NORC at the University of Chicago

TECHNICAL APPENDICES

JULY 2023

Third Evaluation Report

Evaluation of the Vermont All-Payer Accountable Care Organization Model

Presented by:
NORC at the University of Chicago
Sai Loganathan
Project Director
4350 East-West Hwy, Suite 800
Bethesda, MD 20814

Presented to:
Elvedin Bijelic
Center for Medicare & Medicaid Innovation
Centers for Medicare & Medicaid Services
7500 Security Boulevard
Baltimore, MD 21244

The contents of this memo are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Department of Health and Human Services or any of its agencies. Research reported in this memo was supported by the Center for Medicare & Medicaid Innovation under HHSM-500-2014-00035I.

Table of Contents

Table of Exhibits

Appendix A. Glossary of Acronyms

Appendix Exhibit A.1. Glossary of Acronyms

Acronym	Definition
ACH	Accountable Communities for Health
ACO	Accountable Care Organization
AHS	Vermont Agency for Human Services
AIPBP	All-Inclusive Population-Based Payment
AWV	Annual Wellness Visit
BCBSVT	Blue Cross and Blue Shield of Vermont
BY	Baseline Year
CAH	Critical Access Hospital
CAHPS	Consumer Assessment of Healthcare Providers and Systems
CHT	Community Health Team
Innovation Center	Center for Medicare & Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
COVID-19	2019 Novel Coronavirus
DID	Difference-In-Differences
DVHA	Department of Vermont Health Access
EB	Entropy Balancing
ED	Emergency Department
EHR	Electronic Health Record
ERISA	Employee Retirement Income Security Act
ESRD	End-Stage Renal Disease
FFS	Fee-for-Service
FQHC	Federally Qualified Health Center
GMCB	Green Mountain Care Board
HRSA	Health Resources and Services Administration
HSA	Health Service Area
MA	Medicare Advantage
MAPCP	Multi-Payer Advanced Primary Care Program
NGACO	Next Generation Accountable Care Organization
NPPES	National Plan and Provider Enumeration System
NPR	Net Patient Revenue

Acronym	Definition
PAC	Post-Acute Care
PBPY	Per Beneficiary Per Year
PCMH	Patient-Centered Medical Homes
PECOS	Provider Enrollment, Chain, and Ownership System
PHE	Public Health Emergency
PMPM	Per Member Per Month
PMPY	Per Member Per Year
PSM	Propensity Score Matching
PY	Performance Year
QEM	Qualified Evaluation and Management Visit
QHP	Qualified Health Plan
RHC	Rural Health Clinic
RQ	Research Question
RUCC	Rural-Urban Continuum Code
SASH	Support and Services at Home
SIM	State Innovation Model
SNF	Skilled Nursing Facility
SSP	Shared Savings Program
SUD	Substance Use Disorder
TCOC	Total Cost of Care
TIN	Tax Identification Number
T-MSIS	Transformed Medicaid Statistical Information System
UVM	University of Vermont
VBIP	Value-Based Incentive Payment
VBP	Value-Based Payment
VEHI	Vermont Education Health Initiative
VHCIP	Vermont Health Care Innovation Project
VTAPM	Vermont All-Payer Accountable Care Organization Model
ZCTA	Zip Code Tabulation Area

Appendix B. List of Evaluation Research Questions

The evaluation uses a mixed-methods approach involving both primary and secondary (structured and unstructured) data sources to assess how stakeholders have implemented the model, as well as the extent to which and the reasons why the model achieved its intended outcomes. Appendix Exhibit B.1 crosswalks the research questions for the evaluation with the conceptual model domains and lists data sources and analytic methods we use to address them.

Appendix Exhibit B.1. Core Research Questions, Data Sources, and Analytic Methods

Research Questions	Data Sources								Analytic Approach	Addressed in Report
	Primary		Secondary							
	Provider Survey	Interviews	Commercial Claims	T-MSIS	Medicare FFS	CAHPS	Community and Publicly Available Data [a]	Model-Related Documents [b]		
Program design features										
1. How do ACO program design features compare across payers and to other out-of-state federal and non-federal ACO programs?		●						●	Descriptive analysis; Thematic analysis; Triangulation of qualitative and programmatic data	Chapter 1; First Evaluation Report
Model participants and implementation partners										
2. How did characteristics of commercial, Medicaid, and Medicare beneficiaries aligned with the ACO change as the statewide ACO scale increased?		●	●	●	●		●		Descriptive trend analysis; Thematic analysis to inform interpretation of findings	Chapter 2

Research Questions	Data Sources								Analytic Approach	Addressed in Report
	Primary		Secondary							
	Provider Survey	Interviews	Commercial Claims	T-MSIS	Medicare FFS	CAHPS	Community and Publicly Available Data [a]	Model-Related Documents [b]		
Implementation										
3. How did state, ACO, and payers work together to reach the statewide ACO scale targets? What barriers did they encounter?		●						●	Thematic analysis	First Evaluation Report; Second Evaluation Report
4. How did hospitals, community providers, the ACO, and the state collaborate to reach population-level health goals?		●						●	Thematic analysis	Chapter 3
5. How did the GMCB use its regulatory authority to influence model implementation?		●						●	Thematic analysis; Triangulation of qualitative and programmatic data	Chapters 1 & 2
6. What challenges did participating providers encounter? How do the model's key design features influence participating providers' care delivery transformations?		●							Thematic analysis	Chapter 2
7. How did program design features impact implementation at the community level?		●						●	Thematic analysis	Chapter 2
Outcomes: Implementation effectiveness										
9. How did ACO provider network for each payer evolve as the statewide ACO scale increased?	●	●					●		Descriptive analysis; Network analysis; Thematic analysis; Triangulation of quantitative and qualitative data	Chapter 2
10. What are participating and non-participating providers' impressions of the model?	●	●							Survey analysis; Thematic analysis; Triangulation of survey and qualitative data	Chapter 2

