last baseline year for the overall study sample. (Covariate balance for the discharge-level and subgroup samples are not shown. Covariate balance is also not shown for the earlier baseline years.) The table includes the following:

- The covariate means for the IMC and comparison groups without propensity score weighting;
- The standardized difference between the IMC and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score–weighted means for the comparison group ("comparison weighted"); and
- The standardized difference between the IMC group means and the propensity score–weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the IMC group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so only a table for the last baseline year is presented below.

The analysis included all covariates in ***Table K-1-8*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and the calculation of standardized differences is available in ***Appendix L***.

Table K-1-8 shows the balance between the IMC and comparison group covariates before and after applying weights to person–year observations for Medicaid beneficiaries. Prior to propensity score weighting, standardized differences were above 0.10 for some of the individual-level characteristics and most of the county-level characteristics. After propensity score weighting, standardized differences decreased between the IMC and comparison groups for most characteristics, indicating that propensity score weighting improved the covariate balance. In addition, for all individual-level covariates except for total months of enrollment, standardized differences after propensity score weighting were below the 0.10 threshold, indicating an acceptable level of covariate balance. County-level characteristics did not have standardized differences below the 0.10 threshold except for the percentage of people living in poverty, though propensity score weights did improve the balance for these measures, and in some cases, the weighted means were close.

Table K-1-8. Covariate balance between Integrated Managed Care and comparison groups in the last baseline year for Medicaid beneficiaries

Variable	Unweighted mean or percentage, WA IMC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	58.87	56.93	0.04	59.25	0.01
Age in years	33.95	35.41	0.10	33.79	0.01
Percentage of people who are disabled	10.34	13	0.08	11.08	0.02
Percentage of people who are Black	3.7	9.0	0.23	4.0	0.02
Percentage of people who are White	60.09	58.05	0.04	59.59	0.01
Percentage of people who are another race (non-Black and non-White)	14.98	17.67	0.07	15.01	0.001
Total months of enrollment during year	10.70	10.43	0.10	11.37	0.29
CDPS risk score[a]	0.77	0.86	0.06	0.78	0.01
Percentage of people with an SUD diagnosis	12.94	16.15	0.09	13.59	0.02
Percentage of people with an SMI diagnosis	31.60	37.04	0.12	33.12	0.03
County level					
Percentage of people residing in a Metropolitan Statistical Area	75.48	88.63	0.35	88.25	0.34
Percentage of people living in poverty	11.8	11.92	0.02	12.11	0.08
Hospital beds per 1,000 people	1.65	2.09	0.45	2.07	0.43
Median age in years	36.99	37.55	0.17	37.48	0.14
Percentage of people (under 65 years) without health insurance	18.44	16.09	0.74	16.29	0.65

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities. The CDPS score was logged in the propensity score and D-in-D models, but the unlogged version is reported in the table above.

CDPS = Chronic Illness and Disability Payment System; ICD = International Classification of Diseases; SMI = serious mental illness; SUD = substance use disorder; WA = Washington.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.5 Trends in Core Health Care Spending and Utilization Outcomes

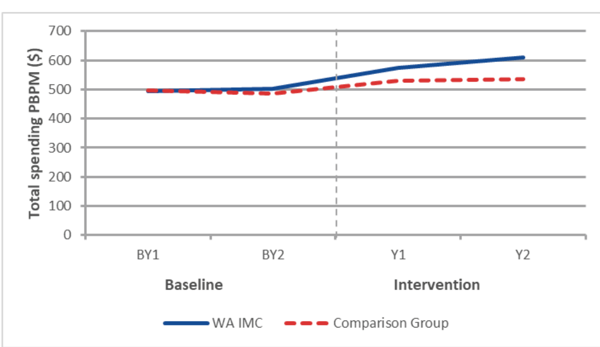
Figures K-1-1 through ***K-1-3*** show propensity score–weighted trends for all analysis years for the core D-in-D outcomes (total spending PBPM, inpatient admissions, and ED visits) for the full sample of Medicaid beneficiaries in the intervention and comparison groups. All outcomes appear to be parallel between the intervention and comparison groups during the baseline period.

As described in ***Appendix L***, the analysis examined outcome trends during the baseline period for the IMC and comparison groups to determine the specifications of the D-in-D models.

The findings are as follows:

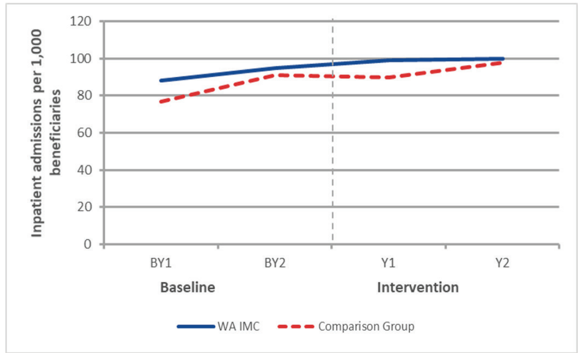
- Total spending PBPM did not change during the baseline period, with increases during the intervention period for both the IMC and comparison groups. The rate was consistently lower in the comparison group than in the intervention group (***Figure K-1-1***). The trends appear to be parallel during the baseline period.
- Inpatient admissions per 1,000 beneficiaries increased slightly during the baseline and intervention periods for both the IMC and comparison groups. The intervention rates were consistently higher than the comparison rates (***Figure K-1-2***). The trends appear to be parallel during the baseline period.
- ED visits per 1,000 beneficiaries decreased the baseline period. The rates did not change as much during the intervention period, and the comparison group rate was consistently higher than the IMC group rate (***Figure K-1-3***). The trends appear to be parallel during the baseline period.

Figure K-1-1. Trends in total spending per beneficiary per month for Medicaid beneficiaries in the Integrated Managed Care and comparison groups



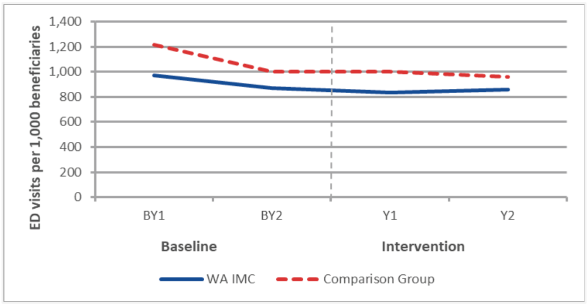
Note: BY = baseline year; IMC = Integrated Managed Care; PBPM = per beneficiary per month; WA = Washington;
Y = year.

Figure K-1-2. Trends in all-cause acute inpatient admissions per 1,000 Medicaid beneficiaries in the Integrated Managed Care and comparison groups



Note: BY = baseline year; IMC = Integrated Managed Care; WA = Washington; Y = year.

Figure K-1-3. Trends in outpatient emergency department visits per 1,000 Medicaid beneficiaries in the Integrated Managed Care and comparison groups



Note: BY = baseline year; ED = emergency department; IMC = Integrated Managed Care; WA = Washington; Y = year.

Source: Federal Evaluation Team analysis of WA Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

K-1.6 Sensitivity Analysis

Table K-1-9 shows how the IMC impact estimates for the core outcomes differ when the D-in-D models assume (1) parallel trends in outcomes between the IMC and comparison groups beginning in the baseline period (same as the main analysis reported in ***Table K-1-2***) and (2) non-parallel trends beginning in the baseline period (sensitivity analysis). The findings for total spending PBPM, inpatient admissions, and ED visits were sensitive to the inclusion of a differential trend in the D-in-D models. The findings are as follows:

- The total spending PBPM D-in-D estimates were in the same direction but were only significant in the sensitivity analysis.
- The inpatient admissions D-in-D estimate was not statistically significant in the main analysis, while the sensitivity analysis showed a statistically significant increase in inpatient admissions.
- The ED visits outcome also was sensitive to the inclusion of a baseline parallel trend in the D-in-D model. In the main analysis, the D-in-D estimate for ED visits was negative and significant; in the sensitivity analysis, the D-in-D estimate for ED visits was positive and not statistically significant.

Table K-1-9. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries in the Integrated Managed Care and comparison groups

Outcome	Main Analysis: Regression-adjusted D-in-D assuming parallel trends (90% CI)	Sensitivity Analysis: Regression-adjusted D-in-D assuming non-parallel trends (90% CI)
Total spending PBPM ($)		
Year 1	8.72 (−61.41, 78.84)	87.13*** (69.82, 104.44)
Year 2	45.58*** (25.81, 65.36)	177.91** (59.26, 296.56)
Overall	22.37 (−22.40, 67.13)	120.74*** (75.48, 166.00)
Inpatient admissions per 1,000 population		
Year 1	0.78 (−2.53, 4.10)	16.07*** (10.51, 21.64)
Year 2	3.63 (−2.48, 9.74)	28.26*** (13.28, 43.24)
Overall	1.84 (−1.24, 4.92)	20.59*** (14.03, 27.15)
ED visits per 1,000 population		
Year 1	−64.88*** (−93.36, −36.40)	−27.23 (−54.95, 0.48)
Year 2	17.16 (−37.38, 71.70)	75.63 (−7.81, 159.06)
Overall	−34.51** (−61.51, −7.50)	10.85 (−24.63, 46.33)

Notes: * p<0.10; ** p<0.05; *** p<0.01.

CDPS = Chronic Illness and Disability Payment System; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; HCA = Health Care Authority; IMC = Integrated Managed Care; OLS = ordinary least squares; PBPM = per beneficiary per month; SMI = serious mental illness; SUD = substance use disorder.

Methods: The analysis used an OLS model to obtain D-in-D estimates for spending outcomes, a logistic regression model to obtain D-in-D estimates for inpatient admission outcomes, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, Medicaid enrollment due to disability, race/ethnicity, a count of total months enrolled in the measurement year, the logged CDPS score, and indicators for SUD and SMI) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the IMC and comparison group outcome trends are parallel during the baseline period.

(continued)

Table K-1-9. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for Medicaid beneficiaries in the Integrated Managed Care and comparison groups (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the IMC group relative to the comparison group after IMC implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the IMC group relative to the comparison group after IMC implementation. The relative difference is the D-in-D estimate as a percentage of the IMC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 357,260. These numbers include all person–year observations for both the IMC and comparison groups.

Source: Washington Medicaid claims data aggregated at the person year level from the WA State Health Care Authority.

Appendix K-2: Washington Accountable Care Network Impact Results

K-2.1 Overview

Since 1993, the Washington Health Care Authority (HCA) has administered both the Medicaid program and the Public Employees Benefits Board (PEBB), the health benefits program for public employees and their families. As a result, the HCA is the largest health care purchaser in the state, spending $12 billion to purchase coverage for over two million Medicaid beneficiaries and PEBB members in 2017.

The PEBB program provides medical, dental, life, and long-term disability coverage to eligible state, local, and higher-education employees and their families. At the onset of the SIM Initiative, the vast majority of PEBB members were enrolled in Uniform Medical Plan (UMP) Classic, a preferred-provider plan for which the HCA self-insured and retained full financial risk.

In support of the state's goals of being a leader in driving value-based purchasing, improving health, and lowering costs, Washington used SIM funding to create an Accountable Care Program model for PEBB members. Known as UMP Plus, the plan was designed to be an attractive alternative for PEBB members who would have otherwise selected UMP Classic. The HCA contracted with two provider networks, known as Accountable Care Networks (ACNs), to "deliver integrated physical, mental health and substance use services" to PEBB members: the Puget Sound High Value Network (PSHVN) and the University of Washington ACN. Compared with UMP Classic, UMP Plus enrollees have lower premiums and out-of-pocket limits. Claims for services provided by ACN providers were paid by Regence BlueShield (UMP's Third-Party Administrator).

In addition to fee-for-service payments, the ACNs were eligible to receive a share of any savings they produced and committed to pay a share of any deficits. The amount paid to or owed by each ACN was determined through an annual reconciliation process that considered cost, quality, and member experience. Two cohorts were defined for purposes of reconciliation: (1) a designated cohort of individuals who were enrolled in one of the ACNs (i.e., UMP Plus members) and (2) an attributed cohort of UMP members who did not chose UMP Plus but received a majority of their primary care from an ACN provider. The designated cohort includes members who chose to enroll in the UMP Plus plans, while the attributed cohort includes members who did not enroll in the UMP Plus plans but received most of their primary care from a provider within the UMP Plus networks. The UMP Plus plans were eligible for shared savings for both cohorts but only faced a financial risk of shared losses for the designated cohort. Eligibility for and the amount of shared savings were determined separately for each cohort as well. For each ACN, savings and deficit shares were calculated separately for the designated and attributed cohorts. The final amount was calculated by adding the **savings or deficit** produced by serving the designated cohort and **any savings** produced by serving the attributed cohort. Each

ACN *was responsible* for deficits associated with UMP Plus members but *was not responsible* for deficits associated with UMP members who did not choose UMP Plus but received primary care from network providers.

Starting in 2016, UMP Plus became available in five counties in the Puget Sound region, enabling PEBB members to choose between the two ACNs (among other coverage options, including a Kaiser plan and a high-deductible plan option). By the 2017 benefit year, UMP Plus was offered to PEBB members living in nine counties. Participation grew steadily in each year of the program and reached nearly 62,000 members in 2018, the final full calendar year of the SIM Initiative. In 2018, approximately 30 percent of PEBB members lived in a county in which an ACN was offered.

State officials saw the increased enrollment and the more than 90 percent retention rate as signs that their members were satisfied with the care provided by the ACNs. During their first three years of operation, both ACNs achieved the maximum quality score, qualifying them for maximum gain sharing. Stakeholders reported that UMP Plus accelerated improvements in the health care networks. As of April 2019, the end of Washington's SIM Initiative, the two ACNs and the HCA remained committed to the UMP Plus model, and the ACNs were renegotiating their contracts with the HCA to increase the model's ongoing financial viability.

Washington is testing whether an ACN plan model for PEBB enrollees can hold providers and delivery systems accountable for providing high-quality care at lower cost and improve health outcomes. The research question for this analysis is as follows:

- To what extent did the ACN model result in changes in health care spending, utilization, and quality of care compared to the UMP Classic model in comparison counties?

The hypotheses for this analysis were that UMP Plus members in the ACN model will have greater access to care than comparison group members, which included similar UMP Classic members who reside in counties that do not offer a UMP Plus option. Increased access to care will result in increased primary care visit rates in the ACN model group relative to the comparison group. Furthermore, increased access to care will result in lower rates of emergency department (ED) visits and inpatient hospitalizations in the ACN model relative to the comparison group. Reductions in inpatient hospitalizations and ED visits will lead to reductions in total spending per member per month (PMPM) in the ACN model group relative to the comparison group. Finally, the provider accountability in the ACN model will result in better quality of care for the ACN model group relative to the comparison group.

It was hypothesized that reductions in spending, inpatient admissions, and ED visits will be larger among members of the designated cohort in the ACN model than among members of the attributed cohort because plans faced financial risks for the designated cohort but not for the attributed cohort.

Table K-2-1 provides a snapshot of the study methods.

Table K-2-1. Methods snapshot

Method	Description
Participating providers	The PSHVN and the University of Washington ACN are the two provider networks participating in the ACN model.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences
Data	Member-level data file derived from PEBB member claims and enrollment data, provided by Washington.
Sample	The analytic sample included 720,582 PEBB members. The intervention group included individuals who were part of the ACN model, either because they were designated to a PEBB UMP Plus plan or because they were attributed to an ACN primary care provider (n=407,292). The comparison group was drawn from PEBB UMP members who reside in counties that never offered an UMP Plus option (i.e., all counties except for Grays Harbor, King, Kitsap, Pierce, Skagit, Snohomish, Spokane, Thurston, and Yakima) (n=313,290) and were not attributed to an ACN primary care provider.
Timeframe	The timeframe for the impact analysis was 2015 through 2018, which includes one baseline year (January 2015–December 2016) and three intervention years (January 2016–December 2018).
Measures	The analysis assessed the effects of the ACN model on three core outcomes: inpatient admissions, outpatient ED visits, and total spending (annual PMPM in dollars). Impacts on additional outcomes included visits to primary care providers, inpatient admissions for ambulatory care sensitive conditions, and four quality screening outcomes including breast cancer, colorectal cancer, cervical cancer, and chlamydia. The analysis included these specific quality measures because shared savings calculations were adjusted based on performance on multiple quality measures, and these are a subset of those measures.
Statistical analysis	The analysis used an OLS model to obtain D-in-D estimates for spending outcomes; a logistic regression model for inpatient admissions, inpatient admissions for ambulatory care sensitive conditions, and the four screening outcomes; and a Poisson model for outpatient ED visits and visits to primary care providers. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in PEBB coverage in the year. Standard errors were clustered at the provider level to account for correlation in outcomes within providers. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: ACN = Accountable Care Network; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PEBB = Public Employees Benefits Board; PMPM = per member per month; PSHVN = Puget Sound High Value Network; UMP = Uniform Medical Plan.

This chapter reports on the impact of the ACN model on spending, utilization, and quality for 407,292 unique plan members who participated in the ACN model.

A full description of the ACN model and a summary of the key impact analysis findings are available in ***Appendix K***. ***Appendix L*** includes an in-depth description of quantitative analysis methods. This appendix provides detailed information on the ACN model impact findings in tables and figures:

- ***Section K-2.2*** presents results of difference-in-differences (D-in-D) analyses for Washington ACN plan members and their comparison group;
- ***Section K-2.3*** presents results of D-in-D analyses separately for those plan members who were designated or attributed, adults, and children for the three core outcomes;
- ***Section K-2.4*** provides information on annual covariate balance between the treatment and comparison groups before and after propensity score weighting; and
- ***Section K-2.5*** describes trends in core outcomes over the analysis timeframe.

Because this analysis only includes one year of baseline data, trends in the ACN model and comparison groups during the baseline period could not be evaluated. As a result, this analysis does not examine the sensitivity of impact estimates to the inclusion of a differential trend in D-in-D models.

K-2.2 Estimates of the Accountable Care Network Model's Impact on Spending, Utilization, and Quality

Tables K-2-2 through ***K-2-5*** show annual and overall estimates of ACN model impact on health care spending, utilization, and quality for Washington's PEBB enrollees. These impact estimates come from D-in-D models, described in ***Appendix L***. For each outcome in each intervention year and for the overall intervention period, the following are presented:

- Regression-adjusted means for the intervention and comparison groups during the baseline period and the intervention period;
- D-in-D estimates of ACN model impacts;
- Relative differences, which measure changes in outcomes from the baseline period; and
- The p-values, which indicate whether the D-in-D estimates are statistically significant.

K-2.2.1 Estimates of the Accountable Care Network model's impact on core outcomes

Table K-2-2 shows the estimates of ACN model impact on total spending PMPM, inpatient admissions, and ED visits for ACN model plan members relative to the comparison group.[116] The findings are as follows:

- Changes in total spending PMPM and inpatient admissions did not differ between ACN model members and comparison plan members during the first three years of implementation.
- ED visits decreased for the ACN group and increased for comparison plan members, leading to a relative decrease of 14.38 visits per 1,000 plan members for designated/attributed members in the ACN model during the first three years of implementation ($p<0.001$).

[116] The WA HCA did not provide data on 30-day readmissions; therefore, this outcome is not included in the core outcomes.

Table K-2-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members in the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PMPM ($)							
Year 1	272.37	211.61	292.25	225.29	6.21 (−4.47, 16.89)	2.3	0.34
Year 2	272.37	211.61	299.16	243.57	−5.16 (−21.94, 11.62)	−1.9	0.61
Year 3	272.37	211.61	296.09	245.87	−10.53 (−32.90, 11.84)	−3.9	0.44
Overall	272.37	211.61	295.90	238.43	−3.40 (−13.56, 6.75)	−1.2	0.58
All-cause acute inpatient admissions per 1,000 population							
Year 1	37.05	37.73	34.50	35.19	−0.05 (−6.29, 6.18)	−0.1	0.99
Year 2	37.05	37.73	33.04	35.06	−1.41 (−5.56, 2.74)	−3.8	0.58
Year 3	37.05	37.73	32.99	31.32	2.27 (−2.16, 6.69)	6.1	0.40
Overall	37.05	37.73	33.49	33.83	0.29 (−2.57, 3.16)	0.8	0.87
ED visits per 1,000 population							
Year 1	156.09	147.59	152.71	148.30	−4.21 (−9.06, 0.65)	−2.7	0.15
Year 2	156.09	147.59	153.24	161.55	−17.90 (−29.30, −6.50)	−11.5	0.01
Year 3	156.09	147.59	150.42	161.13	−20.31 (−32.57, −8.05)	−13.0	0.01
Overall	156.09	147.59	152.10	157.12	−14.38 (−20.30, −8.46)	−9.2	<0.001

(continued)

Table K-2-2. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members in the Accountable Care Network model and comparison groups (continued)

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; PEBB = Public Employees Benefits Board; PMPM = per member per month; ED = emergency department; MARA = Milliman Advanced Risk Adjuster; WA = Washington.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, the MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N is 521,330. This number includes all person–year observations for both the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.2.2 Estimates of the Accountable Care Network model's impact on spending categories

Table K-2-3 shows the estimates of ACN model impact on inpatient spending PMPM, ED spending PMPM, and professional spending PMPM for enrollees in the ACN model relative to the comparison group.[117] The findings are as follows:

- Changes in inpatient spending PMPM and professional spending PMPM did not differ between designated/attributed plan members in the ACN model and comparison plan members during the first three years of implementation.
- ED spending PMPM increased for both designated/attributed plan members in the ACN model and comparison plan members but increased by $1.94 less the ACN group during the first three years of implementation (p=0.01).

[117] The WA HCA did not provide data on pharmacy spending; therefore, that outcome was not included in the spending outcomes.

Table K-2-3. Differences in the pre–post change in inpatient spending, emergency department spending, and professional spending for plan members in the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Inpatient spending PMPM ($)							
Year 1	85.94	71.34	92.62	74.55	3.47 (−5.77, 12.72)	4.0	0.54
Year 2	85.94	71.34	88.92	85.01	−10.69 (−23.36, 1.97)	−12.4	0.16
Year 3	85.94	71.34	84.02	79.06	−9.64 (−24.82, 5.54)	−11.2	0.30
Overall	85.94	71.34	88.40	79.61	−5.83 (−13.20, 1.54)	−6.8	0.19
ED spending PMPM ($)							
Year 1	16.85	15.39	18.18	17.09	−0.36 (−1.65, 0.93)	−2.1	0.65
Year 2	16.85	15.39	19.67	21.49	−3.28 (−5.71, −0.84)	−19.4	0.03
Year 3	16.85	15.39	20.91	21.54	−2.08 (−4.38, 0.21)	−12.4	0.14
Overall	16.85	15.39	19.62	20.08	−1.94 (−3.15, −0.72)	−11.5	0.01
Professional spending PMPM ($)							
Year 1	37.77	35.56	38.31	36.30	−0.20 (−1.16, 0.76)	−0.5	0.73
Year 2	37.77	35.56	38.21	36.21	−0.21 (−1.21, 0.80)	−0.5	0.74
Year 3	37.77	35.56	39.50	37.14	0.15 (−0.42, 0.71)	0.4	0.67
Overall	37.77	35.56	38.69	36.55	−0.08 (−0.58, 0.41)	−0.2	0.78

(continued)

Table K-2-3. Differences in the pre–post change in inpatient spending, emergency department spending, and professional spending for plan members in the Accountable Care Network model and comparison groups (continued)

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MARA = Milliman Advanced Risk Adjuster; OLS = ordinary least squares; PEBB = Public Employees Benefits Board; PMPM = per member per month; WA = Washington.

Methods: The analysis used an OLS model to obtain D-in-D estimates for all outcomes. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, the MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

The total weighted N is 521,330. This number includes all person–year observations for both the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.2.3 Estimates of Accountable Care Network model's impact on utilization

Table K-2-4 shows the estimates of ACN model impact on primary care provider visits for ACN model plan members relative to the comparison group. The finding is as follows:

- The number of primary care provider visits decreased for both designated/attributed plan members in the ACN model and comparison plan members but decreased by 40.70 more visits per 1,000 plan members for the ACN group during the first three years of implementation (p=0.07).

Table K-2-4. Differences in the pre–post change in primary care provider visits for plan members in the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Primary care provider visits per 1,000 population							
Year 1	1,990.86	1,772.45	1,943.47	1,723.54	7.74 (−6.40, 7.95)	0.4	0.86
Year 2	1,990.86	1,772.45	1,870.39	1,708.37	−49.37 (−12.36, 2.49)	−2.5	0.27
Year 3	1,990.86	1,772.45	1,712.67	1,592.15	−76.82 (−12.25, −3.11)	−3.9	0.01
Overall	1,990.86	1,772.45	1,839.09	1,673.89	−40.70 (−7.80, −0.34)	−2.0	0.07

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; MARA = Milliman Advanced Risk Adjuster; PEBB = Public Employees Benefits Board; WA = Washington.

Methods: The analysis used a Poisson model to obtain D-in-D estimates for visits to primary care providers. The estimated primary care visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N is 521,330. These numbers includes all person–year observations for both the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.2.4 Estimates of Accountable Care Network model's impact on quality

Table K-2-5 shows the estimates of ACN model impact on the percentages of ACN members who received cervical cancer screening, breast cancer screening, colorectal cancer screening, and chlamydia screening relative to the comparison group. The finding is as follows:

- The percentage of plan members who received cervical cancer screening increased slightly for both designated/attributed plan members in the ACN model and comparison plan members but increased by 0.50 percentage points more in the ACN group during the first three years of implementation.
- Changes in breast cancer screening, colorectal cancer screening, and chlamydia screening rates did not differ between designated/attributed plan members in the ACN model and comparison plan members during the first three years of implementation.

Table K-2-5. Differences in the pre–post change in cervical cancer screening, breast cancer screening, colorectal cancer screening, and chlamydia screening for plan members in the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of eligible plan members who received cervical cancer screening							
Year 1	74.20	70.43	74.65	70.57	0.32 (0.07, 0.57)	0.4	0.04
Year 2	74.20	70.43	75.02	70.86	0.42 (−0.44, 1.29)	0.6	0.42
Year 3	74.20	70.43	75.31	70.86	0.72 (−0.42, 1.86)	1.0	0.30
Overall	74.20	70.43	75.01	70.76	0.50 (0.003, 1.00)	0.7	0.10
Percentage of eligible plan members who received breast cancer screening							
Year 1	75.60	76.48	75.02	75.89	0.02 (−0.59, 0.63)	0.0	0.96
Year 2	75.60	76.48	74.58	76.31	−0.83 (−2.30, 0.64)	−1.1	0.35
Year 3	75.60	76.48	73.31	75.30	−1.08 (−2.42, 0.27)	−1.4	0.19
Overall	75.60	76.48	74.28	75.80	−0.62 (−1.31, 0.06)	−0.8	0.13
Percentage of eligible plan members who received colorectal cancer screening							
Year 1	61.48	56.68	59.49	54.05	0.56 (0.04, 1.08)	0.9	0.08
Year 2	61.48	56.68	51.63	47.62	−0.97 (−3.37, 1.43)	−1.6	0.51
Year 3	61.48	56.68	62.94	57.62	0.55 (−1.10, 2.21)	0.9	0.58
Overall	61.48	56.68	58.92	53.89	0.16 (−0.81, 1.12)	0.3	0.79

(continued)

Table K-2-5. Differences in the pre–post change in cervical cancer screening, breast cancer screening, colorectal cancer screening, and chlamydia screening for plan members in the Accountable Care Network model and comparison groups (continued)

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Percentage of eligible plan members who received chlamydia screening							
Year 1	44.34	40.86	44.67	40.57	0.64 (−1.23, 2.50)	1.4	0.58
Year 2	44.34	40.86	44.19	43.49	−2.83 (−7.57, 1.92)	−6.4	0.33
Year 3	44.34	40.86	48.81	39.23	6.15 (1.58, 10.72)	13.9	0.03
Overall	44.34	40.86	46.33	40.82	2.04 (−0.42, 4.50)	4.6	0.17

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; MARA = Milliman Advanced Risk Adjuster; PEBB = Public Employees Benefits Board; WA = Washington.

Methods: The analysis used logistic regression model to obtain D-in-D estimates for all outcomes. The estimated probability of each screening was multiplied by 100 to produce a percentage. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for chlamydia screening is 17,314. The total weighted N for breast cancer screening is 62,579. The total weighted N for colorectal cancer screening is 96,102. The total weighted N for cervical cancer screening is 133,921. These numbers include all person–year observations for both the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.3 Estimates of Accountable Care Network Model's Impact on Subpopulations (Designated Enrollees, Attributed Enrollees, Adults, and Children)

Designated and attributed groups are conceptually important subpopulations because ACNs were eligible for shared savings for both groups but only faced a risk of shared losses for the designated population. Almost 90 percent of the total intervention group was ever in the designated cohort. The ACN contract also created different financial incentives for the two groups, and those who chose to enroll were not only aware of their enrollment but also paid lower co-payments than their attributed counterparts.

K-2.3.1 Estimates of Accountable Care Network model's impact on core outcomes for the designated population

Table K-2-6 shows the estimates of ACN model impact on total spending PMPM, all-cause acute inpatient admissions, and ED visits for the designated population in ACN model practices relative to comparison plan members. The findings are as follows:

- Changes to total spending PMPM and inpatient admissions did not differ between designated plan members in the ACN model and comparison plan members during the first three years of implementation.
- ED visits decreased for the designated ACN group and increased in the designated comparison plan member group, leading to a relative decrease of 14.73 visits per 1,000 plan members for designated plan members in the ACN model during the first three years of implementation ($p<0.001$).

Table K-2-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members designated to the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PMPM ($)							
Year 1	272.78	209.09	295.47	222.61	9.17 (−1.39, 19.73)	3.4	0.15
Year 2	272.78	209.09	302.77	242.65	−3.57 (−21.39, 14.25)	−1.3	0.74
Year 3	272.78	209.09	294.06	242.96	−12.59 (−36.51, 11.34)	−4.6	0.39
Overall	272.78	209.09	297.44	236.30	−2.70 (−13.49, 8.10)	−1.0	0.68
All-cause acute inpatient admissions per 1,000 population							
Year 1	36.80	37.61	34.99	35.34	0.41 (−6.06, 6.88)	1.1	0.92
Year 2	36.80	37.61	33.64	35.26	−0.88 (−5.44, 3.69)	−2.4	0.75
Year 3	36.80	37.61	32.70	31.43	1.95 (−2.59, 6.49)	5.3	0.48
Overall	36.80	37.61	33.74	33.98	0.51 (−2.49, 3.52)	1.4	0.78
ED visits per 1,000 population							
Year 1	154.34	147.51	149.77	147.21	−4.34 (−9.76, 1.07)	−2.8	0.19
Year 2	154.34	147.51	150.84	160.96	−17.88 (−30.06, −5.71)	−11.6	0.02
Year 3	154.34	147.51	146.72	160.08	−21.08 (−33.67, −8.50)	−13.7	0.01
Overall	154.34	147.51	149.07	156.23	−14.73 (−20.97, −8.49)	−9.5	<0.001

(continued)

Table K-2-6. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members designated to the Accountable Care Network model and comparison groups (continued)

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MARA = Milliman Advanced Risk Adjuster; OLS = ordinary least squares; PEBB = Public Employees Benefits Board; PMPM = per member per month; WA = Washington.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, the MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications, the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 462,711. This number includes all person–year observations for both members designated to the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.3.2 Estimates of Accountable Care Network model's impact on core outcomes for the attributed population

Table K-2-7 shows the estimates of ACN model impact on total spending PMPM, all-cause acute inpatient admissions, and ED visits among beneficiaries attributed to the ACN model relative to comparison plan members. The findings are as follows:

- Changes to total spending and inpatient admissions did not differ between attributed plan members in the ACN model and comparison plan members during the first three years of implementation.
- ED visits decreased in the attributed ACN group and increased in the attributed comparison plan member group, leading to a relative decrease of 5.12 visits per 1,000 plan members for attributed plan members in the ACN model during the first three years of implementation (p=0.07).

Table K-2-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members attributed to the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PMPM ($)							
Year 1	270.01	227.23	267.58	239.87	−15.07 (−37.54, 7.40)	−5.6	0.27
Year 2	270.01	227.23	266.65	248.25	−24.38 (−44.98, −3.77)	−9.0	0.05
Year 3	270.01	227.23	307.21	258.63	5.81 (−42.06, 53.68)	2.2	0.84
Overall	270.01	227.23	280.21	248.80	−11.36 (−30.06, 7.35)	−4.2	0.32
All-cause acute inpatient admissions per 1,000 population							
Year 1	38.97	37.85	31.22	34.35	−4.31 (−9.67, 1.05)	−11.1	0.19
Year 2	38.97	37.85	28.44	33.98	−6.75 (−13.40, −0.09)	−17.3	0.10
Year 3	38.97	37.85	35.54	30.17	4.69 (−1.96, 11.35)	12.0	0.25
Overall	38.97	37.85	31.70	32.86	−2.18 (−5.78, 1.42)	−5.6	0.32
ED visits per 1,000 population							
Year 1	119.63	108.89	121.70	108.83	2.16 (−6.62, 10.94)	1.8	0.69
Year 2	119.63	108.89	118.19	114.70	−7.83 (−15.73, 0.07)	−6.5	0.10
Year 3	119.63	108.89	117.52	115.87	−9.93 (−16.81, −3.06)	−8.3	0.02
Overall	119.63	108.89	119.17	113.09	−5.12 (−9.69, −0.55)	−4.3	0.07

(continued)

Table K-2-7. Differences in the pre–post change in total spending, inpatient admissions, and emergency department visits for plan members attributed to the Accountable Care Network model and comparison groups (continued)

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OLS = ordinary least squares; MARA = Milliman Advanced Risk Adjuster; PEBB = Public Employees Benefits Board; PMPM = per member per month; WA = Washington.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, the MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 66,103. This number includes all person–year observations for both plan members attributed to the ACN model and the comparison group.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.3.3 Estimates of Accountable Care Network model's impact on core outcomes for children

Table K-2-8 shows the estimates of ACN model impact on total spending PMPM, all-cause acute inpatient admissions, and ED visits for child plan members in the ACN model relative to comparison plan members. The findings are as follows:

- Total spending increased for both child plan members in the ACN model and the child comparison plan member group but increased by $37.36 less for the child ACN group during the first three years of implementation ($p<0.001$).
- Changes to inpatient admissions and ED visits did not differ between child plan members in the ACN model and child comparison plan members during the first three years of implementation.

Table K-2-8. Differences in the pre–post change in total spending, all-cause acute inpatient admissions, and emergency department visits for child plan members in the Accountable Care Network model and comparison groups

Outcome	Baseline period adjusted mean, WA ACN model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, WA ACN model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PMPM ($)							
Year 1	147.54	104.72	155.00	112.28	−0.10 (−24.91, 24.70)	−0.1	0.99
Year 2	147.54	104.72	162.88	169.99	−49.94 (−94.77, −5.10)	−33.8	0.07
Year 3	147.54	104.72	149.10	165.86	−59.58 (−77.62, −41.53)	−40.4	<0.001
Overall	147.54	104.72	155.62	149.98	−37.36 (−55.48, −19.23)	−25.3	<0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	32.55	31.52	28.05	25.50	1.79 (−7.11, 10.69)	5.5	0.74
Year 2	32.55	31.52	27.29	29.57	−3.29 (−12.36, 5.79)	−10.1	0.55
Year 3	32.55	31.52	27.38	27.78	−1.30 (−9.10, 6.50)	−4.0	0.78
Overall	32.55	31.52	27.56	27.65	−0.98 (−5.94, 3.98)	−3.0	0.74
ED visits per 1,000 population							
Year 1	162.23	162.39	153.20	161.08	−7.90 (−59.94, 44.15)	−4.9	0.80
Year 2	162.23	162.39	147.26	168.26	−21.21 (−153.72, 111.30)	−13.1	0.79
Year 3	162.23	162.39	148.50	174.63	−26.37 (−189.43, 136.68)	−16.3	0.79
Overall	162.23	162.39	149.58	168.10	−18.74 (−92.36, 54.88)	−11.6	0.675

(continued)

Table K-2-8. Differences in the pre–post change in total spending, all-cause acute inpatient admissions, and emergency department visits for child plan members in the Accountable Care Network model and comparison groups (continued)

Notes: ACN = Accountable Care Network; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; MARA = Milliman Advanced Risk Adjuster; OLS = ordinary least squares; PEBB = Public Employees Benefits Board; PMPM = per member per month; WA = Washington.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for inpatient admissions, and a Poisson model to obtain D-in-D estimates for ED visits. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models are adjusted for person-level variables (age, gender, a count of total months enrolled in the measurement year, the MARA, employment in state government, and dependent status) and county-level variables (residence in a Metropolitan Statistical Area, percentage uninsured, median age, percentage living in poverty, and supply of short-term acute care hospital beds). All outcome models assume that the ACN model and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the ACN model group relative to the comparison group after ACN model implementation. The relative difference is the D-in-D estimate as a percentage of the ACN model baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models is 143,531. This number includes all child person–year observations for both the ACN model and comparison groups.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.4 Annual Covariate Balance Between the Accountable Care Network Model and Comparison Groups

As described in ***Appendix L**,* the analysis created annual propensity scores for the overall comparison sample at the person–year level and for any comparison subgroups. These subgroups included adults, children, and condition-specific subgroups created for quality outcomes.

Table K-2-9 shows the covariate balance between the intervention and comparison groups in the last baseline year for the overall study sample. (Covariate balances for the discharge-level and subgroup samples are not shown.) The table includes the following:

- The covariate means for the ACN model and comparison groups without propensity score weighting;
- The standardized differences between the ACN model and comparison group means without propensity score weighting ("unweighted standardized differences");
- The propensity score–weighted means for the comparison group ("comparison weighted"); and
- The standardized differences between the ACN model group means and propensity score–weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year using logistic regressions in which the dependent variable was an indicator of inclusion in the ACN model group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences are similar across years, so only a table for the last baseline year is presented below.

The analysis included all covariates in ***Table K-2-9*** in the propensity score models. Additional detail on propensity score covariate selection, propensity score model specification, and calculation of standardized differences is available in ***Appendix L***.

Table K-2-9 shows the balance between ACN model and comparison group covariates before and after applying weights to person–year observations for plan members. Prior to propensity score weighting, standardized differences were above 0.10 for age and some of the area-level characteristics. After propensity score weighting, standardized differences decreased between the ACN model and comparison groups, indicating that propensity score weighting improved covariate balance.

Table K-2-9. Covariate balance between the Accountable Care Network model and comparison groups in the baseline year

Variable	Unweighted mean or percentage, WA ACN model	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	58	53	0.09	58	0.004
Age in years	34.5	36.7	0.11	34.9	0.02
Percentage of people who are state employees	48	47	0.02	47	0.01
Percentage of people who are dependents of a PEBB enrollee	35	34	0.04	35	0.01
Total months of enrollment during year	11.3	11.2	0.05	11.7	0.22
MARA risk score[a]	1.07	0.89	0.07	0.90	0.07
County level					
Percentage of people residing in a Metropolitan Statistical Area	95	52	1.11	90	0.17
Percentage of people living in poverty	10	15	1.35	11	0.06
Hospital beds per 1,000 people	2.0	1.9	0.10	1.9	0.19
Median age in years	37.5	38.6	0.23	37.3	0.10
Percentage of people (under 65) without health insurance	15.0	17.8	1.24	15.5	0.30

Notes: [a] The MARA score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger MARA scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities. The analysis used this risk score (as opposed to other risk score methodologies such as Hierarchical Condition Categories) because this was the risk score that the WA HCA could provide.

ACN = Accountable Care Network; HCA = Health Care Authority; ICD = International Classification of Diseases; MARA = Milliman Advanced Risk Adjuster; PEBB = Public Employees Benefits Board; WA = Washington.

Sources: Federal Evaluation Team analysis of aggregated PEBB member and enrollment data constructed by Milliman and provided by WA State.

K-2.5 Trends in Core Health Care Spending and Utilization Outcomes

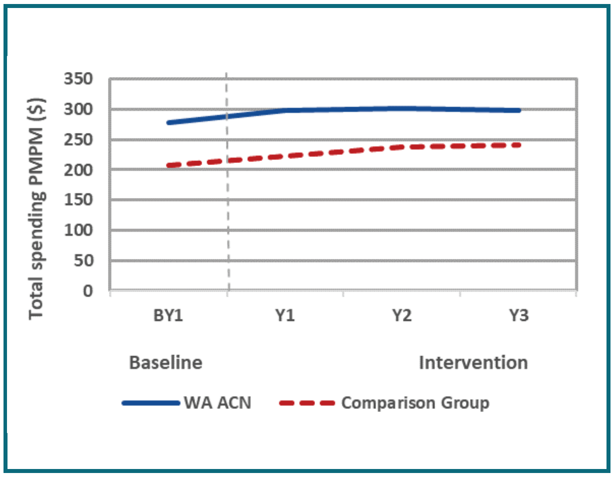
Figures K-2-1 through ***K-2-3*** show propensity score–weighted trends for all analysis years for the core D-in-D outcomes (total spending PMPM, inpatient admissions, ED visits, and readmissions) for the full sample of Medicaid beneficiaries in the ACN model and comparison groups. Because this analysis included data for only one baseline year, it was not possible to visually examine baseline trends in the ACN model and comparison groups. As a result, the D-in-D models for this analysis all assume that outcomes in the ACN model and comparison groups exhibited parallel trends during the baseline period.

K-2.5.1 Trends in core outcomes

Figures K-2-1 through ***K-2-3*** present trends for the three core outcomes (total spending PMPM, inpatient admissions, and ED visits) for the full sample of plan members in the ACN model and comparison groups. The findings are as follows:

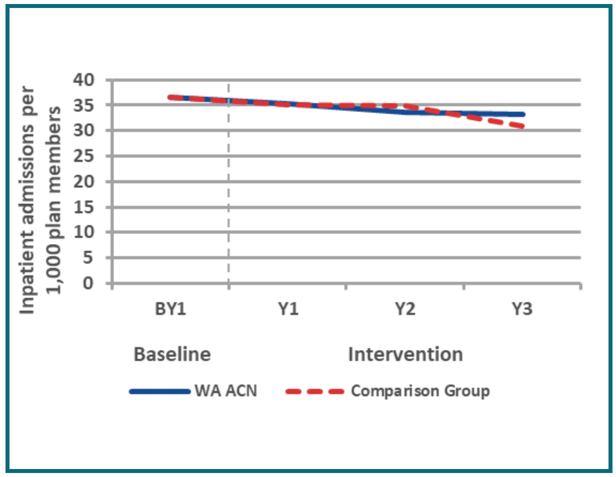
- Total spending PMPM did not increase much during the intervention period. The rate was consistently lower in the comparison group than in the ACN model group (***Figure K-2-1***).
- Inpatient admissions per 1,000 plan members trended down during the intervention period with a slightly faster decrease for the comparison group than the ACN model group (***Figure K-2-2***).
- ED visits per 1,000 plan members increased during the intervention for the comparison group and decreased slightly for the ACN model group (***Figure K-2-3***).

Figure K-2-1. Trends in total spending per member per month for plan members in the Accountable Care Network model and comparison groups



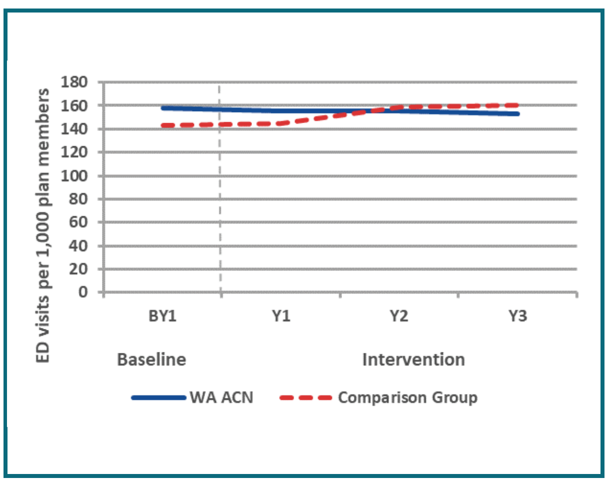
Note: ACN = Accountable Care Network; BY = baseline year; PMPM = per member per month; WA = Washington; Y = year.