Research Questions	Data Sources								Analytic Approach	Addressed in Report
	Primary		Secondary							
	Provider Survey	Interviews	Commercial Claims	T-MSIS	Medicare FFS	CAHPS	Community and Publicly Available Data [a]	Model-Related Documents [b]		
11. Why did providers refuse or cease to contract with the ACO?	●	●							Survey analysis; Thematic analysis; Triangulation of survey and qualitative data	Chapter 2
12. What impact did the model have on the model-specific health care delivery system and monitoring measures?[1]		●	●			●	●		Descriptive analysis; Pre-post analysis	Chapter 3
Outcomes: Program effectiveness—population health										
13. How did the model impact specific population health measures?		●					●		Synthetic control methods; Thematic analysis to inform interpretation of quantitative findings	Chapter 3
Outcomes: Program effectiveness—spending, utilization, cost of care										
14. What impact did the model have on statewide Medicare and Medicaid, all-payer, and commercial insurance spending?		●	●	●	●				Descriptive analysis; DID with group-specific trends; Thematic analysis to inform interpretation of quantitative findings	Chapter 3
15. What impact did the model have on spending, utilization, and quality-of-care outcomes for Medicaid, Medicare, and commercial insurance all-payer ACO populations?		●		●	●		●	●	Descriptive analysis; DID with group-specific trends; Synthetic control methods; Thematic analysis to inform interpretation of quantitative findings	Chapter 3

a) American Community Survey; Medicare Geographic Variation; CMS Public Use File; Behavioral Risk Factor Surveillance System; Area Health Resources File; County Health Ranking Data; National Vital Statistics System.

b) Documents include ACO application; Vermont annual reports; Section 1115 waiver application; hospital and budget submissions and related documents; GMCB reports.

[1] See Section 7, "Statewide Health Outcomes and Quality of Care Targets," of the Vermont All-Payer Accountable Care Organization Model Agreement for the list of population-level health goals, health-care delivery system measures and targets, and process milestones.

Appendix C. Qualitative Methods and Analysis

This report draws on two qualitative data sources: (1) model documents and (2) interviews (45–60-minute interviews using videoconferencing software).

Model Documents. We conducted a standardized review of the model documentation (for example, model agreement, federal communication, OneCare Vermont [OneCare] and hospital budgets and related documents, contracts, GMCB reports). These documents informed key informant outreach and interview guide development.

Interviews. The purpose of the interviews was to obtain firsthand information about implementation of the All-Payer Model. The document review, in addition to input from the Innovation Center, GMCB, and OneCare, contributed to the creation of a list of initial key informants.

Between April and September 2022, the team conducted 39 interviews. The final list of key informants included individuals from the following categories (number of interviews):

- State leaders (such as AHS, DVHA, GMCB) (5)
- Implementation partners (for instance, OneCare, Blueprint for Health) (5)
- Hospitals leaders (7)
- Primary care (5) and specialty care (3) practitioners
- Blueprint for Health program managers (10)
- Community providers (2)
- Participating commercial payers (2)

The team developed semi-structured interview guides based on each category of key informants and tailored these interview guides in advance of each interview. Topics covered included changes implemented at the health system, practice, and community levels; awareness/understanding of the model; collaboration across the continuum of care; and benefits and challenges around model design and implementation.

A two- to three-person team conducted each interview. A senior member of the team led each discussion; the second person took detailed notes during each interview. Each interview was recorded with the participants' consent. The team developed a summary of each interview.

Appendix D. Quantitative Methods and Analysis

In this section, we present additional information on the quantitative analytic approaches for Medicare and Medicaid analyses in this report, including data sources, definitions of the treatment and comparison groups for Medicare and Medicaid analyses, sampling methods used to construct the Medicare comparison pool, claims-based attribution algorithms used to identify the treatment and comparison groups for the Medicare impact analysis, definitions and operationalization of the claims-based outcome measures, and analytic approaches.

Appendix D.1. Data Sources

Appendix Exhibit D.1.1. Data Sources for Quantitative Analyses

Data	Years	Rationale	Source(s)
Medicare beneficiary and enrollment database and claims files	2011–2021	Identify health, cost, utilization, and quality outcomes for Medicare beneficiaries	CMS Virtual Research Data Center (VRDC)
Chronic Conditions Warehouse (CCW) Master Data Management Database	2013–2021	Identify beneficiary enrollment in Medicare ACOs and other CMS initiatives	CMS VRDC
Medicare Geographic Variation Public Use File	2017–2021	Identify Medicare utilization, spending, and provider characteristics at the county and state levels	CMS
NGACO and MSSP ACO provider lists	2013–2021	Identify participating and preferred practitioners to attribute beneficiaries; past experience in Medicare ACO of VTAPM providers	CMS VRDC
National Plan and Provider Enumeration System (NPPES)	2021	Identify provider specialty	CMS
OneCare provider lists	2018–2021	Identify VTAPM participating and preferred practitioners	CMS
Transformed Medicaid Statistical Information System (T-MSIS) enrollment, claims, and encounter data	2016–2021	Identify health outcome for Vermont Medicaid members	CMS VRDC
Medicare shared savings reports	2013–2021	Identify financial and quality results by PY for the Pioneer, Next Generation ACO, and Shared Savings Program Models.	CMS
American Community Survey (ACS) 1- and 5-year estimates	2015–2021	Measure demographics, health status, health care resources, and utilization at the county and state levels	U.S. Census Bureau
Rural-Urban Commuting Area Codes, Federal Office of Rural Health Policy (FORHP) Data Files	2013, 2021	Measure rurality	U.S. Dept. of Agriculture, Economic Research Service (ERS); HRSA
Area Health Resources Files (AHRF)	2015–2021	Identify number of active doctors, Medicare FFS beneficiaries, and hospital beds	HRSA

Appendix D.2. Treatment and Comparison Group Construction

In this report, we construct treatment and comparison groups for the Medicare ACO initiative as well as Medicare beneficiaries statewide (the Medicare Impact Analysis), along with a treatment group of Medicaid beneficiaries (the Medicaid Descriptive Analysis).