Figure K-2-2. Trends in all-cause acute inpatient admissions per 1,000 plan members in the Accountable Care Network model and comparison groups



Note: ACN = Accountable Care Network; BY = baseline year; WA = Washington; Y = year.

Figure K-2-3. Trends in outpatient emergency department visits per 1,000 plan members in the Accountable Care Network model and comparison groups



Note: ACN = Accountable Care Network; BY = baseline year; ED = emergency department; WA = Washington; Y = year.

Sources: Federal Evaluation Team analysis of aggregated Public Employees Benefits Board (PEBB) member and enrollment data constructed by Milliman and provided by WA State.

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Appendix L: Data and Methods

L.1 Qualitative Methods

This section provides detailed descriptions of the methods used to collect the qualitative evaluation data by data type (***Section L.1***), followed by the methods used to analyze those data (***Section L.2***).

L.1.1 Data collection

Stakeholder interviews

From 2016 to 2020, Evaluation Teams assigned to each Round 2 Model Test state (hereafter "State Evaluation Teams") conducted 847 interviews with key SIM Initiative stakeholders to collect in-depth information about the states' planning and implementation processes, progress toward states' goals, and challenges encountered (***Table L-1***). From 2016 to 2019, stakeholder interviews occurred among stakeholders from all 11 Round 2 Model Test states. In 2020, stakeholder interviews were limited to the four Round 2 Model Test states that received no-cost extensions: Connecticut, Michigan, New York, and Tennessee.

Table L-1. Stakeholder interview counts, by state and year

State	Year 1 2016	Year 2 2017	Year 3 2018	Year 4 2019	Year 5 2020[a]	Total
CO	18	19	18	23	0	**78**
CT	16	14	14	14	16	**74**
DE	16	16	17	19	0	**68**
ID	18	19	17	20	0	**74**
IA	17	17	19	19	0	**72**
MI	17	14	22	20	10	**83**
NY	21	18	20	18	19	**96**
OH	18	16	14	15	0	**63**
RI	22	20	18	17	0	**77**
TN	18	15	23	19	12	**87**
WA	20	19	20	16	0	**75**
Total	**201**	**187**	**202**	**200**	**57**	**847**

Notes: [a] Data collection limited to the states that received no-cost extensions: CT, MI, NY, and TN.

CO = Colorado; CT = Connecticut; DE = Delaware; IA = Iowa; ID = Idaho; MI = Michigan; NY = New York; OH = Ohio; RI = Rhode Island; TN = Tennessee; WA = Washington.

To gain a range of perspectives, State Evaluation Teams conducted interviews with the following five major types of key informants:

- State officials;
- Payers and purchasers;
- Providers and provider associations;
- Community partners; and
- Patient and consumer advocacy organizations.

Each state suggested a pool of interview candidates for that state, which Evaluation Team members supplemented after their review of SIM-related documents. State Evaluation Teams selected the final list of interview candidates from this combined list based on the nature of the respective stakeholders' involvement in the SIM Initiative. To encourage candid discussion and protect participants' privacy, the State Evaluation Teams withheld the final lists of interviewees from the state and CMMI. The State Evaluation Teams also assured participants that the evaluation reports would not attribute comments to individuals or their organizations.

State Evaluation Teams used standard interview protocols developed for each stakeholder group. The nature of the interview protocol questions changed over time to align with the stage of the SIM Initiative. In 2016, the questions focused on SIM Initiative design and strategies. In 2017 and 2018, the questions shifted to address implementation progress, changes to SIM Initiative strategies, and early effects of the SIM Initiative. The final interview questions used in 2019 and 2020 examined longer term effects of the SIM Initiative, including changes in participation in value-based payment (VBP) models; the sustainability of SIM Initiative strategies; and lessons learned regarding health care delivery system transformation and payment reform. ***Table L-2*** shows major interview topic areas covered in the 2019 and 2020 interview protocols. Within topics, each State Evaluation Team further tailored the protocols to leverage the knowledge and experience unique to the specific interviewee.

Table L-2. The 2019 and 2020 site visit interview topic areas by key informant type

Topic areas	State officials	Payers and purchasers	Providers and provider associations	Patient and consumer advocacy organizations	Community partners
Information about the respondent and his or her involvement in the state SIM Initiative	✓	✓	✓	✓	✓
Overall progress on state SIM Initiative Operational Model activities	✓	—	—	—	—
Progress toward a preponderance of care covered by VBP models	✓	✓	—	—	—
Governance and policy levers	✓	✓	—	✓	—
Stakeholder engagement	✓	—	—	✓	—
Health care delivery transformation	✓	✓	✓	✓	—
Payment system reform	✓	✓	✓	✓	—
Population health	✓	✓	✓	—	✓
Health IT and other investments	✓	✓	✓	—	—
Workforce	—	—	✓	—	—
Outcomes and impacts	✓	✓	—	✓	—
TA and other support resources	✓	—	✓	—	—
Progress, challenges, and lessons	✓	✓	✓	✓	✓
Sustainability	✓	✓	✓	✓	✓

Note: ✓= topic addressed by informant type; — = topic not addressed by informant type; health IT = health information technology; SIM = State Innovation Model; TA = technical assistance; VBP = value-based payment.

Pairs of State Evaluation Team staff—one interviewer and one designated note taker—conducted the stakeholder interviews. Prior to collecting data, these staff participated in training to clarify their roles, learn interviewing practices, and review note-taking conventions. The interviewer used the previously mentioned interview protocols to guide each interview session, while note takers documented participants' responses.

In 2016, 2018, 2019, and 2020, most interviews were conducted in person during site visits to the Round 2 Model Test states. Interviews typically occurred at the interviewees' workplaces or another location of their choosing. When stakeholders were unavailable to interview in person or at the time of the site visit, interviewers conducted the interview via telephone, either before or after the site visit. In 2017, all interviews were conducted via telephone. Whether conducted in person or via telephone, interviews typically lasted no longer than one hour.

With participants' consent, State Evaluation Teams audio recorded the interviews so the note takers could develop verbatim notes or transcripts after the interviews were complete. All notes, transcripts, and recordings were stored on secured servers accessible only to members of the Evaluation Team.

Focus groups

State Evaluation Teams conducted 139 focus groups with health care professionals and consumers to obtain their perceptions of, and experiences with, SIM Initiative reforms (***Table L-3***). In 2016, 2018, and 2019, focus groups were held in all Round 2 Model Test states. In 2020, focus groups were limited to the Round 2 Model Test states that received no-cost extensions: Connecticut, Michigan, New York, and Tennessee. No focus groups were conducted during 2017 because the Evaluation Team did not conduct in-person site visits and the focus groups were scheduled in conjunction with those visits.

Table L-3. Focus group counts, by state and year

State	Year 1 2016	Year 3 2018	Year 4 2019	Year 5 2020[a]	Total
CO	4	2	4	0	**10**
CT	4	3	4	3	**14**
DE	4	4	4	0	**12**
ID	4	4	4	0	**12**
IA	4	4	4	0	**12**
MI	4	4	2	5	**15**
NY	4	2	3	3	**12**
OH	4	4	4	0	**12**
RI	4	4	4	0	**12**
TN	4	4	3	4	**15**
WA	4	4	5	0	**13**
Total	**44**	**39**	**41**	**15**	**139**

Notes: [a] Data collection limited to the states that received no-cost extensions: CT, MI, NY, and TN.

No focus groups were conducted in 2017 because site visits did not occur.

CO = Colorado; CT = Connecticut; DE = Delaware; IA = Iowa; ID = Idaho; MI = Michigan; NY = New York; OH = Ohio; RI = Rhode Island; TN = Tennessee; WA = Washington.

Each year of data collection, State Evaluation Teams aimed to conduct approximately four focus groups per state—half with health care professionals who were implementing specific health care delivery system or payment reforms and half with consumers affected by the reforms. The number and ratio of groups varied across states and over time because of differences in the reforms pursued in each state, implementation progress, and how easily the professionals and consumers of interest could be identified for focus group recruitment.

The Federal Evaluation Team prepared standardized topic guides for the focus groups with health care professionals and with consumers and then tailored the guides to each Model Test state. ***Table L-4*** shows major focus group topic areas covered in the 2019 and 2020 topic guides.

Table L-4. Focus group discussion topics addressed in 2019 and 2020

Focus group discussion topics	Health care professionals	Health care consumers
Access to care	✓	✓
Care coordination: ADT alerts	✓	✓
Care coordination: provider/care team	✓	✓
Care coordination: referrals to other providers	✓	✓
Care coordination: community referrals/SDoH	✓	✓
Quality of care: preventive screening	✓	✓
BHI	✓	—
Care coordination: costs	✓	—
Community linkages	✓	—
PT facilitators, barriers, and outcomes	✓	—
Payment models	✓	—
Reporting	✓	—
Telehealth	✓	—
Use of data	✓	—
Consumer engagement	—	✓
Support for self-care	—	✓

Note: ✓= topic addressed by informant type; — = topic not addressed by informant type; ADT= admission, discharge, and transfer; BHI = behavioral health integration; PT = practice transformation; SDoH = social determinants of health.

State Evaluation Teams identified one or two locations for the focus groups in each of the 11 Model Test states. The locations were selected to ensure sufficient concentrations of the targeted populations from which to recruit participants. If targeted populations were not concentrated in any single location, State Evaluation Teams arranged virtual focus groups.

Once the State Evaluation Teams identified the target focus group populations and locations, they worked with the states to acquire lists of names and contact information for eligible participants. To ensure focus groups of sufficient size, for every 12 desired focus group participants, the teams typically requested a recruitment list of at least 100 individuals. State Medicaid agencies and other offices responsible for health care transformation typically provided the recruitment lists.

Table L-5 shows the detailed inclusion criteria and list sources for the final set of focus groups conducted in each state. State Evaluation Teams developed screening criteria for each focus group to recruit health care professionals and consumers. Across states,

- providers were typically required to be licensed, to have practiced medicine for at least one year, and to accept Medicaid; and
- patients were typically required to be adults aged 18–64 years, to have received care within the past six to 12 months, and to have the ability to converse in English.

Table L-5. Focus group selection criteria, recruitment sources, by state

Description (location/virtual)	List source/procedures
CO	
Health care professionals	
Providers affiliated with SIM Cohorts 2 and 3 practices (Denver)	State SIM office
Providers affiliated with SIM Cohorts 2 and 3 practices (virtual)	State SIM office
Consumers	
Medicaid beneficiaries attributed to Cohorts 2 and 3 primary care practices who have used a BH service (Denver)	State Medicaid agency
Medicaid beneficiaries attributed to Cohorts 2 and 3 primary care practices who have not used a BH service (Denver)	State Medicaid agency
CT	
Health care professionals	
Providers affiliated with the PCMH+ practice participating in shared shavings program (Hartford)	List from the state Medicaid agency
Providers affiliated with the PCMH+ practice participating in shared savings program (New Haven)	List from the state Medicaid agency
Community health workers from entities participating in CCIP (Waterbury)	List from the Office of Health Strategy

(continued)

Table L-5. Focus group selection criteria, recruitment sources, by state (continued)

Description (location/virtual)	List source/procedures
DE	
Health care professionals	
Provider participating in the BH integration initiative Cohort 1 or Cohort 2 from a primary care or BH practice (Wilmington)	State SIM office
Provider participating in the BH integration initiative Cohort 1 or Cohort 2 from a primary care or BH practice (virtual)	State SIM office
Consumers	
Medicaid beneficiaries attributed to BH integration initiative Cohort 1 or 2 primary care practices who have used BH services (Wilmington)	State Medicaid agency
Medicaid beneficiaries attributed to BH integration initiative Cohort 1 or 2 primary care practices who have used BH services (Wilmington)	State Medicaid agency
ID	
Health care professionals	
Primary care providers who accept Medicaid and are affiliated with a practice participating in the State Health Improvement Plan (Boise)	State Medicaid agency
Primary care providers who accept Medicaid and are affiliated with a practice participating in the State Health Improvement Plan (Boise)	State Medicaid agency
Consumers	
Medicaid beneficiaries attributed to a practice participating in the State Health Improvement Plan (Boise)	State Medicaid agency
Medicaid beneficiaries attributed to a practice participating in the State Health Improvement Plan (Boise)	State Medicaid agency
IA	
Health care professionals	
Providers who are contracted with a Medicaid MCO and practicing in communities with a C3 implementation grant (Knoxville)	State Medicaid agency
Providers who are contracted with a Medicaid MCO and practicing in communities with a C3 implementation grant (West Des Moines)	State Medicaid agency
Consumers	
Patients who have a Medicaid MCO plan residing in communities with a C3 implementation grant (Knoxville)	State Medicaid agency
Patients who have a Medicaid MCO plan residing in communities with a C3 implementation grant (West Des Moines)	State Medicaid agency

(continued)

Table L-5. Focus group selection criteria, recruitment sources, by state (continued)

Description (location/virtual)	List source/procedures
MI	
Health care consumers	
Consumers served by the Genesee CHIR (Flint)	Recruitment by CHIR
Consumers served by the Jackson CHIR (Jackson)	List from CHIR
Consumers served by the Livingston-Washtenaw CHIR (Ann Arbor)	Recruitment by CHIR
Consumers served by the Muskegon CHIR (Muskegon)	List from CHIR
Consumers served by the Northern CHIR (Traverse City)	Participants call in after learning about the focus groups from a flyer, provider, or care coordinator
NY	
Health care professionals	
PCPs working in practices receiving SIM-funded TA to help them adopt the NCQA NYS PCMH model of care (virtual with providers from New York City)	List from the state SIM office
CPs working in practices receiving SIM-funded TA to help them adopt the NCQA NYS PCMH model of care (virtual with providers from New York City)	List from the state SIM office
PCPs working in practices receiving SIM-funded TA to help them adopt the NCQA NYS PCMH model of care (virtual with providers from Upstate New York)	List from the state SIM office
OH	
Health care professionals	
Ohio CPC providers (Cincinnati)	State Medicaid agency
Ohio CPC providers (virtual)	State Medicaid agency
OB/GYNs identified as PAPs for Perinatal Episodes (Cincinnati)	State Medicaid agency
Consumers	
Medicaid beneficiaries attributed to Ohio CPC with high risk-adjusted PMPM paid to CPC practices (Cincinnati)	State Medicaid agency
RH	
Health care professionals	
Providers affiliated with PCMH-Kids practices (Providence)	State partner organization
Providers affiliated with integrated BH practices (Providence)	State partner organization
Users of the care management dashboard in CMHCs (Providence)	State partner organization
Consumers	
Parents or caregivers of children with a complex condition assigned to a PCMH-Kids practice (Providence)	State Medicaid agency

(continued)

Table L-5. Focus group selection criteria, recruitment sources, by state (continued)

Description (location/virtual)	List source/procedures
TN	
Health care professionals	
Administrators and quality managers in nursing facilities that provide LTSS (virtual)	List from the state Medicaid agency
Nursing case managers, supervisors, and administrators in nursing facilities participating in the LTSS Enhanced Respiratory Care Program (virtual)	List from the state Medicaid agency
Health care consumers	
Medicaid beneficiaries receiving Health Link services (Nashville)	List from the state Medicaid agency
Parents of children with an asthma exacerbation event qualifying for EOC (Nashville)	List from the state Medicaid agency
WA	
Health care professionals	
Medicaid MCO medical providers who treated patients with chronic conditions and who also received ongoing care at a mental health clinic for a serious mental illness or at a substance use disorder treatment center (Vancouver)	State Health Care Authority
Medicaid MCO BH providers (Vancouver)	State Health Care Authority
PEBB providers, affiliated with either the University of Washington Accountable Care Network or Puget Sound High Value Network (Seattle)	State Health Care Authority
BH clinic directors (virtual)	June 2018 Washington State Directory of Certified Mental Health, Substance Use Disorder, and Problem & Pathological Gambling Services
Consumers	
Medicaid beneficiaries with chronic conditions who received treatment at a PM1 participating mental health clinic or substance abuse treatment center (Vancouver)	State Health Care Authority

Notes: BH = behavioral health; C3 = Community and Clinical Care; CHIR = Community Health Innovation Region; CMHC = community mental health center; CO = Colorado; CPC = Comprehensive Primary Care; CT = Connecticut; EOC = episode of care; DE = Delaware; IA = Iowa; ID = Idaho; LTSS = long-term services and supports; MCO = managed care organization; MI = Michigan; NCQA = National Committee for Quality Assurance; NY = New York; NYS = New York State; OB/GYN = obstetrician-gynecologist; OH = Ohio; PAP = principal accountable provider; PCMH = patient-centered medical home; PCMH+ = Person Centered Medical Home Plus; PCMH-Kids = Patient-Centered Medical Home-Kids; PCP = primary care provider; PEBB = Public Employees Benefit Board; PMPM = per member per month; PM1 = Payment Model 1; RI = Rhode Island; SIM = State Innovation Model; TA = technical assistance; TN = Tennessee; WA = Washington.

Table reflects the selection criteria used in the final round of focus groups for each Round 2 Model Test state. The NY consumer group was canceled because of limited interest.

The Evaluation Team used letters and telephone calls to screen and recruit focus group participants. Focus group candidates received information about the purpose of the groups, eligibility, compensation for travel, expected time commitments, and incentives (i.e., $300 per professional and $75 per consumer) to encourage their participation. Each group was overrecruited to account for last-minute conflicts and no-shows. An average of six or seven professionals or consumers ultimately participated in each group.

A single Evaluation Team member moderated the focus groups for all 11 Round 2 Model Test states, with occasional co-moderation for a particular state by a State Evaluation Team member. Each focus group lasted less than two hours, including time to review the focus group processes and obtain informed consent.

Focus group moderators used discussion guides customized for each state's SIM Initiative and obtained consent from each participant to audio-record the discussions. After each focus group session, the Evaluation Team had the audio recordings professionally transcribed and used the transcripts for all subsequent analysis.

L.1.2 SIM Initiative meetings

During the implementation period, State Evaluation Teams conducted monthly evaluation calls with representatives from most Round 2 Model Test states and their SIM Project Officers. These calls provided an opportunity for the State Evaluation Teams to (1) hear states' planning and implementation progress updates, particularly their self-identified successes and challenges; (2) request access to data needed for the evaluation; and (3) coordinate the State Evaluation Team's evaluation with the states' self-evaluation plans.

State Evaluation Teams also attended biweekly state-specific SIM program calls with representatives from the Round 2 Model Test states and their SIM Project Officers. During these calls, the Federal Evaluation Team listened as the representatives from the Model Test states updated their SIM Project Officers about their planning and implementation progress, including key information about specific models.

L.1.3 State Innovation Model Initiative documents

Throughout the evaluation period, State Evaluation Teams reviewed new documents relevant to SIM implementation as they became available. The documents included the following:

- State profiles from the State Health Access Data Assistance Center;
- Quarterly and annual reports;
- State-reported model and payer participation and state health care landscape metrics, reported through the CMS Salesforce portal;

- Stakeholder meeting notes; and
- Other materials made publicly accessible or provided by the states to the Federal Evaluation Team.

The Federal Evaluation Team also regularly reviewed states' SIM websites, materials distributed through any SIM Initiative listservs, press releases that discussed the states' SIM Initiatives, and news articles about SIM Initiatives and related state health policy developments.

L.1.4 Qualitative data analysis

Analysis of the qualitative data occurred in three steps: site visit debriefings, state-level thematic analysis, and cross-state thematic analysis.

Site visit debriefings

Starting in 2019, at the conclusion of each site visit, State Evaluation Team members met to discuss initial impressions and findings regarding broad topic areas of relevance to the research questions. The broad topic areas included delivery models and payment reforms, progress toward a preponderance of care in VBP and alternative payment models (APMs), enabling strategies, population health, and governance and sustainability. Team members recorded their early impressions and findings in a debriefing template, organized by topic, and with space to record data sources (i.e., interviews and focus groups) that supported their initial insights. The debriefings helped the State Evaluation Team members quickly synthesize information and identify gaps in knowledge for follow-up.

State-level thematic analysis

State Evaluation Teams distilled findings using a thematic analysis template prepared in Microsoft Excel. The template listed different topics on each tab identical to those used in the debriefing template. State Evaluation Team members prepopulated the thematic analysis template with initial impressions and findings from the debriefings and then used interview transcripts, focus group transcripts, SIM Initiative meeting notes, and SIM Initiative documents to develop their initial impressions and findings into themes. For each theme, State Evaluation Team members documented data sources with supporting details and also noted any contradictory information. State Evaluation Team members refined the themes through discussion with other Federal Evaluation Team members.

After State Evaluation Teams completed the thematic analysis, they prepared findings in a narrative form using a standard template for state reports that facilitated comparisons across states.

Cross-state thematic analysis

The Federal Evaluation Team synthesized findings across states by using the state-specific reports. First, the team aggregated all information relevant to key evaluation topics from across the state reports using NVivo qualitative analysis software. Next, subject matter experts developed themes related to the key evaluation topics by using the same thematic analysis process that the State Evaluation Teams had used to prepare the state-specific reports. The subject matter experts presented their initial findings to the State Evaluation Teams for feedback and refined them accordingly before finalizing the cross-state results.

L.2 Model-Specific Impact Evaluation Methods

This chapter summarizes the methods for quantitatively assessing impacts of state-specific ("model-specific") SIM models on health care spending, utilization, and quality of care.

The models that the Federal Evaluation Team selected as the focus of the model-specific impact evaluations in each Round 2 Model Test state possessed the following characteristics:

- The model had to be well defined and target a specific population that ideally could be individually identified. The target population was identified by its primary providers or other personal characteristics. If a target population could not be individually identified, the Federal Evaluation Team considered alternatives, such as geography, for identifying the target population in the model-specific analysis.
- Appropriate data were available for the analysis. Further, the model was implemented in the state early enough during the Round 2 Model Test period to allow adequate follow-up time for claims data to be processed, adjudicated, and entered into the claims databases before the end date of the federal evaluation contract.
- At least one model was selected from each Model Test state.
- Similar models were prioritized across Model Test states to facilitate cross-state comparisons of results.

As shown in ***Table L-6*,** 14 model-specific analyses were selected for evaluation: three Behavioral Health Integration Models (Colorado Integrated Behavioral Health [IBH], Tennessee Health Link, and Washington Integrated Managed Care [IMC]), six Patient-Centered Medical Home and Practice Transformation Models (Connecticut Person-Centered Medical Home Plus [PCMH+]), Delaware Practice Transformation Initiative [PTI], Idaho Practice Transformation Support Program, New York State PCMH, Ohio Comprehensive Primary Care [Ohio CPC], and Rhode Island Patient-Centered Medical Home-Kids [PCMH-Kids]), two episodes of care (EOCs) models (Ohio and Tennessee), three other models (Iowa Community and Clinical Care [C3], Michigan Community Health Innovation Region [CHIR], and Washington Accountable Care Networks [ACNs]). The remainder of this section provides more details about the overall analytic approach for the model-specific analyses.

Table L-6. Model-specific analyses selected for impact evaluation

Model	Population	Data source	Pre-intervention years	Post-intervention years
Behavioral health integration model-specific analyses				
CO—Integrated Behavioral Health	Medicaid, Medicare, and Commercial	APCD	Cohort 1: 2013–2016 Cohort 2: 2014–2017	Cohort 1: 2016–2018 Cohort 2: 2017–2018
TN—Health Link	Medicaid	TN Medicaid claims	2013–2016	2016–2018
WA—Integrated Managed Care	Medicaid	WA Medicaid data	Southwest Region: 2014–2016 North Central Region: 2016–2017	Southwest Region: 2016–2018 North Central Region: 2018
Patient-centered medical home/practice transformation model-specific analyses				
CT—Person Centered Medical Home Plus	Medicaid	CT Medicaid claims	2014–2016	2017–2018
DE—Practice Transformation Initiative	Medicaid	DE Medicaid claims	Cohort 1: 2014–2015 Cohort 2: 2014–2016 Cohort 3: 2014–2016	Cohort 1: 2016–2018 Cohort 2: 2016–2019 Cohort 3: 2016–2019
ID—Practice Transformation Support Program	Medicaid	ID Medicaid claims	Cohort 1: 2013–2015 Cohort 2: 2014–2016	Cohort 1: 2016–2017 Cohort 2: 2016–2018
NYS—Patient-Centered Medical Home	Commercial	FAIR Health	2016	2019
OH—Comprehensive Primary Care	Medicaid	OH Medicaid claims	Cohort 1: 2014–2016 Cohort 2: 2014–2017 Cohort 3: 2014–2018	Cohort 1: 2017–2018 Cohort 2: 2017–2018 Cohort 3: 2018
RI—Patient-Centered Medical Home-Kids	Medicaid and commercial	APCD	2012–2014	2015–2018
Episodes of care perinatal and asthma model-specific analyses				
OH	Medicaid	MAX and T-MSIS	2013–2015 (perinatal) 2014-2015 (asthma)	2016–2019
TN	Medicaid	MAX and T-MSIS	2013–2014	2015–2019

(continued)

Table L-6. Model-specific analyses selected for impact evaluation (continued)

Model	Population	Data source	Pre-intervention years	Post-intervention years
Other Model-Specific Analyses				
IA—Community and Clinical Care	Statewide	BRFSS	2013–2015	2018–2019
MI—Community Health Innovation Region	Medicaid beneficiaries	T-MSIS	2016–2017	2018–2019
WA—Accountable Care Networks	State employees	WA PEBB data	2015–2016	2016–2018

Note: APCD = all-payer claims database; BRFSS = Behavioral Risk Factor Surveillance System; CO = Colorado; CT = Connecticut; DE = Delaware; IA = Iowa; ID = Idaho; MAX = Medicaid Analytic eXtract; MI = Michigan; NYS = New York State; OH = Ohio; PEBB = Public Employees Benefit Board; RI = Rhode Island; T-MSIS = Transformed Medicaid Statistical Information System; TN = Tennessee; WA = Washington.

L.2.1 Data sources

Data sources for each model-specific analysis are shown in ***Table L-6***. Most analyses used claim-level data; three analyses used aggregated data derived from claims; and one analysis used Behavioral Risk Factor Surveillance System (BRFSS) data.

Medicaid data

Claims data included medical claims for inpatient, facility, outpatient, professional, and pharmacy services. Enrollee eligibility and sociodemographic information are provided in enrollment data files.

Of the 14 model-specific analyses, eight used primarily Medicaid claims and enrollment data (Connecticut PCMH+, Delaware PTI, Idaho practice transformation support, Michigan CHIRs, Ohio CPC, Ohio EOC, Tennessee EOC, and Tennessee Health Link). Five analyses used claim-level state-provided Medicaid claims data; three analyses (Michigan CHIR, Ohio EOC and Tennessee EOC) used federal Medicaid claims datasets. The Michigan CHIR analysis used Michigan Transformed Medical Statistical Information System (T-MSIS) data. The Ohio and Tennessee EOC analyses used both Medicaid Analytic Extract (MAX) and T-MSIS data from Ohio, Tennessee, Kansas, Kentucky, and South Carolina. One analysis (Washington IMC) used person-level—rather than claim-level—data provided by Washington State. All claims-based data sets were unbalanced panels: there were repeated observations for many, but not all, individuals in the data.

Commercial claims-derived data

The New York State PCMH (NYS PCMH) and the Washington ACN analyses used data derived from claims. The Washington ACN analyses used person-level data. The New York analysis used provider month–level data. Outcome measures in the New York data, provided by

FAIR Health, were constructed by aggregating all commercially insured patient claims from primary care providers (PCPs) in New York in each month. Providers were identified for inclusion in the New York data using both a NYS PCMH registry and the National Plan and Provider Enumeration System (NPPES). The registry allowed for the selection of individual providers affiliated with NYS PCMH practices. The NPPES was used to select comparison providers by specialty and ZIP code. Unlike the individual-level claims data sources, the data for the NYS PCMH analysis formed a balanced panel; all providers were represented in both years in the data set.

All-payer claims databases

The Colorado and Rhode Island analyses used APCDs as their principal data sources. The Colorado all-payer claims data, administered by the Center for Improving Value in Health Care, includes health insurance claims from the 20 largest health plans for individual, large group fully insured, small group, and some self-insured lives, as well as Medicaid and Medicare. Together, these claims represent more than 3.5 million unique covered lives and more than 65 percent of the insured population in Colorado.

In addition to all-payer claims data, the Colorado analysis used supplemental Medicaid behavioral health encounter data. Prior to July 1, 2018, Colorado Medicaid paid behavioral health organizations a capitated payment to provide services to Medicaid enrollees in need of behavioral health treatment. This behavioral health service was “carved out” of the traditional fee-for-service Medicaid program. As a result, detail on the services rendered under this capitated payment were not comprehensively reported in the APCD. These behavioral health encounter data were provided by Colorado’s Medicaid agency to supplement the APCD data.

HealthFacts RI is the Rhode Island APCD. HealthFacts RI, maintained by Onpoint Health Data, includes health insurance claims from the nine largest health plans for individual, large-group fully insured, small group, some self-insured lives, and Medicaid and Medicare. Together, these claims represent more than 1 million unique covered lives.

The Colorado and Rhode Island model-specific analyses utilized the APCD to present impact estimates by payer type. The model-specific analysis for Colorado’s IBH model presents the model’s estimated effects on Medicaid, Medicare, and commercial populations separately. Similarly, the model-specific analysis for Rhode Island’s PCMH-Kids model presents that model’s impacts on Medicaid and commercial children.

Behavioral Risk Factor Surveillance System data

The Iowa C3 analysis used BRFSS data from Iowa. The BRFSS is a nationwide telephone survey that collects U.S. residents’ data on their self-perceived health-related risk behaviors, chronic health conditions, and use of preventive services. The survey is sponsored by and hosted at the Centers for Disease Control and Prevention (CDC) and numerous other federal and state health agencies. Each month, the Iowa-specific surveillance system conducts structured telephone interviews on a random sample of adults 18 years and older living in private residences or college housing throughout the state. The BRFSS is a cross-sectional data set, so individuals are only observed once in the data.

Area Health Resources Files

All analyses, except for the NYS PCMH analysis, also used AHRF data for county-level covariates in the propensity score and outcome models. The AHRF comprises data collected by the Health Resources and Services Administration from more than 50 sources containing more than 6,000 variables related to health care access at the county level.

L.2.2 Intervention and comparison group selection

All model-specific analyses included difference-in-differences (D-in-D) modeling, as described in ***Section L.2.4***. Inference from D-in-D modeling relies on the selection of a comparison group that provides a proxy for the counterfactual. The counterfactual informs the outcomes that would have occurred without the SIM Initiative, against which the analysis can compare the observed outcomes for individuals who were part of the SIM Initiative. Intervention and comparison group definitions for each model-specific analysis are summarized in the ***Methods snapshot*** section of quantitative ***Appendices A-1*** through ***K-2***.

The general approach across the model-specific analyses was to consider individuals who were ever part of the model under examination to be in the intervention group and to consider similar individuals in the state who were never part of the model to be in the comparison group. This approach to intervention and comparison group construction was selected for two key reasons. First, it allowed for the possibility that a practice-level intervention may have impacts on individual outcomes that persist after that person is no longer attributed to an intervention practice. Second, it preserved sample size in the intervention group. The EOC analyses were an exception to this approach. Unlike most of the other model-specific analyses, observations for the EOC analysis were at the episode-level rather than the person level. For the EOC model-specific analyses, the intervention and comparison groups included Medicaid beneficiaries with episodes (perinatal or asthma) in the focal state that occurred within the study timeframe. Beneficiary utilization and spending that did not occur within the timeframe of an episode was not included in the EOC analyses.

Intervention and comparison group samples included both children and adults together to produce a single estimate of each model's impact in the overall target population. The exception is the child-only sample for the model-specific analysis for Rhode Island's PCMH-Kids. Unlike other models, PCMH-Kids had a pediatric focus. Model impacts were also estimated separately for adults and children.

Dual Medicare-Medicaid beneficiaries were excluded from the intervention and comparison group samples in most claims-based analyses that included Medicaid beneficiaries (Connecticut's PCMH+ model, Delaware's PTI model, Idaho's practice transformation support program, Michigan's CHIR model, Ohio CPC and EOC, Rhode Island's PCMH-Kids, and Tennessee EOC). Because Medicaid is the payer of last resort for dual Medicare-Medicaid beneficiaries, data on these beneficiaries' spending and utilization are incomplete. Furthermore, in some analyses dual Medicaid-Medicaid beneficiaries were not part of the target population. Dual Medicaid-Medicare beneficiaries were explicitly excluded by Ohio and Connecticut from the Ohio CPC and the Connecticut PCMH+ models. For Rhode Island's PCMH-Kids model, the pediatric focus meant that dual Medicare-Medicaid beneficiaries were a negligible part of the sample. Dual Medicare-Medicaid beneficiaries were included in the Tennessee Health Link analysis because they represented approximately 20 percent of Health Link enrollees in the data used for the D-in-D analysis.

Assignment of patients to providers or practices

Assignment of individuals to SIM-participating providers or practices was a feature of eight model-specific analyses that used person-level observations (Colorado IBH, Delaware PTI, Idaho practice transformation support, Ohio CPC, Rhode Island PCMH-Kids, Tennessee Health Link, and Washington ACN).[118] In these models, assignment to a provider or a practice based on that person's health care utilization patterns, as recorded in health care claims data. For five analyses (Colorado IBH, Idaho practice transformation support, Ohio CPC, Tennessee Health Link, and Washington ACN), states provided lists of people assigned to SIM-participating practices or providers. These lists were linked to claims data. For the Rhode Island PCMH-Kids analysis, the intervention group was constructed by replicating—to the extent possible—the state's attribution process in the claims data. For the Delaware PTI analysis, there was no official state methodology for assignment of patients to providers, so an assignment algorithm was developed to identify where Medicaid beneficiaries received the preponderance of their primary care. For the Ohio CPC and Tennessee Health Link analyses, possible comparison group members were also identified from lists provided from the state. (In the Ohio CPC analysis, comparison group members were attributed to non–Ohio CPC practices. For the Tennessee Health Link analysis, comparison group individuals were attributed to Health Link practices but not enrolled in the model.) For five other analyses (Colorado IBH, Connecticut PCMH+, Rhode Island, PCMH-Kids, and Washington ACN) beneficiaries were assigned to non-SIM practices or providers to create comparison groups. These assignment algorithms replicated the algorithms used to create the intervention groups. For the Idaho practice transformation support analysis, all individuals not in the intervention group were in the comparison group; no assignment algorithms were applied.

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[118] FAIR Health assigned commercially insured patients to providers to produce the provider-month level data set for the NYS PCMH analysis.

For the eight model-specific analyses that included the assignment of patients to providers, the percentage of individuals who were in the sample in all analysis years varied—from 21 percent of commercially insured children for the Rhode Island PCMH-Kids analysis to 72 percent of Medicaid beneficiaries in the Connecticut PCMH+ analysis. In five analyses, more than half of the sample was included in all analysis years (53 percent for Ohio CPC, 57 percent for Delaware PTI, 60 percent for Washington ACN, 63 percent for Tennessee Health Link, and 66 percent for Medicare beneficiaries in Colorado IBH). For the other analyses that included assignment to providers, between 35 percent and 43 percent of the samples were in all analysis years (35 percent for the Medicaid children in Rhode Island PCMH-Kids, 35 percent for commercial plan members in Colorado IBH, 39 percent for Idaho practice transformation support, and 43 percent for Medicaid beneficiaries in Colorado IBH).

In almost all analyses involving patient assignment, more than 50 percent of the sample was in either all years or all years but one (Colorado IBH, Connecticut PCMH+, Delaware PTI, Idaho practice transformation support, Ohio CPC, Tennessee Health Link, and Washington ACN). The only exception was Rhode Island PCMH-Kids, for which 30 percent of commercially insured children and 45 percent of Medicaid children were in the sample in all or almost all analysis years. This difference is due to the child-only sample for the PCMH-Kids analysis. Because the PCMH-Kids model had a pediatric focus, newborns make up a larger percentage of the Rhode Island sample than in the other model-specific analyses, which have samples that include both children and adults. Children who were born during the PCMH-Kids study period will, by definition, not be part of the analytic sample in all years.

For the EOC analyses, Medicaid beneficiaries were not assigned to practices because these initiatives were rolled out statewide. It was not possible to directly identify beneficiaries who were included in EOC programs. As a result, these analyses rely on publicly available definitions and code sets posted on each state's Medicaid agency website to replicate the criteria used to determine whether beneficiaries had eligible perinatal or acute asthma exacerbation episodes. The episode definitions for Ohio and Tennessee were harmonized and used for both states and their comparison groups to enable maximum comparability across states. All beneficiaries meeting the criteria for a perinatal or asthma exacerbation episode are included in the intervention or control group based on their state of residence.

Intervention group definitions

For most model-specific analyses, the intervention group was constructed by identifying the individuals who were ever attributed to providers participating in the SIM Initiative during the analysis period. These individuals were identified in one of two ways. First, as noted in the section above titled ***Assignment of patients to providers or practices***, state agencies provided lists of individuals who could be identified in enrollment and claims or claims-derived data. Second, in other cases, state agencies provided lists of SIM-participating providers or practices. Individuals were then attributed to those SIM-participating providers or practices to form the intervention group. For the NYS PCMH analysis, the analysis was at the provider level, so a list of NYS PCMH providers was used to identify the intervention group.

For two model-specific analyses (Iowa C3 initiative and Michigan CHIR), information that would have allowed us to identify who received services from SIM-participating providers was unavailable. As a result, the intervention group definitions for both those analyses were based on geography. All individuals who were residents of the Iowa C3 or Michigan CHIR counties were in the intervention group in each of those analyses. For the Washington IMC analysis, inclusion in the intervention group also was based on geography because the IMC model was rolled out on a regional basis.

The model-specific analyses for Ohio CPC and Idaho's practice transformation support program departed from the general approach of including everyone in the intervention group who was ever exposed to the SIM model. For the analyses for Ohio CPC and Idaho practice transformation support, the intervention group was based on length of exposure to these models. A Medicaid beneficiary was in the intervention group for the Idaho practice transformation and Ohio CPC models if that beneficiary was attributed to a SIM Initiative–affiliated practice for the majority of that beneficiary's time during the intervention period. For example, the intervention group for the Idaho practice transformation support analysis included anyone who was assigned to an intervention practice for at least half of the total months that those individuals were enrolled in Medicaid during the SIM period. This differing approach for Ohio CPC and Idaho's practice transformation support program was taken because Ohio's and Idaho's models included more frequent attribution than the models in other states.[119] Assignment of Medicaid patients to Ohio CPC was carried out on a quarterly basis, and Idaho's assignment was monthly.

The intervention group for the perinatal EOC included Medicaid beneficiaries with perinatal episodes in the focal state (Ohio or Tennessee) that occurred within the study timeframe. These episodes were triggered by a live birth in a health care setting. The live birth was reported on a professional claim and usually had a corresponding facility claim. Individuals were excluded from the perinatal episode analysis if they had certain a total of 27 or more diagnosed health risk factors, were less than 12 years old or more than 49 years old, were dual Medicare-Medicaid enrollees, did not have full Medicaid benefits, left the birth facility against medical advice, had a hospitalization lasting more than 30 days during the episode period, were receiving cancer treatment or died.

The intervention group for the asthma EOC included Medicaid beneficiaries in the focal state (Ohio or Tennessee) who had an acute asthma exacerbation event within the study

[119] Rhode Island's PCMH-Kids model also used a quarterly attribution algorithm, but a patient-level attribution list from only one calendar quarter was available. As a result, the model-specific analysis for PCMH-Kids replicated the algorithm for assigning patients to PCMH-Kids practices, rather than using lists of intervention beneficiaries, as the Ohio CPC and Idaho analyses did.

timeframe. Acute asthma exacerbation episodes were triggered by an ED or inpatient facility claim with an asthma primary diagnosis or a contingent asthma primary diagnosis with a confirmatory asthma diagnosis in any claims 365 days before the trigger claim or 30 days afterward. Individuals with an asthma exacerbation event were excluded from the analysis if they were younger than 2 or older than 64 years old, did not have full Medicaid benefits, and had certain comorbidities.

Comparison group definitions

In five model-specific analyses, members of the comparison group were defined as people who were never assigned to SIM practices or providers (Colorado IBH, Connecticut PCMH+, Delaware PTI+, Rhode Island PCMH-Kids, and Washington ACN). The Ohio CPC analysis included a variation in this approach. For the Ohio CPC analysis, inclusion in the comparison group was based on length of assignment to a non–Ohio CPC practice during the intervention period. If a Medicaid beneficiary was attributed to a non–Ohio CPC practice for the majority of that beneficiary's enrollment in Medicaid during the intervention period, then that beneficiary was included in the comparison group.

In the NYS PCMH analysis, the comparison group consisted of providers who were not affiliated with NYS PCMH practices.

For the Tennessee Health Link analysis, the comparison group for the Health Link model included people who were attributed to Health Link practices but never enrolled in the model. This approach was taken because an initial attempt to construct a comparison group by replicating Health Link eligibility criteria proved infeasible because one of the criteria was not claims-based ("provider documentation of a functional need") and because of widely divergent baseline outcome trends in the proposed intervention and comparison groups.

In three model-specific analyses (Iowa C3, Michigan CHIR, Washington ACN) comparison groups were geographically defined.

The Ohio and Tennessee EOC model-specific analyses selected the comparison group based on both geography and eligibility criteria. For both the perinatal and acute asthma exacerbation analyses, the comparison group consisted of Medicaid perinatal and acute asthma exacerbation episodes from different states. For Ohio, the comparison group included Kansas and Kentucky. Pennsylvania was originally intended to be a third comparison state but was dropped due to data limitations affecting multiple outcomes and covariates. The comparison group for Tennessee included Kansas, Kentucky, and South Carolina. These states were selected as comparison states based on Euclidean distance scores, information on TAF data quality from publicly available data quality briefs (Research Data Assistance Center [ResDAC], 2021) and CMS documents, and information on Medicaid maternity care payment reforms in each state.

There was limited implementation of Medicaid maternity care payment reforms in the comparison states during the study period.

L.2.3 Analytic timeframes

The model-specific analyses were designed to measure yearly exposure to the intervention. In cases where intervention start dates did not align with the beginning of a calendar year, the analyses used "measurement years" rather than calendar years as an annual unit of observation, and measurement years were aligned with practice cohort start dates. In cases where there was staggered entry of practices into the model during the analysis timeframe (Colorado's IBH model, Delaware's PTI model, Idaho's practice transformation support model, Ohio CPC, and Washington's IMC model) measurement years represented exposure time in the model. In these analyses, measurement years for the comparison groups aligned with the measurement years for the first intervention cohort.

The EOC analyses used different timeframes focused on the specific episode lengths. Perinatal episodes began 280 days before the delivery and ended to 60 days after the delivery, although the analysis window could be extended in cases with ongoing hospitalizations at either the 280-day pre-delivery or 60-day post-delivery dates. Asthma episodes began on the day that an individual was admitted to a hospital or visited an ED and ended 30 days after hospital discharge or ED visit. For the analysis, the episode was assigned to a calendar year based on the episode start date for perinatal episodes and the end date for asthma episodes.

L.2.4 Statistical analysis

All model-specific analyses utilized a D-in-D quasi-experimental design using a longitudinal panel of observations and propensity scores to adjust for intervention and comparison group differences. This section describes the baseline trends analysis that informed D-in-D model specifications, the process for creating and applying propensity score weights to the D-in-D models, and details about model specification. This section also describes subgroup analyses conducted for the model-specific analyses.

Baseline trends analyses for difference-in-differences models

D-in-D is subject to the assumption that there are similar trends between the intervention and comparison groups during the baseline period ("the parallel trends assumption"). Statistical testing for baseline parallel trends was not used for the model-specific analyses because all analyses—except for the NYS PCMH analysis—lacked enough baseline periods to reliably measure baseline trends in outcomes.[120] Instead, visual inspection of intervention and comparison group outcome trends was used to examine whether the two groups were on the same trajectory during the baseline period. Whether baseline trends appeared to satisfy the

[120] The NYS PCMH study timeframe included two years, 2016 and 2019. Observations were at the provider–month level, so there were 12 baseline time points. All other analyses included one to three baseline time points.

parallel trends assumption determined the model specification used for that outcome. Outcomes that appeared to exhibit baseline parallel trends were modeled using standard D-in-D model specifications. Outcomes that appeared to exhibit non-parallel trends during the baseline period were modeled using a specification that adjusted for underlying trend differences between the intervention and the comparison groups. The specifications for models assuming parallel baseline trends and models assuming non-parallel baseline trends are described in detail in the ***Model specification*** section below. The specific rules used to determine model specification were the following:

- Outcome trends during the baseline period for total spending were visually examined. All spending category outcomes were modeled with the same specification as total spending to allow for comparison across spending categories.
- Outcome trends during the baseline period for each utilization and quality outcome were separately examined, and each outcome was modeled based on the visual inspection for that outcome.
- For the four analyses with only one or two baseline time points (Delaware PTI, Iowa C3 initiative, and Washington's IMC and ACN models), a model specification assuming baseline parallel trends was always used. This strategy was chosen because it is not possible to have a trend with only one baseline time point. Furthermore, it also was decided that two baseline points provided insufficient information for assessing the parallel trend assumption visually.
- The model specification chosen for an outcome for a subgroup analyses was the same as the model specification for that outcome for the overall sample. For example, if a D-in-D model for the inpatient admissions outcome assumed a baseline parallel trend in the overall sample, the D-in-D model for inpatient admissions for adults also assumed a baseline parallel trend. This approach was selected to allow for comparison of D-in-D estimates between the overall sample and the subgroups in each model-specific analysis.
- As a check on the robustness of the D-in-D estimates, total spending, inpatient admissions, emergency department (ED) visits, and readmissions outcomes were modeled both with and without the assumption of parallel baseline trends. The D-in-D estimates for both model specifications were compared in the ***Sensitivity Analysis*** section of quantitative ***Appendices***. For these robustness checks, the main analysis was the one that used the D-in-D model specification determined by visual inspection. These robustness checks were not conducted for analyses for Iowa's C3 initiative, the NYS PCMH model, and Washington's ACN model. Both the Iowa C3 analysis and the Washington ACN analysis included only one baseline time point, so the robustness test was not relevant. The NYS PCMH analysis examined differing impacts by provider specialty instead.

Balancing intervention and comparison groups. Annual propensity score weights were applied to comparison group observations in all model-specific analyses to improve balance on person- and county-level characteristics between the intervention and comparison groups. The propensity score weights were created from propensity scores. The propensity scores were produced from logistic regression models in which the outcome was the probability of an individual's inclusion in the intervention group. Covariates considered for inclusion in propensity score models were gender, age, enrolled in Medicaid because of disability, race, total months enrolled in coverage in a given measurement year, health plan characteristics (for commercial claims analyses only), health status measures (Chronic Illness and Disability Payment System score for Medicaid beneficiaries; Hierarchical Condition Category score for commercial plan members and Medicare beneficiaries), and county-level measures derived from the Area Health Resources File. Models for specific analyses included additional covariates, as appropriate. The NYS PCMH analysis used a more limited set of covariates because of data availability.

In almost all model-specific analyses, annual propensity scores were created for the overall comparison sample at the person-year level and at the inpatient discharge level and for any comparison subgroups. The Ohio and Tennessee EOC analyses represent the exception to this approach. Propensity scores for the comparison groups in the Ohio and Tennessee EOC analyses were based on the full study period because few individuals in the sample had more than one episode. A single set of propensity scores based on the entire study sample allowed more alignment/common support between the EOC (intervention) and comparison groups.

The propensity scores were used to calculate inverse probability weights (propensity score/(1-propensity score)), which were then applied to observations in the comparison group. Propensity score weights were capped to be within the range of 0.05 and 20 because extreme weights may give undue influence to a small set of observations, leading to greater sensitivity in the impact results.

After propensity score weights were applied to comparison group observations, standardized differences between the means on selected characteristics in the weighted comparison group and intervention group were calculated and assessed for each analysis year. Covariates with standardized differences below 0.1 were considered well-balanced (Austin & Stuart, 2015, December 10).

Aside from propensity score weighting, one frequently used method is matching, whereby an enrollee is matched to a comparison group enrollee who has a similar propensity score (Stuart & Rubin, 2008). Propensity score matching to produce covariate balance across the intervention and comparison groups was not pursued for two reasons. First, propensity score weighting has been shown to produce less biased estimates and less modeling error (e.g., mean squared error, type 1 error) than propensity score matching. Second, propensity score weighting has also been shown to produce more accurate variance estimation and confidence intervals when modeling dichotomous outcomes, and the model-specific analyses include many dichotomous utilization and quality of care outcomes (Austin, 2010, September 10).

Difference-in-differences analysis. D-in-D models were used to test the impact of each SIM model on health care spending, utilization, and quality outcomes. Two model specifications were used: one that assumed baseline parallel trends in outcomes for the intervention and comparison groups and a second that assumed non-parallel trends in outcomes between the intervention and comparison groups in the baseline period. For most model-specific analyses, the specification for models assuming parallel trends was, as shown in ***Equation L.1***[121]:

$$Y_{ijt} = f(\beta_0 + I_i\beta + \Sigma_t \text{Year}_{t,b}\beta_t + \Sigma_k \text{Year}_{k,p}\beta_k + \Sigma_k (I_i{*}\text{Year}_{k,p})\delta_k + X_{ijt}\theta + \varepsilon_{it}) \quad \text{(Eq. L.1)}$$

where

- I_i (= 0, 1) indicates if beneficiary *i* was in the intervention group.
- $\text{Year}_{t,b}$ is a series of dummy variables for the baseline measurement years. The subscript *t* denotes year *t* out of *b* baseline years.
- $Year_{k,p}$ is a series of dummy variables for the intervention measurement years. The subscript *k* denotes year *k* out of *p* intervention years.
- X_{ijt} denotes the set of model covariates.
- δ_k is the coefficient of interest, capturing the impact of the SIM model relative to a comparison group.

The alternative D-in-D specification that assumes an underlying difference in trends across the intervention and comparison groups is shown in ***Equation L.2***:

$$Y_{ijt} = f(\beta_0 + I_i\beta + \text{Trnd}_i\theta_0 + I_i\text{Trnd}_i\theta_1 + \Sigma_k \text{Year}_{k,p}\beta_k + \Sigma_k (I_i{*}\text{Year}_{k,p})\delta_k + X_{ijt}\theta + \varepsilon_{it}) \quad \text{(Eq. L.2)}$$

where

- $Trnd_i$ (=1, 2, …, T) denotes a linear trend variable that takes the values 1 for the first measurement year, 2 for the second measurement year, and so on up to the last measurement year.
- All other notation is equivalent to specification (***Equation L.1***).

[121] The model specifications differed for the analyses for Iowa C3 and NYS PCMH. The model specification for the Iowa analysis differed because a pooled approach was used, combining multiple baseline and intervention years into one period. The New York model specification included limited covariates, because of data limitations, provider-level fixed effects, and no year dummies because the analysis only included two years of data.

The linear trend term and the interaction of the linear trend term with the intervention group indicator (I_i) in ***Equation L.2*** allow for baseline trends to differ between the intervention and comparison groups. Moreover, by extending the trend term across the baseline and intervention periods, ***Equation L.2*** alters the interpretation of δ_k. Specifically, this coefficient now measures the relative change in outcome Y_{ijt} after netting out the expected difference in changes that can be attributed to pre-existing differences in the outcome trends across groups, which are measured by θ_1. To see this, in the special case of a linear functional form, note that the "difference-in-differences" calculation will result in the linear combination of parameters: $\theta_1 + \delta_k$. Since θ_1 captures the underlying difference in trend across the intervention and comparison groups, δ_k is a D-in-D impact estimate after subtracting the underlying difference in trends.

Estimation approaches, calculation of overall impact estimates, use of propensity score weights and eligibility fraction weights, and use of cluster-robust standard errors, all described below, are equivalent to those used for the traditional D-in-D specification.

However, adjusted means are calculated differently for the model specification that assumes non-parallel baseline trends than for the standard D-in-D model specification. Specifically, because θ_1 (the coefficient on the time trend) is netted out from the impact estimate, θ_1 is also netted out from the adjusted mean estimates. The reason for estimating the adjusted means in this way is that they better align with the impact estimates. For example, in a linear specification, the D-in-D calculation using the adjusted means will be almost exactly equivalent to the reported impact estimate. In contrast, if θ_1 is included in the adjusted mean estimates, the D-in-D calculation using these adjusted means could be potentially very different from the reported impact estimate. The extent of the discrepancy (under either option) will depend on the severity of the differences in trend between the intervention and comparison groups.

Pre–post model without a comparison group

Both pre–post and D-in-D models were used to assess the impacts of the Tennessee Health Link model. A D-in-D model was used to measure the Health Link model's effects on individuals who were part of Health Link because they met diagnostic criteria for inclusion ("Category 1"). However, it was not possible to identify valid comparison groups for individuals in the Health Link model who were part of the model because they met utilization criteria for specific diagnoses ("Category 2") or because they had provider documentation of a functional need ("Category 3"). Eligible, nonparticipating beneficiaries in both categories appeared to be systematically different from Health Link participants, perhaps because all organizations that qualify for Health Link are participating in the program. Because it was not possible to construct valid comparison groups for Categories 2 and 3, the selected approach was to examine changes in outcomes between the baseline period and the intervention period for the same people participating in Health Link. The model specification for this pre–post analysis was, as shown in ***Equation L.3***:

$$Y_{ijt} = f(\beta_0 + Post_i\beta + X_{ijt}\theta + \varepsilon_{it}) \qquad \text{(Eq. L.3)}$$

where

- $Post_i$ (= 0,1) denotes a dummy variable for the intervention measurement years.
- β is the coefficient of interest, capturing any changes in the outcome after Health Link is implemented.
- All other notation is equivalent to specification (***Equation L.1***).

Estimation

The estimation approach was consistent across all model-specific analyses with individual-level observations. Ordinary least squares outcome models were used to estimate SIM model impacts on spending. Negative binomial models were used for counts of ED visits, PCP visits, and behavioral health visits.[122] As noted in the ***Outcomes*** section, the inpatient admissions outcome was represented as a binary outcome (1 = any use during the year). Therefore, the inpatient admissions outcome was modeled with a logistic regression model.[123] Other utilization outcomes, such as readmissions within 30 days of a hospital discharge or visits to a provider within 14 days of hospital discharge, were also modeled with logistic regressions. Quality outcomes, including receipt of well-child visits or hemoglobin A1c screening and retinal eye exams for patient with diabetes, were represented as binary outcomes and modeled with logistic regression models. D-in-D table notes within quantitative ***Appendices A-1*** through ***K-2*** describe the regression models used for each outcome. (The NYS PCMH analysis, with observations at the provider-month level, used ordinary least squares models for all outcomes.)

The marginal effects and adjusted means from the logistic regression models and some count models were multiplied by 100 or 1,000, as appropriate, to obtain approximate percentages or utilization rates per 1,000 people. Multiplying the marginal effect of the binary inpatient admissions outcome by 1,000 does not produce an exact rate of admissions per 1,000 members because it assumes that no person has more than one admission per year. However, this is a reasonable approximation because only 1 to 5 percent of individuals across samples had more than one inpatient admission in a single year.

Calculation of impact estimates and adjusted means

Annual D-in-D estimates, overall D-in-D estimates, and adjusted means were produced for each model-specific analysis. D-in-D estimates of SIM model impact for each intervention year were produced, and overall D-in-D estimates were a weighted average of the annual D-in-D estimates. The weights used for calculating the weighted average were based on the number of

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[122] For the Delaware PTI, Washington IMC, and Washington ACN analyses, Poisson models were used for count outcomes instead of negative binomial models because Poisson models were a better fit for the data. A logistic regression model was used for the behavioral health visits models for Colorado; see ***Sub-Appendix A-1***.
[123] For the Michigan CHIR analysis, the logistic regression model for inpatient admissions did not converge, so a linear probability model was used instead.

observations in the intervention group in each intervention year. Overall standard errors, used to create confidence intervals and p-values for the overall D-in-D estimates, were also created as a function of the weighted annual standard errors.

For each outcome, regression-adjusted means were calculated for the intervention and comparison groups during the baseline period, in each intervention year, and for the overall intervention period. Adjusted means during the baseline period represent the average of the outcome during the middle baseline year (e.g., the second year in a three-year baseline period), after controlling for beneficiary and area-level characteristics. Adjusted means during the intervention period represent the average of the outcome for each specific intervention year, after controlling for beneficiary and area-level characteristics. The overall adjusted mean is a weighted average of the year-specific adjusted means calculated for each of the intervention years. The weights used in this calculation were chosen to account for the fact that the size of the intervention (and comparison) group varies across years. The weights were calculated as the number of intervention (or comparison) beneficiaries observed within each year divided by the total number of intervention (or comparison) beneficiary-years observed during the intervention period.

Outcome measures

The analyses included outcome measures related to spending, utilization, and quality of care. Almost all model-specific analyses constructed D-in-D models for four core outcomes: total spending per person per month, inpatient admissions per 1,000 population, ED visits per 1,000 population, and readmissions with 30 days of hospital discharge.

The core outcomes were defined as follows:

- **Total spending per person per month:** Total spending per person per month is total payments for an individual in a single year, calculated from all claim types, including pharmacy claims. Total spending was annualized by dividing it by the eligibility fraction, the number of months in a year that an individual was included in the analytic sample divided by 12. (If an individual was included in the analytic sample for an entire year, the eligibility fraction was 1.) Annual total spending was converted to a per person per month value by dividing it by 12. Total spending—like all other spending outcomes—was capped at the 99.9th percentile to reduce the influence of extreme outliers on impact estimates.
- **Inpatient admissions:** The inpatient admissions outcome is a person's probability of being admitted to an acute care hospital in a year. An inpatient admission was identified in inpatient claims. The admission was assigned to an analysis year based on discharge date.

- **ED visits:** The ED visit outcome is the annual count of a person's ED visits not resulting in an inpatient admission. ED visits that resulted in an inpatient admission were excluded from the ED visit count. Observation stays were considered to be ED visits. ED visits not resulting in an inpatient admission were identified using a combination of revenue codes and procedure codes in outpatient claims. ED visit counts were annualized by dividing the count for each person in each year by that person's eligibility fraction and rounding the annualized count to the nearest integer.
- **Readmissions within 30 days of hospital discharge:** Readmissions is a hospital discharge-level indicator of whether a person 18 years old or older had at least one acute hospitalization that occurred within 30 days following an inpatient hospital discharge. Index hospital discharges were identified as inpatient stays with a discharge date within the given measurement period (12 months) minus 30 days from the end of the period. If an index stay had another admission within 30 days, that was considered a readmission.

The model-specific analyses that did not include all four core outcomes were those for Iowa C3, Michigan CHIR, Rhode Island PCMH-Kids, the Washington IMC and ACN models and the Ohio and Tennessee EOC models. The Iowa C3 analysis did not include the four core outcomes because the analysis did not use claims data; the CHIR analysis did not include spending because of data limitations; and the PCMH-Kids analysis did not include readmissions because the model had a pediatric focus, and children were excluded from the sample for the readmissions outcome. Both model-specific analyses for Washington State excluded readmissions because the outcome was unavailable in the data used for those analyses. Although the NYS PCMH model included outcomes for spending, inpatient admissions, ED visits, and readmissions, these outcomes are observed at the provider-month level rather than at the person-year or discharge levels.

The outcome measures for the Ohio and Tennessee EOC analyses differ from the core outcomes for other models because these were targeted on narrow populations and primarily focused on improving specific outcomes. For the perinatal episodes, the outcomes included:

- The percentage of all episodes with a delivery by cesarean section;
- The percentage of all episodes where the mother has a follow up visit with a primary care provider, including specialists in obstetrics or gynecology, within 60 days of discharge after the delivery;
- The percentage of episodes with a vaginal delivery where the mother was screened for group B streptococcus (GBS); and
- The percentage of all episodes where the mother was screened for human immunodeficiency virus (HIV).

For the acute asthma exacerbation episodes, the outcomes included:

- Rates of relevant follow-up care within the post-trigger window;
- Rates of receipt of appropriate asthma medication; and
- Rates of repeat acute asthma exacerbation within the post-trigger window.

The GBS and HIV screening perinatal outcomes are not reported for Tennessee because of data anomalies affecting these measures in multiple years after implementation. The repeat acute asthma exacerbation outcome is not reported for Ohio because of invalid data for one of the two comparison states (Kansas).

Model-specific analyses used a variety of other outcomes, D-in-D estimates for which are available in ***Appendices A*** through ***K***. Brief definitions for outcomes used in model-specific analyses are available in ***Tables L-11*** through ***L-14*** in the Addendum at the end of this chapter.

Difference-in-differences model covariates

The covariates included in the regression specifications were equivalent to those included in the propensity score model. As noted in the section titled ***Balancing intervention and comparison groups*** above, the propensity score and D-in-D regressions included the following covariates: gender, age, enrolled in Medicaid because of disability, race, total month enrolled in measurement year, health plan characteristics (for commercial claims analyses only), health status measures (Chronic Illness and Disability Payment System score for Medicaid beneficiaries; Hierarchical Condition Category score for Medicare beneficiaries and commercial plan members), and county-level measures reflecting demographic and socioeconomic characteristics and health care system supply. Analyses included other relevant covariates, as available.

Weighting and clustering

For all claims-based analyses—except for those for the Iowa C3 and NYS PCMH—all comparison-group observations at the person-year level were weighted by a propensity score weight multiplied by an eligibility fraction, previously described in the section titled ***Outcome measures***. Outcomes at the discharge-level or episode-level were multiplied by the propensity score weight only.

The Iowa C3 analysis included both propensity score weights and survey weights to account for the use of survey data. Because the NYS PCMH analysis was at the provider level, the analysis included propensity score weights but not eligibility fractions. For all analyses that used data either claim data or claims-derived data, standard errors were clustered at the provider or county level to account for correlation in the error term.

Subgroup analyses

For each model-specific analysis, impacts on core outcomes were estimated for specific subgroups in addition to the full sample. As noted in ***Appendices A*** through ***K***, model impacts were separately assessed for certain subgroups because it was possible that impacts could differ by subgroup. Most model-specific analyses examined model impacts separately for children and adults. The child subgroup included people who were 18 years old or younger. The adult subgroup included individuals who were 19 years old or older. Several analyses also included behavioral health–focused subgroups. Definitions for behavioral health subgroups are included in the sub-appendices for each model-specific analysis. ***Table L-7*** shows the subgroups for each model-specific analysis.

Table L-7. Subpopulations for model-specific analyses

Model-specific analysis	Subpopulations
CO IBH	• People with behavioral health conditions • People without behavioral health conditions
CT PCMH+	• Adults • Children
DE PTI	• Adults • Children
IA C3	• Adults who reported being diagnosed with diabetes
ID practice transformation support	• Adults • Children
MI CHIR	• Adults • Children
NYS PCMH	• Providers at practices that gained PCMH recognition for the first time while participating in the NYS PCMH model • Providers at practices that received recognition under a prior PCMH standard
OH CPC	• Adults • Children
OH asthma EOC	• Adults • Children
RI PCMH-Kids	• Children with behavioral health conditions
TN Health Link	• Medicaid beneficiaries who participated in both the Health Link and the PCMH programs • Medicaid beneficiaries who only participated in the Health Link program
TN asthma EOC	• Adults • Children
WA IMC	• Adults with serious mental illness • Adults with serious mental illness and chronic conditions

(continued)

Table L-7. Subpopulations for model-specific analyses (continued)

Model-specific analysis	Subpopulations
WA ACN	• Individuals designated to ACNs • Individuals attributed to ACNs • Adults • Children

Notes: ACN = Accountable Care Network; C3 = Community and Clinical Care; CHIR = Community Health Innovation Region; CO = Colorado; CT = Connecticut; DE = Delaware; IA = Iowa; ID = Idaho; IBH = Integrated Behavioral Health; IMC = Integrated Managed Care; MI = Michigan; NYS = New York State; OH = Ohio; PCMH = patient-centered medical home; PCMH+ = Person-Centered Medical Home Plus; PTI = Practice Transformation Initiative; RI = Rhode Island; TN = Tennessee; WA = Washington.

L.3 Statewide Impact Evaluation Methods

The Federal Evaluation Team carried out statewide impact analyses for SIM Round 2 states that met the following two criteria:

1. The state rolled out more than one health care payment or delivery model for a payer population. In a state that only launched one payment or delivery model via the SIM Initiative, the model-specific analyses described the impact of that model. For states with more than one SIM payment or delivery model, the statewide analyses were an opportunity to examine the aggregate effects of more than one initiative.
2. The model-specific analyses for these states showed statistically significant impacts.

Ohio and Tennessee were the two states that met these criteria. Under its SIM award, Ohio implemented its Ohio Comprehensive Primary Care (Ohio CPC) model, a patient-centered medical home (PCMH) model for primary care practices, and episodes of care (EOCs), a model that holds a single clinician or entity accountable for care across all services related to a given condition. Both Ohio CPC and EOCs serve Ohio Medicaid patients and were evaluated as model-specific analyses. The model-specific analysis of the EOC model focused on perinatal and asthma episodes. Tennessee launched PCMHs, health homes for Medicaid beneficiaries with acute behavioral health needs (Health Link), a long-term services and supports model (LTSS), and the EOC initiative. The Tennessee model-specific analyses focused on the Medicaid population and evaluated the impacts of Health Link and the same two episodes as in the Ohio model-specific analysis: perinatal and asthma episodes.

The specific research question for the Ohio and Tennessee statewide impact analyses was:

- Was there evidence of SIM Initiative impacts on admissions, emergency department (ED) visits, and readmissions?

L.3.1 Data sources

The data sources for the statewide analyses were Medicaid claims data and the Area Health Resources Files (AHRF). The AHRF is described above in ***Section L.2.1***.

Medicaid claims

The Federal Evaluation Team used Medicaid claims data from the Chronic Conditions Data Warehouse for Ohio and Tennessee and their respective comparison states (Kansas, Kentucky, and South Carolina). The Ohio statewide analysis used data from January 1, 2014, through December 31, 2019, and the Tennessee statewide analysis used data from January 1, 2013, through December 31, 2019, for the Tennessee statewide analysis. These time frames overlapped with the transition in federal Medicaid data systems from the Medicaid Analytic eXtract (MAX) to the Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF). ***Table L-8*** shows the data sources for Ohio, Tennessee, and the comparison states during each year of the statewide analyses and indicates that the analyses spanned MAX, a MAX file produced with state T-MSIS data (MAX-T), and TAF data. The Federal Evaluation Team conducted exploratory analyses to identify potential breaks in outcome trends across these data sources. Trends for Tennessee in 2016 (the first year of TAF) were inconsistent with the rest of the study period. As such, 2016 was excluded from the Tennessee analysis.

Table L-8. Medicaid data sources for Ohio, Tennessee, and comparison states

State	Data time frame	First T-MSIS submission date	MAX dates	MAX-T dates	TAF dates
OH	January 2014–December 2019	October 2014	Not applicable	2014	2015–2019
TN	January 2013–December 2019	October 2015	2013–2014	2015	2016–2019
KS (OH and TN comparison state)	January 2013–December 2019	January 2013	Not applicable	2013	2014–2019
KY (OH and TN comparison state)	January 2013–December 2019	July 2014	Not applicable	2013–2014	2015–2019
SC (TN comparison state)	January 2013–December 2019	July 2014	Not applicable	2013–2014	2015–2019

Note: KS = Kansas; KY = Kentucky; MAX = Medicaid Analytic eXtract; MAX-T = MAX file produced with state Transformed Medicaid Statistical Information System (T-MSIS) data; OH = Ohio; SC = South Carolina; TAF = T-MSIS Analytic Files; TN = Tennessee.

L.3.2 Intervention and comparison group selection

As in the model-specific analyses, the statewide analysis included difference-in-differences (D-in-D) modeling. Inference from D-in-D modeling relies on the selection of a comparison group that provides a proxy for the counterfactual. The counterfactual informs the outcomes that would have occurred without the SIM Initiative, against which the analysis can compare the observed outcomes for individuals who were part of the SIM Initiative.

The Federal Evaluation Team chose comparison states to approximate what would have occurred in Ohio and Tennessee in the absence of SIM Round 2–funded payment and delivery models. The procedures that the Federal Evaluation Team used to select intervention and comparison states for the statewide impact analyses are discussed below.

Intervention group definition

All non-dual Medicaid beneficiaries with full benefits who were enrolled in Medicaid in Ohio or Tennessee during the study period were included in the intervention groups for the Ohio and Tennessee statewide analyses.

Comparison group definition

All non-dual Medicaid beneficiaries with full benefits who were enrolled in Medicaid in Kansas or Kentucky during the study period were included in the comparison group for Ohio. The comparison group for Tennessee included not only beneficiaries from Kansas and Kentucky but also from South Carolina. Comparison states were identified using a multi-step process. The Federal Evaluation Team:

- Identified the pool of eligible potential comparison states, excluding SIM Round 1 and other SIM Round 2 Model Test states;
- Identified and refined a consensus list of key observable characteristics in seven core, health-related domains for use in selecting the comparison states;
- Computed Euclidean distance scores by using the finalized list of key covariates within the seven domains to create a single global measure of the difference between each Round 2 Model Test state and each potential comparison state;
- Rank-ordered the comparison states by their distance scores;
- Separately for Ohio and Tennessee, identified the seven states with the lowest distance scores;
- Reviewed the identified states with internal Medicaid experts, with CMS input, to determine the face validity and appropriateness of each selected comparison state as a match for the respective Round 2 Model Test state;
- Reviewed information about TAF data quality for each of the states selected as potential comparisons because of Euclidean distance scores, excluding states, such as Missouri, with data that seemed unlikely to be usable;
- Reviewed information about maternity care payment models in the comparison states to ensure that the comparison states had not implemented perinatal EOCs models or

other significant maternity care payment reforms, with the goal of using the same comparison states as in the EOC model-specific analyses; and

- Eliminated states with unusable data quality after exploring the TAF data. For example, although Pennsylvania was initially selected as a third comparison group state for Ohio, it was eliminated for consideration after data exploration indicated significant data quality concerned.

After limiting the set of potential comparison states to those that were not Round 1 or other Round 2 Model Test states, the Federal Evaluation Team identified variables to use in the distance function of the comparison state selection procedure. Specifically, the team chose the variables that were expected to influence health care spending, utilization, and health outcomes. The RTI Team classified these variables into the following seven health-related domains:

1. CMS initiatives;
2. State initiatives;
3. Population characteristics;
4. Health care system spending, coverage, and delivery models;
5. Baseline care coordination or quality measures;
6. Baseline access to care measures; and
7. Baseline population health measures.

The Federal Evaluation Team was particularly interested in capturing concurrent federal and state initiatives and characteristics of the state Medicaid programs. Lastly, the team quantified the variables during the analysis period.

The initial list of potential variables in these seven domains included 166 variables, which the Federal Evaluation Team examined for data availability, data integrity, variation across states, and correlation with other variables. Next, the Federal Evaluation Team calculated pairwise correlations across the full matrix of preliminary variables. The Federal Evaluation Team then selectively removed the variables from consideration that had missing values for key states, minimal variations across states, or strong correlations (greater than 0.5) with other variables. Additionally, when possible, the Federal Evaluation Team combined variables (e.g., by creating a single count of all federal initiatives rather than using 11 separate variables). These steps reduced the list to 82 variables to be used for selecting the comparison states. ***Table L-9*** provides descriptions and the sources of selected variables for each of the seven health-related domains used for selecting the comparison states.

State selection procedure

The Federal Evaluation Team calculated Euclidean distance scores, based on the list of 82 variables between Ohio and Tennessee and each potential comparison state. The team then ranked the comparison states in order of increasing distance from Ohio or Tennessee.

Table L-9. Domains and select variables used for selecting comparison states

Domains and selected variables	Field descriptions	Years	Sources
CMS initiatives			
Number of Transforming Clinical Practice Initiative awards	#	2015	CMMI
Number of HCIA for Round 1 and Round 2	#	2014	CMMI
Number of federal initiatives (e.g., APACO, CCTP, CFAI, CPCi, FQHC, MAPCP, MEPD, MFFSFAI, MIPCD, MSSP, PACO)	#	2015	CMMI
State initiatives			
Community health worker initiatives	State-led initiative: no or no data = 0; yes = 1	2015	NASHP
Accountable care activities	State-led initiative: no = 0; yes = 1	2012	NASHP
Number of Medicaid initiatives (e.g., ACA, ACO, DSRIP, dual eligibility, EOC, PCMH)	#	2014–2015	KFF
Population characteristics			
Percentage of the population living in urban areas	%	2010	U.S. Census Bureau
Average median annual income	$	2014	U.S. Census Bureau
Percentage of the rate of unemployment	%	2014	KFF
Percentage of the population aged 65 years and older	%	2013	Administration on Aging
Health care system characteristics			
Total Medicare spending per total enrollees	$	2013	IOM
Total Medicaid spending per total enrollees	$	2011	KFF
Percentage of state budgets that are Medicaid expenses	%	2013	RWJF
Medicaid expansion status	State decision to expand Medicaid: no = 0, yes = 1, discussions = 2	2015	KFF
Percentage of the population in a designated health professional shortage area	%	2015	HRSA
Baseline care coordination and quality measures			
Percentage of 30-day mortality among Medicare beneficiaries hospitalized for heart attack, heart failure, or pneumonia	%	2009–2011	Commonwealth

(continued)

Table L-9. Domains and select variables used for selecting comparison states (continued)

Domains and selected variables	Field descriptions	Years	Sources
Percentage of the discharge rate among the Medicare population for diagnoses amenable to non-hospital–based care	%	2014	United Health Foundation
Percentage of inpatient readmissions within 30 days of an acute hospital stay during the reference period	%	2013	IOM
Number of inpatient or hospital outpatient ED visits	# per 1,000 population	2013	IOM
Number of prevention quality indicators (e.g., diabetes, COPD or asthma, hypertension, congestive heart failure, dehydration, bacterial pneumonia, UTI, asthma in younger adults, lower extremity amputation)	# per 100,000 population	2013	IOM
Baseline access to care measures			
Total number of physician assistants	# per 100,000 population	2013	HRSA
Scope of practice laws providing physician assistants with full prescribing authority	Permissive state laws: no = 0, yes = 1	2014	KFF
Percentage of market share in an individual market	%	2013	KFF
Percentage of market share in a large group market	%	2013	KFF
Percentage of market share in a small group market	%	2013	KFF
Baseline population health measures			
Number of years of potential life lost before a person is aged 75 years	# of potential life years lost per 100,000 population	2014	NCHS
Percentage of the babies born before 37 weeks gestation	%	2014	United Health Foundation
Percentage of adults who responded “yes” to the question “Have you ever been told by a doctor that you have diabetes?”	%	2014	United Health Foundation
Percentage of adults who have been told by a health professional they have high blood pressure	%	2014	United Health Foundation

Note: ACA = Affordable Care Act; ACO = accountable care organization; APACO = Advance Payment Accountable Care Organization (model); CCTP = Community-based Care Transitions Program; CFAI = Capitated Financial Alignment Initiative; CMMI = Center for Medicare and Medicaid Innovation; CMS = Centers for Medicare & Medicaid Services; COPD = chronic obstructive pulmonary disease; CPCi = Comprehensive Primary Care initiative; DSRIP = Delivery System Reform Incentive Payment; EOC = episode of care; ED = emergency department; FQHC = Federally Qualified Health Center; HCIA = Health Care Innovation Awards; HRSA = Health Resources and Services Administration; IOM = Institute of Medicine; KFF = Kaiser Family Foundation; MAPCP = Multi-Payer Advanced Primary Care Practice; MEPD = Medicaid Emergency Psychiatric Demonstration; MFFSFAI = Managed Fee-for-Service Financial Alignment Initiative; MIPCD = Medicaid Incentives for Prevention of Chronic Diseases; MSSP = Medicare Shared Savings Program; NASHP = National Academy for State Health Policy; NCHS = National Center for Health Statistics; PACO = Pioneer Accountable Care Organization; PCMH = patient-centered medical home; RWJF = Robert Wood Johnson Foundation; UTI = urinary tract infection.

The next step in the state selection process was to produce a list of comparison states for Ohio and Tennessee rank-ordered by distance scores, with the smallest scores at the top. The Federal Evaluation Team allowed the same states to be potential comparisons for both Ohio and Tennessee. Then, the team examined information about TAF data quality and Medicaid payment reforms in maternity care to identify three potential comparison states each for the Ohio and Tennessee EOC and statewide analyses.

As a result of this process, Kentucky and Kansas were selected as comparison states for both Ohio and Tennessee. South Carolina was selected as a third comparison state for Tennessee. Although Pennsylvania was initially selected as the third comparison state for Ohio, as noted above, it had to be dropped due to TAF data quality concerns.

Sensitivity analyses

The Federal Evaluation Team conducted a sensitivity analysis to assess the robustness of the state rankings based on the Euclidean distance scores. Specifically, the Federal Evaluation Team examined the sensitivity of the rankings to the omission of a single variable. That is, the Federal Evaluation Team recalculated the Euclidean distance score and state rankings, omitting a single variable from the final set of selection variables, generating 80 iterations of the rankings for Ohio and Tennessee. The team used the analysis to examine the importance of each variable in the overall state rankings and to determine what the rankings would be without that variable. In general, no individual variable substantially drove the overall state rankings. In some instances, the exclusion of a variable moved a state that was ranked fourth or fifth into the top three.

L.3.3 Analytic timeframes

As for the model-specific analysis, the statewide analysis was designed to measure yearly exposure to SIM models. As noted above, the timeframe for the Ohio statewide analysis was January 1, 2014, through December 31, 2019, and the timeframe for the Tennessee statewide analysis was January 1, 2013, through December 31, 2019, excluding January 1 through December 31, 2016. (The year 2016 was excluded due to data anomalies.) For both statewide analyses, the intervention period was defined as the earliest point at which any health care delivery model within each state linked provider performance to payment. The intervention period began on January 1, 2016, for Ohio and January 1, 2015, for Tennessee. In both states, the start of the intervention period marks when the state first tied performance on perinatal and asthma episode quality measures and spending to financial awards and penalties.

L.3.4 Statistical analysis

The statistical methods for the statewide impact analysis resemble those for the model-specific analyses.

Baseline trends analyses for difference-in-differences models

Like the model-specific analyses, the statewide analyses used D-in-D models and propensity scores to adjust for differences between the intervention and comparison groups. As noted in ***Section L.2.4***, D-in-D analysis is subject to the assumption that there are similar trends between the intervention and comparison groups during the baseline period. For both the Ohio and Tennessee statewide analyses, it was not possible to assess parallel trends during the baseline period because there were only two baseline data points—one for each baseline year—for each analysis. As a result, all D-in-D models for the Ohio and Tennessee statewide analyses were modeled with a specification that assumes that the intervention and comparison groups have parallel baseline trends in outcomes.

Balancing intervention and comparison groups

As in the model-specific analyses, annual propensity score weights were applied to comparison group observations in all model-specific analyses to improve balance on person- and county-level characteristics between the intervention and comparison groups. As in the model-specific analyses, annual propensity scores were created for the overall comparison sample at the person-year level and at the inpatient discharge level (for the readmissions outcome, described below).

Propensity score weights were capped to be within the range of 0.05 and 20 because extreme weights may give undue influence to a small set of observations, leading to greater sensitivity in the impact results. After propensity score weights were applied to comparison group observations, standardized differences between the means on selected characteristics in the weighted comparison group and intervention group were calculated and assessed for each analysis year. Covariates with standardized differences below 0.1 were considered well-balanced.

The Federal Evaluation Team initially included all covariates previously listed in both person-year–level propensity scores and discharge-level propensity scores generated for the statewide analyses. However, a few county-level variables—percentage below poverty and hospital beds per 1,000 population for Ohio and percentage without insurance for Tennessee—had be removed from the statewide propensity score to achieve sufficient balance on other model covariates.

Difference-in-differences analysis

To estimate differences in utilization, the Federal Evaluation Team used D-in-D models. The team constructed separate models for assessing SIM Round 2 statewide impacts in Ohio and in Tennessee. The Ohio and Tennessee D-in-D model specification aligns with ***Equation L.1***.

Estimation

The three outcomes included in the statewide analyses were inpatient admissions, ED visits, and readmissions within 30 days of discharge. A negative binomial model was used for counts of ED visits. The inpatient admissions outcome was represented as a binary outcome (1 = any use during the year). Therefore, the inpatient admissions outcome was modeled with a logistic regression model.[124] The readmissions outcome was also modeled with logistic regression model. The marginal effects and adjusted means from the logistic regression models and the count models were multiplied by 1,000 to obtain utilization rates per 1,000 people.

Calculation of impact estimates and adjusted means

Annual D-in-D estimates, overall D-in-D estimates, and adjusted means were produced for the statewide analysis in the same manner as in the model-specific analyses. See ***Section L.2.4*** for a description of how overall D-in-D estimates and adjusted means are calculated from annual D-in-D estimates and annual adjusted means.

Outcome measures

As noted in the previous section titled ***Estimation***, the outcomes for the statewide impact analyses included the core utilization outcomes for the federal evaluation of Round 2 of the SIM Initiative: all-cause admissions, outpatient ED visits, and readmissions. Descriptions of these outcomes can be found in ***Table L-11***.

Total spending was not included as an outcome due to TAF data anomalies. According to the Medicaid Data Quality Atlas, there are data quality concerns for the total spending data for Tennessee, Ohio, and Kentucky, and the Kansas spending data are unusable (Medicaid.gov, n.d.). The Federal Evaluation Team's analysis confirmed that spending in these states did not have face validity. All intervention or comparison group states included in the statewide analyses have high rates of Medicaid managed care enrollment, so calculating only total fee-for-service spending was not an appropriate strategy.

D-in-D model covariates

The covariates included in the D-in-D models were equivalent to those included in the propensity score models, with three exceptions. First, the D-in-D models included covariates, listed in the section titled ***Balancing intervention and comparison groups*** above, that had to be removed from the propensity score models to achieve balance. Second, county-level median age and a child indicator variable—included in the propensity score models—were excluded from the D-in-D models because high levels of correlation between these variables and other covariates prevented the D-in-D models from converging. Third, the Tennessee D-in-D models included comparison state indicator variables to control for time-invariant differences across

[124] For the Michigan CHIR analysis, the logistic regression model for inpatient admissions did not converge, so a linear probability model was used instead.

states. The Ohio D-in-D models did not include these indicator variables because they created convergence problems.

Weighting and clustering

All comparison-group observations for the two person-year level outcomes (inpatient admissions and ED visits) were weighted by a propensity score weight multiplied by an eligibility fraction, as in the model-specific analyses. Comparison group observations for 30-day readmissions, the discharge-level outcome, were weighted by the propensity score weight only.

L.4 Data for Provider and Payer Market Characteristics

This section summarizes the data construction for the provider and payer market characteristics analyses. Each state-specific appendix (***Appendices A–K***) includes a description of the state's provider and payer market characteristics during the period of the SIM Initiative. These characteristics are part of the overall analysis of the context in which the state's SIM-related activities occurred. Additional analyses of states' provider characteristics—and the broader implication for participation in value-based payment models—are available in ***Appendix M-9*** and ***Appendix M-10***.

L.4.1 Data source: Characteristics of primary care practice sites

The data source "Characteristics of Primary Care Practice Sites (C-PCPS)" operationalizes practices as distinct physical practice sites, combining administrative data on practice addresses, billing, and individual-organization relationships. Yearly data are available for 2013–2017. Each practice record includes information on the practice location, the number and types of clinicians at the practice (e.g., PCPs, physicians, behavioral health practitioners, nurse practitioners [NPs]), and flags indicating whether the practice participated in a Medicare alternative payment model (APM) model in a given year.

L.4.2 Construction of the Characteristics of Primary Care Practice Sites

CarePrecise, the CMS NPPES, Medicare Data on Physician Practice and Specialty (MD-PPAS), and Medicare Provider Enrollment, Chain, and Ownership System (PECOS) each contribute data elements to the C-PCPS:

- NPPES contains all typical providers and links providers' National Provider Identifiers (NPIs) with their own Tax Identification Numbers (TINs).
- CarePrecise, which is built on NPPES, supplies unique practice location identifiers, or "colocation codes."
- MD-PPAS and PECOS provide associations between individual providers and their primary Medicare billing TINs or active Medicare billing TINs, respectively.

In combination, (a) a colocation code and (b) an organization TIN define a unique practice in the C-PCPS. All individual providers sharing the same combination of colocation code and organization TIN in a given year are allocated to the same practice. Individual providers are classified by their taxonomy codes in NPPES and specialty codes in PECOS as physicians, PCPs, NPs, physician assistants (PAs), and behavioral health providers. Any practice with one or more PCP is classified as a primary care practice.

Strengths of this approach

By using NPPES and CarePrecise as its foundational data source, the C-PCPS operationalizes practices as distinct physical sites of practice, a unit of analysis which is relevant when evaluating and making investments in primary care.

The C-PCPS leverages the strengths of underlying data systems against the weaknesses of the others, in particular:

- NPPES and CarePrecise contain every typical provider, versus the Medicare-specific subset in MD-PPAS and PECOS.
- PECOS provider specialties are more likely to be accurate and up to date than NPPES taxonomies.
- MD-PPAS identifies a primary billing relationship, versus the potential for many individual-organization relationships in PECOS.

Combining individual provider identifiers (individual NPI and TIN), relationships with organizations and their identifiers (organization NPI and TIN), and physical location (colocation code) allows for integration with additional data sources.

Limitations of this approach

The C-PCPS is subject to the availability and accuracy of data in the underlying sources. Inaccurate practice addresses and provider taxonomies in NPPES (and CarePrecise) pose a particular threat to the validity of the C-PCPS.

Given the method of allocating individual providers to practices, provider and practice lists in the C-PCPS may not align with those reported elsewhere.

Decision rules are needed when determining how well a practice location in the C-PCPS matches to a practice as identified in a SIM state-provided list of individual clinicians or practices participating in a payment model or delivery system transformation effort, or in the CMS-maintained sources of practices participating in Medicare APMs.

MD-PPAS was most recently updated for 2017, limiting the usability of data available for associating individual providers with an organization TIN.

In some instances, individual providers who actually provide care at the same practice may be allocated to different practice identifiers in the C-PCPS, particularly in the case of individual providers without an identified relationship to an organization TIN.

Individual provider universe of the C-PCPs

The C-PCPS contains a subset of the individual providers in NPPES, specifically those with taxonomy codes in NPPES or specialty codes in PECOS that identify them as:

- Physician PCPs;
- All other physicians;
- NP or PA with plausibly primary care taxonomies/specialties; and
- Behavioral health providers.

Note that NPs and PAs are only classified as PCPs when they are either (1) co-located with physician PCPs or (2) located at a practice composed exclusively of NPs or PAs.

Practice inclusion and exclusion criteria

Inclusion criteria:

- Practices with one or more physicians are included.
- Practices with only NPs or PAs, but zero physicians, are included.

Exclusion criteria:

- Addresses outside of the United States are excluded.
- Practices of exclusively NPs or PAs are excluded if they are located in states in which these types of providers cannot practice independently of a physician.
- Some NP- and PA-only practices in ZIP codes containing large hospitals or health systems are excluded as a result of quality checks, because it was determined that they are likely providing care at a hospital rather than independently.

Data dictionary

Table L-10 lists the variables in the C-PCPS provides their descriptions.