Medicare Impact Analysis. The structure of our Medicare impact analysis reflects the VTAPM's multiple layers of accountability, with incentives focused both on the ACO's attributed population as well as Vermont's statewide population. For this reason, as we did in previous evaluation reports, we estimate the model's impact at two levels:

- **VTAPM Medicare ACO (ACO-Level) Analysis**: Is the VTAPM Medicare ACO initiative achieving spending, utilization, and quality-of-care goals for its attributed Medicare beneficiaries?
- **Vermont Medicare (State-Level) Analysis**: Is Vermont achieving spending, utilization, and quality-of-care goals for the Medicare population statewide?

The treatment and comparison groups for the ACO- and state-level populations, as well as their rationales, are described in **Appendix Exhibit D.2.1**, with additional detail on the four stages of our approach to construct the groups in the following subsections.

Appendix Exhibit D.2.1. Medicare Treatment and Comparison Group Definitions and Rationales

	Definition	Rationale
VTAPM Medicare ACO Analysis		
Treatment	The treatment group consists of Medicare FFS beneficiaries residing in Vermont and receiving the plurality of their primary care services from model practitioners during the baseline years and PY 4.	To define the treatment group, our evaluation uses concurrent attribution—a method that attributes beneficiaries to VTAPM's practitioners based on their care-seeking patterns during the PY. We used a concurrent attribution approach because we hypothesize that the model's ACO initiatives will impact all Medicare beneficiaries—attributed and non-attributed—who receive a meaningful level of primary care services from the model practitioners.
Comparison	The comparison group is a representative, weighted sample of Medicare FFS beneficiaries who resided in the 26 comparison states, where those beneficiaries received the plurality of their primary care services from (that is, are concurrently attributed to) practitioners participating in Medicare SSP Track 1 and Basic A/B/C/D ACOs during the baseline and PYs.	Because OneCare was a Medicare SSP Track 1 ACO during the baseline period, we hypothesize that the ACO would have remained in the Medicare SSP absent the VTAPM.
Vermont Medicare Analysis		
Treatment	The treatment group consists of all eligible Vermont Medicare FFS beneficiaries who received the majority of their primary care services within the state during the baseline and PY 4.	We assess outcomes for all eligible Vermont Medicare beneficiaries because the model's population health initiatives and delivery system reform will impact all Vermonters, including those not attributed to model practitioners.

	Definition	Rationale
Comparison	The comparison group is a representative, weighted sample of Medicare FFS beneficiaries residing in the 26 comparison states, where those beneficiaries received the majority of their primary care services within the same comparison state during the baseline and PYs.	Because the model is expected to have statewide reach, beneficiaries in other states were used for the comparison group.

We used a four-step approach to construct the treatment and comparison groups for the ACO- and state-level analyses, summarized below.

Stage 1: Identification of Comparison States

Because the VTAPM aims to improve outcomes statewide by redesigning the care delivery system through an all-payer design implemented across the entire state, a within-state comparison group was infeasible. Therefore, we drew the comparison group from 26 states with similar histories of health reform initiatives relevant to the evolution of the VTAPM, specifically primary care medical home (PCMH) initiatives formally recognized by the National Committee for Quality Assurance and multi-payer CMS reform initiatives (such as SIM, MAPCP). We included similar health care reform history as a criterion for selecting comparison group states because we hypothesized that Vermont's focus on improving population health and health care reform during the baseline period was an important factor in the model's development, as well as that states with similar reform efforts as Vermont's may be more comparable in baseline period trends. These initiatives may also have longer-term effects that extend into the VTAPM performance period; we aim to account for this by choosing comparison states that also have similar trailing effects of previous health reform efforts. To avoid contamination of model impacts, we excluded any states that share a boundary with Vermont. Additionally, we excluded Maryland and Pennsylvania because these states are also currently implementing Innovation Center-funded all-payer reform initiatives. **Appendix Exhibit D.2.2** lists the 26 states selected for inclusion in the comparison group.

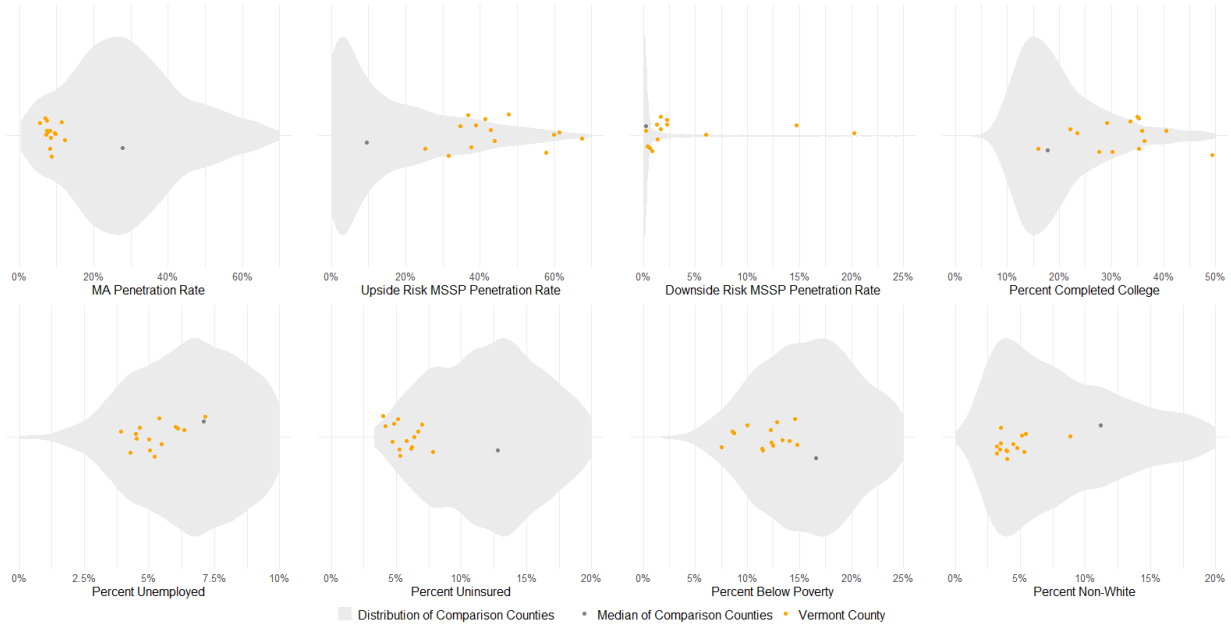
Appendix Exhibit D.2.2. Medicare Comparison Group States