Table L-10. Characteristics of Primary Care Practice Sites variables and description

Variable name	Description
CoLoCode	Unique practice identifier.
Zip Code	5-digit ZIP code of the practice's address.
Latitude	Latitude of the ZIP code centroid.
Longitude	Longitude of the ZIP code centroid.
State	State of the practice's address.
RuralUrban	Identifier of ZIP code's rural/urban status. "U" = urban, "R" = rural, "O" = other. Note that this flag is determined by zip code and is provided by CarePrecise, which defines these as: • If the ZIP code has no core-based statistical area code (i.e., area population <10,000) = rural. • If population >50,000, it is a metro area = urban. • If neither of those it is a non-urban, non-rural populated area = other. • To pick up areas that might have been missed as rural, if ZIP code is in the FORHP Eligible Zip Codes file maintained at HRSA, https://www.hrsa.gov/rural-health/about-us/definition/datafiles.html = rural.
Year	Year of data
HPSA	Flag identifying primary care health professional shortage area ZIP codes.
Physician_count	Number of physicians at a practice.
PCP_count	Number of primary care providers at a practice, including physicians, PAs, and NPs.
NonPhysicianProvider_count	Number of PAs and NPs at a practice.
NP_count	Number of NPs at a practice.
PA_count	Number of PAs at a practice.
Behavioral_count	Number of behavioral health providers at a practice.
PCPhysician_count	Number of physician PCPs at a practice.
Provider_count	Number of physicians, NPs, and PAs at a practice.
ACO	Flag identifying practices that participated in a Medicare ACO in a given year. Models included are Pioneer, Medicare SSP, and Next Generation ACO.
Other	Flag identifying practices that participated in a Medicare APM other than an ACO in a given year. Models included are PGP Transition, MAPCP, MMCO Financial Alignment, CPCi, Medicare Health Care Quality Demo for Indiana, Comprehensive ESRD Care, CPC+, Vermont All-Payer Model, and Maryland Total Cost of Care.
VBP_Any	Flag identifying practices that participated in a Medicare APM (either ACO or Other) in a given year, including any ACO or Other model.
PCP	Flag identifying practices with 1+ PCPs.

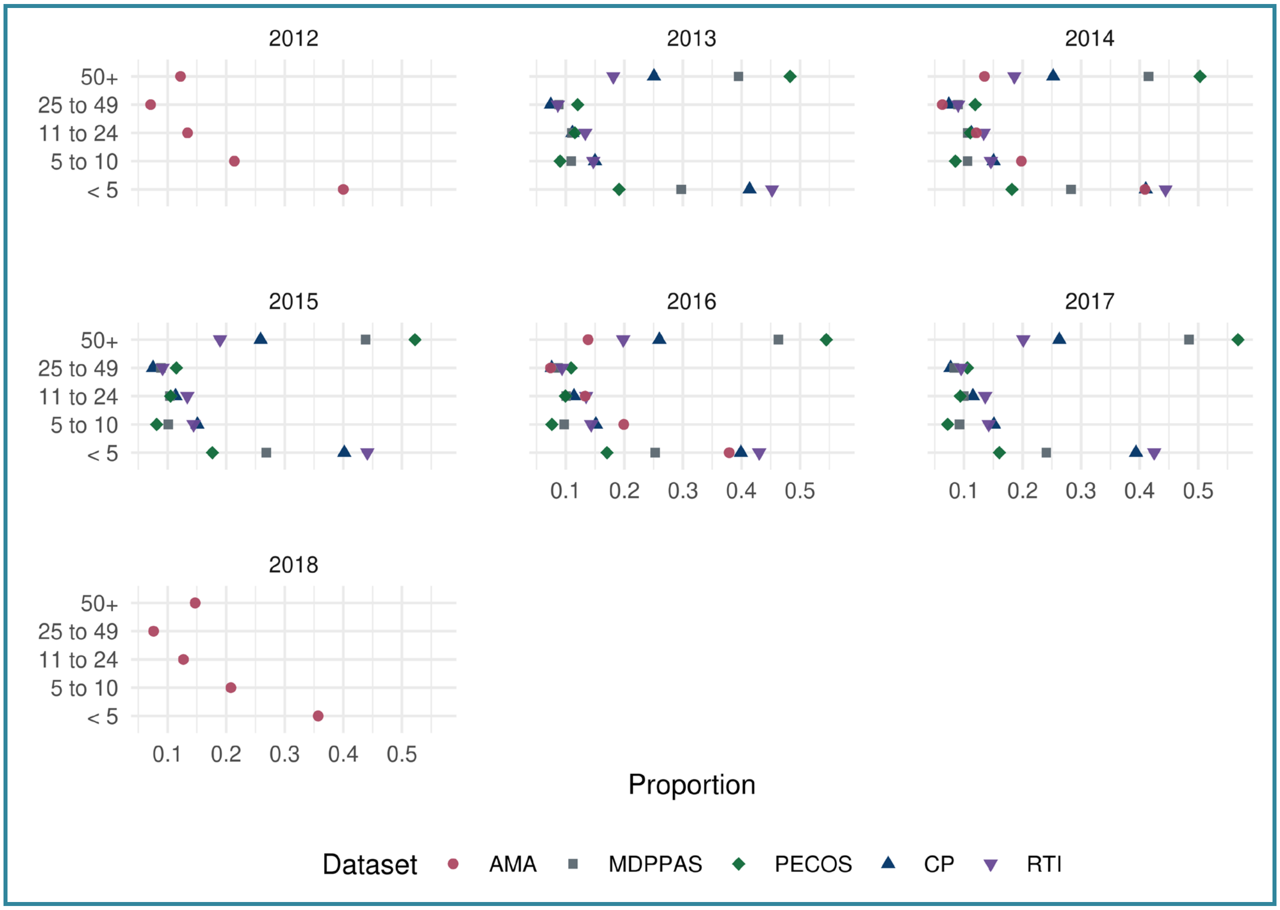
Note: ACO = accountable care organization; APM = alternative payment model; CPC+ = Comprehensive Primary Care Plus; CPCi = Comprehensive Primary Care initiative; ESRD = end-stage renal disease; FORHP = Federal Office of Rural Health Policy; HRSA = Health Resources and Services Administration; MAPCP = Multi-Payer Advanced Primary Care Practice; MMCO = Medicare-Medicaid Coordination Office; NP = nurse practitioner; PA = physician's assistant; PCP = primary care provider; PGP = Physician Group Practice; SSP = shared savings program.

Validity

The number of physicians, and specifically primary care physicians, in the C-PCPS closely matches the numbers reported by other external data sources on a state level, often falling between the estimates of these other sources. C-PCPS data were compared with various external data sources: the Association of American Medical Colleges, Kaiser Family Foundation, Federation of State Medical Boards, and Bureau of Labor Statistics. These comparisons allow us to quality check our alignment algorithm and validate that the methodology results in estimates that align well with findings from other surveys. Data from the AHRQ's Compendium of U.S. Health Systems Performance (CHSP) Initiative were also considered, but because the CHSP contains data only from hospital systems, it underestimates the number of physicians and primary care physicians.

The distribution of physician practice sizes in the C-PCPS closely matches that reported by the American Medical Association (AMA), which surveys physicians nationwide (see ***Figure L-1***). Physicians report the number of physicians who work at their practice; however, there is no link between survey submissions (i.e., two participants who work together may respond that they work at a small clinic, but there is no way to link their de-identified responses to know that they do in fact work together). Instead, the AMA reports on practice size from a physician level. For example, in 2018, approximately 35 percent of AMA respondents reported working at a practice with fewer than five physicians.

Figure L-1. The distribution of practice sizes in the Characteristics of Primary Care Practice Sites closely matches that in the American Medical Association's Physician Practice Benchmark Survey biannual survey



Note: AMA = American Medical Association (which produced the Physician Practice Benchmark Survey); CP = CarePrecise; MDPPAS = Medicare Data on Physician Practice and Specialty; PECOS = Medicare Provider Enrollment, Chain, and Ownership System; RTI = RTI-created Characteristics of Primary Care Practice Sites.

Aligning with other data sources

Identifying individual providers in the C-PCPS participating in Medicare APMs. Individual providers (and subsequently, practices) that participated in Medicare APMs are identified by provider identifiers in the Medicare Master Data Management (MDM) files. Specifically, an individual provider is flagged as participating in an APM if:

- Individual's "parent" organization TIN in the MDM (regardless of constructed practice identifier), if in the MDM:
  - All of the organization TIN's subpart NPIs participated in a model.
  - Organization TIN has a record without an associated NPI.
  - Organization TIN's associated NPIs are exclusively individual NPIs.

- Individual's constructed practice identifier TIN in MDM, if in the MDM:
  - All of the organization TIN's subpart NPIs participated in a model.
  - Organization TIN has a record without an associated NPI.
  - Organization TIN's associated NPIs are exclusively individual NPIs.
  - Individual's NPI or TIN in the MDM.

Identifying practices in the C-PCPS participating in Medicare APM models. A constructed practice in the C-PCPS is flagged as participating in APM if:

- Practice TIN in MDM, if in the MDM:
  - All of the organization TIN's subpart NPIs participated in a model.
  - Organization TIN has a record without an associated NPI.
  - Organization TIN's associated NPIs are exclusively individual NPIs.
- Practice CoLoCode shared by an organization NPI in MDM, including subpart organization NPIs of organization TINs identified above, only if the practice does not contain an organization TIN.
- ≥60 percent individual providers at a practice participated in an APM (threshold selected after examining distribution of the percentage of APM-participating providers in practices).

Identifying individual providers and practices in the C-PCPS participating in SIM Initiative–supported models. Identifying participation in SIM Initiative–supported models used the same aforementioned methodologies as identifying participation in Medicare APMs with minor modifications and caveats:

- State agencies provided SIM Initiative provider and practice lists. Some contained individual providers' NPIs, whereas others contained only organization NPIs.
- Michigan and New York practice lists identified all PCMHs statewide, not those that received SIM-supported technical assistance.
- For those states supplying individual provider NPIs, instead of using the 60 percent individual provider threshold for individual providers at a practice, state-specific thresholds were selected to maximize concordance, where possible between (1) the number of SIM-participating practices in the C-PCPS and those identified by the state and (2) distributions of practice characteristics (e.g., size) between the C-PCPS and those of state-provided practice lists. These thresholds were as follows:
  - Colorado: 100 percent;
  - Delaware: ≥60 percent;

– Michigan: ≥70 percent; and

– Rhode Island: ≥70 percent.

L.4.3 Data sources: Payer market characteristics

APM landscape scan

Detailed information was collected on the APM landscape in each of the SIM states using systematic online research. Searches used targeted phrases including permutations of state names, health insurance companies' names, and APM/VBP-related keywords such as "value-based payment (VBP)," "incentive payment," "alternative payment model (APM)," "accountable care organization (ACO)," "shared savings," and "shared savings program (SSP)." Identified models were followed up with further searches to identify additional information. Information sources identified were reviewed for additional information on additional models. For each APM identified, participating payer(s) (Medicaid, Medicare, commercial), year(s) in operation, the availability of information on participating providers and practices, and APM category were recorded. APMs were classified using the Health Care Payment Learning & Action Network (HCPLAN) APM Framework. VBP models were operationalized as APMs of HCPLAN Category 2C (pay-for-performance) or higher.

National Association of Insurance Commissioners' supplemental health care exhibit reports

These annual reports were used to collect enrollment for each commercial insurer in a state, measured as the sum of individual, small group, and large group covered lives. These enrollment numbers became the numerator in market share calculations.

American Community Survey

Annual American Community Survey (ACS) estimates of the number of individuals covered by private insurance in SIM states were used as the denominator in market share calculations. In the ACS, private insurance is operationalized as "a plan provided through an employer or union, a plan purchased by an individual from a private company, or TRICARE or other military health care."

Herfindahl-Hirschman Index

Market concentration was operationalized as the Herfindahl-Hirschman Index (HHI), which is calculated by taking the sum of squared market shares of each firm competing in a market. HHI ranges between 0 and 10,000. An HHI of <1,500 is considered competitive, while 1,500–2,500 is moderately concentrated, and >2,500 is highly concentrated.

Addendum

Table L-11. Outcome measures used in the claims-based model-specific impact analyses

Outcome measure	Outcome type	Definition
Spending		
Total spending per person per month	Continuous	Total payments for an individual in a single year, calculated from all claim types, including pharmacy claims. Total spending was annualized by dividing it by the eligibility fraction. The eligibility fraction is the number of months in a year that an individual was included in the analytic sample divided by 12. Annual total spending was converted to a per person per month value by dividing it by 12. Total spending per person per month—like all other spending outcomes—was capped at the 99.9th percentile to reduce the influence of extreme outliers on impact estimates.
Inpatient spending per person per month	Continuous	The sum of payments to hospitals for covered services provided during all inpatient admissions in a single year. These payments come from inpatient facility claims. Inpatient spending was annualized and capped in the same manner as total spending.
ED spending per person per month	Continuous	The sum of payments for all outpatient ED visits. ED visits not resulting in an inpatient admission were identified using a combination of revenue codes and procedure codes in outpatient facility claims. ED spending was annualized and capped in the same manner as total spending.
Professional spending per person per month	Continuous	The sum of payments for all professional claims and encounters. Professional spending was annualized and capped in the same manner as total spending.
Prescription drug spending per person per month	Continuous	The sum of payments for all pharmacy claims. Prescription drug spending was annualized and capped in the same manner as total spending.
Total BH spending per person per month	Continuous	The sum of payments from all facility and professional medical claims for which the primary diagnosis code was included in the Mental Health Diagnosis or Chemical Dependency HEDIS value sets. **Variation for Rhode Island PCMH-Kids analysis:** The sum of net payments from all facility and professional medical claims for which the primary diagnosis code was for attention deficit disorder or developmental disability, as defined by the HEDIS value sets. This change was made because of the focus of the model on these conditions. Total BH spending was annualized and capped in the same manner as total spending.

(continued)

Table L-11. Outcome measures used in the claims-based model-specific impact analyses (continued)

Outcome measure	Outcome type	Definition
BH-related inpatient spending	Continuous	The sum of payments to hospitals for covered services provided during BH inpatient admissions in a single year. These payments come from inpatient facility claims. An inpatient admission is BH-related if the primary diagnosis code was included in the Mental Health Diagnosis or Chemical Dependency HEDIS value sets. BH inpatient spending was annualized and capped in the same manner as total spending.
BH-related ED spending	Continuous	The sum of payments to hospitals for BH outpatient ED visits in a single year. These payments come from outpatient facility claims. An ED visit is BH-related if the primary diagnosis code was included in the Mental Health Diagnosis or Chemical Dependency HEDIS value sets. BH ED spending was annualized and capped in the same manner as total spending.
Utilization		
All-cause inpatient admissions	Binary	An indicator for admission to an acute care hospital in a measurement year. An inpatient admission was identified in inpatient claims. This outcome was multiplied by 1,000 and presented as a rate per 1,000 people because greater than 95 percent of people across analyses had either zero or one acute inpatient admissions in a single year.
ED visits	Count	The count of ED visits not resulting in an inpatient admission (outpatient ED visits). ED visits that resulted in an inpatient admission were excluded from the ED visit count. Observation stays were considered ED visits. Outpatient ED visits were identified using a combination of revenue codes and procedure codes in outpatient claims. ED visit counts were annualized by dividing the count of visits for each person in each year by that person's eligibility fraction and rounding the annualized count to the nearest integer. ED visit counts were multiplied by 1,000 to create a rate per 1,000 people. For the Rhode Island PCMH-Kids analysis only, the ED visit outcome was represented as binary because of the relatively low percentage of children with any ED visits.
Readmission within 30 days of hospital discharge	Binary	A hospital discharge-level indicator of whether a person 18 years old or older had at least one acute hospitalization that occurred within 30 days following an inpatient hospital discharge. Index hospital discharges were identified as inpatient stays with a discharge date within the given measurement period (12 months) minus 30 days from the end of the period. If an index stay had another admission within 30 days, that was considered a readmission. The probability of a readmission was multiplied by 1,000 to create a rate of readmissions per 1,000 hospital discharges.

(continued)

Table L-11. Outcome measures used in the claims-based model-specific impact analyses (continued)

Outcome measure	Outcome type	Definition
Follow-up provider visit within 14 days of hospital discharge	Binary	A hospital discharge-level indicator of whether a person who had an acute care hospital admission also had an evaluation and management visit to a provider that was not in an inpatient setting. For an acute care hospitalization to be in the sample for this outcome, a person was required to (1) be eligible at both the time of admission and 14 days post-discharge, (2) be alive both at discharge and 14 days post-discharge, and (3) not have a readmission within 14 days post-discharge.
Primary care provider visits	Count or binary	A count of visits for which the provider's specialty was primary care and the associated procedure, diagnosis, or revenue codes were included in the HEDIS Value Sets for Ambulatory Visits, Other Ambulatory Visits or Well Care. Primary care visit counts were annualized by dividing the count for each person in each year by that person's eligibility fraction and rounding the annualized count to the nearest integer. Primary care provider visit counts were multiplied by 1,000 to create a rate per 1,000 people. A binary version of the primary care visit outcome was also presented in analyses of PCMH models (CT PCMH+, DE PTI, ID practice transformation support, OH CPC, and RI PCMH-Kids).
BH related provider visits	Count	A count of the BH-related visits. BH-related visits are identified as (1) visits to a provider with a BH specialty, and the primary diagnosis code for the visit was on the Mental Health Diagnosis or Chemical Dependency HEDIS value sets; (2) visits that included mental health or substance abuse-related procedure codes; or (3) visits for which the primary diagnosis code for the visit was on the Mental Health Diagnosis or Chemical Dependency HEDIS value sets and the procedure code indicated an evaluation and management visit. BH-related visit counts were annualized by dividing the count for each person in each year by that person's eligibility fraction and rounding the annualized count to the nearest integer. BH-related provider visit counts were multiplied by 1,000 to create a rate per 1,000 people. For the CO IBH analysis, this outcome was represented as binary because of concerns about the effects of extreme outliers on D-in-D model estimates. For the WA IMC analysis, this outcome was defined as office-based outpatient visits where the primary taxonomy was for a BH related specialty, such as for addiction medicine or psychiatry.
BH-related inpatient admissions	Binary	An indicator for an admission to an acute care hospital in a year for BH. A BH-related inpatient admission was identified in inpatient claims as an admission for which the primary diagnosis code was included in the Mental Health Diagnosis or Chemical Dependency HEDIS value sets. This outcome was multiplied by 1,000 and presented as a rate per 1,000 people.

(continued)

Table L-11. Outcome measures used in the claims-based model-specific impact analyses (continued)

Outcome measure	Outcome type	Definition
BH-related ED visits	Count	Outpatient ED visit for which for which the primary diagnosis code was included in the Mental Health Diagnosis or Chemical Dependency HEDIS value sets. ED visit counts were annualized by dividing the count for each person in each year by that person's eligibility fraction and rounding the annualized count to the nearest integer. BH-related ED visit counts were multiplied by 1,000 to create a rate per 1,000 people.
Quality: All quality outcomes are 2016 HEDIS measures		
Patients with diabetes who received a HbA1c screening	Binary	An indicator for receipt of an HbA1c test by an individual aged 18 to 75 years with type 1 or type 2 diabetes. The outcome is represented as the percentage of all individuals aged 18 to 75 years with type 1 or type 2 diabetes who received HbA1c screening in a year.
Patients with diabetes who received a retinal eye exam	Binary	An indicator for receipt of a retinal eye exam by an individual aged 18 to 75 years with type 1 or type 2 diabetes. The outcome is represented as the percentage of all individuals aged 18 to 75 years with type 1 or type 2 diabetes who received a retinal eye exam in the measurement year.
Patients who received breast cancer screening	Binary	An indicator for receipt of breast cancer screening for women aged 41 to 69 years. The outcome is represented as the percentage of all women aged 41 to 69 years who were screened for breast cancer at least once during the past two measurement years.
Patients who received cervical cancer screening	Binary	An indicator for (1) receipt of cervical cancer cytology among women aged 21 to 64 years or (2) receipt of cervical cytology/HPV co-testing among women among women aged 30 to 64 years. This outcome is represented as the percentage of eligible women who received cervical cancer screening within the appropriate timeframe during the measurement year.
Patients who received colorectal cancer screening	Binary	An indicator for receipt of colorectal cancer screening for people aged 50 to 75 years within the appropriate timeframe, which varies by test type. The outcome is represented as the percentage of all individuals aged 50 to 75 years who received colorectal cancer screening with a recommended frequency during the measurement year.
Patients who received chlamydia screening	Binary	An indicator for receipt of chlamydia screening among women aged 16 to 24 years. The outcome is represented as the percentage of all women aged 16 to 24 years who were screened for chlamydia during the measurement year.

(continued)

Table L-11. Outcome measures used in the model-specific impact evaluation claims-based analyses (continued)

Outcome measure	Outcome type	Definition
Patients >18 years diagnosed with a new episode of major depression and treated with antidepressant medication and who remained on medication treatment at least 12 weeks and 6 months	Binary	An indicator for sustained treatment with antidepressant medication for individuals with depression. This outcome is represented as a percentage of patients 18 years of age and older who were diagnosed with a new episode of major depression and treated with antidepressant medication, and who remained on an antidepressant medication treatment for 12 weeks or 6 months, respectively. Two percentages were reported during each measurement year: – Effective Acute Phase Treatment. This is the percentage of newly diagnosed and treated patients who remained on an antidepressant medication for at least 84 days (12 weeks). – Effective Continuation Phase Treatment. This is the percentage of newly diagnosed and treated patients who remained on an antidepressant medication for at least 180 days (6 months).
Mental illness–related acute inpatient hospital admissions among patients aged 6 years or older as of the date of discharge with a mental health follow-up visit within seven and 30 days	Binary	A hospital-discharge level indicator for acute inpatient hospital admissions with a primary diagnosis for a BH condition that are followed by a visit to a provider for a mental health visit (identified by CPT or revenue codes) within seven or 30 days of discharge date. The outcome is represented as the percentage of BH inpatient admissions with a follow up provider visit. BH inpatient admissions are defined as including a BH admission as a primary diagnosis. Admissions that are followed by a readmission to an acute or other facility within seven or 30 days are excluded from the outcome.
Children and adolescents using multiple concurrent antipsychotics	Binary	An indicator for the use of two or more antipsychotic medications at the same time among children aged 1 to 17 years. The outcome is represented as the percentage of children aged 1 to 17 years who were dispensed multiple antipsychotic medications in the measurement year. A mental health diagnosis was not required for inclusion in the sample.
Eligible children with at least six well-child visits by 15 months of age	Binary	An indicator for receipt of six or more well-child visits to primary care providers by children who were 15-months old in the measurement year. The outcome is represented as the percentage of children aged 15 months who received at least six well-child visits.
Eligible children aged 3 to 6 years with at least one well-child visit during the year	Binary	An indicator for receipt of one or more well-child visits to primary care providers by children who were aged 3 to 6 years old in the measurement year. The outcome is represented as the percentage of children aged 3 to 6 years who received at least one well-child visit.

(continued)

Table L-11. Outcome measures used in the claims-based model-specific impact analyses (continued)

Outcome measure	Outcome type	Definition
Adolescent well-care visits	Binary	An indicator for the receipt of at least one comprehensive well-care visit with a primary care provider or obstetrics/gynecology practitioner among adolescents aged 12 to 21 years. A visit counts as a well-care visit if the claim includes a well-care visit CPT, Healthcare Common Procedure Coding System, or diagnosis code, defined based on the HEDIS value set. This outcome is represented as the percentage of adolescents who had at least one comprehensive well-care visit with a primary care provider or obstetrics/gynecology practitioner. Variation for Rhode Island analysis: The Rhode Island definition only includes adolescents aged 12 to 17 years because the Rhode Island sample only includes children under 18 years old.
Children aged 6 to 12 years old with at least 1 ADHD follow-up care visit within 30 days after the start date of the first ADHD prescription (initiation phase)	Binary	An indicator for at least one ADHD follow-up care visit within 30 days (defined by procedure codes in the Attention Deficit Disorder Visits HEDIS value set) after the start date of first ADHD prescription (defined by NDCs in the HEDIS value set) among children aged 6 to 12 years old. The first prescription was operationalized as the earliest with no prior ADHD prescription in the preceding 120 days. Children with diagnoses in the Mental Health or Chemical Dependency HEDIS values sets within 30 days of their first ADHD visit, as well as those with diagnoses in the Narcolepsy HEDIS value set at any point in the year, were excluded from the sample for this outcome. The outcome is represented as the percentage of the total number of children aged 6 to 12 years old with their first ADHD prescription who had appropriate follow-up care.
Percentage of children aged 6 to 12 years old with at least two ADHD follow-up care visits within 31 to 300 days (1) after the start date of the first ADHD prescription and (2) following an initial provider visit (continuation and maintenance phase)	Binary	An indicator for at least two ADHD follow-up care visits (defined by procedure codes in the Attention Deficit Disorder Visits HEDIS value set) within 31 to 300 days (1) after the start date of the first ADHD prescription and (2) following an initial provider visit, divided by the total number of children aged 6 to 12 years with their first ADHD prescription and initial follow-up visit among children aged 6 to 12 years. Children with diagnoses in the Mental Health or Chemical Dependency HEDIS values sets within 30 days of their first ADHD visit, as well as those with diagnoses in the Narcolepsy HEDIS value set at any point in the year, were excluded from the sample for this outcome. The outcome is represented as the percentage of children aged 6 to 12 years old with their first ADHD prescription who received appropriate follow-up care.

(continued)

Table L-11. Outcome measures used in the claims-based model-specific impact analyses (continued)

Outcome measure	Outcome type	Definition
Percentage of children with asthma aged 5 to 17 remaining on asthma medication for at least 75% of the treatment period	Binary	An indicator for having a consistent supply of asthma medication among children aged 5 to 17 years during the measurement year. Asthma medications were identified by National Drug Codes in the HEDIS value set. Beneficiaries with emphysema, chronic obstructive pulmonary disease, obstructive chronic bronchitis, chronic respiratory conditions due to fumes or vapors, cystic fibrosis, or acute respiratory failure (as defined by diagnosis codes in the HEDIS value set) were excluded from the sample for this outcome. The outcome is represented as a percentage of the total number of children with asthma aged 5 to 17 years with asthma (as defined by diagnosis codes in the HEDIS value set) with a supply of asthma medication for at least 75% of the year.
Maternity care		
Timely prenatal visits	Binary	An indicator for a delivery that was preceded by a prenatal care visit in the first trimester or within 42 days of coverage. (HEDIS measure)
Postpartum visits	Binary	An indicator for a delivery that was followed by a postpartum visit on or between seven and 84 days after delivery. (HEDIS measure)
Initiation of long-acting reversible contraceptive within 60 days of delivery	Binary	An indicator for initiation of a long-acting reversible contraceptive (implants and intrauterine devices or systems) among women aged 15 to 44 years and who had a live birth in the previous 60 days. (NQF measure)
Initiation of a most effective or moderately effective method of contraception within 60 days of delivery	Binary	An indicator for initiation of a most effective or moderately effective method of contraception among women aged 15 to 44 years and who had a live birth in the previous 60 days. Most effective contraception includes long-acting reversible contraception or sterilization. Moderately effective contraception includes diaphragms and birth control pills, patches, rings, or injections. (NQF measure)

Notes: All spending, utilization, and quality outcomes are assigned to service end dates or discharge dates.

ADHD = attention deficit/hyperactivity disorder; BH = behavioral health; BRFSS = Behavioral Risk Factor Surveillance System; CPC = Comprehensive Primary Care; CPT = Current Procedural Terminology; CT = Connecticut; DE = Delaware; ED = emergency department; HEDIS = Healthcare Effectiveness Data and Information Set; HPV = human papillomavirus; ID = Idaho; NDC = National Drug Code; NQF = National Quality Forum; OH = Ohio; PCMH = patient-centered medical home; PCMH-Kids = Patient-Centered Medical Home-Kids; PTI = Practice Transformation Initiative; RI = Rhode Island.

Table L-12. Outcome measures used in the New York State Patient-Centered Medical Home model–specific impact analysis

Outcome	Outcome type	Outcome definition
Total spending per member per month	Continuous	For each provider in each month, the total payments to a provider on behalf of all commercially insured patients. This total monthly payment amount was divided by the number of patients assigned a given provider to produce total spending per commercial plan member per month.
All-cause acute inpatient admissions per 1,000 patient–months	Continuous	The total number of commercially insured patients who had an admission to an acute care hospital during a specific month. Admissions for ACSCs were excluded from this outcome; only non-ACSC admissions were included.
ED visits per 1,000 patient–months	Continuous	The total number of commercially insured patients who were attributed to a provider who had an ED visit during a specific month.
All-cause 30 day readmissions per 1,000 admissions	Continuous	Within a specific month, the total number of commercially insured patients who had a readmission within 30 days of an acute care hospital stay divided by the total number of commercially insured patients with a hospital admission during the same month. Patients with cancer were excluded from the count of patients with readmissions.
Admissions for ACSCs	Continuous	The total number of commercially insured patients who had an admission to an acute care hospital for an ACSC during a given month. Admissions for ACSCs were identified as admissions for one of 16 conditions, such as dehydration, hypertension, or uncontrolled diabetes. Hospital stays for these conditions are considered “ambulatory care-sensitive” because the hospital stays can be potentially prevented with effective care in non-hospital settings.
BH visits	Continuous	The total number of commercially insured patients who had who had an evaluation and management or psychotherapy medicine visit for a behavioral health condition in a month.
Preventative care visits	Continuous	The total number of patients who had a preventative care visit in a month. Preventive care visits were defined by procedure codes for preventive medicine or wellness visits.
Preventative care screening	Continuous	The total number of patients who had a preventative care screening in a month. Preventive care screenings included activities like colorectal screenings, mammograms, Prostate Stimulating Antigen tests, and depression screening.

Notes: All outcomes are at the provider-month level and are created by aggregating claims from attributed patients to a provider. Outcomes were generated by FAIR Health based on FAIR Health’s specifications. Because very few people have more than one instance of utilization in a month, “utilization per 1,000 patient-months,” as the outcomes are presented, and “patients with utilization per 1,000 patient-months,” as the outcomes are calculated, are almost equivalent. The former interpretation was chosen because it is more intuitive.

ACSC= ambulatory care sensitive conditions; ED = emergency department; NY = New York.

Table L-13. Outcome measures used in the Iowa model-specific impact analysis

Outcome	Outcome type	Outcome definition
Ever been told by a health care professional that they had diabetes	Binary	An indicator for whether an individual reported ever receiving a diabetes diagnosis from a health care provider.
Ever been told by a health care professional that they had pre-diabetes	Binary	An indicator for whether an individual reported ever receiving a pre-diabetes diagnosis from a health care provider.
Ever had a test for high blood sugar or diabetes in the past three years	Binary	An indicator for whether an individual reported having a test for high blood sugar during the past three years.
Self-reported fair or poor health	Binary	An indicator for whether an individual reported their general health status as fair or poor rather than good, very good, or excellent.
Number of physical health days that were not good in the past 30 days	Count, but treated as continuous	The number of days in the past 30 days that an individual reported having physical health that was not good.
Number of mental health days that were not good in the past 30 days	Count, but treated as continuous	The number of days in the past 30 days that an individual reported having mental health that was not good.
BMI	Continuous	Measure of body fat, calculated from self-reported height and weight.
Obese	Binary	An indicator for a BMI greater than or equal to 25 and less than 30.
Overweight	Binary	An indicator for a BMI greater than 30.
Current smoker	Binary	An indicator for an individual's report of (1) ever having smoked 100 cigarettes and (2) having smoked at least some days during the past 30 days.
Had ever smoked 100 cigarettes total	Binary	An indicator for whether an individual reported having smoked 100 cigarettes total in that individual's life.
Tried to quit in past year	Binary	An indicator for whether an individual reported trying to stop smoking for at least one day during the previous 12 months.
Exercised in last month	Binary	An indicator for whether an individual reported exercising or engaging in any physical activity that was not job-related in the previous month.
Age at diabetes diagnosis	Count, but treated as continuous	Reported age at which an individual received a diabetes diagnosis.
Number of HbA1c tests in last year	Count, but treated as continuous	The number of reported times that an individual's HbA1c was tested by a health care provider in the previous 12 months.

(continued)

Table L-13. Outcome measures used in the Iowa model-specific impact analysis (continued)

Outcome	Outcome type	Outcome definition
Number of times seen by a health professional for diabetes in past year	Count, but treated as continuous	The number of reported times that an individual saw a health care professional about that individual's diabetes in the previous 12 months.
Report that a doctor has ever told them diabetes has affected their eyes	Binary	An indicator for whether an individual reported that a doctor said that the individual’s diabetes was affecting the individual's eyes or that he or she had retinopathy.
Currently taking insulin	Binary	An indicator for whether an individual was taking insulin at the time of the survey.
Taken a course on DSME	Binary	An indicator for whether an individual reported ever having taken a class on diabetes self-management.
Frequency of non-professional blood tests over last year	Count, but treated as continuous	An indicator for the frequency for which an individual reported that her or she took at-home blood glucose tests over the past 12 months.
Frequency of foot test for sores over past year	Count, but treated as continuous	A count of the number of times an health care provider examined an individual's feet for irritation and sores over the past 12 months.

Notes: BFRSS = Behavioral Risk Factor Surveillance System; BMI = body mass index; DSME = diabetes self-management and education; HbA1c = hemoglobin A1c; IA = Iowa.

All outcomes are self-reported by non-institutionalized adults responded to the IA BRFSS survey.

Table L-14. Outcome measures used in the Ohio and Tennessee acute asthma exacerbation and perinatal episode analyses

Outcome	Outcome type	Outcome definition
Perinatal episode with a C-section delivery	Binary	Episode included a C-section delivery.
Perinatal episode in which the mother received prenatal HIV screening	Binary	Episode included screening for HIV during the 280-day window before delivery of the newborn.
Perinatal episode in which the mother received GBS screening	Binary	Episode included screening for GBS during the 280-day window before delivery of the newborn. The denominator is the number of vaginal birth episodes included in the analysis (i.e., excluding those underwent a cesarean section delivery).
Perinatal episode in which the mother had a follow-up visit within 60 days after delivery	Binary	Episode included a visit with a primary care physician (including OB-GYN specialists) during the 60-day window after delivery of the newborn.
Acute asthma exacerbation episode in which the patient receives follow-up care within the post-trigger window	Binary	Episode included a follow-up evaluation and management visit within 30 days after the episode trigger.
Acute asthma exacerbation episode includes an administration of or filled prescription for oral corticosteroids or injectable corticosteroids within the trigger and post-trigger window	Binary	Episode in which the patient is administered or dispensed an oral or injectable corticosteroid during the episode trigger or within 30 days of the trigger.
Acute asthma exacerbation episode in which the patient has a repeat asthma acute exacerbation within the post-trigger window	Binary	Episode in which the patient has a repeat acute asthma trigger in an ED visit or inpatient admission within 30 days of the initial episode trigger.

Notes: All outcomes are at the episode level.

C-section = cesarean section; ED = emergency department; GBS = group B streptococcus; HIV = human immunodeficiency virus; OB-GYN = obstetrician-gynecologist; OH = Ohio; TN = Tennessee.

References for Appendix L

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Appendix M: Supplemental Analyses

This appendix presents additional analyses that explore several different areas of the SIM Initiative's impacts. Two analyses use qualitative and quantitative data from the main report to draw overarching conclusions about state or model-specific factors associated with positive outcomes. Three analyses take a deeper dive into the results in individual states (Colorado, Idaho, and Ohio). Three analyses explored model impacts on specific types of care (maternity care visits, primary care provider visits, and readmissions), and two provide additional context for understanding the main results and impacts.

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Appendix M-1: Exploratory Qualitative Comparative Analysis

- One factor individually and one combination of factors enabled states to achieve a high level of sustainability:
- Using the state's role as a payer through managed care organization (MCO) contracting as a policy lever for change (Delaware, Iowa, Michigan, Ohio, Rhode Island, Tennessee, and Washington), or
- Aligning quality measures among multiple payers in combination with building on prior patient-centered medical home (PCMH) investments, and not engaging commercial stakeholders for voluntary payment reform (Connecticut, Rhode Island).
- Using the state's role as a payer through MCO contracting as a policy lever for change was a key factor in sustaining SIM activities.

M-1.1 Introduction

This qualitative comparative analysis (QCA) assesses how different features of SIM—individually or in combination—are necessary (must be present for an outcome to occur) or sufficient (produce the outcome) for demonstration outcomes. This analysis supported systematic cross-case comparison and accommodated SIM's small population, which allowed the Evaluation Team to explore the complex, interplay of factors related to SIM sustainability.

QCA uses formal logic and set theory, a branch of mathematics, to identify non-correlational relations by using qualitative data, quantitative data, or both derived from the cases included in the analysis. This approach differs from traditional variable-oriented statistical techniques with large sample size requirements, which are often not well suited for explaining complex social phenomena. This approach allowed for analysis of a configural research question among 11 state demonstrations.

QCA Question:

What combinations of factors—individually or in combination—are necessary or sufficient for achieving a key SIM outcome: sustaining most SIM activities after the award period?

M-1.2 Methods

This analysis drew upon the SIM conceptual model (***Overview, Exhibit 2***) to identify the factors that may collectively lead to outcomes in the conceptual model. Key factors were defined, calibrated (see ***Appendix M-S1***), and outlined in a worksheet for each State Evaluation Team (SET) on the federal evaluation. SETs scored their respective states on each factor and provided supporting qualitative or quantitative values to justify their score. Scoring was reviewed to ensure consistency across the states and to adjudicate questions.

The analysis employed the enhanced standard analysis of QCA (Kane & Kahwati, 2020; Schneider & Wagemann, 2012) using the SetMethods (Oana & Schneider, 2018) and QCA packages in R (Duşa, 2019). A truth table was constructed to explore necessity and sufficiency, assess parameters of fit (consistency and coverage), and conduct robustness checks (see ***Table M-S1-2***). After finalizing the solution results, exemplar states were identified to elaborate how and why the particular combination(s) worked in those exemplar states. The principles for case selection outlined by Kane and Kahwati (2020) and Schneider and Rohlfing (2013) were used to identify the illustrative cases.

This analysis examined the outcome of achieving a high level of sustainability following the SIM award (i.e., sustained more than half of their major SIM initiatives).

Table M-1-1 provides a snapshot of methods used in this analysis.

Table M-1-1. Methods snapshot

Method	Description
Data	Stakeholder interviews; state progress reports and workplans; environmental scan data; and claims analysis results
Sample	All SIM demonstration states
Timeframe	Full SIM Initiative time period (2015–2020, see ***Section M-1.1*** for no-cost extension states)
Measures (i.e., condition sets)[a]	• Convened commercial payer stakeholders for voluntary value-based payment participation • Used role as payer through contracts with managed care organization as a policy lever • Used role as purchaser as policy lever through state employee plans • Aligned quality measures among commercial payers in the state (i.e., states achieved partial alignment among one or more commercial payers) • Built on prior PCMH investments in the state
Outcome set	• Achieved a high level of sustainability
Analysis	Enhanced standard analysis of QCA

Notes: [a] The condition sets included in this row represent factors used in the final model. Information on other factors was collected information; those that had no or minimal variation and were not used for the analysis. The entire set of condition sets is included in the appendices.

PCMH = patient-centered medical home; QCA = qualitative comparative analysis; SIM = State Innovation Model.

M-1.3 Results

M-1.3.1 Results for achieving a high level of sustainability

Eight out of the 11 demonstration states achieved a high level of sustainability of their SIM activities. The three states that did not achieve the outcome served as counterfactuals in this analysis. One factor individually and one combination of factors enabled states to achieve a high level of sustainability:

- Using the state's role as a payer through managed care organization (MCO) contracting as a policy lever for change (Delaware, Iowa, Michigan, Ohio, Rhode Island, Tennessee, and Washington), or
- Aligning quality measures among commercial payers in combination with building on prior patient-centered medical home (PCMH) investments, and not convening commercial payer stakeholders for voluntary VBP participation (Connecticut and Rhode Island).

These results accounted for all eight states (total solution coverage=1.000). ***Table M-1-2*** displays the solution terms, their individual parameters of fit, and the overall solution for the intermediate solution. ***Figure M-1-1*** is a Venn diagram of these results.

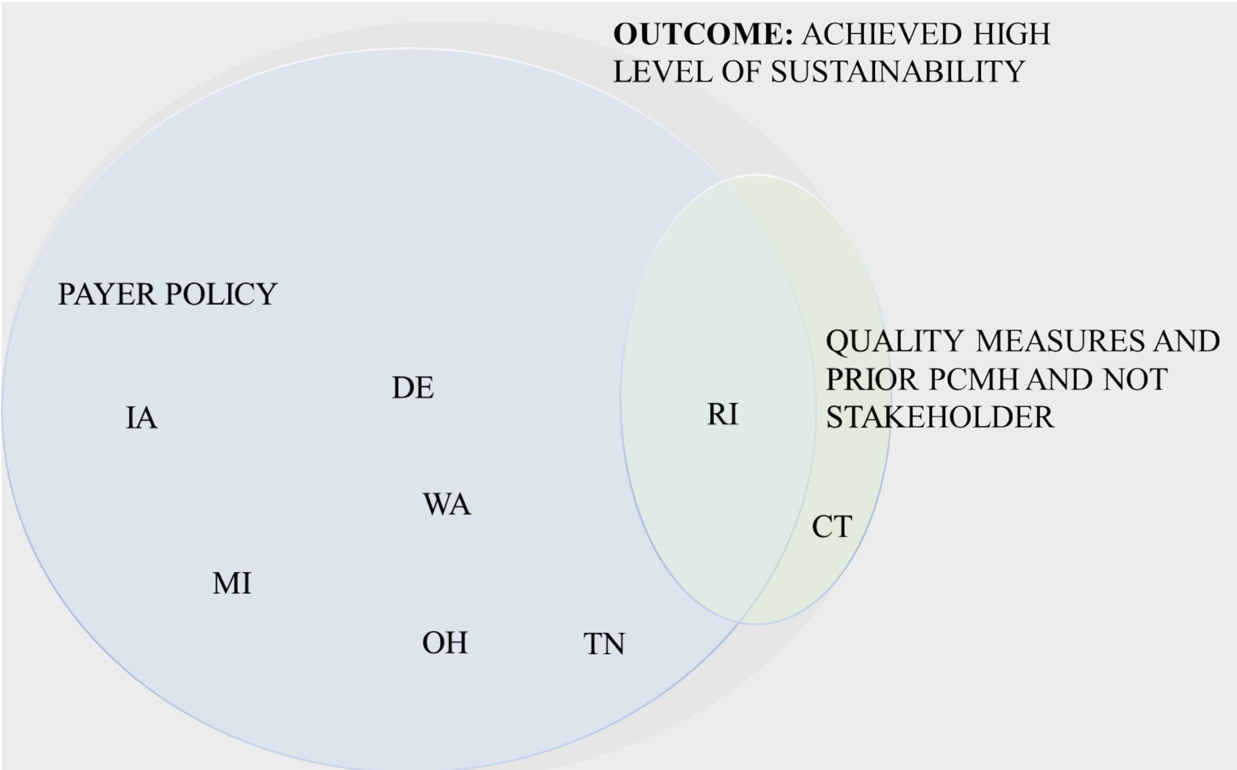
Table M-1-2. Solution terms and parameters of fit for the outcome achieving a high level of sustainability

Combination/solution term	Raw coverage	Unique coverage	Consistency	Cases in the solution term
Using the state's role as a payer through MCO contracting as a policy lever for change	0.875	0.750	1.000	DE, IA, MI, OH, RI, TN, and WA
Aligning quality measures among commercial payers in combination with building on prior PCMH investments, and not convening commercial payer stakeholders in voluntary VBP	0.250	0.125	1.000	CT and RI
Total solution consistency: 1.000				
Total solution coverage: 1.000				

Notes: "Consistency" characterizes the strength of a set relationship; it ranges from 0 (not at all consistent) to 1 (perfectly consistent). "Coverage" represents portion of cases in the outcome and solution sets and ranges from 0 (not empirically relevant) to 1 (completely empirically relevant). For individual solution terms, raw and unique coverage are also calculated. Raw coverage indicates the portion of cases represented by a solution term; unique coverage indicates the portion of cases represented by a single solution term.

CT = Connecticut; DE = Delaware; IA = Iowa; MCO = managed care organization; MI = Michigan; OH = Ohio; PCMH = patient-centered medical home; RI = Rhode Island; TN = Tennessee; VBP = value-based payment; WA = Washington.

Figure M-1-1. Venn diagram of results for the outcome achieving a high level of sustainability



Notes: Figure is not perfectly scaled.

States that did not achieve the outcome (CO, ID, and NY) are not shown; they are outside the large blue circle.