Arkansas	Iowa	Oregon
California	Louisiana	Pennsylvania
Colorado	Maine	Rhode Island
Connecticut	Michigan	South Carolina
Delaware	Minnesota	Tennessee
Florida	Missouri	Texas
Georgia	New Mexico	Washington
Hawaii	North Carolina	Wyoming
Idaho	Ohio	

After selecting comparison states based on similar history of health reform initiatives as described above, we observed meaningful differences in sociodemographic and market characteristics between Vermont and comparison states (**Appendix Exhibit D.2.3**). Notably, Vermont's rates of Medicare Advantage and Medicare Shared Savings Program (both upside and downside risk) penetration are distinct from the rates in comparison

states. This aligns with our finding that Vermont has a broader history of health care reform initiatives than most states, including those in our comparison group.

Appendix Exhibit D.2.3. Vermont's Sociodemographic and Market Characteristics Differ Distinctly from Comparison States'



SOURCE: 2018 5-year estimates from American Community Survey.

Stage 2: Comparison Pool Sampling Methodology

We considered all eligible beneficiaries residing within each of the comparison states for inclusion in the comparison pool. To minimize computational burden involved in using a sizable comparison pool, we used a stratified, random sample of beneficiaries. Over 19 million eligible beneficiaries (95 million beneficiary-years) resided in the comparison states during the analytic period. Conducting impact analyses on a sample exceeding 10 million beneficiaries per year is computationally challenging and would call for analytical resources exceeding those allocated for this evaluation. Therefore, as shown in **Appendix Exhibit D.2.4**, we implemented the following steps to draw a stratified, random sample of beneficiaries from the comparison states to create the comparison pool.

Step 1: Stratify all Medicare beneficiaries residing in the comparison states by state of residence, year, and rurality (based on Rural-Urban Continuum Code classification [RUCC]: metropolitan; non-metropolitan – urban; and non-metropolitan – rural).

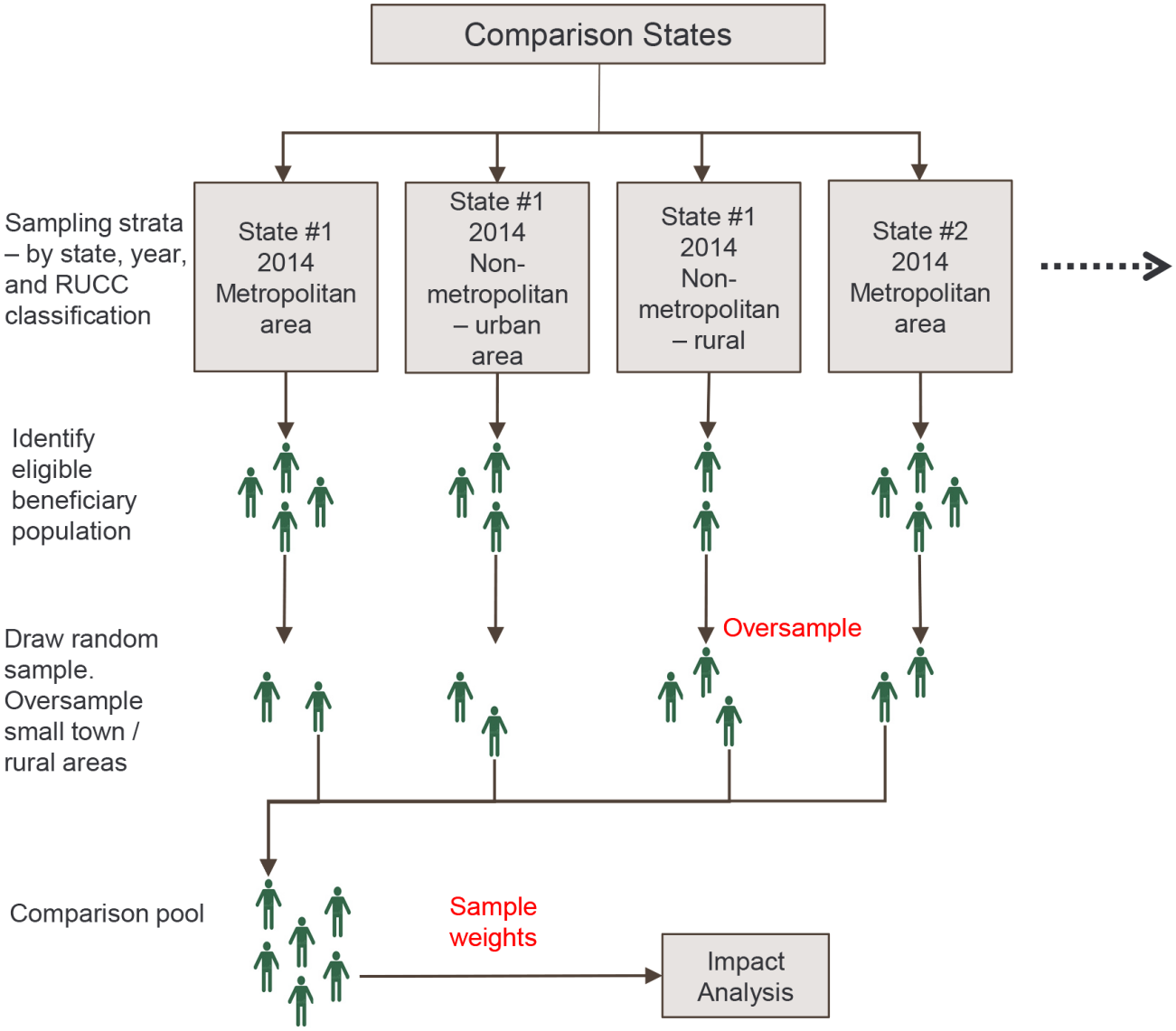
Step 2: Select beneficiaries who meet the insurance coverage (continuous FFS coverage and no MA coverage) attribution criteria.