CT = Connecticut; DE = Delaware; IA = Iowa; MI = Michigan; OH = Ohio; “PAYER POLICY” = Used role as payer through contracts with managed care organization as a policy lever; “PRIOR PCMH” = built on prior PCMH investments; “QUALITY MEASURES” = Aligned quality measures among commercial payers in the state; RI = Rhode Island; “STAKEHOLDER” = Convened commercial payer stakeholders for voluntary value-based payment; TN = Tennessee; WA = Washington.

M-1.4 Discussion

M-1.4.1 Overall

In this model, “using the state’s role as a payer through MCO contracting as a policy lever for change” (i.e., PAYER POLICY) was important for sustainability. MCO contracting was the most empirically relevant solution term (raw coverage=0.875) in achieving sustainability and is individually sufficient for the outcome (when the state uses its role as policy lever occurs, the outcome of sustainability also occurs). These findings suggest that by using MCO contracting, state’s may be investing in sustainable changes in the value-based payment (VBP) landscape.

M-1.4.2 Discussion for achieving a high level of sustainability

As previously noted, a critical factor for a state’s sustainability was the state’s role as a payer through MCO contracting. MCOs are organizations that, under a contract with the state

Medicaid agency, accept financial risk for delivery of a comprehensive set of health services (for more details about MCO contracts see ***Section 5***). All seven states that used MCOs as a policy lever during the SIM Initiative (Delaware, Iowa, Michigan, Ohio, Rhode Island, Tennessee, and Washington) made progress in increasing VBP usage, and many states leveraged contracts to support other SIM goals or VBP use in non-Medicaid markets. All seven states continued to use MCOs after the end of their SIM awards, which likely contributed to their ability to sustain (or expand) their delivery system reforms. For example, Tennessee designed their SIM activities to be sustainable and leveraged MCO contracts to sustain the state's policy improvements. Stakeholders expected a smooth transition partly because of the strong working relationships between the state and the MCOs.

The second result (aligning quality measures among multiple payers in combination with building on prior PCMH investments and not convening commercial payer stakeholders for voluntary VBP participation) represented Connecticut uniquely and Rhode Island (which appeared in both results). Although Connecticut does not have MCOs, the state's main initiative in SIM (Person-Centered Medical Home Plus [PCMH+]) was through Medicaid and was built on its prior PCMH investments. Rhode Island similarly built on its significant PCMH investments (expanding to cover children). As with many QCA analyses, this analysis found a negative solution, which is often counter-intuitive. Here, "not convening commercial payer stakeholders for voluntary VBP participation" (i.e., NOT STAKEHOLDER) was part of this result showing that although engaging commercial payers for *voluntary* VBP reforms was part of several state's SIM strategies, Connecticut and Rhode Island did not rely on this approach. Instead, Rhode Island regulates commercial payers through a state office, and Connecticut ultimately focused its efforts on Medicaid only. This solution does not indicate that stakeholder engagement is not important; rather, investing in convening voluntary commercial payers for voluntary VBP participation was not a part of how Connecticut and Rhode Island managed to achieve sustainability. It may be that alignment of quality measures, also part of the result, was a more targeted and productive investment than convening around voluntary VBP participation for these states.

M-1.4.3 Limitations

This study has several limitations. The first limitation is that it was not possible to control for all contextual factors; nor are "controls" appropriate for QCA, which is not a probabilistic method. Similar to other analytic methods, QCA limits analysis to a smaller set of conditions. Consequently, it was not possible to include additional activities or policies without creating far more possible combinations than the number of cases could accommodate (what is known as "limited diversity" in QCA). The sustainability outcome accounts for the proportion of activities sustained, but it may not fully capture whether these activities were larger, key initiatives or smaller investments. To attempt to address this issue a careful review of all states' results was conducted to ensure at least some major initiatives were accounted for in the sustained activities.

The second limitation is that several factors (e.g., states using their role as regulators, investing in care delivery transformation) were excluded from the analysis because of a lack of variation. Although these factors may have been important activities for SIM states, they would not meaningfully contribute to the solution terms. The third limitation is that this analysis includes a small number of states, so the results cannot be statistically generalized to other similar demonstrations. Instead, this analysis explores which common characteristics enabled these SIM states to achieve outcomes. Finally, because QCA is not designed to assess the individual impact or contribution of specific factors, we cannot explain the degree to which one factor contributed relative to another.

M-S1. Qualitative Comparative Analysis Supplementary Appendix Information

This appendix contains information regarding the QCA. This appendix includes the decision rules for calibrating conditions and outcomes in the analysis (***Table M-S1-1***) and the truth tables for sustainability (***Table M-S1-2***) and preponderance of care (***Table M-S1-3***).

Table M-S1-1. Decision rules for calibrating conditions and outcomes

Construct	Definition	Calibration	Data sources for decision and scoring	Additional information
Using the state's role as payer through MCO contracting as a policy lever	SIM states could add VBP requirements in Medicaid contracts with MCOs	1 = The state used its role as payer to require VBP in Medicaid. 0 = The state did not use its role as payer.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	
Using the state's role as purchaser (state employee plans) as a policy lever	States could require VBP in their role as purchaser by purchasing state employee health plans with VBP	1 = The state used its role as purchaser to require VBP in state employee health plans. 0 = The state did not use its role as purchaser.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	Examined but was not related to outcomes in the final model
High level of stakeholder engagement in the demonstration	States engaged a variety of stakeholders throughout the SIM award period. Evidence of high stakeholder engagement would include the following: (1) direct convening of or engagement with stakeholder groups and (2) engaging with two or more stakeholder types (e.g., payers, consumers) in at least one phase of the award.	1 = The state convened multiple stakeholder groups (including payers, providers, and consumers at least twice during the award period. 0 = The state did not convene stakeholders more than once or did not include multiple stakeholders.	Site visit interviews about the topic of stakeholder engagement, as well as state progress reports	Not examined or included in the model because of a lack of variation
Convened commercial stakeholders for voluntary VBP increases	States engaged commercial payers through multi-stakeholder committees to seek commercial payers' voluntary offerings of their own VBP models	1 = The state convened commercial payers in VBP model discussions. 0 = The state did not convene payers in voluntary VBP discussions.	Site visit interviews about the topic of stakeholder engagement, as well as state progress reports	

(continued)

Table M-S1-1. Decision rules for calibrating conditions and outcomes (continued)

Construct	Definition	Calibration	Data sources for decision and scoring	Additional information
Quality measure alignment among multiple payers	States reporting some quality measurement alignment among at least two payers	1 = States created a common measure set across multiple (two or more) payers. 0 = States did not create a common measure set.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	Not examined or included in the model because of a lack of variation
Achieved partial alignment among commercial payers on quality measures	States reached partial alignment if at least one commercial payer reported the use of some of the common measures	1 = One or more commercial payers used common measures. 0 = No commercial payers used common measures.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	
Built on prior PCMH investments	States could build SIM activities on prior PCMH investments	1 = The state had one or more adult pre-SIM PCMH investment(s) (prior federal funding or commercial payer led). 0 = The state did not have any pre-SIM PCMH investments.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	
Market characteristics	The number of payers and relative market share	1 = The state has a single commercial payer that controls more than 30% of the insurance market. 0 = No single commercial payer makes up more than 30% of the insurance market.	Interviews with stakeholders, state progress reports and workplans, and environmental scans	Examined but was not included in the final model
Achieved a high level of sustainability	States sustained most of their SIM activities post-award (immediately post-award, long term is not available)	1 = The state reported that it would sustain >50% of its SIM activities immediately post-award. 0 = The state reported that it will sustain <50% of its activities post-award.	SIM Final Report tables	Note: State teams also tried to account for the size of the sustained initiatives to “weigh” a state’s main activities more heavily

Table M-S1-2. Truth table for achieving a high level of sustainability

Row number	Engaged commercial payers in SIM	Used role as a payer as a policy lever	Used role as a purchaser as a policy lever	Aligned quality measures among commercial payers	Built on prior PCMH investments in the state	Number of cases in the combination	Cases	Row consistency
1	0	0	0	1	1	1	CT	1.000
2	0	1	0	0	0	1	IA	1.000
3	0	1	0	0	1	1	MI	1.000
4	0	1	0	1	1	1	RI	1.000
5	0	1	1	1	0	1	WA	1.000
6	1	1	0	0	0	1	OH	1.000
7	1	1	1	0	0	1	DE	1.000
8	1	1	1	0	1	1	TN	1.000
9	1	0	0	0	1	2	CO, ID	0.000
10	1	0	0	1	1	1	NY	0.000

Notes: "Consistency" indicates the degree to which the combination produces the outcome, or the strength of the linkage between the combination and the outcome. Consistency ranges between 0 (not consistent) and 1 (perfect consistency): 1 = state had the condition; 0 = state did not have the condition.

This table shows only the 10 combinations with empirical cases; this table excludes the remaining 22 possible combinations with no empirical cases.

CO = Colorado; CT = Connecticut; DE = Delaware; IA = Iowa; ID = Idaho; MI = Michigan; NY = New York; OH = Ohio; RI = Rhode Island; TN = Tennessee; WA = Washington.

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Appendix M-2: Meta-Analysis of Spending Results for the State Innovation Model Initiative Rounds 1 and 2 States

- Across 20 payment and delivery models tested under the SIM Initiative Rounds 1 and 2, total spending decreased on average by $2 per person per month across relative to a comparison group, but this estimate was not statistically significant. Impacts on spending did not vary by the percentage of SIM funding invested in health information technology or by the percentage of persons who reside Metropolitan Statistical Areas.
- There was no evidence that spending was more favorable over longer follow-up periods.
- The magnitude of estimated spending effects may have been influenced by the total number of residents in a state served by a delivery or payment model or the level of baseline spending.

M-2.1 Introduction

This analysis summarizes results from a meta-analysis that (1) compared the impacts of all SIM Initiative Rounds 1 and 2 delivery or payment models on health care spending, (2) compared spending impacts across different types of payment and delivery models, and (3) assessed the associations of spending impacts for each SIM state's delivery or payment model with selected model characteristics. Specifically, the objective of this analysis was to combine the results from the model-specific spending analyses reported in the SIM Initiative Rounds 1 and 2 federal evaluations to examine factors that may have systematically affected spending. Meta-analysis, a general method for synthesizing results across studies, was used for this analysis.

This analysis addressed the following research question: Why did some SIM states' models have more favorable (or less favorable) spending effects than other states' models? This analysis focused on whether state-level spending impacts attributable to the SIM-supported delivery or payment model were associated with the following:

- The type of delivery or payment model;
- The level of investment of SIM funds for health information technology (health IT);
- Person- or county-level characteristics of the state; and
- Features of the study design.

M-2.2 Methods

Table M-2-1 provides a snapshot of methods used in this analysis.

Table M-2-1. Methods snapshot

Method	Description
Study design	Meta-analysis of 20 SIM-supported payment or delivery models with D-in-D estimates of model effects on spending. Because of the comparatively small number of available models evaluated, analysis procedures were limited to forest plot summaries and to bivariate scatterplots between spending effects and selected SIM-supported delivery or payment model features.
Data	D-in-D estimates of spending effects and their standard errors. Meta-analysis data were compiled from three primary sources. Spending impacts were drawn from the detailed D-in-D regression results reported in ***Appendices A–K*** of this report; the SIM Round 1 Evaluation Year 4 Annual Report; and the SIM Round 1 Evaluation Year 5 Annual Report. Model-specific mean values for person- and county-level characteristics were abstracted from each analysis' propensity-weighted covariate balance tables. These covariates were used for both propensity score modeling and regression adjustment. Finally, several features of each delivery or payment model were abstracted from the state evaluation reports.
Sample	Twenty SIM Round 1 and Round 2 model-specific spending results. Because of the comparatively small number of models tested among SIM Model Test states in Round 2, this analysis increased generalizability and precision by including results from SIM Model Test states in Round 1, yielding a sample of 22 impacts (13 from SIM Round 2 and nine from SIM Round 1) from states for which spending impacts were evaluated. Two states (Tennessee and Maine) were outliers, having extremely large relative increases in spending and large proportions of people with disabilities, and were removed from subsequent analyses.
Timeframe	All models had between one and three years of follow-up spending data.
Measures	The meta-analysis focused on the effect of a state's SIM-supported delivery or payment model on total spending, measured as a PPPM difference from a comparison group. Estimated PPPM impacts derived from D-in-D regression models may be negative (indicating relative decline in spending) or positive (representing relative increase in spending).
Statistical analysis	Forest plot displays, weighted spending effects, bivariate associations between state characteristics and spending effects.

Note: D-in-D = difference-in-differences; PPPM = per person per month; SIM = State Innovation Model.

M-2.3 Results

M-2.3.1 Spending variation across State Innovation Model Initiative Rounds 1 and 2 payment and delivery models

Figure M-2-1 displays a forest plot showing the spending impact estimates for 20 model-specific analyses for accountable care organization (ACO), behavioral health integration (BHI), and patient-centered medical home (PCMH) models in the SIM Initiative. Each line in the forest plot shows the results for a specified state's payment model and payer population served by that model (Medicaid-, Medicare-, or commercially insured populations). The dot depicts the estimated spending impact derived from regression-adjusted difference-in-differences (D-in-D) models. The horizontal lines show the 90 percent confidence interval (CI) for the estimate. The dotted vertical line demarcates an impact of zero dollars. Dots to left of the vertical line represent favorable reductions in spending relative to a comparison group; dots to the right indicate unfavorable increases in spending relative to a comparison group. The results in the plot have been grouped by delivery or payment model type to facilitate comparisons between the models.

Figure M-2-1 indicates that there was a considerable amount of variation in these impacts, even within the same model. The results showed a wide range of spending impacts, both favorable and unfavorable. Because most delivery or payment models served large numbers of patients, most confidence intervals were narrow.

The diamonds in the plot represent the mean of the spending results for each type of payment model (ACO, BHI, and PCMH). The upper and lower points of each diamond are the mean spending impacts, and the left and right points show the 90 percent CI of the mean spending. The means are weighted by sample size, such that larger models receive more weight than the smaller models.

Spending impacts were most favorable for the four BHI models (mean relative decrease of nearly $18 per person per month (PPPM), which differed significantly from zero). The average ACO and PCMH impacts were closer to zero. Overall, across all models, the mean impact was -$2.42 PPPM, which did not differ significantly from zero. This impact is shown in ***Figure M-2-1*** by the dotted vertical line in the plot.

M-2.3.2 Associations between model characteristics and spending impacts

The wide range of spending savings and losses shown in the forest plots raises the question: Why did some states have more favorable (or less favorable) impacts on spending than others? To address this question, a series of bivariate scatterplots were used to identify the characteristics that are also correlated with spending results. Three study design characteristics were examined: model population size, magnitude of baseline spending in the model's comparison group, and the length of the study follow-up period. In addition, other characteristics related to SIM funding investment and the population (percentage residing in a rural location and mean age) were studied.[125, 126] The graphs that appear in this section plot the estimated spending impacts (vertical axis) by the value of model characteristic on the horizontal axis.

Figure M-2-2 shows the estimated spending impacts by the sample sizes for each model-specific impact analysis. Analysis sample sizes represented the weighted number of intervention and comparison beneficiaries used in the spending analyses. ***Figure M-2-2*** indicates that smaller models have the most favorable spending impacts and also some of the largest unfavorable spending impacts. In contrast, the impacts for the three largest programs are close to zero.

[125] Several county-level characteristics were also considered. The characteristics were hospital beds per 1,000 population; the percentage of the adult population below the poverty line; and the percentage of uninsured adults. None of the characteristics were associated with spending impacts.
[126] A cautionary note is that the magnitude of these spending impacts may have been influenced by the size of the sample or by the level of spending during the baseline period.

Figure M-2-3 shows the estimated spending impacts by the model baseline spending levels. The baseline PPPM mean for the comparison group in each evaluation was the measure of the overall pre-SIM spending level. These means ranged between $200 and $1,000 per month. ***Figure M-2-3*** suggests that the spending impact is small when baseline PPPM level is low. All models with baseline PPPMs below $500 PPPM had spending effects in the $50 range. Out of the four programs with baseline spending above $500 PPPM, three had spending impacts outside the $50 range. This finding suggests that the potential to have large spending impacts (either favorable or unfavorable) may be limited by the level of baseline spending. The practice transformation model in Delaware had the largest savings impact and had a significantly higher baseline PPPM.

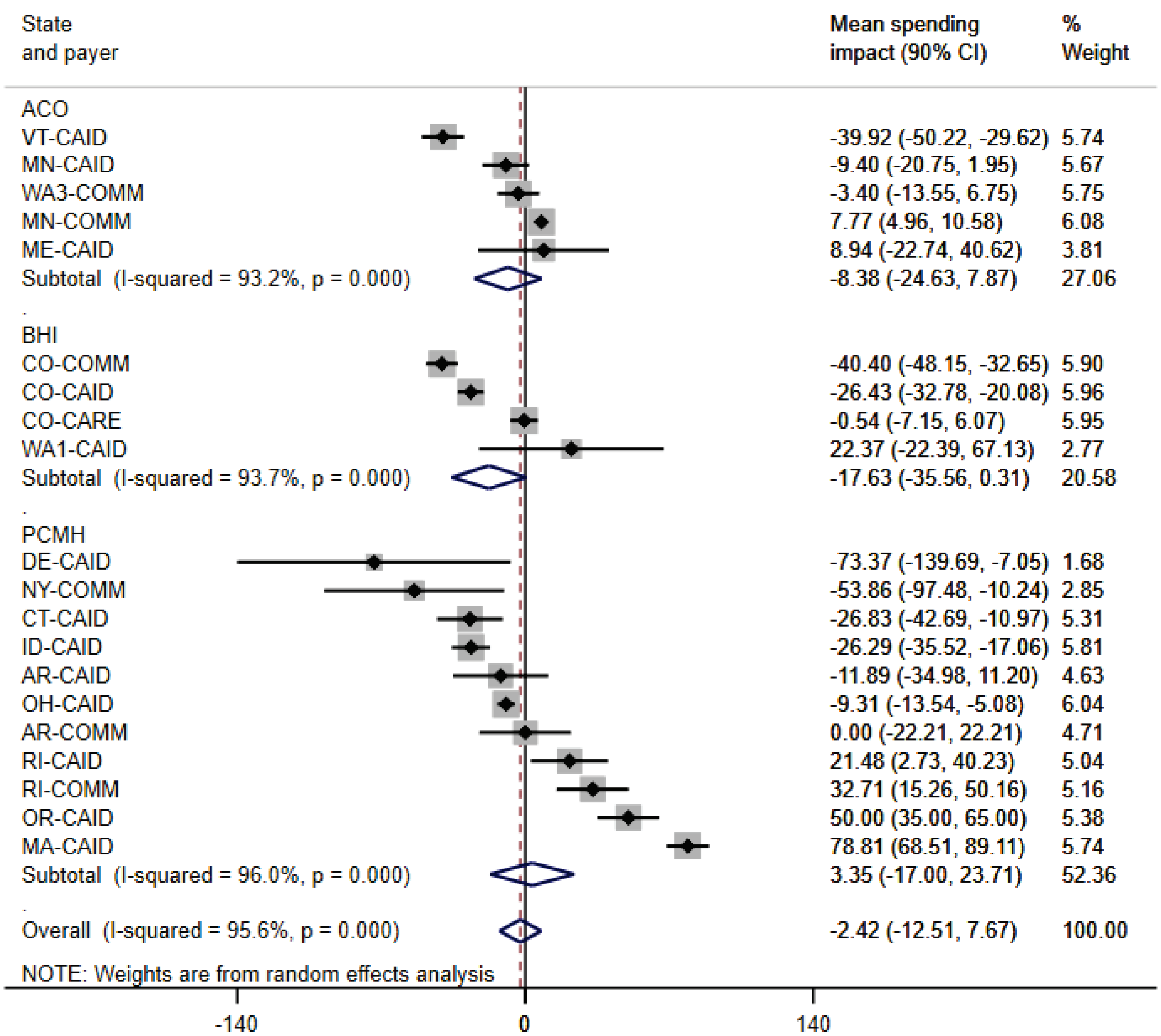
Figure M-2-4 shows a scatterplot of the estimated spending impacts by the length of the follow-up period. In the SIM Initiative, post-implementation follow-up periods ranged from one to three years. Several models enrolled cohorts of practices over time with varying lengths of follow-up. The models that ran a full three years exhibited a wide range of both relative increases and decreases in spending. This result suggests that follow-up periods beyond three years may be necessary to assess whether favorable spending impacts are more likely.

Figure M-2-5 displays a scatterplot of the estimated spending impacts by SIM investment of funds in health IT. States that invested in health IT and data analysis might be expected to have used those strategies in delivery system changes that could reduce overall spending levels. Investment in health IT as a percentage of total SIM funding ranged from 0 percent to 42 percent across models. However, the scatterplot indicates that these relative investments were not associated with spending impacts for any states' specific delivery or payment models.

Spending impact associations were examined separately for the following two demographic characteristics: the percentage of individuals in the analytic sample residing in Metropolitan Statistical Areas (***Figure M-2-6***) and mean age of the analytic sample (data not shown). ***Figure M-2-6*** shows a funnel pattern, with the models with the largest percentage of non-Metropolitan Statistical Area participants (i.e., Maine ACO and Arkansas PCMH) having near zero spending impacts. However, the results for the models with larger percentages of Metropolitan Statistical Area residents were as likely to be favorable as they were to be unfavorable. Second, there was no linkage between spending impacts and the mean age, which ranged between 7.5 years and 69.7 years.

This analysis also examined whether there were associations between model spending impacts and several county-level characteristics: hospital beds per 1,000 population, the percentage of the adult population living below the poverty line, and the percentage of uninsured adults. None of these characteristics was associated with spending impacts (data not shown).

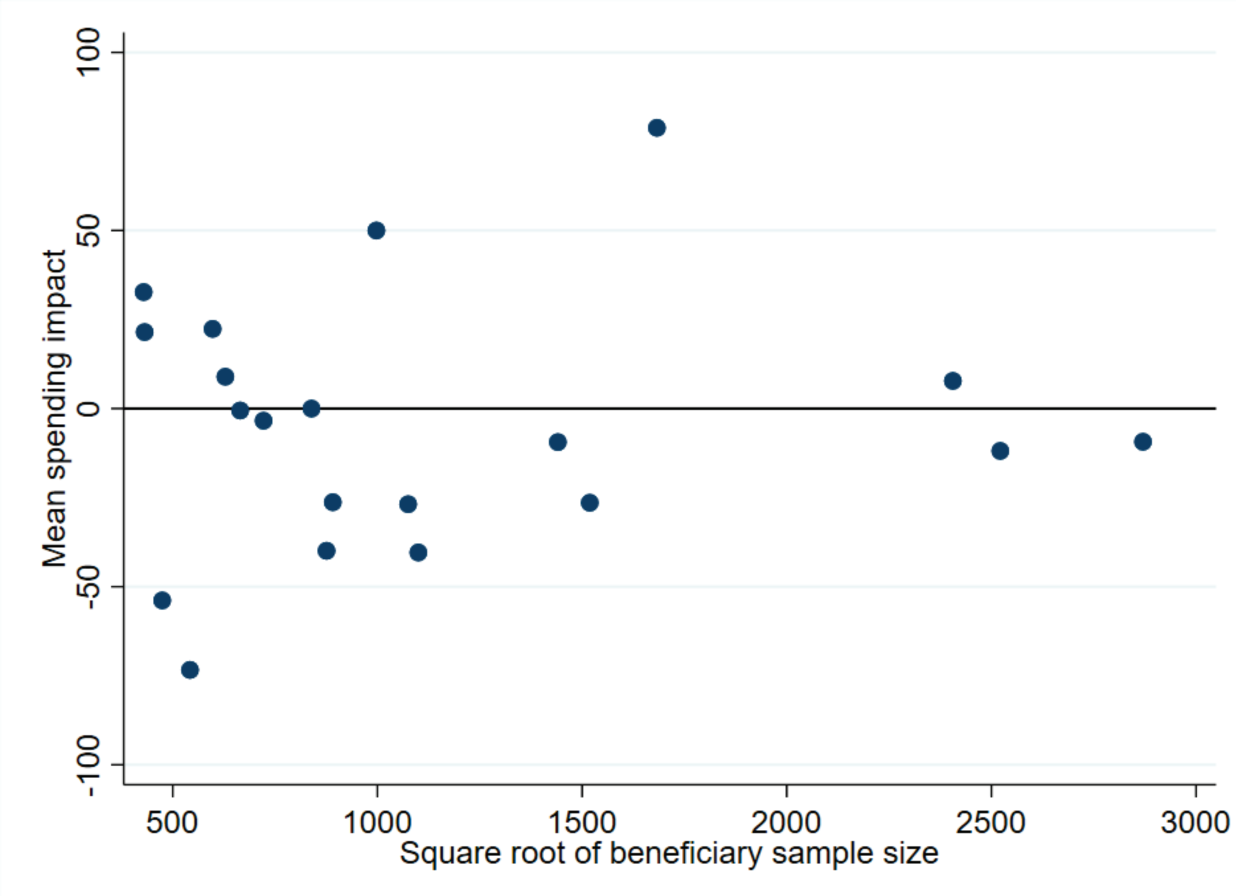
Figure M-2-1. Forest plot of impacts on total spending (and 90% confidence interval) by model, state, and payer (N=20 SIM-supported delivery or payment models)



Notes: The I-squared value is the percentage of the variation in spending impacts attributable to heterogeneity between observations. Higher I-squared values indicate that most of the variation within each payment model is due to heterogeneity.

ACO = accountable care organization; AR = Arkansas; BHI = behavioral health integration; CI = confidence interval; CAID = Medicaid beneficiaries in the analysis; CARE = Medicare beneficiaries in the analysis; CO = Colorado; COMM = commercially insured individuals in the analysis; CT = Connecticut; DE = Delaware; ID = Idaho; MA= Massachusetts; ME = Maine; MN = Minnesota; OH = Ohio; OR = Oregon; PCMH = patient-centered medical home; RI = Rhode Island; SIM = State Innovation Model; VT = Vermont; WA1 = Washington Integrated Managed Care model; WA3 = Washington Accountable Care Networks.

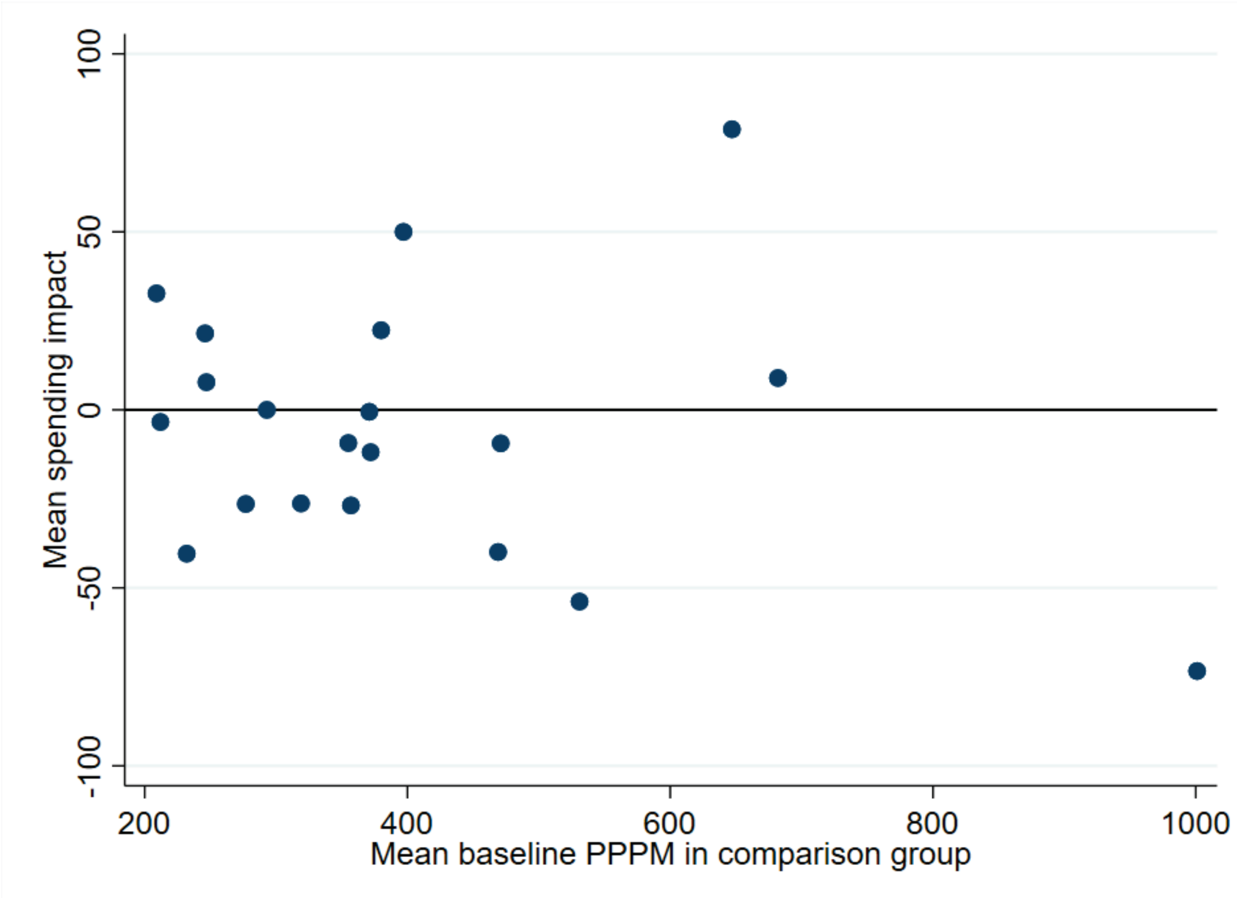
Figure M-2-2. SIM models' impact on per person per month spending by analysis sample size



Notes: The square root of the beneficiary sample size is reported because the sample size relationship with spending is not expected to be linear.

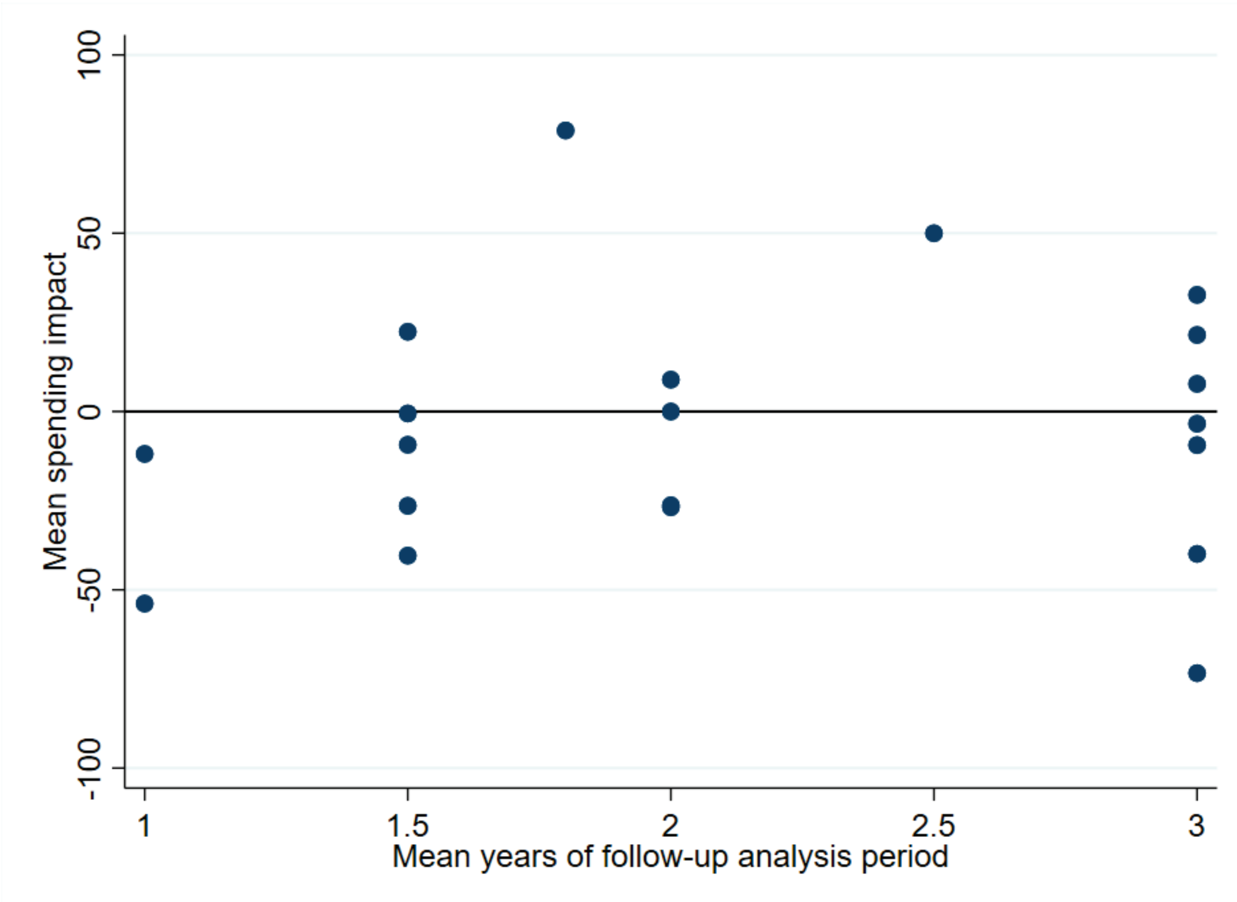
SIM = State Innovation Model.

Figure M-2-3. SIM models' impact on per person per month spending by mean spending level in the comparison group



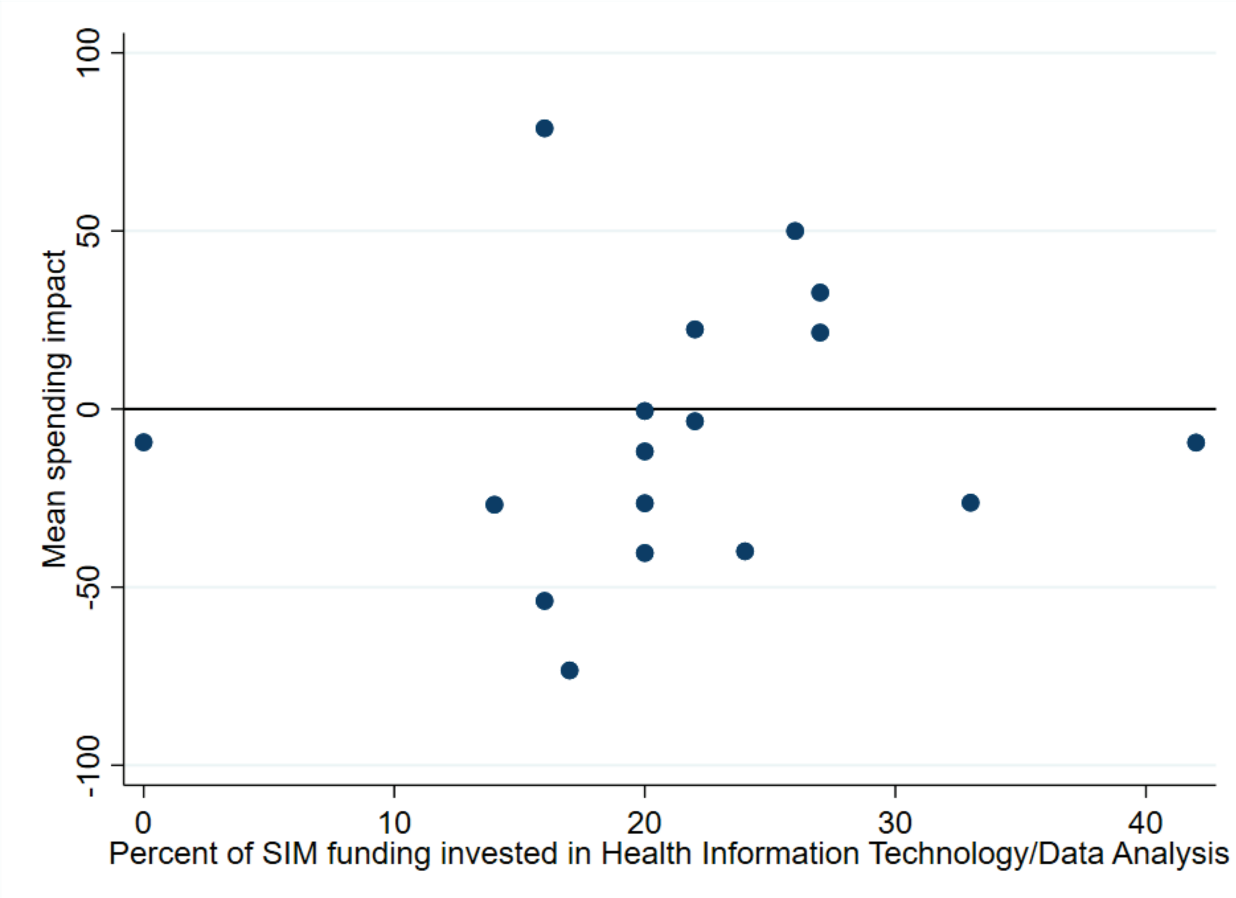
Note: PPPM = per person per month; SIM = State Innovation Model.

Figure M-2-4. SIM models' impact on per person per month spending by length of the study follow-up period



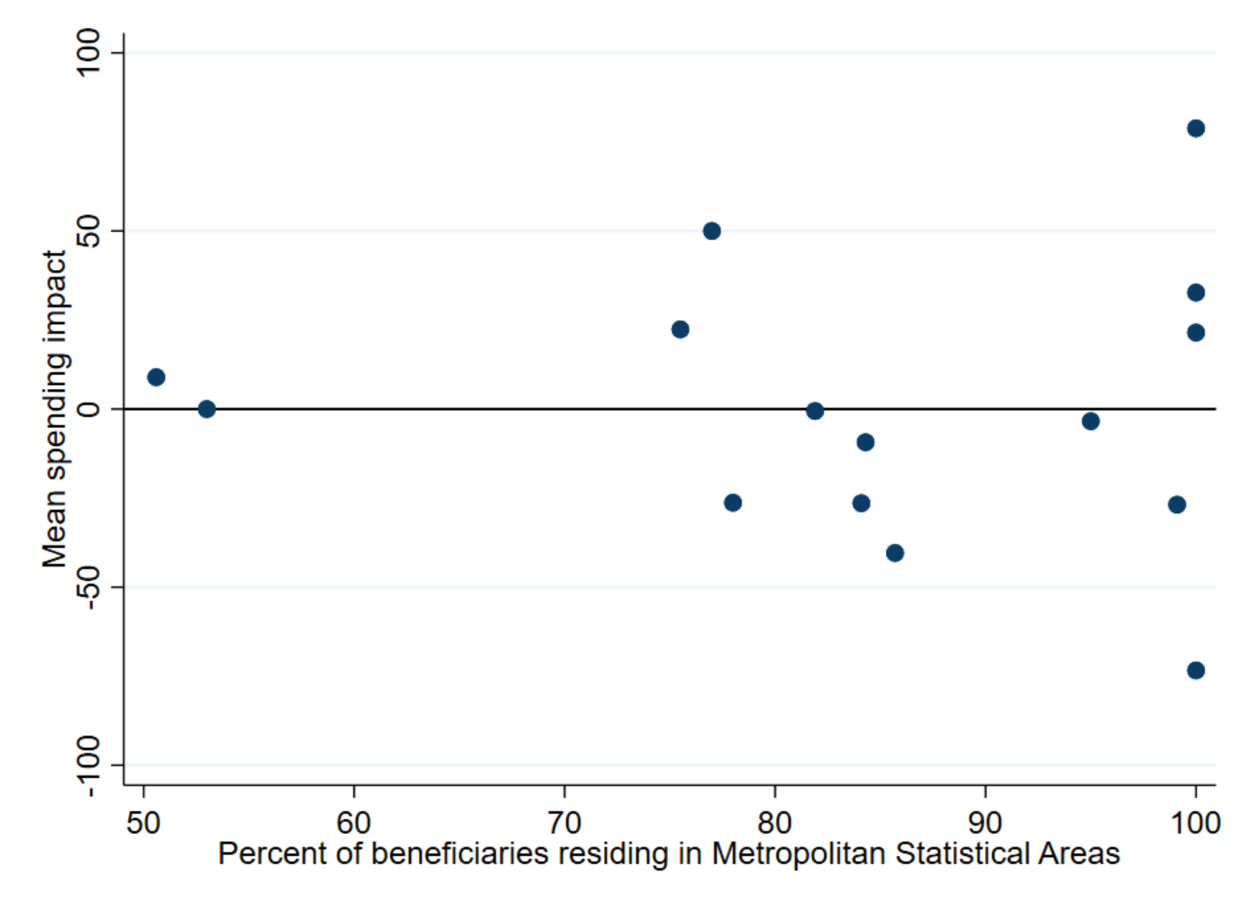
Note: SIM = State Innovation Model.

Figure M-2-5. SIM models' impact on per person per month spending by percentage of SIM funding invested in health information technology/data analysis



Note: SIM = State Innovation Model.

Figure M-2-6. SIM models' impact on per person per month spending by percentage of beneficiaries residing in Metropolitan Statistical Areas



Note: SIM = State Innovation Model.

M-2.4 Discussion

Twenty SIM Round 1 and Round 2 payment and delivery models were included in a meta-analysis of model impacts on total spending PPPM. Analytic methods were limited to bivariate associations because of the small number of observations. There was considerable variation in impacts on total spending PPPM across SIM delivery or payment models, with a wide range of relative decreases and increases in the ACO, BHI, and PCMH models. Across all models, the weighted mean spending impact was a decrease of approximately $2 PPPM relative to the comparison group that was not statistically significant.

This analysis also indicated that longer follow-up periods did not produce greater declines in spending in the intervention group relative to the comparison group. The percentage of SIM funding invested in health IT/data analysis also was not associated with differences in spending impacts across SIM models. Similarly, the percentage of individuals in the analysis sample that resided in Metropolitan Statistical Areas (Arkansas and Maine) was not associated with differences in spending impacts across models. In addition, there were no strong associations between spending impacts and the mean age of the analysis sample. A cautionary note is that the magnitude of these impacts may have been influenced by the size of the analysis sample or by the level of spending during the baseline period. Finally, there were no strong associations between spending impacts and county-level characteristics (hospital beds per 1,000 population; percentage of the adult population living below the poverty line, and the percentage of uninsured adults).

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Appendix M-3: Colorado: Payer Agnostic Analysis

- The impacts of participating in Colorado's integrated behavioral health (IBH) model regardless of payer type were favorable. These findings aligned with the Medicare-, Medicaid-, and commercial insurance-specific impacts of the IBH model presented in ***Appendix A***.
- Under the IBH model, spending growth was slower and inpatient admissions decreased for the IBH group relative to the comparison group. Moreover, even though emergency department (ED) visits remained unchanged for individuals in the IBH group, ED visits increased for the comparison group, so the IBH model was able to contain ED visit growth.
- Unexpectedly, the percentage of individuals with a behavioral health visit decreased in the IBH group and increased in the comparison group. This finding may be explained by challenges in billing insurers for co-located behavioral health care within primary care practices.

M-3.1 Introduction

The Colorado SIM Initiative recruited 319 primary care practices statewide, including both adult and pediatric practice, over three years to participate in practice transformation efforts. The goal of this effort was to help practices implement care delivery models that integrate physical and behavioral health (henceforth referred to as integrated behavioral health [IBH]). Primary care practices interested in participating in the SIM Initiative were required to apply and be accepted into the initiative. Colorado opened the application process three times over the course of the SIM Initiative, and groups of practices (known as "cohorts") that were selected to participate in each wave began the practice transformation process at the same time. One hundred primary care practices (Cohort 1) joined the SIM Initiative in February 2016, and 156 more practices (Cohort 2) joined in September 2017. Eighty-eight practices (Cohort 3) joined in June 2018.[127] Each cohort of practices focused on meeting practice transformation milestones to establish or improve behavioral health integration, engage in clinical quality improvement efforts, and report clinical quality measures. Primary care practices received practice transformation and clinical health information technology (health IT) facilitation and access to funding for transformation activities. The practices also participated in biannual learning collaboratives. Colorado reported that an estimated 760,000 individuals were attributed to SIM-participating primary care practices.