Step 3: Oversample beneficiaries who reside in rural areas by including all beneficiaries who reside in counties with a small town/rural RUCC designation. Draw a random sample of eligible beneficiaries from counties with a

metropolitan or non-metropolitan RUCC designation. The sample size allocation for each stratum is set to match Vermont's population breakdown by RUCC.

Step 4: Generate sample weights to ensure that the comparison pool sample is representative of the eligible population residing in the comparison states. Incorporate sampling weights in the estimation of the model's impacts.

Appendix Exhibit D.2.4. Medicare Comparison Pool Sampling Design



As shown in **Appendix Exhibit D.2.5**, this approach yielded a comparison pool sample that was representative of comparison states with a computationally manageable sample size of 19 million beneficiary-years.

Appendix Exhibit D.2.5. Medicare Beneficiaries in Comparison Pool Sample

Year	RUCC Designation	Beneficiaries in Vermont Counties		Beneficiaries in Comparison Pool Counties		Stratified, Random Sample of Comparison Pool Beneficiaries	
		N	%	N	%	N	%
2014	Metropolitan	25,016	23.62%	18,840,032	78.94%	3,248,236	27.40%
2014	Non-metropolitan – urban	66,750	63.04%		19.06%		60.94%
2014	Non-metropolitan – rural	14,124	13.34%		2.01%		11.65%
2015	Metropolitan	25,283	23.27%	18,856,517	78.97%	3,232,787	27.15%
2015	Non-metropolitan – urban	68,479	63.03%		19.03%		61.19%
2015	Non-metropolitan – rural	14,876	13.69%		2.00%		11.66%
2016	Metropolitan	25,808	23.19%	19,170,616	79.08%	3,269,451	27.19%
2016	Non-metropolitan – urban	69,840	62.75%		18.95%		61.24%
2016	Non-metropolitan – rural	15,643	14.06%		1.97%		11.57%
2017	Metropolitan	26,202	23.32%	19,194,282	79.10%	3,273,491	27.35%
2017	Non-metropolitan – urban	70,374	62.64%		18.93%		61.10%
2017	Non-metropolitan – rural	15,766	14.03%		1.97%		11.55%
2018	Metropolitan	27,055	23.77%	18,920,027	79.17%	3,237,396	27.78%
2018	Non-metropolitan – urban	71,042	62.42%		18.86%		60.71%
2018	Non-metropolitan – rural	15,717	13.81%		1.97%		11.50%
2019	Metropolitan	27,521	24.10%	18,835,196	79.25%	3,237,040	28.05%
2019	Non-metropolitan – urban	71,035	62.21%		18.77%		60.45%
2019	Non-metropolitan – rural	15,629	13.69%		1.98%		11.50%
2020	Metropolitan	27,836	24.36%	18,409,687	79.46%	3,163,727	28.35%
2020	Non-metropolitan – urban	70,971	62.11%		18.57%		60.21%
2020	Non-metropolitan – rural	15,452	13.52%		1.97%		11.44%
2021	Metropolitan	26,346	24.14%	17,594,230	79.68%	3,019,864	28.13%
2021	Non-metropolitan – urban	68,298	62.58%		18.36%		60.49%
2021	Non-metropolitan – rural	14,496	13.28%		1.95%		11.38%

NOTE**:** The breakdown by RUCC designation for the comparison pool sample does not exactly match Vermont's proportions in this Exhibit because we applied the stratification within each of the 26 comparison states.

- **Lack of covariate balance on area-level characteristics.** As noted above, Vermont had a significantly greater upside-risk Medicare SSP ACO penetration rate and a lower MA penetration rate than comparison states during the baseline period (**Exhibit D.2.2**). The MA penetration rate in Vermont was significantly lower than comparison states (9% versus 26%), and the ACO penetration rate was significantly higher than comparison states (48% versus 22%). Given that magnitude of difference, we were unable to achieve balance on these characteristics using the EB weights. Because providers in Vermont were more likely to have experience with upside-risk Medicare ACO contracts, certain differences in outcomes between treatment and comparison groups could be attributed to varied experiences with these contracts, in addition to impacts attributed to the VTAPM. For the ACO-level analysis, providers' differing levels of experience with these contracts are mitigated to some extent because the comparison group was limited to Medicare beneficiaries attributed to Track 1 or Basic A/B/C Medicare SSP ACO providers.