To investigate the impact of the IBH model, the primary analysis of Colorado's IBH model examined utilization of health services and spending among individuals receiving care from IBH practices and a comparison group of individuals receiving care from non-IBH primary care providers. Using Colorado's all-payer database, we conducted analyses separately by payer (Medicaid, Medicare, and commercial) to assess whether the model had differential impacts by payer group. In this analysis, we conducted a "payer blind" or "payer agnostic" version of the

[127] Ninety-two practices out of the 100 enrolled Cohort 1 practices, 144 out of the 156 Cohort 2 practices, and 83 out of the 88 Cohort 3 practices remained active in SIM practice transformation activities for the duration of the SIM Initiative.

main IBH impact analysis and did not stratify by payer. A payer agnostic analysis adds to the payer-specific analyses because it aligns with Colorado's whole person approach to the IBH model. Participating practices were expected to apply transformation activities to all of their patients regardless of which insurer was paying for care.

To assess the effects of Colorado's IBH model on care for beneficiaries, the analysis addressed the following research question: To what extent does the implementation of IBH result in changes in total and behavioral health–specific spending and the utilization of primary and behavioral health care?

The hypothesis for this analysis was that more IBH will slow total spending growth. Hypothesized changes in utilization varied depending on the metric. For example, reductions in total and behavioral health–related inpatient admissions, emergency department (ED) visits, and inpatient readmissions were expected as practices invest in IBH and other practice transformation activities targeted to high utilizers. Increases in behavioral health visits were expected if practices were able to improve access to behavioral health care for their patients.

M-3.2 Methods

Table M-3-1 provides a snapshot of the study methods.

Table M-3-1. Methods snapshot

Method	Description
Participating providers	Primary care practices in Colorado applied to and were accepted into the IBH model. Practices joined the model in three cohorts between February 2016 and June 2018.
Study design	This analysis employed a D-in-D quasi-experimental design with an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Medicaid, Medicare, and commercial claims data were provided through Colorado's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on behavioral health–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the Colorado SIM office. This payer-agnostic analysis and the payer-specific analyses presented in ***Appendix A*** differ based on their treatment of claims for individuals with multiple sources of coverage. In the payer-specific analyses, individuals with multiple sources of coverage could be included in multiple payer-specific samples (Medicare, Medicaid, or commercial), and their claims would have been separated across samples by payer type. For example, people with both Medicaid and commercial coverage would have been included in both the Medicaid analysis and the commercial analysis, but only their Medicaid claims would have been included in the Medicaid analysis and only their commercial claims would have been included in the commercial analysis. Under the payer-agnostic approach, each person's Medicaid, commercial, and Medicaid claims were combined into one claims experience for that person.

(continued)

Table M-3-1. Methods snapshot (continued)

Method	Description
Sample	If a beneficiary was enrolled in Medicaid or commercial insurance, then he or she was attributed to the intervention group if the beneficiary was assigned to primary care practices in the SIM Cohort 1 (n=93 practices) and SIM Cohort 2 (n=149 practices).[a] If a beneficiary was enrolled in Medicare, then he or she was attributed to the intervention group if the beneficiary was assigned to primary care practices in the SIM Cohort 1 only because of the lack of complete Medicare claims data over the analytic timeframe of interest. Cohort 3 was excluded from the intervention group, regardless of what insurance coverage a patient had, because of a lack of data in the intervention period. The comparison group included individuals attributed to primary care providers not participating in the SIM Initiative. The final analytic sample included 524,072 beneficiaries who were attributed to SIM-participating practices and 2,379,560 beneficiaries who were attributed to primary care providers not participating in SIM. Of these 2,903,632 beneficiaries, 11% had only Medicare coverage, 28% had only Medicaid coverage, 40% had only commercial coverage, and 21% had multiple sources of coverage.
Timeframe	The timeframe for the impact analysis was February 2013 through August 2018. The study period was chosen to accommodate rolling entry at the practice level so that the analysis included three baseline years and up to two intervention years for each practice. The practices in Cohort 1 entered in February 2016, and the practices in Cohort 2 entered in September 2017. Claims data were available through December 2018, which allowed for two years of follow-up time for Cohort 1 (February 2016 through January 2018) and one year of follow-up time for Cohort 2 (September 2017 through August 2018).
Measures	The analysis assessed the effects of the IBH initiative on total spending (annual PPPM in dollars), inpatient admissions, outpatient ED visits, and inpatient readmissions, as well as several behavioral health related outcomes, including behavioral health–related inpatient admissions, ED visits, and provider visits.
Statistical analysis	The analysis used logistic regression for binary outcomes, negative binomial regression for count outcomes, and OLS models for continuous outcomes. Analytic weights were created by multiplying the propensity score weight by the fraction of time a person was receiving insurance coverage. Standard errors were clustered at the provider level to account for correlation in outcomes within primary care providers. All models were run assuming parallel baseline trends and included controls for demographic, health status, insurance coverage (e.g., commercial, Medicare, Medicaid, or multiple sources of coverage), and socioeconomic county-level variables.

Notes: [a] The number of practices included in the analysis was less than the number that joined the IBH model. Some practices merged or decided to end participation midway through the model, resulting in a different count of practices used for attributing individuals to SIM practices.

CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; PT = practice transformation; SIM = State Innovation Model.

M-3.2.1 Results and discussion

Table M-3-2 shows estimates of the impact of the IBH model on total spending per person per month (PPPM), all-cause and behavioral health-related inpatient admissions, all-cause and behavioral health-related ED visits, 30-day inpatient readmissions, and the percentage of the population with a behavioral health visit.

Table M-3-2. Differences in the pre–post change in total spending, inpatient admissions, behavioral health inpatient admissions, readmissions, emergency department visits, behavioral health and emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PPPM ($)							
Year 1	365.77	350.35	394.38	410.76	−31.81 (−39.49, −24.13)	−8.7	<0.001
Year 2	365.77	350.35	404.34	410.19	−21.29 (−32.12, −10.45)	−5.8	<0.001
Overall	365.77	350.35	398.19	410.54	−27.79 (−34.09, −21.49)	−7.6	0.001
All-cause acute inpatient admissions per 1,000 population							
Year 1	56.06	60.48	51.53	67.53	−11.17 (−12.44, −9.89)	−19.9	<0.001
Year 2	56.06	60.48	50.67	57.56	−2.77 (−4.26, −1.27)	−4.9	0.002
Overall	56.06	60.48	51.20	63.70	−7.95 (−8.92, −6.98)	−14.2	<0.001
BH inpatient admissions per 1,000 population							
Year 1	3.68	3.75	4.37	4.92	−0.48 (−0.76, −0.21)	−13.2	0.004
Year 2	3.68	3.75	4.10	4.66	−0.50 (−0.81, −0.18)	−13.6	0.010
Overall	3.68	3.75	4.27	4.82	−0.49 (−0.70, −0.28)	−13.4	<0.001
Readmissions within 30 days of discharge per 1,000 discharges							
Year 1	94.11	108.43	144.00	167.60	−2.74 (−9.29, 3.80)	−2.9	0.49

(continued)

Table M-3-2. Differences in the pre–post change in total spending, inpatient admissions, behavioral health inpatient admissions, readmissions, emergency department visits, behavioral health and emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group (continued)

Outcome	Baseline period adjusted mean, CO IBH	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, CO IBH	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Year 2	94.11	108.43	160.87	176.42	4.38 (−2.12, 10.88)	4.7	0.27
Overall	94.11	108.43	150.65	171.08	0.06 (−4.66, 4.79)	0.1	0.98
ED visits per 1,000 population							
Year 1	596.39	644.97	597.73	673.82	−25.60 (−42.57, −8.62)	−4.3	0.01
Year 2	596.39	644.97	596.15	636.87	7.49 (−8.79, 23.78)	1.3	0.45
Overall	596.39	644.97	597.12	659.62	−12.94 (−25.13, −0.74)	−2.2	0.08
BH ED visits per 1,000 population							
Year 1	21.27	22.38	27.07	31.88	−3.31 (−6.43, −0.19)	−15.6	0.08
Year 2	21.27	22.38	27.14	25.01	3.57 (0.02, 7.12)	16.8	0.098
Overall	21.27	22.38	27.09	29.24	−0.68 (−3.03, 1.68)	−3.2	0.64
Percentage of beneficiaries with a BH visit							
Year 1	22.52	18.85	21.90	21.00	−3.08 (−3.73, −2.42)	−13.7	<0.001
Year 2	22.52	18.85	21.81	21.34	−3.52 (−4.38, −2.66)	−15.6	<0.001
Overall	22.52	18.85	21.87	21.13	−3.25 (−3.77, −2.72)	−14.4	<0.001

(continued)

Table M-3-2. Differences in the pre–post change in total spending, inpatient admissions, behavioral health inpatient admissions, readmissions, emergency department visits, behavioral health and emergency department visits, and behavioral health visits in integrated behavioral health and the comparison group (continued)

Notes: BH = behavioral health; CI = confidence interval; CO = Colorado; D-in-D = difference-in-differences; ED = emergency department; IBH = integrated behavioral health; OLS = ordinary least squares; PPPM = per person per month; SIM = State Innovation Model.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a negative binomial model to obtain D-in-D estimates for ED visits, and a logistic regression model to obtain D-in-D estimates for the inpatient admissions and readmissions. The estimated probability of any inpatient admission was multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models were adjusted for person-level variables (gender, age, a count of total months enrolled in health coverage in the measurement year, enrollment in more than one payer's insurance plan in the measurement year, enrollment in a particular type of coverage (e.g., Medicaid or Medicare), the logged Hierarchical Condition Category risk score, and presence of a BH condition in the year before entering the IBH model) and county-level variables (residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute hospital beds, median age, percentage uninsured, percentage residing in a mental health professional shortage area, and supply of physicians). All regression models assume that the CO IBH and comparison group outcome trends were parallel during the baseline period.

How to interpret the findings: A negative value for the regression-adjusted D-in-D corresponded to a greater decrease or a smaller increase in an outcome after the implementation of CO IBH relative to the comparison group. A positive value corresponds to a greater increase or a smaller decrease in an outcome in the IBH group relative to the comparison group after IBH implementation. The relative difference is the D-in-D estimate as a percentage of the IBH baseline period adjusted mean.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all outcome models except the readmission outcome is 3,933,054. The weighted N for the readmission outcome is 222,720.

Sources: Federal Evaluation Team analysis of Medicaid, Medicare, and commercial claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Supplemental Medicaid data on BH–related visits, hospitalizations, and ED visits were provided by the CO Department of Health Care Policy and Financing. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

With practice facilitation, clinical health IT support, and a focus on changing care delivery and connecting individuals to needed behavioral health care, practices were expected to favorably impact utilization and spending for their patients. Improving behavioral health integration and care delivery appears to have achieved the expected goals of slowing cost growth and reducing high-cost service use. Under the IBH model, total spending grew for both individuals in the IBH group and comparison individuals but increased less for the IBH group (−$27.79 PPPM). Inpatient admissions decreased in the IBH group and increased in the comparison group, leading to a relative decrease in inpatient admissions in the IBH group (−7.95 admissions per 1,000 individuals). These findings aligned with the payer-specific findings, which are presented in ***Appendix A***. The payer-specific analyses showed slower total spending growth for the commercially insured population and absolute spending reductions in the case of the Medicaid population but no statistically significant changes for Medicare beneficiaries. Similarly, in the payer-specific analyses, inpatient admissions decreased in the IBH group and increased in the comparison group for the Medicaid and commercially insured populations, leading to a relative decrease in inpatient admissions. In the payer-agnostic model, ED visits remained almost unchanged for the IBH group, but visits increased in the comparison group (−12.94 ED visits per 1,000 individuals), suggesting that the IBH model was able to contain growth in ED visits. This change was driven by changes in ED visit rates for Medicare beneficiaries because—as the payer-specific analyses showed—there were no significant changes in ED visits for Medicaid and commercially insured patients in the IBH group relative to the comparison group.

Behavioral health–related inpatient admissions and ED visits were infrequent in the full sample. However, behavioral health–related inpatient admissions increased slightly in both the IBH group and the comparison group but increased a little less in the IBH group (−0.49 behavioral health inpatient admissions per 1,000 individuals). Changes to behavioral health–related ED visits did not differ between the IBH group and the comparison group.

The one unanticipated finding was that the percentage of individuals with a behavioral health visit decreased slightly among individuals in the IBH group and increased in the comparison group (−3.25 percentage points). Similar changes were identified for Medicaid and commercially insured populations in the payer-specific analyses in ***Appendix A***. Billing practices may be one potential explanation for this finding. Many SIM practices used grant funding provided by the Colorado Health Foundation for the SIM Initiative to hire a behavioral health provider. Practice staff reported during site visit interviews that their co-located providers often experienced challenges in billing insurance for their services; the reasons for the challenges were many and varied by insurer. Some of the decrease in billed behavioral health visits may be attributed to the fact that individuals were now receiving co-located care, and the providers were not billing for that care.

There are several limitations to this analysis to consider. Given data availability and data quality, Cohort 3 members and Cohort 2 members who had Medicare coverage were not included in the analysis. Moreover, follow-up time was fairly limited at two years for Cohort 1 and only one year for Cohort 2. Results presented here may be more conservative; findings could be more robust given more follow-up time and more individuals exposed to integration efforts.

M-S3. Additional Details About Methods

M-S3.1 Covariate Balance Between the Integrated Behavioral Health and Comparison Groups

Table M-S3-1 shows the covariate balance between the Colorado IBH and comparison groups for the study sample in the last baseline year for the overall study sample. Covariate balance for the discharge-level sample for readmissions is not shown. Covariate balance is also not shown for the earlier baseline years. ***Table M-S3-1*** includes the following:

- The covariate means for the IBH and comparison groups without propensity score weighting;
- The standardized difference between the IBH and comparison groups means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison groups ("comparison weighted"); and
- The standardized difference between the IBH group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year by using logistic regressions in which the dependent variable was an indicator of inclusion in the IBH group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences were similar across years, so covariate balance results are presented for the last baseline year only. Prior to propensity score weighting, standardized differences were greater than 0.10 for some individual- and county-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table M-S3-1. Covariate balance between the integrated behavioral health and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, CO IBH N=510,879	Unweighted mean or percentage, comparison group N=2,229,219	Unweighted standardized difference	Weighted mean or percentage, comparison group N=509,925	Weighted standardized difference
Individual level					
Percentage of people who are female	54.76	56.14	0.03	54.90	0.003
Age in years	29.4	39.8	0.44	29.7	0.01
Age in years, squared	1,419.9	2,173.4	0.39	1,434.1	0.01
Total months of enrollment during the year	11.1	10.4	0.25	11.1	0.002
Percentage of people who have multiple types of insurance coverage in the year (e.g., Medicaid and commercial)	11.45	9.42	0.07	11.69	0.01
Percentage of people with Medicare coverage in the year	11.47	21.44	0.27	11.58	0.004
Percentage of people with Medicaid coverage in the year	63.44	35.35	0.59	63.13	0.01
Hierarchical Condition Category risk score, logged[a]	−0.1	−0.01	0.24	−0.1	0.01
Percentage of people who have a behavioral health condition	13.53	9.24	0.14	13.41	0.004
County level					
Percentage of people living in a Metropolitan Statistical Area	84.01	88.48	0.13	83.52	0.01
Percentage of people living in poverty	12.5	11.3	0.30	12.6	0.01
Hospital beds per 1,000 people	2.5	2.2	0.16	2.5	0.004
Median age in years	36.3	36.3	0.02	36.3	0.01
Percentage of people (aged 64 years and under) without health insurance	9.9	9.1	0.32	9.9	0.005
Percentage of people living in a mental health professional shortage area	34.02	29.94	0.09	34.41	0.01
Physicians per 1,000 people	3.1	2.9	0.15	3.1	0.01

Notes: [a] Hierarchical Condition Category risk score is a risk adjustment score calculated from ICD-9 and ICD-10 diagnosis codes, with larger Hierarchical Condition Category scores corresponding to higher predicted health care costs.

CO = Colorado; IBH = integrated behavioral health; ICD = International Classification of Diseases; SIM = State Innovation Model.

Sources: Federal Evaluation Team analysis of Medicaid claims data provided through CO's all-payer claims database, administered by the Center for Improving Value in Health Care. Information about which beneficiaries were attributed to SIM primary care providers was provided by the CO SIM office.

Appendix M-4: Idaho Telehealth Supplemental Analysis

- The number of telehealth claims was a tiny fraction of all Medicaid claims in Idaho during the study period, roughly 0.01 percent from 2013 to 2016 and 0.08 percent from 2017 to 2019.
- The Idaho SIM practice transformation support program coincided with a surge in claims for telehealth. Most of this increase was because of newly covered school-based speech therapy and does not appear to be associated with the SIM Initiative, but there is some evidence that beneficiaries assigned to participating clinics had a larger increase in telehealth use than the comparison group.
- Most telehealth services were received in schools, physician offices, and outpatient settings. Although it was allowed by Idaho Medicaid, patients were rarely able to use telehealth at home because they lacked the required technology.
- Idaho remains actively engaged in expanding telehealth use, and the Idaho SIM Initiative gave many clinics and stakeholders a set of tools and experiences that could facilitate the transition.

M-4.1 Introduction

Telehealth was a core component of Idaho's SIM Initiative, and the state used SIM funds to encourage telehealth expansion in multiple ways. Practices adopting telehealth as part of a virtual patient-centered medical home (PCMH) model received one-time rewards of up to $2,500. In 2016, all clinics participating in the SIM practice transformation support program were invited to webinars on how to assess the demand for telehealth services and their clinic's readiness to provide these services. Additional webinars on topics including reimbursement, equipment selection, evaluation and monitoring, and best practices were held that year for clinics wanting more telehealth program development information. A telehealth toolkit was also provided to all participating clinics. Through a grantmaking process, SIM funds supported the implementation or expansion of 12 telehealth programs at eight clinics and one community health emergency medical services (CHEMS) agency. These nine organizations received site assessments and frequent coaching sessions from the state's telehealth technical assistance consultants. The state encouraged group learning through four interactive learning collaborative webinars held in 2018 that covered more in-depth information about the topics from the 2016 webinars, along with lessons learned from organizations that received the grants. These learning collaboratives were open to all clinics in the practice transformation program. Regional Collaboratives (RCs) also supported clinics in developing telehealth by connecting providers to telehealth resources, expert coaches, and other clinics willing to share their experiences. Lastly, the SIM Initiative supported a meeting of telehealth stakeholders from across the state in May 2018 to set priorities for the future of telehealth.

Idaho Medicaid adopted telehealth in 2003 for behavioral health pharmacological management and psychotherapy services and over the years expanded the number of services eligible to be delivered through telehealth. In February 2016, the Medicaid program expanded telehealth to align with the SIM practice transformation initiative and emphasis on PCMH by adding primary care provider and physician specialists' outpatient services.[128] In July 2016, the state added physical, occupational, and speech therapy services as covered telehealth services, which could be billed by schools.[129] Additional codes for psychotherapy crisis services and early intervention services for children aged three years and younger were added in 2018, bringing the total to 35 covered services (Brock, 2020, February 26; Idaho Department of Health and Welfare, 2018, July 1) Codes that were consistently permitted for telehealth during the SIM period (2016–2018) related to crisis intervention and therapeutic consultation for substance use disorder, translation services, specific occupational and physical therapy activities, primary care and specialty evaluation and management services, prescription management, psychiatric evaluations, psychotherapy, and tobacco cessation counseling.

The Idaho Telehealth Access Act of 2015 defined telehealth services in the Idaho Code as, "health care services provided by a provider to a person through the use of electronic communications, information technology, asynchronous store and forward transfer or synchronous interaction between a provider at a distant site and a patient at an originating site." "Store and forward transfer" is the secure transmission of a patient's health information between sites. "Synchronous interaction" is real-time communication involving two-way video and audio or audio communication.[130] Idaho Medicaid used a definition for telehealth services throughout the study period that only allowed for live, high-quality two-way video communication. Although this policy did not preclude patients using telehealth services from home, the technological requirements could not be met by most smartphone or computer applications, especially for patients without broadband internet access. Store and forward, phone or email exchanges, or remote patient monitoring were not covered (Idaho Medicaid, 2021, March 15). Idaho did not have a private payer parity law during the study period, although many payers covered telehealth services.

This claims-based descriptive analysis provides insight into whether the SIM Initiative was associated with changes in telehealth use in Idaho by reporting on the following:

- Observed trends in telehealth use from 2013 to 2019 among Medicaid beneficiaries attributed to the SIM practice transformation support program and those assigned to non-participating providers;
- The geographic distribution of telehealth use and whether patterns changed concurrent with SIM Initiative–funded activities; and
- The types of services reported on telehealth claims and the settings in which those services were provided.

[128] Idaho Medicaid Information Release MA15-11 (2015, December 31).
[129] Idaho Medicaid Information Release MA16-07 (2016, May 9).
[130] Idaho Code § 54-5703.

The primary hypothesis for this analysis was that SIM Initiative–funded activities increased use of telehealth services by individuals attributed to the practice transformation support program compared with beneficiaries assigned to non-participating providers. A secondary hypothesis was that services expanded in rural and frontier areas, in part because of the training and support opportunities funded under the SIM Initiative.

M-4.2 Methods

Table M-4-1 provides a snapshot of the study methods.

Table M-4-1. Methods snapshot

Method	Description
Participating providers	All Idaho Medicaid providers with at least one claim for telehealth services during the study period (N=165).
Study design	Descriptive analysis using an unbalanced longitudinal panel.
Data	Idaho claims data provided by the Idaho Department of Health and Welfare, Division of Medicaid.
Sample	The study sample included 1,535 Idaho Medicaid beneficiaries with at least one claim for telehealth services during the study period. Dually eligible Medicaid and Medicare beneficiaries were excluded because Medicaid is not the primary payer for these patients. The intervention group included beneficiaries who were assigned to clinics that participated in the practice transformation support program (n=509). The comparison group comprised similar Idaho Medicaid beneficiaries assigned to providers who did not participate in practice transformation, although those practices may have been PCMHs (n=1,026).
Timeframe	The timeframe for this descriptive analysis was February 2013 through June 2019, which includes three years prior to Idaho's SIM Initiative (2013–2015); three intervention years (2016–2018), in which three cohorts of practices received direct support; and a partial year (five months) following the end of the SIM Initiative.
Measures	The analysis examined the number of telehealth claims in total and per 1,000 beneficiaries, the number of beneficiaries with telehealth claims, and how telehealth claims were distributed across Idaho counties of residence for Medicaid beneficiaries. Telehealth claims were identified via a "GT" modifier on procedure codes, indicating a service provided via interactive video and audio telecommunications systems. Idaho Medicaid required the use of this modifier code for telehealth-services billing throughout the analysis period. The analysis also looked at counts of service types and service locations reported on telehealth claims.
Statistical analysis	The analysis is limited to descriptive counts and rates of telehealth use. Changes to allowable telehealth services concurrent to implementation of the SIM practice transformation support program and low claims volume, especially in the years prior to the SIM Initiative, precluded hypothesis testing. One related concern is that although providers may have used telehealth, they may not have billed Medicaid correctly for it. For example, they may have omitted the GT modifier code or erroneously used only the new telehealth place of service code that replaced the GT modifier code for Medicare claims starting in 2017. Consequently, the counts presented in this analysis are likely low. Furthermore, stakeholder interviews suggested that any observed effects of telehealth uptake could be significantly delayed because telehealth implementation was a slow process.

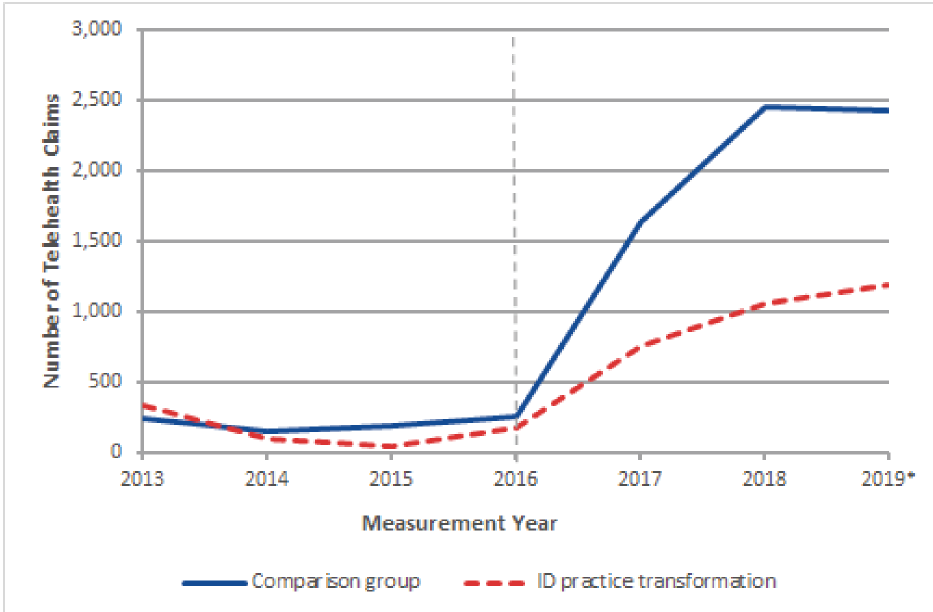
Note: PCMH = patient-centered medical home; SIM = State Innovation Model.

M-4.3 Results

Exhibit M-4-1 shows trends in telehealth claims for beneficiaries attributed to the SIM practice transformation group and to the comparison group. The findings are as follows:

- There was an average of 373 telehealth claims each year before the SIM Initiative (2013–2015) and in 2016, when the first cohort of clinics received practice transformation support and the first set of telehealth webinars occurred. This average was less than 0.01 percent of the total number of claims paid each year.
- Between 2017 and 2019, Medicaid providers billed 2,400–3,600 telehealth claims each year, averaging about 0.08 percent of the total number of claims paid each year. This was the period when the nine clinics received direct technical assistance to support development and expansion of 12 telehealth programs, and all other clinics participating in the SIM practice transformation support program had access to webinars and other learning tools focused on telehealth topics.
- The surge in telehealth claims in 2017 and 2018 primarily reflects new claims from school-based health systems using telehealth for speech therapy services. Schools and school districts provided telehealth services to beneficiaries assigned to clinics participating in practice transformation and to the comparison group. School-based services accounted for two-thirds of all telehealth claims for the comparison group. For beneficiaries attributed to SIM practices, school-based services accounted for 36 percent of telehealth claims in 2017 and 40 percent of telehealth claims in 2018.

Exhibit M-4-1. Idaho Medicaid telehealth claims from 2013–2019



Notes: * The data for 2019 are full-year estimates based on data from February 2019 through June 2019.

The vertical dotted line indicates the start of the ID SIM practice transformation support program.

CG = comparison group; ID = Idaho; measurement year = February of the listed year through January of the following year, to align with the years of the SIM practice transformation support program; ID practice transformation = patients assigned to clinics participating in the ID SIM practice transformation support program.

Source: Federal Evaluation Team analysis of ID claims data provided by the ID Department of Health and Welfare.

Table M-4-2 shows trends in Idaho Medicaid telehealth claims, excluding school-based claims. The trends include the following:

- The number of telehealth claims per 1,000 beneficiaries increased from 1.52 in 2016 to 5.15 in 2018 for those attributed to the SIM practice transformation support program and from 0.90 in 2016 to 4.01 in 2018 for the comparison group.
- The share of beneficiaries receiving telehealth services increased from 0.03 percent in 2016 to 0.14 percent in 2018 for the SIM practice transformation support program group compared with 0.04 percent in 2016 and 0.10 percent in 2018 for the comparison group.
- The addition of new covered services concurrent to the SIM practice transformation program and low claims volume from 2013 through 2015 preclude meaningful hypothesis testing, but overall patterns suggest slightly faster growth of telehealth use for the SIM practice transformation beneficiaries after 2016.

Table M-4-2. Idaho Medicaid non-school–based telehealth claims from 2013–2018

Outcome	Year	ID practice transformation	Comparison group	Total claims
Telehealth claims per 1,000 Medicaid beneficiaries				
Baseline	2013	4.85	1.78	585
	2014	1.20	0.95	251
	2015	0.46	0.97	229
SIM period	2016	1.52	0.90	362
	2017	4.09	2.50	1,024
	2018	5.15	4.01	1,442
Percentage (%) of Medicaid beneficiaries with a telehealth claim				
Baseline	2013	0.08	0.10	192
	2014	0.05	0.04	107
	2015	0.03	0.05	122
SIM period	2016	0.03	0.04	108
	2017	0.09	0.05	223
	2018	0.14	0.10	372

Notes: ID = Idaho; SIM = State Innovation Model.

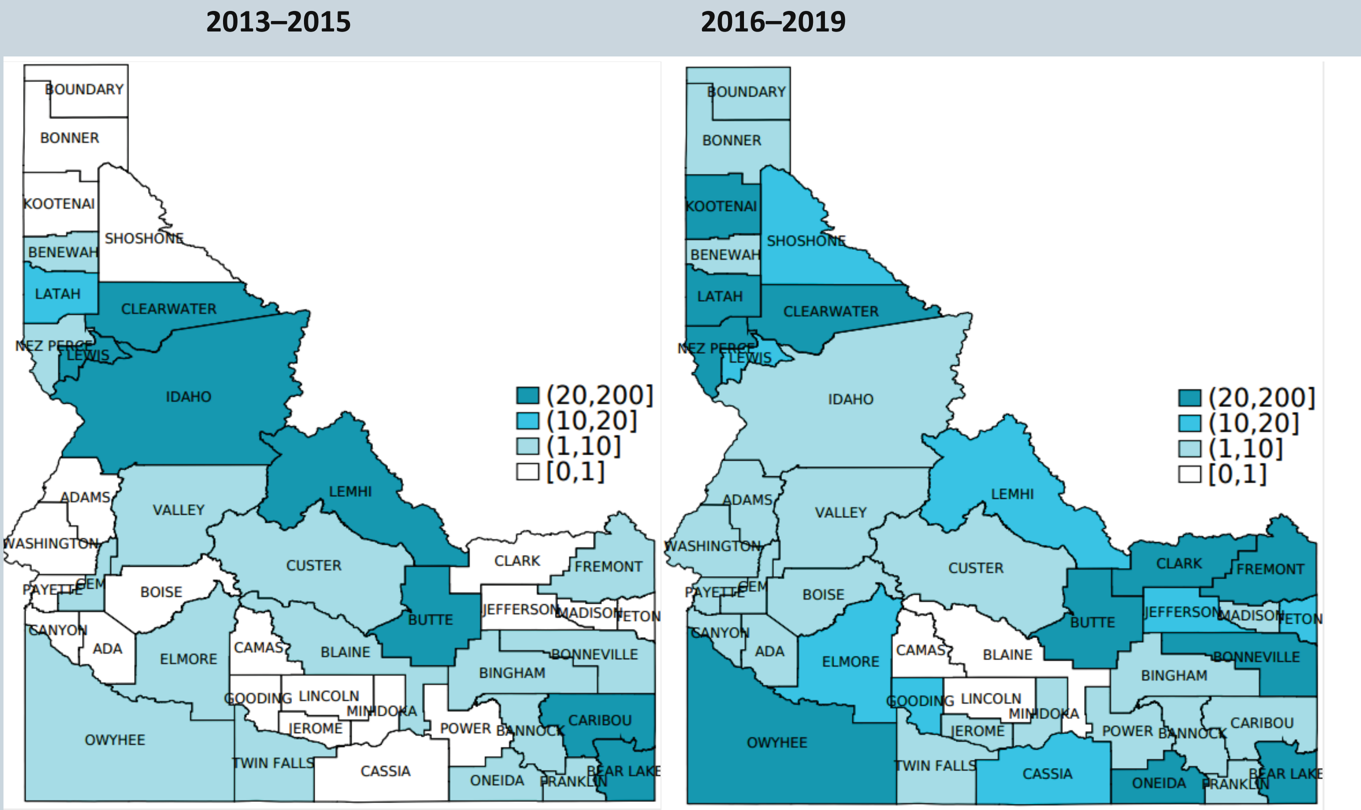
ID practice transformation = patients assigned to clinics participating in the ID SIM practice transformation support program. These calculations exclude claims where the place of service was a school.

Source: Federal Evaluation Team analysis of ID claims data provided by the ID Department of Health and Welfare.

Exhibit M-4-2 shows the geographic distribution of telehealth claims in Idaho in the three years before the SIM practice transformation program began and the 3.5 years after the first cohort of participating practices began receiving services. The findings are as follows:

- Telehealth use expanded in many areas of the state during the SIM period. Use increased in nearly all nine urban counties (i.e., Ada, Bannock, Bonneville, Canyon, Kootenai, Latah, Madison, Nez Perce, and Twin Falls) but some of the largest increases occurred in rural and frontier counties, such as Cassia, Clark, Elmore, Freemont, Gooding, Jefferson, Oneida, Owyhee, Shoshone, and Teton.
- Telehealth use declined in a few counties, including large rural and frontier counties in the north central portion of the state. One such county (i.e., Idaho County) spans the width of the state at that point and encompasses more than 8,500 square miles, with a population density of approximately two people per square mile. Neighboring Lewis and Lemhi Counties also saw fewer claims in 2016–2019. However, there were more rural and frontier counties with gains than there were with declines.

Exhibit M-4-2. Medicaid telehealth claims per 1,000 population by county



Note: ID = Idaho.

Source: Federal Evaluation Team analysis of ID claims data provided by the ID Department of Health and Welfare.

Exhibit M-4-3 illustrates the types of services and service locations that reported telehealth claims in Idaho for the entire study period. The findings are as follows:

- Treatment of an Auditory Processing Disorder (Speech Therapy) was the most common service reported by a wide margin. Almost all telehealth claims for speech therapy were school-based services.
- Evaluation and Management Services was the second largest category of services on telehealth claims. The procedure codes that were used indicated that these services were almost always for established patients.
- Psychotherapy Services and Procedures was the third largest category of services, although the volume was lower during the SIM period than in the three years before the SIM Initiative (data not shown).
- Schools were the most common service location for telehealth claims, followed by office and on campus-outpatient hospital settings. Claims rarely indicated that beneficiaries received telehealth services at home.

Exhibit M-4-3. Most common service types and places of service on Medicaid telehealth claims, 2013–2019

Type of Service	Claim Lines
Treatment of Auditory Processing Disorder (Speech Therapy)	10,394
Evaluation and Management Services	4,030
Psychotherapy Services and Procedures	499
Physical Medicine and Rehabilitation Therapeutic Procedures	315
Psychiatric Diagnostic Evaluation Services	88
Alcohol and Drug Abuse Treatment	73
Preventative Medicine Services	11

Place of Service	Claim Lines
School	10,169
Office	3,668
On Campus-Outpatient Hospital	860
Telehealth	440
Inpatient Hospital	202
Federally Qualified Health Center	26
Rural Health Center	23
Home	18

Notes: Frequencies shown are numbers of claim lines indicating the listed type of service or place of service. One claim may have multiple lines.

ID = Idaho.

Source: Federal Evaluation Team analysis of ID claims data provided by the ID Department of Health and Welfare.

M-4.4 Discussion

Idaho Medicaid claims data indicate that the volume of telehealth services increased substantially in 2017 and continued to grow afterward. Most of the growth was because of the state's expanded coverage for school-based services rather than the SIM Initiative. However, there is some evidence that beneficiaries assigned to clinics in the SIM practice transformation program had more use of telehealth services than the comparison group after 2016. The patterns of claims by county also indicate that telehealth use grew in many rural and frontier areas.

The patterns of telehealth service use observed in this analysis were consistent with our initial hypotheses and expectations. The patterns often corroborated feedback received during the interviews and focus groups held in Idaho for this evaluation and aligned well with information from the state evaluators. State officials saw the potential of telehealth but noted that setting up telehealth programs was difficult and took a lot of time and expertise. Providers appreciated getting help from experts to get their ideas off the ground and were frequently optimistic about the future for telehealth services, but they also expressed frustration about confusing and inconsistent reimbursement policies across payers and technological barriers. Slow growth was expected. The state's telehealth training contractor reported that the 12 sites that received grants to support new or expanded telehealth served 161 new patients (not necessarily limited to Medicaid beneficiaries) and provided 349 telehealth visits through December 2018. Four sites served less than 10 new patients and one site was unable to serve any new patients because of implementation challenges. All sites planned to expand their telehealth activities in 2019 and beyond (Glossa, O'Connor, & Brousseau, 2019, January).

> "The patients have to go to those rural and frontier clinics to be able to do telehealth, so it kind of defeated the whole purpose of telehealth."
>
> —Idaho provider

Lack of access to or use of high-speed broadband internet was a barrier to telehealth adoption in many portions of the state. Data presented to the Healthcare Transformation Council of Idaho's (HTCI's) Telehealth Taskforce indicated that approximately one million Idaho residents did not use the internet at broadband speeds in 2019; this figure includes 80 percent or more of the populations of most rural and frontier counties throughout the state (Forsch, 2020, July 29). Rates of use are particularly low in the north central portion of the state where some of the largest declines in telehealth use were observed. The cost of the necessary internet service and technology limited in-home and provider use, particularly with Medicaid's requirement for video that was not fuzzy or choppy. Consequently, patients were typically required to travel to a clinic or other health care facility for a telehealth visit with a provider at a distant site. Providers noted that this situation was not practical for many Medicaid patients, especially those living in remote areas or who had limited access to transportation. In contrast, schools and school districts were well set up to provide two-way video connections for Medicaid-enrolled students needing speech therapy services. Students could receive these services at school, a place where they were on a regular basis, and the speech therapists could be in a central location or another portion of the state.

> "Telehealth is one of those infrastructure activities for transformation that requires investment. It's not just technology, but it's workflow, and it's having sites to connect to, and having reimbursement mechanisms that make it financially viable."
>
> —Idaho state official

The coronavirus disease 2019 (COVID-19) public health emergency may permanently remove some barriers to telehealth. In 2020, the state relaxed the two-way video requirement and allowed all appropriate services—suspending the limited list of approved services—because of the pandemic (Idaho Department of Health and Welfare, 2020). The HTCI's Telehealth Task Force also convened stakeholders throughout 2020 and recommended that the state and payers align definitions, expand the ways in which patients and providers can connect with each other, and coordinate with the state's broadband initiative. The future of telehealth in Idaho will likely look very different from the SIM Initiative years, but the initiative gave many practices and stakeholders a set of tools and experiences that could facilitate the transition to this new environment.

M-S4. Appendix: Additional Methods Information for the Idaho Telehealth Supplemental Analyses

Table M-S4-1 provides definitions for the outcome measure used in this analysis.

Table M-S4-1. Outcome measures used in the telehealth supplemental analyses

Outcome measure	Outcome type	Definition
Telehealth claim	Count	Telehealth services were identified via a “GT” modifier on procedure codes, indicating a service was provided via interactive video and audio telecommunications systems. Six claims for durable medical equipment and medical supplies were excluded because the claim lines with the GT modifier were for non-covered items that should have had a “GY” modifier and likely represented data entry errors. A GY code indicates that the service on that claim line is not a covered service. It is used to exclude that line item when there are covered services on other lines from the same claim.

M-S4.1 Beneficiary Assignment to the Idaho State Innovation Model Practice Transformation Model

Idaho Medicaid attributed beneficiaries to providers participating in the SIM Initiative–funded practice transformation support program for each month starting in February 2016 through the end of the initiative in January 2019. Unlike the other analyses for Idaho in this evaluation, the treatment group for this analysis included all beneficiaries assigned to any cohort because it maximized the sample size and because no hypothesis testing was involved. The goal was simply to observe and describe patterns. All individuals not in the treatment group were in the comparison group; no assignment algorithms were applied.

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Appendix M-5: Controlling for Local Demographic and Socioeconomic Characteristics Using a Social Risk Score

- Including a local social inequity score instead of county-level covariates in difference-in-differences models for the Ohio CPC model-specific analysis did not meaningfully change the estimates of Ohio CPC's impacts on total spending, inpatient admissions, emergency department visits.
- The local social inequity score covariate represents a parsimonious way to control for area-level demographic and socioeconomic characteristics in difference-in-differences models.

M-5.1 Introduction

Social determinants of health—the "social, economic, and physical conditions" that affect health outcomes—are a key area of health policy interest (Healthy People 2020, 2020). Despite the important contributions of educational attainment and literacy, food insecurity, housing problems, access to transportation, and other social determinants of health to individual health, these factors are not comprehensively accounted for in most quantitative evaluations of health care delivery reforms. Although Medicaid enrollees may have similar levels of income, important differences in their social context may be largely unaccounted for.

RTI has been developing ZIP code–level social inequity scores to begin to account for the effects of a broader range of social determinants of health than currently exists in our evaluation work. A "random forest" machine learning algorithm (Donges, 2020, September 3) was used to develop local social inequity scores for Ohio that draw on 147 variables across 10 domains of social determinants. The 10 domains are: (1) health care access, coverage, costs, and quality; (2) educational attainment and quality; (3) community health, well-being, and healthy behaviors; (4) bias, stress, and trauma; (5) justice, crime, and incarceration; (6) food security and access to healthy food; (7) poverty, inequality, and employment; (8) housing adequacy, crowding, and structural health; (9) environmental quality; and (10) transportation access, infrastructure, and safety. Although other measures of small-area social and economic disadvantage are available—such as the Area Deprivation Index (University of Wisconsin, n.d.) or the Centers for Disease Control and Prevention and Agency for Toxic Substances and Disease Registry's Social Vulnerability Index (Agency for Toxic Substances and Disease Registry, 2021, April)—these do not include as many measures as RTI's Artificially Intelligent Risk Adjustment (AIRA) local social inequity score. In Ohio, where there is a 29-year gap between the longest and shortest life expectancies at the Census tract level, the local social inequity score explains 73 percent of the variation in life expectancy. This percentage is an improvement on the Social Deprivation Index, which explains only 50 percent of the variation in life expectancy.

The newly developed ZIP code–level local social inequity scores were tested as part of the analysis of the Ohio Comprehensive Primary Care (Ohio CPC) model. The hypothesis was that use of the social inequity score would not affect the direction or magnitude of the previous

Ohio CPC estimates (***Appendix H***); instead, it would be a more parsimonious way to adjust for beneficiaries' area-level social drivers.

M-5.2 Methods

Table M-5-1 provides a snapshot of the study methods.

Table M-5-1. Methods snapshot

Method	Description
Participating providers	To be eligible for the Ohio CPC model prior to January 2019, practices were required to have at least 500 attributed Medicaid beneficiaries. Practices also agreed to meet activity requirements—such as extended patient hours—associated with the provision of patient-centered primary care. This analysis included three cohorts of practices. The first cohort of practices was the largest and joined the model in January 2017; the second cohort of practices joined in April 2017; and the third cohort of practices joined in January 2018. In 2018, 145 practices participated in Ohio CPC.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Ohio Medicaid claims data were provided by the Ohio Department of Medicaid.
Sample	The intervention group included Medicaid beneficiaries who were attributed to practices that participated in the Ohio CPC model (n=1,116,460). The comparison group included similar Ohio Medicaid beneficiaries attributed to practices that did not participate in Ohio CPC (n=1,888,767). Ohio CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the Ohio CPC and comparison groups based on each beneficiary's total length of time attributed to Ohio CPC versus non-Ohio–CPC practices.
Timeframe	The timeframe for the impact analysis was January 1, 2014, through December 31, 2018. The study period was chosen to accommodate rolling entry at the practice level so that the analysis includes at least three years of baseline data and up to two years of intervention period data for all practices. The intervention period began on January 1, 2017.
Measures	The analysis assessed the effects of Ohio CPC on four core outcomes, including total spending PBPM, inpatient admissions, readmissions, and outpatient ED visits.
Statistical analysis	The analysis used logistic regression for inpatient admissions and readmissions, negative binomial regression for ED visits, and OLS models for total spending PBPM. Analytic weights were created by multiplying the propensity score weight by the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the county level to account for the correlation in outcomes within geographic regions. All models included controls for demographics, health status, county-level rate of FQHCs and beds per capita, and the local social risk scores developed by RTI.

Note: D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; OH = Ohio; Ohio CPC = Ohio Comprehensive Primary Care; OLS = ordinary least squares; PBPM = per beneficiary per month.

M-5.3 Results and Discussion

Table M-5-2 shows the estimates of the Ohio CPC model on total spending per beneficiary per month (PBPM), inpatient admissions, emergency department (ED) visits, and readmissions for Medicaid beneficiaries attributed to Ohio CPC practices relative to comparison beneficiaries in a D-in-D model that uses the local social inequity score as a covariate.[131] The "standard" column in ***Table M-5-2*** shows D-in-D estimates for the same outcomes from a model that uses county-level covariates from the Area Health Resources Files, presented in ***Appendix H***. The 90% confidence intervals for all D-in-D estimates in the model with the local social inequity scores overlapped with the confidence intervals for the standard D-in-D estimates, indicating that the D-in-D estimates across both models were not significantly different.

In the model that included the local social inequity score, total spending PBPM increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by \$8.37 less (\$9.31 less in the standard model) for the Ohio CPC group during the first two years of Ohio CPC implementation (p<0.001). Inpatient admissions decreased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but decreased by 11.99 more admissions per 1,000 beneficiaries (11.85 more admissions for per 1,000 beneficiaries in the standard model) for the Ohio CPC group during the first two years of Ohio CPC implementation (p<0.001). ED visits decreased for the Ohio CPC group and increased for comparison beneficiaries, leading to a relative decrease of 24.80 visits per 1,000 beneficiaries (17.79 visits per 1,000 beneficiaries in the standard model) for Medicaid beneficiaries attributed to Ohio CPC practices (p<0.001). Readmissions within 30 days of discharge increased for both Medicaid beneficiaries attributed to Ohio CPC and the comparison group but increased by 5.14 fewer readmissions per 1,000 discharges (5.63 fewer readmissions per 1,000 discharges in the standard model) for the Ohio CPC group during the first two years of Ohio CPC implementation (p=0.02).

As expected, using the single local social inequity score variable in lieu of several area-level covariates did not meaningfully change estimates of Ohio CPC's impacts on total spending, inpatient admissions, ED visits, and readmissions. Because a D-in-D model with a local social inequity score is more parsimonious than a model with area-level variables but produces similar estimates, there are likely further opportunities to apply the local social inequity score to impact analyses.

[131] Total spending PBPM, inpatient admissions, and ED visits include both children and adults. Readmissions are only calculated for individuals who are aged 18 years or older.

Table M-5-2. Differences in the pre–post change in total spending, inpatient admissions, readmissions, and emergency department visits, in Ohio Comprehensive Primary Care and the comparison group

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Local social inequity score: Regression-adjusted D-in-D (90% CI)	Standard: Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Total spending PBPM ($)								
Year 1	358.44	349.74	388.48	398.35	−18.63 (−23.84, −13.41)	-19.17 (-24.72, -13.63)	−5.2	<0.001
Year 2	358.44	349.74	411.83	400.09	2.98 (−2.90, 8.86)	1.61 (-4.82, 8.05)	0.8	0.40
Overall	358.44	349.74	399.56	399.13	−8.37 (−12.28, −4.46)	-9.31 (-13.53, -5.09)	−2.3	<0.001
All-cause acute inpatient admissions per 1,000 population								
Year 1	96.28	97.10	82.23	100.64	−17.60 (−21.06, −14.14)	-17.17 (-20.07, -14.28)	−18.3	<0.001
Year 2	96.28	97.10	76.44	82.81	−5.77 (−11.78, 0.24)	-5.96 (-11.86, -0.07)	−6.0	0.11
Overall	96.28	97.10	79.48	92.66	−11.99 (−15.37, −8.60)	-11.85 (-15.04, -8.67)	−12.5	<0.001
ED visits per 1,000 population								
Year 1	1,317.99	1,338.80	1,316.49	1,386.27	−48.19 (−62.50, −33.89)	-41.51 (-56.49, -26.53)	−3.7	<0.001
Year 2	1,317.99	1,338.80	1,313.27	1,332.94	1.10 (−18.11, 20.32)	8.47 (-11.95, 28.89)	0.08	0.93
Overall	1,317.99	1,338.80	1,314.96	1,362.39	−24.80 (−36.61, −12.98)	-17.79 (-30.27, -5.30)	−1.9	<0.001

(continued)

Table M-5-2. Differences in the pre–post change in total spending, inpatient admissions, readmissions, and emergency department visits, in Ohio Comprehensive Primary Care and the comparison group (continued)

Outcome	Baseline period adjusted mean, OH CPC	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, OH CPC	Intervention period adjusted mean, comparison group	Local social inequity score: Regression-adjusted D-in-D (90% CI)	Standard: Regression adjusted D-in-D (90% CI)	Relative difference (%)	p-value
Readmissions within 30 days of discharge per 1,000 discharges								
Year 1	122.47	124.53	165.48	177.88	−8.50 (−13.96, −3.03)	-8.85 (-14.00, -3.70)	−6.9	0.01
Year 2	122.47	124.53	187.70	191.70	−0.96 (−5.61, 3.68)	-1.82 (-6.36, 2.72)	−0.8	0.73
Overall	122.47	124.53	175.40	183.59	−5.14 (−8.80, −1.47)	-5.63 (-9.11, -2.15)	−4.2	0.02

Notes: AIRA = Artificially Intelligent Risk Adjustment; CI = confidence interval; D-in-D = difference-in-differences; ED = emergency department; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care; PPPM = per person per month.

The local social inequity score model fits the data slightly better than the area-level covariates model; however, the change in these fit statistics is minimal.

Methods: The analysis used an OLS model to obtain D-in-D estimates for total spending, a logistic regression model to obtain D-in-D estimates for the inpatient admission and readmissions outcomes, and a negative binomial model to obtain D-in-D estimates for the ED outcome. The estimated probability of any inpatient admission and the ED visit count were multiplied by 1,000 to obtain an approximate rate per 1,000 members. The estimated probability of a readmission was multiplied by 1,000 to obtain an approximate rate per 1,000 discharges. Models were adjusted for person-level variables (gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score, and changes to attribution status across calendar quarters), and county-level variables (residence in a Metropolitan Statistical Area, supply of short-term acute care hospital beds, percentage uninsured) and RTI’s local social inequity score. (The county-level variables included in the standard analysis were residence in a Metropolitan Statistical Area, percentage of residents, living in poverty, supply of short-term acute care hospital beds, median age, percentage uninsured, and FQHCs per 1,000 people.) The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non–OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary’s total length of time attributed to OH CPC versus non–OH CPC practices. All outcome models assume that OH CPC and comparison group outcome trends are parallel during the baseline period.

(continued)

Table M-5-2. Differences in the pre–post change in total spending, inpatient admissions, readmissions, and emergency department visits, in Ohio Comprehensive Primary Care and the comparison group (continued)

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of OH CPC relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the OH CPC group relative to the comparison group after OH CPC implementation. The relative difference is the D-in-D estimate as a percentage of the OH CPC baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For binary and count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted N for all models except the readmission outcome is 8,229,002; the weighted N for the readmission outcome is 696,087. These numbers include all person-year (or discharge-year) observations for both the OH CPC and comparison group.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the OH Department of Medicaid.

M-S5. Additional Details About Methods

M-S5.1 Covariate Balance Between the Ohio Comprehensive Primary Care and Comparison Groups

Table M-S5-1 shows the covariate balance between the Ohio CPC and comparison groups for the study sample in the last baseline year for the overall study sample. Covariate balance for the discharge-level sample for readmissions is not shown. Covariate balance is also not shown for the earlier baseline years. ***Table M-S5-1*** includes the following:

- The covariate means for the Ohio CPC and comparison groups without propensity score weighting;
- The standardized difference between the Ohio CPC and comparison groups means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison groups ("comparison weighted"); and
- The standardized difference between the Ohio CPC group means and the propensity-score weighted comparison group means ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year by using logistic regressions in which the dependent variable was an indicator of inclusion in the IBH group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences were similar across years, so covariate balance results are presented for the last baseline year only. Prior to propensity score weighting, standardized differences were greater than 0.10 for some individual- and county-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table M-S5-1. Covariate balance between the Ohio Comprehensive Primary Care and comparison groups in the last baseline year

Variable	Unweighted mean or percentage, OH CPC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	54.3	53.3	0.02	54.4	0.001
Age in years	22.8	25	0.12	22.5	0.02
Percentage of people who are disabled	5.7	5.6	0.004	5.7	0.002
Percentage of people whose race is non-white	50.6	42.0	0.17	51.1	0.01
Total months of enrollment during year	11.0	10.8	0.07	11	0.02
CDPS risk score, logged[a]	−0.1	−0.1	0.05	−0.1	0.01
Percentage of people who had changes to attribution status across calendar quarters[b]	39.4	22.5	0.37	41.0	0.03
ZIP-code level					
Social risk score	0.70	0.70	0.04	0.70	0.0002
County level					
Percentage of people residing in a Metropolitan Statistical Area	84.3	78.1	0.16	84.7	0.01
Hospital beds per 1,000 people (2015)	3.8	3.4	0.19	3.8	0.01
FQHCs per 1,000 people (2016)	<0.001	<0.001	0.10	<0.001	0.004

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

[b] The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non-OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non-OH CPC practices.

CDPS = Chronic Illness and Disability Payment System; FQHC = Federally Qualified Health Center; ICD = International Classification of Diseases; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the OH Department of Medicaid.

Table M-S5-2 lists the variables ultimately used to assign an AIRA score to each Ohio and comparison state zip code.

Table M-S5-2. Variables included in Ohio local social inequity score by domain

Domains	Variables
Community	Asthma prevalence, 2013–2017
Community	Cancer incidence, age-adjusted, 2013–2017
Community	Cancer mortality rate per 100,000, 2010–2014
Community	Children born in a tract and who stayed in the same tract as adults (%), 1978–2015
Community	Chlamydia prevalence per 100,000, 2010–2014
Community	Chronic lung disease prevalence, 2013–2017
Community	Diabetes prevalence, 2015
Community	Disability prevalence, 2010–2014
Community	Drug overdose mortality rate, 2015
Community	Excessive drinking prevalence, 2015
Community	Heart disease (%), 2013–2017
Community	HIV prevalence per 100,000, 2010–2014
Community	Hypertension prevalence, 2013–2017
Community	Infant mortality rate, 2015
Community	Injury mortality rate, age-adjusted, per 100,000, 2010–2014
Community	Low birthweight (%), 2010–2014
Community	Mammogram rate, 2015
Community	Mentally unhealthy days (mean), 2015
Community	Obesity prevalence, 2015
Community	Physical inactivity prevalence, 2015
Community	Physically unhealthy days (mean), 2015
Community	Smoking prevalence, 2015
Community	Stroke hospitalization rate, 2013–2015
Community	Teen birth rate, 1978–2015
Education	Bachelor's degree or more (%), 2010–2014
Education	Childhood Opportunity Index, 2010–2015
Education	High school diploma/GED or more (%), 2010–2014
Education	No computer at home (%), 2014–2018
Food	Fast food/casual restaurants per 1,000 persons, 2014
Food	Limited supermarket access (no vehicle), 2010–2014
Food	Limited supermarket access (within half mile), 2010–2014
Food	Limited supermarket access (within half mile/10 miles), 2010–2014
Food	Residents receiving food assistance (%), 2010–2014

(continued)

Table M-S5-2. Variables included in Ohio local social inequity score (continued)

Domains	Variables
Healthcare	Dual enrollment rate, 2010–2014
Healthcare	Medicaid enrollment rate, 2010–2014
Healthcare	Uninsured (%), 2014–2018
Housing	Foreclosure risk score, 2008
Housing	Household size in owner-occupied homes (mean), 2010–2014
Housing	Household size in rented homes (mean), 2010–2014
Housing	Households paying >30% of income for rent (%), 2010–2014
Housing	Households receiving rental assistance (%), 2014–2015
Housing	Households that were owner-occupied (%), 2010–2014
Housing	Households that were renter occupied (%), 2010–2014
Housing	Housing units built in 1939 or before (%), 2010–2014
Housing	Housing units built in 1990 or later (%), 2010–2014
Housing	Housing units that were mobile homes (%), 2010–2014
Housing	Median gross rent, 2014–2018
Housing	Owner households spending >30% of income on housing (%), 2010–2014
Housing	Owner-occupied home value (median), 2014–2018
Housing	Owner-occupied homes with one or more housing problem (%), 2010–2014
Housing	Rented homes with one or more housing problem (%), 2010–2014
Housing	Vacant housing rate (%), 2010–2014
Justice	Juvenile population in jail (%), 2010
Justice	Percentage (%) of population in jail, 2010
Poverty	Children who grew up in a tract and ended up living in a tract with poverty rate of <10% in adulthood (%), 1978–2015
Poverty	Percentage (%) of workers in construction occupations, 2014–2018
Poverty	Probability of reaching the top 20% of national household income distribution (among those born during the same year), 1978–2015
Poverty	Residents with incomes below the official poverty threshold (%), 2010–2014
Poverty	Unemployment rate (%), 2010–2014
Poverty	Workers in service occupations (%), 2010–2014
Poverty	Workers with office jobs (%), 2010–2014
Stress	Asian non-Hispanic (%), 2010–2014
Stress	Black non-Hispanic (%), 2010–2014
Stress	Foreign-born residents (%), 2010–2014
Stress	Foster children (%), 2010–2014
Stress	Fraction of children claimed by two people in the year they are linked to parents, 1978–2015
Stress	Hispanic, any race (%), 2010–2014

(continued)

Table M-S5-2. Variables included in Ohio local social inequity score (continued)

Domains	Variables
Stress	Other or multiple races (%), 2010–2014
Stress	Speaks a language other than English at home (%), 2010–2014
Stress	White non-Hispanic (%), 2010–2014
Transportation	Bridges in medium to fair condition (%), 2014
Transportation	Bridges in poor condition (%), 2014
Transportation	Civic airports (number), 2014
Transportation	Commercial airports (number), 2014
Transportation	Households with one vehicle (%), 2010–2014
Transportation	Households with two vehicles (%), 2010–2014
Transportation	Households with three vehicles (%), 2010–2014
Transportation	Households with no vehicle (%), 2010–2014
Transportation	Miles of passenger rail, 2014
Transportation	Mix of employment and housing, 2015
Transportation	Mix of employment types, 2015
Transportation	Number of bridges, 2014
Transportation	Number of business establishments, 2014
Transportation	Number of docks, 2014
Transportation	Other aerodromes (number), 2014
Transportation	Resident workers commuting to work in other counties (number), 2014
Transportation	Resident workers commuting to work in same county (number), 2014
Transportation	Residents (number), 2014
Transportation	Route miles of freight railroad, 2014
Transportation	Street intersection density, 2015
Transportation	Workers commuting from other areas (number), 2014
Transportation	Workers in transportation jobs (%), 2010–2014
Transportation	Workers who commute by bicycle (%), 2010–14
Transportation	Workers who commuted to work in another way (%), 2010–2014
Transportation	Workers who drove to work (%), 2010–2014
Transportation	Workers who took public transit to work (%), 2010–2014
Transportation	Workers who walked to work (%), 2010–2014
Transportation	Workers who worked from home (%), 2010–2014

Note: AIRA = Artificially Intelligent Risk Adjustment; ED = emergency department; GED = General Educational Diploma; HIV = human immunodeficiency virus; OH = Ohio; PPPM = per person per month.

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Appendix M-6: Descriptive Changes in Primary Care Provider Visits in Patient-Centered Medical Home States

- Findings from a descriptive analysis suggest that patient-centered medical home models in SIM Round 2 states may not have reduced primary care provider (PCP) visits among Medicaid beneficiaries who had many PCP visits in a year.

M-6.1 Introduction

The impact analyses for patient-centered medical home (PCMH) models in Connecticut, Delaware, Idaho, Ohio, and Rhode Island showed unexpected results for primary care provider (PCP) visits.[132] It was hypothesized that the implementation or expansion of PCMH models would result in increased primary care visit use among patients attributed to the SIM Round 2 PCMH models relative to a comparison group. However, Rhode Island was the only PCMH state for which primary care visit counts per 1,000 patients increased more in the intervention group than in the comparison group.[133] In both Connecticut and Ohio, PCP visit rates declined in the intervention group relative to the comparison group. In Delaware, Idaho, and New York, changes to PCP visit rates did not differ between the intervention and comparison groups. (For an overview of PCMH findings across states, see ***Section 1***.)

When PCP visits are modeled as a binary outcome—indicating the percentage of Medicaid beneficiaries with at least one PCP visit in a year—results are favorable for PCMH models in Connecticut, Delaware, and Rhode Island; are unfavorable for Ohio; and are non-significant for Idaho (see ***Section 1***). The fact that Connecticut, Delaware, and Rhode Island had favorable outcomes for the binary PCP visit outcome—and that only Rhode Island showed favorable findings for the PCP visit count outcome—indicated that PCMH models could be preserving access to primary care while reducing PCP visits among individuals with many PCP visits in a year. To help explain the trends in PCP visits across states, this analysis addressed the following research question: To what extent were overall trends in PCP visits across states driven by changes in PCP visit use among individuals who were high utilizers of PCP visits?

This analysis considered individuals in the top 20 percent of PCP visit use as "high utilizers." The hypothesis for the PCP visits analysis was that PCMH models could have reduced counts of PCP visits among individuals who were previously high utilizers of PCP visits.

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[132] There also was an impact analysis for the New York State PCMH model, but it was at the provider-month level, not the person-year level; therefore, it is not included here.
[133] The impact analysis for Rhode Island's Patient-Centered Medical Home-Kids (PCMH-Kids) model included both a Medicaid sample and a commercial sample. The findings for the Medicaid sample are the focus for the descriptive PCP visit analysis, allowing for a straightforward comparison with the Medicaid-focused analyses for the other four PCMH states.

M-6.2 Methods

Table M-6-1 provides a snapshot of the study methods.

Table M-6-1. Methods snapshot

Method	Description
Study design	Descriptive analysis of trends in the distribution of Medicaid beneficiaries with specific counts of PCP visits in a year
Data	This analysis used annual counts of PCP visits per Medicaid beneficiary from five PCMH states: Connecticut, Delaware, Idaho, Ohio, and Rhode Island. The New York State PCMH model was excluded from this analysis because the data for the New York State PCMH analysis were at the provider-month level rather than the person-year level.
Sample	In Connecticut, there were 131,487 Medicaid beneficiaries in the intervention group and 91,728 in the comparison group. In Delaware, there were 39,320 beneficiaries in the intervention group and 122,521 in the comparison group. In Idaho, there were 115,772 beneficiaries in the intervention group and 279,596 in the comparison group. In Ohio, there were 1,116,460 beneficiaries in the intervention group and 1,888,767 in the comparison group. In Rhode Island, the Medicaid analytic sample included 106,930 beneficiaries in the intervention group and 495,460 in the comparison group. All samples except for Rhode Island's included both children and adults; the sample for Rhode Island only included children.
Timeframe	The analysis utilized data from all baseline and intervention years from each of the five PCMH model-specific analyses. The timeframe for Delaware included two baseline years, and the timeframes for Connecticut, Idaho, Ohio, and Rhode Island included three baseline years. The timeframes for Connecticut, Idaho, and Ohio included two intervention years; and the timeframes for Delaware and Rhode Island included three intervention years.
Measures	The analysis focused on PCP visit counts per person. The PCP visits outcome was also used in the model-specific analyses.

Note: PCMH = patient-centered medical home; PCP = primary care provider.

M-6.3 Results and Discussion

The downward shifts in utilization were largely unchanged among the highest users, as shown in ***Figure M-6-1***. This result does not support the hypothesis that PCMH models reduced PCP visits among high utilizers of PCP visits.

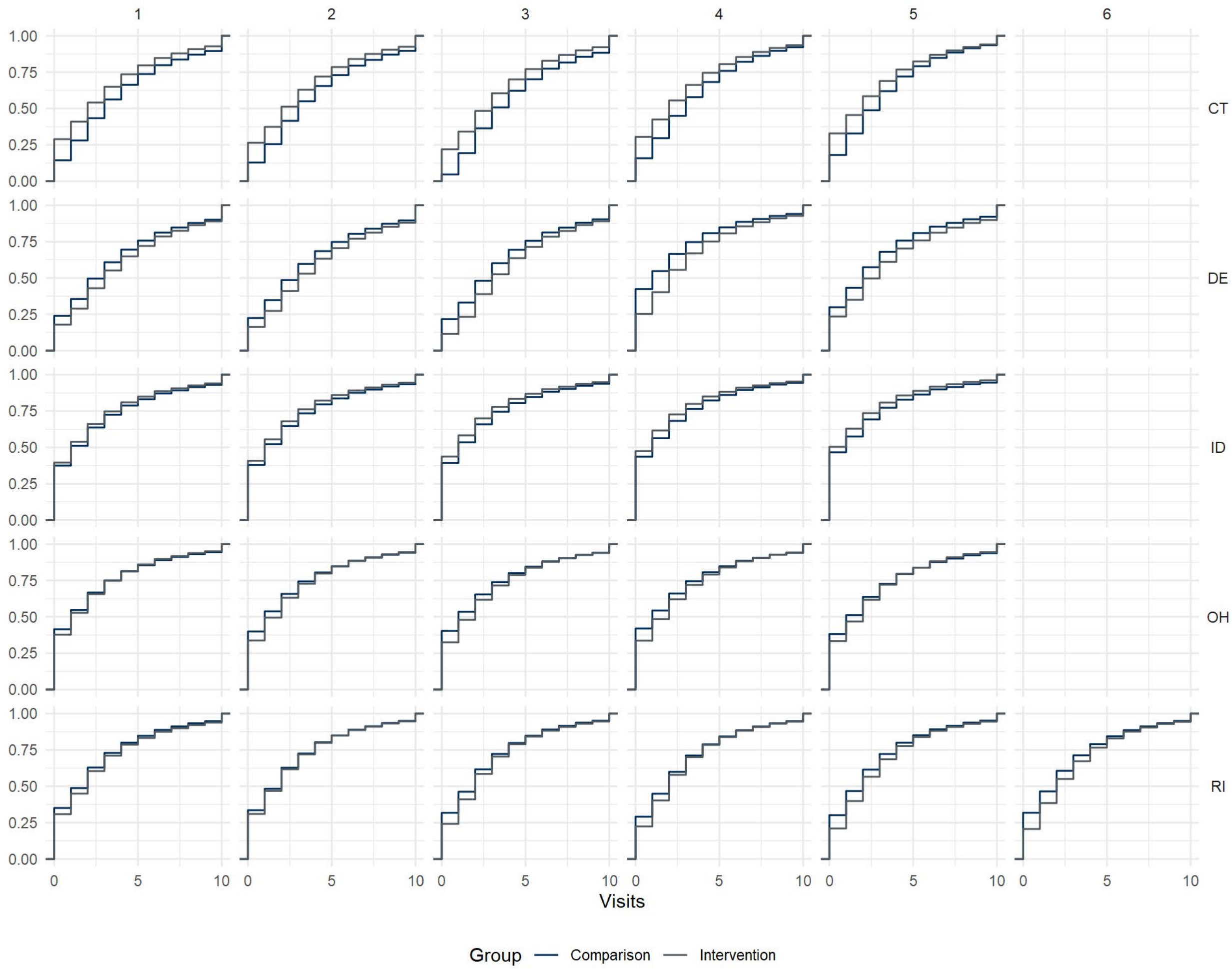
Figure M-6-1 shows the cumulative proportion of Medicaid beneficiaries with different counts of PCP visits for each PCMH model over time. Each row of ***Figure M-6-1*** represents a PCMH state. The labels for each state are on the right side of the figure. Each column of the figure denotes a measurement year for each PCMH analysis. For example, the column labeled "1" denotes the first measurement year for each PCMH analysis. (If a cell in a column is blank, then it means that the analysis timeframe was five years rather than six years.) The calendar year associated with each measurement year varies for each PCMH analysis. In the graphs within each row, the *x*-axis indicates the total number visits per beneficiary, and the *y*-axis denotes the cumulative proportion of the intervention or comparison groups with a specific number of PCP visits or fewer (i.e., two visits or fewer). The proportion of the sample for each state that is considered to be high utilizers—that is, the top 20 percent of PCP visit users—can be identified as greater than 0.8 on the *y*-axis. Individuals in the high utilizer category had approximately six or more PCP visits in a year. Colored lines denote the intervention and comparison groups.

If declines in overall PCP visit rates for PCMH models were driven by changes in PCP visit rates among high utilizers of PCP visits, then the proportion of Medicaid beneficiaries in PCMH models with higher numbers of PCP visits in each year would decline. Specifically, the line for the intervention group (blue) in the upper right quadrant of the graph would diverge from, and eventually be below, the line for the comparison group (red).

Looking at each state's graphs from left to right over the analysis years, there are no marked shifts over time to suggest that the SIM Round 2 PCMH models reduced the number of annual PCP visits among high utilizers. Although there are some state-specific shifts, such as the narrowing gap between the intervention and comparison groups in Connecticut, there is no generalizable trend across SIM primary care models during the analysis period.

Similarly, there are no cross-state trends indicating decreases in PCP visits among individuals with few (0 or 1) PCP visits in a year. Decreases in PCP visits would be denoted by marked differences between the lines for the intervention group (blue) and the comparison group (red) over time in the lower left quadrant of each cell in ***Figure M-6-1***. Although there are some state-specific shifts, such as the clear increase in Medicaid beneficiaries with no PCP visits in Delaware in both the intervention and comparison groups, there is no generalizable trend across all SIM Round 2 PCMH models during the analysis period.

Figure M-6-1. Cumulative proportion of individuals with different numbers of primary care provider visits by year, state, and patient-centered medical home intervention status



Note: CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; RI = Rhode Island.

The limited changes in the number of annual PCP visits among high utilizers may reflect several factors. First, although PCMH models seek to reduce inappropriate care, they typically focus on reducing inappropriate use of high-cost inpatient and emergency services rather than primary care services. Second, PCMH models seek to expand, rather than restrict, access to primary care services. Third, individuals who have complex health conditions may need multiple PCP visits in each year to effectively manage their health; in these cases, higher levels of PCP visit use may be appropriate.

Although this analysis provides insights into PCP visit use among individuals in PCMHs models in five SIM Round 2 PCMH states, it is descriptive and therefore does not control for non-SIM factors (e.g., health status) that could affect PCP visit use among Medicaid beneficiaries. As a result, the trends in PCP visits among high utilizers in the five SIM Round 2 PCMH states should be interpreted as suggestive, rather than showing an association.

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Appendix M-7: Trends in Health Risk for Medicaid Beneficiaries with Readmissions in Patient-Centered Medical Home States

- Health risk, as measured by Chronic Illness and Disability Payment System (CDPS) scores, generally increased over time among Medicaid beneficiaries with inpatient admissions and readmissions in analyses of patient-centered medical home (PCMH) models in Connecticut, Delaware, Idaho, and Ohio.
- Increases in health risk among Medicaid beneficiaries admitted to the hospital over time are likely contributing to increases in readmission rates identified in the model-specific analyses.

M-7.1 Introduction

Results from analyses using state-provided Medicaid claims data in Connecticut, Delaware, Idaho, and Ohio showed that all-cause readmissions increased for both Medicaid beneficiaries participating in SIM patient-centered medical home (PCMH) initiatives (the intervention group) and Medicaid beneficiaries not participating in these initiatives (the comparison group).[134] This trend is contrary to recent evidence from Healthcare Cost and Utilization Project hospital discharge data indicating that readmission rates were flat for Medicaid beneficiaries during a time period that partially overlapped with the SIM Round 2 Initiative (2010–2016) (Bailey, Weiss, Barrett, & Jiang, 2019, February). Although readmission rates were trending in an unexpected direction, readmission rate findings were either favorable relative to a comparison group (Connecticut and Ohio) or were not statistically significant (Delaware and Idaho). To help explain trends in readmissions across states, this analysis addressed the following research question: Were overall trends in readmissions across states influenced by changes in health risks for those admitted to the hospital?

The hypothesis for this analysis was that increases in health risks for Medicaid beneficiaries with inpatient admissions contributed to increases in readmission rates. In Connecticut, Delaware, Idaho, and Ohio, inpatient admission rates decreased over time. A decrease in inpatient admissions could have meant that admissions for people with lower health risks were being prevented, so people with higher health risks could have made up a larger percentage of Medicaid beneficiaries with inpatient admissions. It is also likely that inpatient admissions associated with higher health risk were more likely to result in a readmission. In this analysis, "health risk" was measured with a Chronic Illness and Disability Payment System (CDPS) score, which is derived from diagnosis codes in claims data (University of California, n.d.).

[134] The all-cause readmissions outcome only applied to individuals aged 18 years or older; therefore, it was not included in the impact analysis for Rhode Island's Patient-Centered Medical Home-Kids (PCMH-Kids) program.

M-7.2 Methods

Table M-7-1 provides a snapshot of the study methods.

Table M-7-1. Methods snapshot

Method	Description
Study design	Descriptive analysis of trends in CDPS scores—a measure of health risk—over time for people with inpatient admissions and readmissions in Connecticut, Delaware, Idaho, and Ohio.
Data	The analyses used the inpatient admissions and readmissions outcomes and mean and median CDPS scores from four PCMH states (Colorado, Delaware, Idaho, and Ohio).
Sample	This analysis included two samples from each of four PCMH states. The first set of samples consisted of beneficiary-year level observations from Medicaid beneficiaries with at least one inpatient admission. The number of beneficiary-year observations for the first set of samples varied from approximately 56,000 in Connecticut to more than 1,000,0000 for Ohio (n=55,997 for Connecticut; n=85,829 for Delaware; n=120,399 for Idaho; and n=1,146,231 for Ohio). The second set of samples consisted of inpatient admissions that included a readmission within 30 days of hospital discharge. The first set of samples included both children and adults, whereas the second set of samples included only individuals aged 18 years or older. (The readmissions outcome is defined to exclude pediatric readmissions.) The numbers of admission-level observations varied from less than 5,000 in Connecticut to almost 145,000 for Ohio (n=4,573 for Connecticut; n=14,312 for Delaware; n=6,451 for Idaho; and n=144,864 for Ohio).
Timeframe	The analysis utilized data from all baseline and intervention years from each of the four PCMH model-specific analyses. The timeframe for Delaware included two baseline years, and the timeframes for Connecticut, Idaho, and Ohio included three baseline years. The timeframes for Connecticut, Idaho, and Ohio included two intervention years; and the timeframe for Delaware included three intervention years.
Measures	The outcomes were mean and median CDPS scores for Medicaid beneficiaries with at least one inpatient admission or for Medicaid beneficiaries with a readmission within 30 days of hospital discharge. This analysis used concurrent CDPS scores, which means that they are calculated from the relevant year's utilization.[a]

Notes: [a] CDPS scores are included as a covariate in the propensity score models and difference-in-differences models in the model-specific analyses. However, these CDPS scores in these models are frozen in the baseline period because CDPS scores could be affected by the SIM Round 2 interventions. However, the focus of this analysis was on changes to CDPS scores over time, so concurrent CDPS scores, which are not frozen in the baseline period, are examined.

CDPS = Chronic Illness and Disability Payment System; PCMH = patient-centered medical home; SIM = State Innovation Model.

M-7.3 Results and Discussion

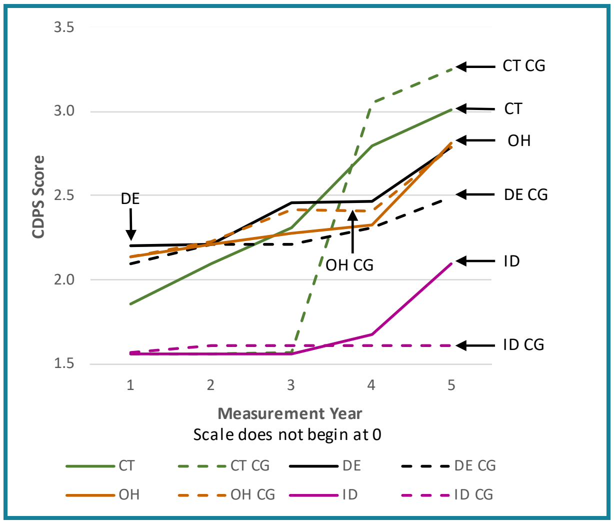
Figure M-7-1 and ***Figure M-7-2*** show descriptive trends in median and mean CDPS scores, respectively, for Medicaid beneficiaries in the intervention and comparison groups who had at least one inpatient admission per year. The *y*-axes in these figures are the values of the CDPS score. The *x*-axes in these figures represent the measurement year for the analysis. Across all states included in the analysis, the scores range from 1 to 10, with larger scores representing higher health risks.

Figure M-7-1 shows that median CDPS scores among Medicaid beneficiaries with at least one inpatient admission increased in both the intervention and comparison groups in Connecticut, Delaware, and Ohio. In Idaho, median CDPS scores increased in the intervention group and were flat in the comparison group. ***Figure M-7-2*** shows mean CDPS scores among Medicaid beneficiaries with at least one inpatient admission in a year. The trends in mean CDPS scores resembled those for the median CDPS scores.

In addition, ***Figure M-7-3*** and ***Figure M-7-4*** show that median and mean CDPS scores, respectively, increased for readmissions within 30 days of hospital discharge for all four PCMH states, though the increase was small for Delaware. Not surprisingly, Medicaid beneficiaries who had a readmission had higher mean CDPS scores—indicating higher levels of health risk—than individuals with at least one inpatient admission in a year (whether or not that inpatient admission included a readmission). It should be noted that sample sizes for the descriptive readmissions analysis were relatively small, as previously described in ***Table M-7-1***. The small sample sizes likely increased variability in the reported mean and median CDPS scores across years.

Health risk, as measured by mean and median CDPS scores, generally increased among both Medicaid beneficiaries with at least one inpatient admission in a year and among Medicaid beneficiaries who had a readmission. Taken together, this result supports the hypothesis that readmission trends for PCMH models were influenced by increases in health risks among individuals admitted to the hospital. Although this analysis provides insights into trends in health risk for Medicaid beneficiaries who used hospital care in four SIM Round 2 states, it is descriptive and therefore should be interpreted as suggestive, rather than showing an association.

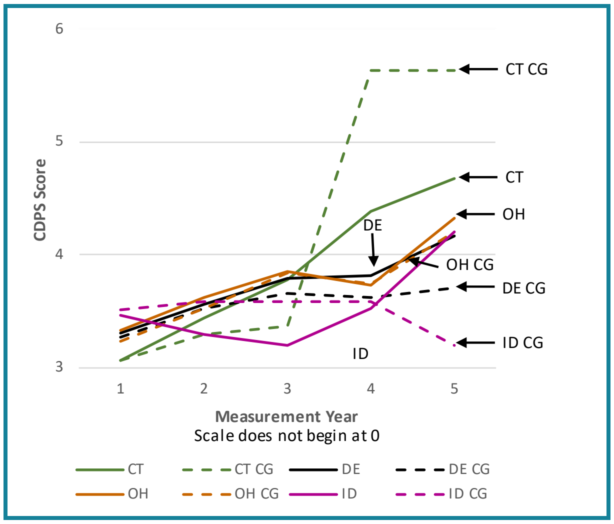
Figure M-7-1. Trends in median Chronic Illness and Disability Payment System scores for Medicaid beneficiaries with at least one inpatient admission in a year



Note: CDPS = Chronic Illness and Disability Payment System; CG = comparison group; CT = Connecticut; DE = Delaware; ID = Idaho; IG = intervention group; OH = Ohio.

Scale does not begin at 0.

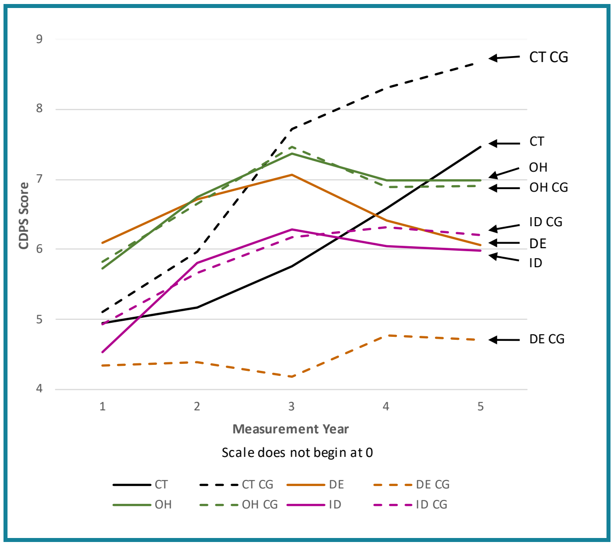
Figure M-7-2. Trends in mean Chronic Illness and Disability Payment System scores for Medicaid beneficiaries with at least one inpatient admission in a year



Note: CDPS = Chronic Illness and Disability Payment System; CG = comparison group; CT = Connecticut; DE = Delaware; ID = Idaho; IG = intervention group; OH = Ohio.

Scale does not begin at 0.

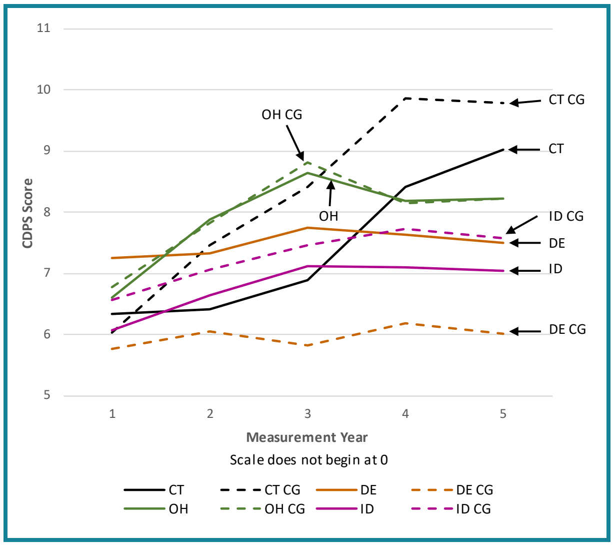
Figure M-7-3. Trends in median Chronic Illness and Disability Payment System scores for readmissions



Note: CDPS = Chronic Illness and Disability Payment System; CG = comparison group; CT = Connecticut; DE = Delaware; ID = Idaho; IG = intervention group; OH = Ohio.

Scale does not begin at 0.

Figure M-7-4. Trends in mean Chronic Illness and Disability Payment System scores for readmissions



Note: CDPS = Chronic Illness and Disability Payment System; CG = comparison group; CT = Connecticut; DE = Delaware; ID = Idaho; IG = intervention group; OH = Ohio.

Scale does not begin at 0.

Appendix M-8: Impacts of the Patient-Centered Medical Home Model Among High Utilizers of Emergency Department Visits

- Relative to a comparison group, Medicaid beneficiaries with high baseline emergency department (ED) utilization who were also attributed to the patient-centered medical home (PCMH) model had fewer ED visits in Ohio.
- ED visit rates also trended downwards among PCMH attributed Medicaid beneficiaries with high baseline ED utilization in Connecticut and Delaware. However, there was no change in ED visits in the PCMH group relative to the comparison group in either state.
- The lack of impact on the high utilizer populations in Connecticut and Delaware contrasts with the significant declines in ED visits found for all Medicaid beneficiaries participating in the SIM PCMH models, implying the impact of SIM PCMH initiatives on ED visits was not driven by high utilizers.

M-8.1 Introduction

The impact analyses of patient-centered medical home (PCMH) models in three states (Connecticut Person-Centered Medical Home Plus [PCMH+], Delaware Practice Transformation Initiative [PTI], and Ohio Comprehensive Primary Care [CPC]) showed significant reductions in emergency department (ED) visits. Specifically, the model-specific analyses found larger declines in ED visit rates for Medicaid beneficiaries attributed to SIM PCMH practices than for comparison beneficiaries attributed to non-SIM practices in Connecticut, Delaware, and Ohio. (For an overview of PCMH findings across states, see ***Section 1***.) Because care coordination provided by PCMHs is intended to reduce the use of ED visits, this analysis assessed whether the observed declines in ED visits in these states occurred among individuals considered to be high utilizers of ED visits (Agency for Healthcare Research and Quality, 2019, December 4).

This analysis addressed the following research question: To what extent does the implementation of PCMH models result in changes in the number of ED visits among high utilizers of ED visits?

This analysis defined individuals with two or more ED visits in any baseline year as “high utilizers.” The hypothesis for the ED visits analysis is that implementation of the PCMH model may have reduced counts of ED visit among individuals who were high utilizers of ED visits in the baseline period. On one hand, high utilizers may be more likely to benefit from care coordination in PCMHs and substitute ED utilization with other more appropriate types of care. On the other hand, high utilizers may experience more need for ED care and use the ED appropriately. These beneficiaries also may have ingrained patterns of ED visit use and their health seeking behaviors may be harder to influence.

M-8.2 Methods

Table M-8-1 provides a snapshot of the study methods.

Table M-8-1. Methods snapshot

Method	Description
Participating providers	In Connecticut, seven FQHCs and two ANs participated in Wave 1 of PCMH+. To be eligible for the PCMH+ model, practices were required to be an FQHC or AN, actively participate in the Connecticut Medicaid PCMH program with at least 2,500 attributed lives, and provide comprehensive primary care services. To be eligible for the Delaware PTI model, practices had to provide primary care services in the state. In 2016, 112 practices joined the PTI model on a quarterly basis. There were three cohorts of practices. These cohorts joined the model during the first, second, and third quarters of 2016. To be eligible for the Ohio CPC model prior to January 2019, practices were required to have at least 500 attributed Medicaid beneficiaries. Practices also agreed to meet activity requirements—such as extended patient hours—associated with the provision of patient-centered primary care. This analysis included three cohorts of practices. The first, largest cohort of practices joined the model in January 2017; the second cohort of practices joined in April 2017; and the third cohort of practices joined in January 2018. In 2018, 145 practices participated in Ohio CPC.
Study design	D-in-D quasi-experimental design using an unbalanced longitudinal panel and propensity scores to adjust for intervention and comparison group differences.
Data	Connecticut Medicaid claims data were provided by the Connecticut Department of Social Services. Delaware Medicaid claims data were provided by the Delaware Health and Social Services. Ohio Medicaid claims data were provided by the Ohio Department of Medicaid.
Sample	The analysis sample was limited to Medicaid beneficiaries with two or more ED visits in any baseline year. In Connecticut, there were 50,717 Medicaid beneficiaries in the intervention group and 30,630 in the comparison group. In Delaware, there were 11,629 beneficiaries in the intervention group and 38,390 in the comparison group. In Ohio, there were 425,952 beneficiaries in the intervention group and 667,560 in the comparison group.
Timeframe	The analysis utilized data from all baseline and intervention years from each of the three PCMH model–specific analyses. The timeframe for Delaware included two baseline years, and the timeframes for Connecticut and Ohio included three baseline years. The timeframes for Connecticut and Ohio included two intervention years; and the timeframe for Delaware included three intervention years.
Measures	The analysis assessed the effects of the Connecticut PCMH+, Delaware PTI, and Ohio CPC models on outpatient ED visits.
Statistical analysis	Logistic regression for the outpatient ED visits binary outcome was used. Analytic weights were created by multiplying the propensity score weight times the fraction of time a person was enrolled in Medicaid. Standard errors were clustered at the county level to account for correlation in outcomes within geographic regions. All models included controls for demographic, health status, and socioeconomic county-level variables.

Note: AN = Advanced Network; CPC = Comprehensive Primary Care; D-in-D = difference-in-differences; ED = emergency department; FQHC = Federally Qualified Health Center; PCMH = patient-centered medical home; PCMH+ = Person-Centered Medical Home Plus; PTI = Practice Transformation Initiative.

M-8.3 Results and Discussion

Table M-8-2 shows estimates on the impact of SIM PCMH models among Medicaid beneficiaries with high ED utilization during the baseline period. Outpatient ED visits decreased for both Medicaid beneficiaries in Ohio CPC group and the comparison group but decreased more for the Ohio CPC group (-46.59 visits per 1,000 beneficiaries). Although the ED visit rate decreased among SIM-participating beneficiaries in Connecticut and Delaware, changes in ED visits did not differ between the SIM-participating group and the comparison group in either state.