- **Influence of outlier weights.** Achieving balance on most market- and beneficiary-level covariates meant that a small proportion of beneficiaries with large EB weights comprised a large proportion of the weighted comparison group. A small proportion of beneficiaries in comparison states were similar to Vermonters on observed beneficiary-level characteristics and resided in areas with market-level characteristics similar to Vermont. For example, in the ACO-level analysis, 1% of beneficiaries of SSP providers in comparison states accounted for 37% of the weighted comparison group. Few regions outside Vermont have identical market-level demand and supply characteristics.[2]
- **Magnitude of the stated impacts was sensitive to how we defined the baseline period.** Because PY 0 (2017) is considered a "ramp-up" period during which the model design was being finalized, we defined the baseline period as 2014–2016. Using our flexible DID framework, we adjusted for incremental differences between Vermont and the comparison group's annual Medicare spending trends in the baseline period. Because our estimate of the baseline period includes only three time points (2014–2016), there may be uncertainty associated with our estimate of the group-specific baseline trends. To assess the robustness of the impact estimates to our assumptions about the group-specific baseline trends, we included PY 0 (2017) as the fourth baseline year (BY). Inclusion of PY 0 (2017) in the baseline period *lowered* Vermont's incremental annual Medicare spending trend in the baseline period relative to the comparison group's, while its exclusion *increased* Vermont's incremental annual Medicare spending trend in the baseline period over the comparison group. In our main analyses, Vermont's incremental annual spending trend in the baseline period was influenced by a spike in the state's Medicare spending in calendar year (CY) 2015. Including PY 0 (2017) in the baseline period in sensitivity checks mitigated the CY 2015 spending spike's influence on the stated impacts (see **Exhibits D.8.1** and **D.8.2**). However, given that PY 0 (2017) saw the ramp-up of the Medicare ACO initiative in the state, we excluded it from the baseline period for our main findings. Overall, across the different baseline approaches, results for PY 4 consistently showed reductions in Medicare spending, although the magnitude of the reduction varied. In the sections below, we present findings from this sensitivity assessment alongside the main findings to convey the uncertainty associated with the magnitudes of the stated impacts.
- **Potential of delayed impacts of other Vermont health reform efforts.** As described in detail in Chapter 2, the VTAPM builds on a history of health reform efforts in Vermont spanning the last two decades. Many of the initiatives overlapped, spanned multiple payers, and had goals similar to those of the VTAPM around improving the health of Vermonters through delivery system reform and financial incentives. Because of this, findings may also reflect delayed impacts from other health reform initiatives in Vermont. To partially mitigate this potential source of bias, we selected comparison states with similar histories of health reform, specifically PCMH and multi-payer reform initiatives.

[2] We observed the same issue of high outlier weights in each iteration of our comparison group, further reinforcing the fact that Vermont's market- and beneficiary-level characteristics are unique among states and that it is likely that no comparison group would be able to mitigate those differences entirely.

Stage 3: Claims-Based Attribution to Treatment and Comparison Groups

Below, we describe the claims analysis steps for attributing Medicare beneficiaries to the state- and ACO-level treatment and comparison groups.

State-Level Attribution. In this section, we describe the claims-based attribution logic employed to construct the state-level treatment and comparison groups. **Appendix Exhibit D.2.6** presents the step-down counts associated with the state-level attribution criteria.

Step 1. We used the 2014–2021 Medicare Beneficiary Summary File (MBSF) Base segments to identify beneficiaries with the following enrollment and geography inclusion criteria:

- Covered by Medicare Parts A and B throughout performance period or until death
- No months of MA or other Medicare-managed care plan (Part C)
- No months of coverage where Medicare is the secondary payer
- Reside in Vermont or an identified comparison county
- Have at least one paid QEM claim during the alignment period

Step 2. For the eligible beneficiaries identified in Step 1, we extracted 2014–2021 Outpatient header and service line final paid claims submitted by FQHCs, RHCs, or CAHs[3] with a claims processing date on or before March 31 of the following year. We retained the claims rendered by an attending physician who billed using the eligible provider specialty codes.[4]

Step 3. We identified Outpatient service line claims associated with the Outpatient header claims selected in Step 2 and retained the claims that had a Healthcare Common Procedure Coding System (HCPCS) code that qualified as an eligible QEM[5] and had an allowed charge greater than 0. For CAHs, the revenue center code must also be eligible.

Step 4. For the eligible beneficiaries identified in Step 1, we extracted 2014–2021 Carrier service line final paid claims with a claims processing date on or before March 31 of the following year and a HCPCS code that qualitied as a QEM. We retained claims that included an eligible provider specialty code.

Step 5. We retained the provider ID (including TIN, NPI, and CCN) and allowable charge fields in the Outpatient and Carrier claims and merged both claims files to create an analytic dataset. Next, we calculated the total allowed charges for each beneficiary in each BY (2014–2016) and PY (2017–2021). Finally, we identified claims with a provider specialty code associated with primary care practice specialty and calculated the total allowed charges for each beneficiary in each BY (2014–2016) and PY (2017–2021). If the proportion of total allowed charges billed by practitioners with a primary care specialty code exceeded 10% of total allowed charges during a given BY or PY, the beneficiary was attributed to the state-level treatment and comparison groups through their primary care practitioner in Step 6. All other beneficiaries were attributed to the state-level treatment and

[3] FQHCs, RHCs, and CAHs were identified based on the billing codes 77, 71, and 85, respectively, on outpatient claims.

[4] Primary care practitioners included those with specialty codes 01, 08, 11, 37, 38, 50, 89, and 97. Specialists included those with specialty codes 06, 12, 13, 16, 23, 25, 26, 27, 29, 39, 46, 70, 79, 82, 83, 84, 86, 90, and 98.