These findings suggest that impacts of SIM PCMH models on high utilizers of ED visits were limited. Despite statistically significant declines in ED visit rates in Ohio among high utilizers, the relative difference of –1.8% indicates only a modest change. The lack of impact on high utilizers of ED visits in Connecticut and Delaware contrasts with the significant declines in ED visits found for the overall SIM-participating population in both states, implying the impact of the SIM PCMH models on ED visits was not driven by high utilizers. These findings suggest that high ED–utilizing beneficiaries may require different interventions than a general-population PCMH model to achieve reductions in ED utilization.

Table M-8-2. Difference in the pre–post change in emergency department visits between patient-centered medical home model participants and their comparison groups

Model	Baseline period adjusted mean, PCMH model	Baseline period adjusted mean, comparison group	Intervention period adjusted mean, PCMH model	Intervention period adjusted mean, comparison group	Regression-adjusted D-in-D (90% CI)	Relative difference (%)	p-value
CT PCMH+	2,040.94	1,808.41	1,491.90	1,324.67	−3.19	−0.16	0.92
DE PTI	3,741.63	3,673.33	1,802.14	1,872.13	−71.69	−1.92	0.31
OH CPC	2,585.90	2,678.11	1,994.27	2,116.61	−46.59	−1.80	<0.001

Notes: Only overall D-in-D estimates are shown in the table above. Annual D-in-D estimates are omitted.

CI = confidence interval; CT = Connecticut; D-in-D = difference-in-differences; DE = Delaware; ED = emergency department; OH CPC = Ohio Comprehensive Primary Care; PCMH = patient-centered medical home;
PCMH+ = Person-Centered Medical Home Plus; PTI = Practice Transformation Initiative; SIM = State Innovation Model.

Methods: The analysis used negative binomial model for Connecticut and Ohio and a Poisson model for Delaware to obtain D-in-D estimates for ED visit counts. The ED visit count was multiplied by 1,000 to obtain an approximate rate per 1,000 members. Models were adjusted for person-level variables such as gender, age, Medicaid enrollment because of disability, race, a count of total months enrolled in the measurement year, the logged CDPS score and county-level variables, such as residence in a Metropolitan Statistical Area, percentage living in poverty, supply of short-term acute care hospital beds, median age, and percentage uninsured. The list of covariates varied across states; see ***Appendices B-1***, ***C-1***, and ***H-1*** for more detail.

All outcome models assume that the intervention and comparison group outcome trends are parallel during the baseline period.

How to interpret the findings: A *negative* value for the regression-adjusted D-in-D corresponds to a *greater decrease* or a *smaller increase* in an outcome after the implementation of the SIM PCMH initiative relative to the comparison group. A *positive* value corresponds to a *greater increase* or a *smaller decrease* in an outcome in the SIM PCMH group relative to the comparison group after SIM PCMH implementation. The relative difference is the D-in-D estimate as a percentage of the SIM PCMH baseline period adjusted mean.

The same baseline period is used for the D-in-D estimate for all intervention periods, so the baseline adjusted mean is the same for each year and for the overall intervention period.

For count outcomes estimated using nonlinear models, the regression D-in-D estimate may not match the D-in-D calculated from the adjusted means because in nonlinear specifications the D-in-D calculated from the regression-adjusted means is known to be a biased estimator for the treatment effect. As such, the nonlinear regression D-in-D is calculated as an average marginal effect.

The total weighted Ns are 193,073 for CT, 57,422 for DE, and 1,335,085 for OH.

Sources: Federal Evaluation Team analysis of CT Medicaid claims data from the CT Department of Social Services, DE Medicaid claims data from the DE Health and Social Services, and OH Medicaid claims data from the OH Department of Medicaid.

M-S8. Additional Methods Details

M-S8.1 Covariate Balance Between the State Innovation Model–Participating Groups and the Comparison Groups

Table M-S8-1, ***M-S8-2***, and ***M-S8-3***, show the covariate balance between the Connecticut PCMH+, Delaware PTI, and Ohio CPC groups and their comparison groups for the study sample in the last baseline year for the overall study sample. Covariate balance is not shown for the earlier baseline years. Each table includes the following:

- The covariate means for the SIM-participating groups and comparison groups without propensity score weighting;
- The standardized difference between the SIM-participating groups and comparison groups means without propensity score weighting ("unweighted standardized differences");
- The propensity score-weighted means for the comparison groups ("comparison weighted"); and
- The standardized difference between the means for the SIM-participating groups and the means for the propensity-score weighted comparison groups ("weighted standardized differences").

The analysis estimated propensity scores in each analysis year by using logistic regressions in which the dependent variable was an indicator of inclusion in a SIM-participating group. Although the analysis calculated propensity scores in each analysis year, means and standardized differences were similar across years, so covariate balance results are presented for the last baseline year only. Prior to propensity score weighting, standardized differences were greater than 0.10 for some individual- and county-level characteristics. After propensity score weighting, standardized differences were all below the 0.10 threshold, indicating an acceptable level of covariate balance.

Table M-S8-1. Covariate balance between Connecticut Person-Centered Medical Home Plus and comparison groups in the last baseline year among those with high emergency department utilization

Variable	Unweighted mean or percentage, CT PCMH+	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	58.3	54.0	0.09	58.0	0.01
Age in years	26.7	20.4	0.34	26.5	0.01
Age in years, squared	1,046.9	761.3	0.26	1,039.6	0.01
Percentage of people aged 65 years old and older	0.6	0.8	0.02	0.6	0.002
Percentage of people aged 19 years old and younger	39.4	58.3	0.39	40.3	0.02
Percentage of people who are disabled	4.0	2.60	0.08	4.0	0.0004
Percentage of people who are Black	15.0	13.5	0.04	14.5	0.01
Percentage of people who are Hispanic	35.6	26.7	0.19	36.6	0.02
Percentage of people who are Asian	1.2	1.8	0.05	1.2	0.002
Percentage of people who are another race (non-white)	27.6	28.7	0.02	28.5	0.02
Total months of enrollment during the year	11.6	10.9	0.38	11.6	0.01
CDPS risk score, logged[a]	-0.2	-0.2	0.01	-0.1	0.01

(continued)

Table M-S8-1. Covariate balance between Connecticut Person-Centered Medical Home Plus and comparison groups in the last baseline year among those with high emergency department utilization (continued)

Variable	Unweighted mean or percentage, CT PCMH+	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
County level					
Percentage of people residing in a Metropolitan Statistical Area	99.3	92.3	0.35	99.3	0.001
Percentage of people living in poverty	10.9	10.8	0.07	11.0	0.05
Hospital beds per 1,000 people	2.7	2.6	0.11	2.7	0.02
Median age in years	39.8	40.1	0.22	39.8	0.02
Percentage of people (under 65 years) without health insurance	7.1	6.8	0.16	7.0	0.03
Median household income ($)	74,793.9	74,034.7	0.08	74,338.7	0.04

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities.

CDPS = Chronic Illness and Disability Payment System; CT = Connecticut; ICD = International Classification of Diseases; PCMH+ = Person-Centered Medical Home Plus.

Source: CT Medicaid claims data from the CT Department of Social Services.

Table M-S8-2. Covariate balance between Delaware Practice Transformation Initiative and comparison groups in the last baseline year among those with high emergency department utilization

Variable	Unweighted mean or percentage, DE PTI	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	63.37	61.89	0.03	62.67	0.01
Age in years	29.8	27.4	0.13	29.6	0.01
Age in years, squared	1,318.90	1,113.30	0.15	1,333.20	0.01
Percentage of people who are disabled	10.8	8.61	0.07	10.98	0.01
Total months of enrollment during the year	11	10.8	0.05	10.9	0.01
CDPS risk score, logged[a]	0.3	0.2	0.14	0.3	0.003
Practice level					
Percentage of practices with two to three practitioners	30.41	36.75	0.13	28.45	0.04
Percentage of practices with more than three practitioners	49.65	43.43	0.13	47.02	0.05
Percentage of practices that are multispecialty	48.65	25.33	0.50	50.35	0.03
Percentage of practices that are ACO-affiliated	89.99	18.02	2.09	24.89	1.75
County level					
Percentage of people residing in a Metropolitan Statistical Area	100	100	Not applicable	100	Not applicable
Percentage of people living in poverty	12.6	12.6	0.01	12.6	0.002
Hospital beds per 1,000 people	2.4	2.8	0.53	2.3	0.03
Median age in years	40.4	38.5	0.52	40.5	0.03
Percentage of people (under 65 years) without health insurance	7.6	6.8	0.54	7.6	0.03
Median household income ($)	60,613.90	62,722.20	0.36	60,477.30	0.02

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to larger numbers of comorbidities or more severe sets of comorbidities. ACO = accountable care organization; CDPS = Chronic Illness and Disability Payment System; DE = Delaware; ICD = International Classification of Diseases; PTI = Practice Transformation Initiative.

Source: DE Medicaid claims data from the DE Health and Social Services.

Table M-S8-3. Covariate balance between Ohio Comprehensive Primary Care and comparison groups in the last baseline year among those with high emergency department utilization

Variable	Unweighted mean or percentage, OH CPC	Unweighted mean or percentage, comparison group	Unweighted standardized difference	Weighted mean or percentage, comparison group	Weighted standardized difference
Individual level					
Percentage of people who are female	57.93	57.89	0.001	57.95	0.0005
Age in years	23.8	26.1	0.13	23.7	0.002
Percentage of people who are disabled	7.19	6.98	0.01	7.23	0.001
Percentage of people whose race is non-white	50.21	41.14	0.18	50.45	0.005
Total months of enrollment during year	11.4	11.3	0.06	11.4	0.007
CDPS risk score, logged[a]	0.2	0.2	0.01	0.2	0.007
Percentage of people who had changes to attribution status across calendar quarters[b]	39.53	24.96	0.32	42.02	0.051
County level					
Percentage of people residing in a Metropolitan Statistical Area	84.17	78.17	0.15	83.95	0.01
Percentage of people living in poverty (2016)	15.7	15.4	0.10	15.8	0.02
Hospital beds per 1,000 people (2015)	3.8	3.5	0.19	3.8	0.004
Median age in years (2010)	38.2	39.0	0.30	38.1	0.03
Percentage of people (under 65 years) without health insurance (2016)	6.8	6.8	0.004	6.8	0.02
FQHCs per 1,000 people (2016)	0.0	0.0	0.10	0.0	0.003

Notes: [a] CDPS score is a risk-adjustment score calculated from ICD-9 and ICD-10 diagnosis codes included on hospital and outpatient claims, with larger CDPS scores corresponding to a larger number of comorbidities or a more severe set of comorbidities.

[b] The covariate for changes to attribution status indicates whether beneficiaries were attributed to both OH CPC practices and non–OH CPC practices while enrolled in OH Medicaid. OH CPC attribution was on a quarterly basis, and there was significant churn in attribution status, so this analysis assigned beneficiaries to the OH CPC and comparison groups based on each beneficiary's total length of time attributed to OH CPC versus non–OH CPC practices.

CDPS = Chronic Illness and Disability Payment System; FQHC = Federally Qualified Health Center; ICD = International Classification of Diseases; OH = Ohio; OH CPC = Ohio Comprehensive Primary Care.

Source: Federal Evaluation Team analysis of OH Medicaid claims data from the OH Department of Medicaid.

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Appendix M-9: Primary Care Practice Characteristics Associated with Participating in the State Innovation Model Initiative

- All practice characteristics examined—prior participation in a Medicare alternative payment model (APM), practice size, collocation of physician and non-physician primary care providers, and rurality—were associated with differences in primary care practices' propensity to participate in the SIM Initiative.
- These systematic differences suggest that estimates of the effects of SIM Initiative delivery and payment models on costs, utilization, and quality may be most generalizable to initiatives that involve practices with characteristics similar to SIM-participating practices.
- This analysis can help interpret findings from other quantitative analyses, with the caveat that the underlying primary care practice characteristics data set estimates practice characteristics from administrative data sources that only partially align with practice lists maintained by SIM Model Test states.

M-9.1 Introduction

Because primary care practices and patients were not randomly assigned to participate in the SIM Initiative, estimates of the effects of the SIM Initiative on spending, utilization, and quality may be influenced by selection effects—systematic differences between the practices and patients enrolled in the SIM Initiative and those that were not. In the state-specific quantitative evaluations of the SIM Initiative delivery and payment models (see state chapters in ***Appendices A–K***), propensity weighting was used to create comparison groups that were balanced with intervention groups on observable characteristics (see ***Appendix L*** for methodological details of the propensity weighting approach used). Although this propensity weighting accounted for systematic differences between *patients* in the intervention and comparison groups, there may be additional differences between the *primary care practices* in these groups.

This supplemental analysis used the Characteristics of Primary Care Practice Sites data set (see ***Appendix L*** for a full description of the methods used to construct this data set), which contains time-varying practice-level information about participation in the SIM Initiative and other estimated practice characteristics. The analysis assessed whether selection effects might influence the estimated effects of SIM Initiative delivery and payment models in claims-based analyses (in states where characteristics of SIM-participating practices could be estimated).

To understand the association of various primary care practice characteristics with participation in the SIM Initiative, this analysis addressed the following research questions:

- Which characteristics were associated with greater propensity for primary care practices to participate in the SIM Initiative?
- Did these associations vary among SIM states?

M-9.2 Methods

Table M-9-1 provides a snapshot of the study methods.

Table M-9-1. Methods snapshot

Method	Description
Universe of primary care practices	All primary care practices in SIM states for which data on participation in the SIM Initiative were available and in which interventions began prior to 2017: Colorado, Connecticut, Delaware, Idaho, Ohio, Rhode Island, and Tennessee.
Study design	Observational correlational design.
Data	The Characteristics of Primary Care Practice Sites data set was developed for this federal evaluation from a combination of self-reported individual provider information that is publicly available and sources of information about Medicare providers' billing relationships (for more information, see a full description of the methods in ***Appendix L***). Missing from these data are other potentially important contextual factors such as hospital ownership or affiliations among practices. Medicare VBP participation was operationalized as the following subset of Medicare APMs in the CMS Master Data Management system: Pioneer ACO, Medicare SSP ACO, Next Generation ACO, PGP Transition, MAPCP, MMCO Financial Alignment, CPCi, Medicare Health Care Quality Demo for Indiana, Comprehensive ESRD Care, CPC+, Vermont All-Payer Model, and Maryland Total Cost of Care. Because primary care practices are constructed through decision rules about the relationships between individual providers and practices based on several sources (e.g., location from one source, billing relationship from another source), these data give us a list of SIM-participating practices that approximates but is not an exact match to practice lists provided by each SIM state.
Sample	All primary care practices that were observed in both the baseline period (starting in 2013) and the intervention period (starting in 2015–2017 depending on the state) were included. "SIM Initiative participation" was counted for Colorado SIM-funded technical assistance to integrate behavioral health in primary care; Connecticut PCMH+; Delaware PTI; Idaho Medicaid PCMH; Ohio CPC; Rhode Island PCMH-Kids; and Tennessee Medicaid PCMH. The final analytic sample included an estimated 18,141 primary care practice locations, including 16,817 that did not participate in the SIM Initiative and 1,324 that did. Out of these 18,141 practice locations, 3,232 were in Colorado; 2,964 in Connecticut; 849 in Delaware; 910 in Idaho; 6,034 in Ohio; 840 in Rhode Island; and 3,312 in Tennessee.
Timeframe	The timeframe for this analysis was 2013 through 2017, which was chosen to include all years in the Characteristics of Primary Care Practice Sites dataset and to accommodate varying SIM Initiative start dates as best as possible. Practices in Colorado, Delaware, Idaho, Ohio, Rhode Island, and Tennessee began participating in the SIM Initiative in 2016, while those in Connecticut began in 2017, which allowed between one and two years of follow-up time.
Outcome measure	Participation in the SIM Initiative (binary): whether a primary care practice participated in the SIM Initiative during any year between the start of the SIM Initiative in the practice's state and 2017: no = 0; yes = 1. Practices in Colorado, Delaware, Idaho, Ohio, Rhode Island, and Tennessee began participating in the SIM Initiative in 2016, while those in Connecticut began in 2017.

(continued)

Table M-9-1. Methods snapshot (continued)

Method	Description
Statistical analysis	A logistic mixed-effects model was estimated for the binary outcome (participation in the SIM Initiative) using maximum likelihood estimation with Laplace Approximation by the "glmer" function in the *lme4* R package (version 1.1.26) (Bates, Mächler, Bolker, & Walker, 2015, October 7) with Nelder-Mead optimization (Nelder & Mead, 1965) from the *nloptr* R package (version 1.2.2.2) (Johnson, n.d.). Predictors included prior participation in a Medicare APM, practice size (grand mean centered and standardized), collocation of physicians and non-physician primary care providers, rurality, and whether CPC+ was active in the state. For each practice, the most recent observation prior to the start of the SIM Initiative in the practice's state was selected. To investigate variation between states, the following maximal random effects that did not produce model convergence issues were included: model intercept, the slope of the effect of prior participation in a Medicare APM, the slope of the effect of practice size, and the slope of the effect of collocation of physician and non-physician primary care providers.

Note: ACO = accountable care organization; APM = alternative payment model; CMS = Centers for Medicare and Medicaid Services; CPC = Comprehensive Primary Care; CPC+ = Comprehensive Primary Care Plus; CPCi = Comprehensive Primary Care initiative; ESRD = End-Stage Renal Disease; MAPCP = Multi-Payer Advanced Primary Care Practice; MMCO = Medicare-Medicaid Coordination Office; PCMH = patient-centered medical home; PCMH+ = Person-Centered Medical Home Plus; PCMH-Kids = Patient-Centered Medical Home-Kids; PGP = Physician Group Practice; PTI = Practice Transformation Initiative; SIM = State Innovation Model; SSP = Shared Savings Program; VBP = value-based payment.

M-9.3 Results

Table M-9-2 shows estimates of fixed effects and random effects for the model of participation in a Medicare alternative payment model (APM) after the beginning of the SIM Initiative. ***Table M-9-3*** summarizes state-specific estimates for random effects. The findings are as follows:

- Primary care practices that participated in a Medicare APM prior to the SIM Initiative were on average, across states, 2.29 times as likely[135] to participate in the SIM Initiative as those that had no history of participating in Medicare APMs ($p<0.001$). This effect varied between SIM states (standard deviation [SD]=0.93), with the largest effect in Tennessee and Connecticut, followed by Delaware, Rhode Island, Colorado, and Ohio. In contrast, in Idaho, prior Medicare APM participation was associated with a *decreased* propensity to participate in the SIM Initiative (see supplemental ***Table M-S9-2*** for state-specific effect estimates).
- Primary care practices with below-average number of providers were on average, across states, 0.59 times as likely to participate in the SIM Initiative for the first SD under the grand mean practice size, although the overall effect was not statistically significant ($p=0.118$). This effect of practice size varied between SIM states

[135] As odds ratios, these model coefficients are for the "average" practice across all states that had the mean number of providers, did not have collocated physician and non-physician primary care providers, was located in a non-rural ZIP code, and did not previously participate in a Medicare APM.

(SD=0.78). The largest negative effect was in Colorado, followed by Connecticut, Delaware, and Rhode Island. In contrast, in Idaho and Ohio, larger practices were more likely to participate in the SIM Initiative. In Tennessee, the effect was near nil (see supplemental ***Table M-S9-2*** for state-specific effect estimates).

- Primary care practices with collocated physicians and non-physician providers were on average, across states, 2.72 times as likely to participate in the SIM Initiative as those that had exclusively physician or non-physician providers (p<0.001). This effect varied among SIM states (SD=0.31), with the largest effect in Idaho, followed by Tennessee, Ohio, Delaware, Rhode Island, Colorado, and Connecticut (see supplemental ***Table M-S9-2*** for state-specific effect estimates).
- Rural[136] primary care practices were on average, across states, 1.49 times as likely to participate in the SIM Initiative non-rural practices (p<0.001).

Table M-9-2. Estimated effects of practice characteristics on participation in the SIM Initiative (mixed-effects model)

Model coefficient	Estimate	SE	p-value	95% CI low	95% CI high
Fixed effects					
Intercept	0.041	0.007	<0.001	0.029	0.058
Participated in Medicare APM pre-SIM	2.291	0.841	0.024	1.116	4.703
Practice size (count of providers, grand mean-centered and standardized)	0.593	0.198	0.118	0.308	1.143
Collocated physician and non-physician PCPs	2.719	0.380	<0.001	2.068	3.576
Rural	1.487	0.110	<0.001	1.286	1.719
Random effects					
Intercept	0.446	Not applicable	Not applicable	Not applicable	Not applicable
Participated in Medicare APM pre-SIM	0.934	Not applicable	Not applicable	Not applicable	Not applicable
Practice size (count of providers, grand mean-centered and standardized)	0.782	Not applicable	Not applicable	Not applicable	Not applicable
Collocated physician and non-physician PCPs	0.308	Not applicable	Not applicable	Not applicable	Not applicable

Notes: Fixed effect estimates are odds ratios. Random effect estimates are standard deviations. Parametric confidence intervals were calculated using the Wald method.

APM = alternative payment model; CI = confidence interval; PCP = primary care provider; SE = standard error; SIM = State Innovation Model.

[136] Practices were classified as rural if they were located in a ZIP code that was either (a) not part of a core-based statistical area (CBSA; see https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html) or (b) Federal Office of Rural Health Policy (FORHP) eligible (see https://www.hrsa.gov/rural-health/about-us/definition/datafiles.html).

M-9.4 Discussion

All of the practice characteristics examined—prior participation in a Medicare APM, practice size, collocation of physician and non-physician primary care providers, and rurality—were associated with differences in primary care practices' propensity to participate in the SIM Initiative, although most of these varied in magnitude if not direction by state. As such, the estimated effects of the SIM Initiative delivery and payment models may be somewhat influenced by these practice characteristics, although the direction of that influence is uncertain and likely varies between states.

The observed variation in the association between practice characteristics and participation in the SIM Initiative between states may be due to other differences in states' SIM Initiative delivery and payment models, such as building on existing state-specific delivery models or differences in eligibility criteria (see state chapters in ***Appendices A–K***). ***Table M-1-3*** discusses the state-varying associations between practice characteristics and participation in the SIM Initiative by state (see supplemental ***Table M-S9-2*** for point estimates of state-specific effects).

Table M-9-3. Summary of the direction of state-varying associations between practice characteristics and participation in the SIM Initiative, by state

State	Participation in Medicare APM pre-SIM	Practice size	Collocated physician and non-physician primary care providers
CO	✓	✗	✓
CT	✓	✗	✓
DE	✓	✗	✓
ID	✗	✓	✓
OH	✓	✓	✓
RI	✓	✗	✓
TN	✓	∅	✓

Note: ✓ = positive association between predictor and participation in the SIM Initiative; ✗ = negative association between predictor and participation in the SIM Initiative; ∅ = near nil association between predictor and participation in the SIM Initiative; APM = alternative payment model; CO = Colorado; CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; RI = Rhode Island; SIM = State Innovation Model; TN = Tennessee.

This analysis has three important limitations. First, although there appear to be systematic differences between primary care practices that participated in the SIM Initiative and those that did not, there is uncertainty regarding the extent to which these differences may have influenced estimates of effects in quantitative claims-based analyses of SIM delivery or payment models, and in which direction. Second, because of the nature of the Characteristics of Primary Care Practice Sites dataset, these primary care practices are not an exact match to the practice lists provided by each SIM Model Test state. Third, there may be unobserved variables that are both associated with the variables in this model and that influenced primary care practices' participation in the SIM Initiative, such as membership in an integrated health system.

M-S9. Appendix: Sensitivity Analysis and State-Specific Effect Estimates

As a sensitivity analysis of the results of the generalized linear mixed model, a generalized linear model was also estimated (see ***Table M-S9-1***). This model was specified as closely as possible to that reported above (see ***Table M-1-1***). State-specific fixed effects were included in this model.

In comparison with a comparable generalized linear mixed model that replaces fixed effects of state with random effects, the fixed-effects model estimates were identical to at least the first digit but slightly underestimated several standard errors.

Table M-S9-1. Estimated effects of practice characteristics on participation in the SIM Initiative (fixed-effects model)

Model coefficient	Estimate	SE	p-value	95% CI low	95% CI high
OH	0.022	0.076	<0.001	0.019	0.026
RI	0.032	0.162	<0.001	0.023	0.043
CT	0.029	0.093	<0.001	0.024	0.035
ID	0.040	0.135	<0.001	0.031	0.052
CO	0.053	0.072	<0.001	0.046	0.061
TN	0.081	0.065	<0.001	0.071	0.091
DE	0.091	0.111	<0.001	0.073	0.113
Participated in Medicare APM pre-SIM	2.868	0.069	<0.001	2.506	3.279
Practice size (count of providers, grand mean-centered and standardized)	1.045	0.019	0.018	1.008	1.086
Collocated physician and non-physician primary care providers	2.359	0.061	<0.001	2.093	2.658
Rural	1.488	0.073	<0.001	1.289	1.714

Notes: Model estimates are odds ratios.

APM = alternative payment model; CI = confidence interval; CO = Colorado, CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; RI = Rhode Island; SE = standard error; SIM = State Innovation Model; TN = Tennessee.

Table M-S9-2. State-specific estimates and standard deviations of random effects

State	State-specific conditional estimate	State-specific conditional SD
Intercept		
CO	0.055	0.065
CT	0.026	0.102
DE	0.077	0.103
ID	0.039	0.120
OH	0.022	0.067
RI	0.033	0.157
TN	0.062	0.053
Collocated physician and non-physician primary care providers		
CO	2.047	0.074
CT	1.942	0.087
DE	2.754	0.114
ID	4.777	0.078
OH	2.852	0.028
RI	2.266	0.134
TN	3.376	0.026
Practice size		
CO	0.196	0.223
CT	0.367	0.254
DE	0.417	0.333
ID	1.871	0.202
OH	1.135	0.038
RI	0.425	0.387
TN	1.043	0.052
Participated in Medicare APM pre-SIM		
CO	2.619	0.143
CT	4.484	0.168
DE	3.486	0.311
ID	0.287	0.406
OH	2.241	0.139
RI	2.926	0.308
TN	4.513	0.135

Notes: State-specific effect estimates were calculated as the exponentiated sum of the fixed effect (log-odds) and state-specific conditional modes (log-odds) for each predictor. These state-specific effects are odds ratios. Effects and SDs are “conditional” in the sense that they are conditioned on a practice being located in a given state.

APM = alternative payment model; CO = Colorado, CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; RI = Rhode Island; SD = standard deviation; SIM = State Innovation Model; TN = Tennessee.

Appendix M-10: The Effect of Participating in the State Innovation Model Initiative on Primary Care Practices' Subsequent Participation in Medicare Value-Based Payment Models

- The SIM Initiative tested state-led strategies to increase delivery of care under value-based payment (VBP) models. Although increasing participation in Medicare alternative payment models (APMs)—one type of VBP—was not a focus of states' SIM activities, SIM-supported activities could prepare primary care practices for participation in VBP models generally.
- Primary care practices that participated in the SIM Initiative were on average, across states, 4.1 times as likely as those that did not participate to subsequently or concurrently participate in a Medicare APMs, after controlling for prior participation in Medicare APMs and other practice characteristics ($p<0.001$).
- The effect of SIM participation on subsequent or concurrent participation in a Medicare APM varied between SIM states, with the largest effects in Delaware and Tennessee; followed by Ohio, Colorado, and Connecticut; and with a near-nil estimated effect in Idaho.

M-10.1 Introduction

A goal of the SIM Initiative was to reach a preponderance of care delivered under a value-based payment (VBP) model (i.e., 80 percent of payments, providers, or beneficiaries under VBP. States varied in the SIM supports to primary care practices involving technical assistance on care delivery or health information technology (health IT) investments, but generally these supports would be expected to facilitate providers' participation in VBP models. Because the quantitative metrics reported by SIM states were not directly comparable, quantitatively evaluating the extent to which SIM states reached preponderance of care proved to be a challenge. (For qualitative assessments of preponderance of care in SIM states, see state chapters in ***Appendices A–K***.)

This supplemental analysis uses the Characteristics of Primary Care Practice Sites data set (for a full description of the methods used to construct this data set, see ***Appendix L***), which contains time-varying practice-level information about participation in the SIM Initiative and Medicare alternative payment models (APMs), to investigate the role of the SIM Initiative in increasing participation in Medicare APMs among primary care practices in SIM states.

Investments in primary care practices through the SIM Initiative may have facilitated VBP model participation among primary care practices beyond participation in Medicaid-only models. Descriptively, the rate of primary care practices participating in Medicare APMs increased in all SIM states between 2013 and 2017 (see ***Section 8.1, Exhibit 8.2***). At the same time, many of the primary care practices that participated in the SIM Initiative had not previously participated in a Medicare APM (see ***Section 8.1, Exhibit 8.3***). In addition, local, sub-state differences in health care markets, such as the predominant payer in an area, would also be expected to influence primary care practices' participation in VBP models offered by local payers. Practices may be more likely to participate in a predominant payer's VBP model because they would likely have enough patients covered by that payer to make VBP model participation worthwhile. For example, in areas with high concentrations of Medicare or Medicaid beneficiaries, primary care practices may be more likely to participate in Medicare- or Medicaid-led VBP models, respectively.

To assess the effects of participating in the SIM Initiative and the influence of local Medicare and Medicaid coverage on primary care practices' participation in VBP, the analysis addressed the following research questions:

- To what extent, if any, was participation in the SIM Initiative associated with subsequent or concurrent participation in a Medicare APM?
- Did these effects vary between SIM states?
- To what extent, if any, were local rates of Medicare and Medicaid coverage associated participation in a Medicare APM?

This analysis tests the hypothesis that SIM-funded investments in primary care practice delivery system change and/or VBP prepared primary care practices to participate in VBP models more broadly.

M-10.2 Methods

Table M-10-1 provides a snapshot of the study methods.

Table M-10-1. Methods snapshot

Method	Description
Universe of primary care practices	All primary care practices in SIM states for which data on participation in the SIM Initiative were available, interventions began prior to 2017, and initiatives were not restricted to pediatric populations: Colorado, Connecticut, Delaware, Idaho, Ohio, and Tennessee.
Study design	Pre-test/post-test quasi-experimental design with comparison group.

(continued)

Table M-10-1. Methods snapshot (continued)

Method	Description
Data	The Characteristics of Primary Care Practice Sites data set was developed for this federal evaluation from a combination of self-reported individual provider information that is publicly available, and sources of information about Medicare providers' billing relationships (for more information, see a full description of the methods in ***Appendix L***). Missing from these data are other potentially important contextual factors such as hospital ownership or affiliations among practices. Medicare VBP participation was operationalized as the following subset of Medicare APMs in the CMS Master Data Management system: Pioneer ACO, Medicare SSP ACO, Next Generation ACO, PGP Transition, MAPCP, MMCO Financial Alignment, CPCi, Medicare Health Care Quality Demo for Indiana, Comprehensive ESRD Care, CPC+, Vermont All-Payer Model, and Maryland Total Cost of Care. Because primary care practices are constructed through decision rules about relationships between individual providers and practices based on several sources (e.g., location from one source, billing relationship from another source), these data give us a list of SIM-participating practices that approximates but is not an exact match to practice lists provided by each SIM state. ZIP code–level rates of Medicare and Medicaid coverage (Medicare lives divided by total insured; Medicaid lives divided by total insured) were calculated from 2013–2017 American Community Survey five-year estimates for ZCTAs.
Sample	All primary care practices that were observed in both the pre-period (starting in 2013) and the post-period (starting in 2015–2017 depending on the state) were included. "SIM Initiative participation" was counted for Colorado SIM-funded technical assistance to integrate behavioral health in primary care; Connecticut PCMH+; Delaware PTI; Idaho Medicaid PCMH; Ohio CPC; and Tennessee Medicaid PCMH. The final analytic sample included 17,301 primary care practices, including 16,020 that did not participate in the SIM Initiative and 1,281 that did. Out of these 17,301 practices, 3,232 were located in Colorado; 2,964 in Connecticut; 849 in Delaware; 910 in Idaho; 6,034 in Ohio; and 3,312 in Tennessee.
Timeframe	The timeframe for this analysis was 2013 through 2017, which was chosen to include all years in the Characteristics of Primary Care Practice Sites data set and to accommodate varying SIM Initiative start dates as best as possible. Practices in Colorado, Delaware, Idaho, Ohio, and Tennessee began participating in the SIM Initiative in 2016, whereas those in Connecticut began in 2017, which allowed between one and two years of follow-up time. Because of the limited duration of follow-up time, the years in which primary care practices began participation in the SIM Initiative were included in the post-period. Because these data only contain one observation per year, it is possible that some practices began participating in a Medicare APM prior to or concurrent with the SIM initiative.
Outcome measure	Participation in a Medicare APM (binary): whether a primary care practice participated in a Medicare APM during any year between the start of the SIM Initiative in their state and 2017: no = 0; yes = 1. Practices in Colorado, Delaware, Idaho, Ohio, and Tennessee began participating in the SIM Initiative in 2016, while those in Connecticut began in 2017.

(continued)

Table M-10-1. Methods snapshot (continued)

Method	Description
Statistical analysis	A logistic mixed-effects model was estimated for the binary outcome (participation in a Medicare APM) using maximum likelihood estimation with Laplace Approximation by the "glmer" function in the *lme4* R package (version 1.1.26) (Bates, Mächler, Bolker, & Walker, 2015, October 7) with Nelder-Mead optimization (Nelder & Mead, 1965) from the *nloptr* R package (version 1.2.2.2) (Johnson, n.d.). Practice-level covariates were included for prior participation in a Medicare APM, practice size (grand mean centered and standardized), and collocation of physicians and non-physician primary care provider. ZIP code–level covariates were included for rurality and percentages of insured individuals covered by Medicare and Medicaid, respectively (grand mean centered and standardized). A state-level covariate was included for whether CPC+ was active in the state. To investigate variation in the effect of the SIM Initiative between states, random effects were included for intercepts and the slope of the effect of participating in the SIM Initiative.

Note: ACO = accountable care organization; APM = alternative payment model; CMS = Centers for Medicare and Medicaid Services; CPC = Comprehensive Primary Care; CPC+ = Comprehensive Primary Care Plus; CPCi = Comprehensive Primary Care initiative; ESRD = End-Stage Renal Disease; MAPCP = Multi-Payer Advanced Primary Care Practice; MMCO = Medicare-Medicaid Coordination Office; PCMH = patient-centered medical home; PCMH+ = Person-Centered Medical Home Plus; PGP = Physician Group Practice; PTI = Practice Transformation Initiative; SIM = State Innovation Model; SSP = Shared Savings Program; VBP = value-based payment; ZCTA = ZIP Code Tabulation Area.

M-10.3 Results

Table M-10-2 shows estimates of fixed effects and random effects for the model of participation in a Medicare APM after the beginning of the SIM Initiative. The findings are as follows:

- Primary care practices that participated in the SIM Initiative were on average, across states, 4.1 times as likely[137] as those that did not participate to subsequently or concurrently participate in a Medicare APM (p<0.001).
- The effect of SIM participation on subsequent or concurrent participation in a Medicare APM varied between SIM states (standard deviation [SD]=0.84), with the largest positive estimated effects in Delaware and Tennessee; followed by Ohio, Colorado, and Connecticut; and with a near-nil estimated effect in Idaho (for state-specific effect estimates, see supplemental ***Table M-S10-2***).
- The percentage of insured individuals covered by Medicare in a primary care practice's ZIP code did not have a significant effect on the practice's concurrent or

[137] As odds ratios, these model coefficients are for the "average" practice across all states that did not previously participate in a Medicare APM, had the grand mean number of providers, did not have collocated physician and non-physician primary care providers, was located in a non-rural ZIP code, was located in a ZIP code with the grand mean percentage of insured individuals covered by Medicare and Medicaid, was located in a state in which CPC+ was not active, and did not participate in the SIM Initiative.

subsequent participation in a Medicare APM. For a 1 SD increase over the grand mean percentage of insured individuals covered by Medicare in a ZIP code, the primary care practices in that ZIP code were 0.972 times as likely to participate in a Medicare APM during the post-period (p=0.516).

- The percentage of insured individuals covered by Medicaid in a primary care practice's ZIP code reduced the likelihood of the practice's concurrent or subsequent participation in a Medicare APM. For a 1 SD increase over the grand mean percentage of insured individuals covered by Medicaid in a ZIP code, the primary care practices in that ZIP code were 0.926 times as likely to participate in a Medicare APM during the post-period (p=0.067).

- Other covariates included in the model were also statistically significant predictors of participation in a Medicare APM. Specifically:
  - Primary care practices that had participated in a Medicare APM prior to the SIM Initiative were 496.36 times as likely as those that had not to participate in a Medicare APM (p<0.001).
  - Primary care practices with collocated physician and non-physician primary care providers were 2.22 times as likely as those with exclusively one or the other to participate in a Medicare APM (p<0.001).
  - Primary care practices located in rural[138] ZIP codes were 2.22 times as likely as those in non-rural ZIP codes to participate in a Medicare APM (p=0.009).

[138] ZIP codes were classified as rural if they were either (1) not part of a core-based statistical area (CBSA; see https://www.census.gov/topics/housing/housing-patterns/about/core-based-statistical-areas.html) or (2) Federal Office of Rural Health Policy (FORHP) eligible (see https://www.hrsa.gov/rural-health/about-us/definition/datafiles.html).

Table M-10-2. Estimated effect of participating in the SIM Initiative on participation in Medicare alternative payment models, including control variables (mixed-effects model)

Model coefficient	Estimate	SE	p-value	95% CI low	95% CI high
Fixed effects					
Intercept	0.054	0.027	<0.001	0.021	0.142
Participated in SIM Initiative	4.116	1.520	<0.001	1.996	8.488
Participated in Medicare APM pre-SIM	496.361	66.310	<0.001	382.019	644.928
Practice size (count of providers, grand mean-centered and standardized)	1.028	0.032	0.378	0.967	1.094
Collocated physician and non-physician primary care providers	2.224	0.142	<0.001	1.962	2.522
Rural (ZIP code level)	1.311	0.137	0.009	1.069	1.609
Medicare percentage of covered lives (ZIP code level, grand mean-centered and standardized)	0.972	0.043	0.516	0.891	1.060
Medicaid percentage of covered lives (ZIP code level, grand mean-centered and standardized)	0.926	0.039	0.067	0.853	1.006
CPC+ (state level)	0.722	0.479	0.624	0.197	2.651
Random effects					
Intercept (State-by-ZIP code)	0.822	Not applicable	Not applicable	Not applicable	Not applicable
Intercept (State)	0.854	Not applicable	Not applicable	Not applicable	Not applicable
Participated in the SIM Initiative	0.838	Not applicable	Not applicable	Not applicable	Not applicable

Notes: Fixed-effect estimates are odds ratios. Random-effect estimates are standard deviations. Parametric confidence intervals were calculated using the Wald method.

APM = alternative payment model; CI = confidence interval; CPC+ = Comprehensive Primary Care Plus; SE = standard error; SIM = State Innovation Model.

M-10.4 Discussion

These results were consistent with the expectation that the SIM Initiative's investments in primary care practices may have facilitated the decision among these practices to participate in other, non-SIM VBP models. Local variation in rates of Medicare and Medicaid coverage appear to have played only a minor role in influencing which primary care practices choose to participate in VBP models.

The magnitude of the influence of participating in the SIM Initiative on subsequent participation in a Medicare APM varied substantially across states (see supplemental ***Table M-S10-2*** for point estimates of state-specific effects). A combination of state factors likely explains these results. In Idaho, primary care practices had the shortest follow-up period during which to start participating in a Medicare APM, which likely suppressed the model-estimated effect of participating in the SIM Initiative in this state. Furthermore, because Comprehensive Primary Care Plus (CPC+) was not active in either Connecticut or Idaho, there were fewer opportunities to participate in Medicare APMs in these states. Delaware, which had the largest association between participating in the SIM Initiative and subsequently participating in a Medicare APM, was not a CPC+ region, but information collected during stakeholder interviews suggested that nearly all SIM-participating practices were already part of a Medicare accountable care organization.

This analysis has four important limitations. First, because of the coarse yearly time resolution of the Characteristics of Primary Care Practice Sites data set, this analysis was unable to fully establish that participation in the SIM Initiative preceded participation in a Medicare APM. Second, there may be unobserved variables that are both associated with the predictors in this model and that influenced primary care practices' participation in both the SIM Initiative and Medicare APMs, such as membership in an integrated health system. Third, the outcome includes only participation in Medicare APMs in the CMS Master Data Management system. As such, this outcome does not reflect participation in other Medicare APMs that are not in this system and excludes commercial payers' VBP models entirely. Fourth, because models with interaction terms failed to converge, it was not possible to evaluate whether the effect of SIM Initiative participation on subsequent Medicare APM participation varied by values of other factors, such as rural practice location.

M-S10. Appendix: Sensitivity Analysis and State-Specific Effect Estimates

As a sensitivity analysis of the results of the generalized linear mixed model, a generalized linear model was also estimated (see ***Table M-S10-1***). This model was specified as closely as possible to that reported above (see ***Table M-10-1***), but required some modifications. Rather than random effects of state and ZIP code, only *fixed* effects of state were included in this model. Because CPC+ varied at the state level, the inclusion of both state fixed effects and a CPC+ indicator caused convergence issues that did not arise in the mixed-effects model with state *random* effects. Thus, a CPC+ indicator was not included in this sensitivity analysis.

In comparison with a comparable generalized linear mixed model that replaces fixed effects of state with random effects, the fixed-effects model appears to underestimate most model coefficients (most notably, the effects of participating in the SIM Initiative and previously participating in a Medicare APM), somewhat overestimate the effects of percentages of Medicare and Medicaid covered lives, and substantially underestimate standard errors.

Table M-S10-1. Estimated effect of participating in the SIM Initiative on participation in Medicare alternative payment models, including control variables (fixed-effects model)

Model coefficient	Estimate	SE	p-value	95% CI low	95% CI high
OH	0.145	0.046	< 0.001	0.132	0.158
CT	0.031	0.099	< 0.001	0.025	0.037
ID	0.020	0.170	< 0.001	0.015	0.028
CO	0.064	0.073	< 0.001	0.055	0.074
TN	0.035	0.086	< 0.001	0.030	0.042
DE	0.214	0.091	< 0.001	0.179	0.256
Participated in the SIM Initiative	4.818	0.085	< 0.001	4.076	5.690
Participated in Medicare APM pre-SIM	307.140	0.119	< 0.001	244.892	389.912
Practice size (count of providers, grand mean-centered and standardized)	1.047	0.029	0.107	0.990	1.111
Collocated physician and non-physician primary care providers	2.147	0.059	< 0.001	1.911	2.410
Rural	1.352	0.070	< 0.001	1.178	1.551
Medicare percentage of covered lives (grand mean-centered and standardized)	0.921	0.029	0.005	0.870	0.975
Medicaid percentage of covered lives (grand mean-centered and standardized)	0.908	0.028	0.001	0.859	0.959

Notes: Model estimates are odds ratios.

APM = alternative payment model; CI = confidence interval; CO = Colorado; CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; SE = standard error; SIM = State Innovation Model; TN = Tennessee.

Table M-S10-2. State-specific estimates and standard deviations of random effects

State	State-specific conditional estimate	State-specific conditional SD
Intercept		
CO	0.078	0.100
CT	0.028	0.126
DE	0.173	0.172
ID	0.022	0.208
OH	0.172	0.062
TN	0.036	0.118
Participated in SIM Initiative		
CO	4.285	0.182
CT	1.868	0.344
DE	9.388	0.245
ID	1.297	0.428
OH	4.666	0.176
TN	9.168	0.167

Notes: State-specific effect estimates were calculated as the exponentiated sum of the fixed effect (log-odds) and state-specific conditional modes (log-odds) for each predictor. These state-specific effects are odds ratios. Effects and SDs are "conditional" in the sense that they are conditioned on a practice being located in a given state.

APM = alternative payment model; CO = Colorado; CT = Connecticut; DE = Delaware; ID = Idaho; OH = Ohio; SD = standard deviation; SIM = State Innovation Model; TN = Tennessee.

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