[5] Qualified evaluation and management (E&M) codes are the following: 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99324, 99325, 99326, 99327, 99328, 99334, 99335, 99336, 99337, 99339, 99340, 99341, 99342, 99343, 99344, 99345, 99347, 99348, 99349, 99350, 99495, 99496, 99490, G0402, G0438, and G0439.

comparison groups through their specialists in the next step. Primary care specialists are given preference, and ties are broken by the date of the claim.

Step 6. If the proportion of total allowed charges for QEM services billed by primary care practitioners exceeded 10%, we retained QEM service claims billed by primary care practitioners and excluded QEM service claims billed by other practitioners. Next, we identified QEM service claims rendered within the state in which the beneficiary resided during the calendar year. For the treatment group, we also identified QEM service claims rendered by VTAPM participants. If the proportion of total QEM service claims rendered within the state of residence (or by VTAPM participants, in the case of the treatment group) exceeded 50%, the beneficiary was attributed to the state-level treatment or comparison group. If the total allowed charges for QEM services billed by primary care practitioners did not exceed 10%, we retained QEM service claims billed by eligible specialists and applied the same attribution logic described above to attribute beneficiaries to the state-level treatment and comparison groups.

Appendix Exhibit D.2.6. PY 4 Medicare State-Level Attribution Step-Down Table

Attribution Criteria	Description	Number of Beneficiaries							
		BY 3 (2014)	BY 2 (2015)	BY 1 (2016)	PY 0 (2017)	PY 1 (2018)	PY 2 (2019)	PY 3 (2020)	PY 4 (2021)
TREATMENT GROUP									
Geographic & Coverage Criteria	Reside in Vermont (based on MBSF) and continuously covered under both Parts A & B throughout the CY or until death and zero months of MA coverage and zero months of Medicare as a secondary payer coverage	104,253	107,070	109,699	110,740	112,274	112,622	112,894	107,798
Claims Attribution Criteria	Receive any QEM from eligible practitioners	90,909	91,182	94,690	95,511	96,079	96,551	98,047	95,439
	Receive majority of QEMs within Vermont or from OneCare participants	**80,193**	**79,728**	**83,039**	**83,523**	**83,770**	**83,956**	**86,590**	**84,338**
	Receive at least 10% of allowed charges for QEMs from eligible PCPs	78,128	77,122	80,698	81,097	81,088	81,180	84,690	82,883
	Receive less than 10% of allowed charges for QEMs from eligible PCPs (that is, specialist-aligned)	2,065	2,606	2,341	2,426	2,682	2,776	1,900	1,455
COMPARISON GROUP									
Geographic & Coverage Criteria	Reside in comparison state (based on MBSF) and continuously covered under both Parts A & B throughout the CY or until death and zero months of MA coverage and zero months of Medicare as a secondary payer coverage	3,162,130	3,147,984	3,184,758	3,189,323	3,154,337	3,154,514	3,089,051	2,950,258
Claims Attribution Criteria	Receive any QEM from eligible practitioners	2,677,614	2,642,867	2,746,494	2,754,428	2,722,745	2,726,704	2,668,533	2,585,282
	Receive majority of QEMs within comparison state	**2,549,593**	**2,511,610**	**2,618,603**	**2,627,289**	**2,596,282**	**2,598,095**	**2,547,287**	**2,464,899**
	Receive at least 10% of allowed charges for QEMs from eligible PCPs	2,400,302	2,364,294	2,511,111	2,527,665	2,501,636	2,508,553	2,469,943	2,402,642
	Receive less than 10% of allowed charges for QEMs from eligible PCPs (that is, specialist-aligned)	149,291	147,316	107,492	99,624	94,646	89,542	77,344	62,257

ACO-Level Attribution. In this section, we describe the claims-based attribution logic employed to construct the ACO and comparison groups. The model's participant list for PY 4 was used to identify practices participating in the VTAPM. **Appendix Exhibit D.2.7** summarizes the contents of the participation lists. The CY 2021 Medicare SSP Track 1 and Basic Track Levels A/B/C/D ACO participant list were used to identify the comparison group practices. We limited comparison group participants to those who provided services within the comparison states. The TIN and CMS Certification Number (CCN) were used to identify bills submitted by the identified practices.[6] The claims-based attribution logic used paid QEM service claims submitted by practitioners within the participating practices using the eligible specialty codes.[7] Attribution for the comparison group in each cohort mirrored the approach used for the treatment group. We used the same HCPCS and specialty codes[8] that the model used to attribute beneficiaries to the VTAPM, which included eight additional telehealth-specific codes added to the previous year's list, to align with the updated Medicare coverage for telehealth visits implemented in March 2020.[9]

Appendix Exhibit D.2.7. VTAPM Medicare ACO Treatment and Comparison Group Participants

		PY 1		PY 2		PY 3		PY 4	
		CCNs	TINs	CCNs	TINs	CCNs	TINs	CCNs	TINs
Treatment Group	VTAPM Participants	11	22	18	36	12	37	19	32
Comparison Group	MSSP Track 1 and Basic Track Level A/B/C ACO Participants Providing Services in the Comparison States	789	1,631	1,383	4,812	1,833	4,856	2034	4719

NOTE: CCN is CMS Certification Number; TIN is Taxpayer Identification Number.

Below, we describe the claims analysis steps for attributing beneficiaries to the ACO-level treatment and comparison groups. **Appendix Exhibit D.2.8** presents the step-down counts associated with the state-level attribution criteria.

Steps 1 through 5. The first five steps of the ACO-level claims-based attribution logic are the same as for the state-level analysis described in the previous section.

[6] FQHCs, RHCs, and CAHs were identified based on billing codes 77, 71, and 85, respectively, on outpatient claims. Practitioners billing through CAHs included those who receive payment from Medicare through the optional payment method, where the CAH bills for facility and professional outpatient services to Medicare when physicians or practitioners reassign billing rights to them.

[7] Primary care practitioners included those with specialty codes 01, 08, 11, 37, 38, 50, 89, and 97. Specialists included those with specialty codes 06, 12, 13, 16, 23, 25, 26, 27, 29, 39, 46, 70, 79, 82, 83, 84, 86, 90, and 98.

[8] These eight Healthcare Common Procedure Coding System (HCPCS) codes are: 99421-99423 (online digital E&M visit for an established patient, varying times); 99441-99443 (phone E&M visit with a physician or other qualified health professional, varying times); G2010 (remote evaluation of recorded video and/or images); and G2012 (5–10-minute communication using a technology-based service).

[9] Centers for Medicare & Medicaid Services. (2020). *COVID-19 Emergency Declaration Blanket Waivers for Health Care Providers*. https://www.cms.gov/files/document/summary-covid-19-emergency-declaration-waivers.pdf

Step 6. If the proportion of total allowed charges for QEM services billed by primary care practitioners exceeded 10%, we retained QEM service claims billed by primary care practitioners and excluded QEM service claims billed by other practitioners. Next, we identified the practice that was responsible for providing the plurality of QEM service claims rendered by eligible primary care specialists during each BY and PY. For the treatment pool beneficiaries, if the identified practice was a VTAPM participant, we attributed the beneficiary to the treatment group. For the comparison pool beneficiaries, if the practice was a Medicare SSP Track 1 participant in a PY, we attributed the beneficiary to the comparison group for that respective PY. If the total allowed charges for QEM services billed by primary care practitioners did not exceed 10%, we retained QEM service claims billed by eligible specialists and applied the same attribution logic described above to attribute beneficiaries to the ACO-level treatment and comparison groups.

Appendix Exhibit D.2.8. PY 4 Medicare ACO-Level Attribution Step-Down Table

Attribution Criteria	Description	Number of Beneficiaries							
		BY 3 (2014)	BY 2 (2015)	BY 1 (2016)	PY 0 (2017)	PY 1 (2018)	PY 2 (2019)	PY 3 (2020)	PY 4 (2021)
TREATMENT GROUP									
Geographic & Coverage Criteria	Reside in Vermont (based on MBSF) and continuously covered under both Parts A & B throughout the CY or until death and zero months of MA coverage and zero months of Medicare as a secondary payer coverage	104,253	107,070	109,699	110,740	112,274	112,622	112,902	107,798
Claims Attribution Criteria	Receive any QEM from eligible practitioners	88,777	91,704	95,913	97,487	98,737	99,457	96,508	93,757
	Receive plurality of QEMs from OneCare participants	**45,485**	**48,129**	**51,348**	**53,467**	**55,824**	**56,999**	**55,061**	**53,630**
	Receive at least 10% of allowed charges for QEMs from eligible PCPs	44,537	47,303	50,632	52,838	55,211	56,394	54,186	52,880
	Receive <10% of allowed charges for QEMs from eligible PCPs (that is, specialist-aligned)	948	826	716	629	613	605	875	750
COMPARISON GROUP									
Geographic & Coverage Criteria	Reside in comparison state (based on MBSF) and continuously covered under both Parts A & B throughout the CY or until death and zero months of MA coverage and zero months of Medicare as a secondary payer coverage	3,162,130	3,147,984	3,184,758	3,189,323	3,154,337	3,154,514	3,089,051	2,950,258
Claims Attribution Criteria	Receive any QEM from eligible providers	2,535,115	2,532,547	2,700,212	2,722,730	2,702,488	2,717,739	2,605,088	2,527,690
	Receive plurality of QEMs from CY 2021 Track 1 or Basic A/B/C/D MSSP participants	**557,772**	**578,153**	**636,668**	**671,188**	**692,962**	**711,540**	**690,158**	**655,447**
	Receive at least 10% of allowed charges for QEMs from eligible PCPs	532,833	553,505	620,888	656,640	679,158	698,437	675,918	643,988
	Receive <10% of allowed charges for QEMs from eligible PCPs (that is, specialist-aligned)	24,939	24,648	15,780	14,548	13,804	13,103	14,240	11,459

Stage 4: Weighting Comparison Beneficiaries Using Entropy Balancing

After selecting the treatment and comparison beneficiaries (Step 3), we used the Stata package *ebalance*[10] to weight comparison beneficiaries with entropy balancing (EB) methods. The EB approach ensured that the comparison group beneficiaries, on average, resided in regions similar to Vermont and were similar to those Vermonters on observed characteristics.[11] Beneficiaries were balanced using individual-level (sociodemographic and health) and area-level (sociodemographic and health care market) characteristics. The EB approach balanced the means and distributions of observed characteristics across treatment and comparison groups; see **Appendix Exhibits D.2.9-D.2.11** and **Appendix Exhibits D.2.14-D.2.18** for balancing statistics before and after EB weights were applied for the ACO- and state-level analyses, respectively.

[10] Hainmueller J, Xu Y. Ebalance: A Stata Package for Entropy Balancing. J Stat Software. 2013;54(7). Available at SSRN: https://ssrn.com/abstract=1943090 or http://dx.doi.org/10.2139/ssrn.1943090

[11] Hainmueller J. Entropy Balancing for Causal Effects: A Multivariate Reweighting Method to Produce Balanced Samples in Observational Studies. Political Analysis. 2012;20(1):25-46. doi:10.1093/pan/mpr025

Appendix Exhibit D.2.9. Medicare ACO-Level Covariate Balance: Area-Level Sociodemographic and Market Characteristics

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Downside-Risk MSSP Rate	0.2678	-0.1744	0.3196	-0.2810	0.0195	-0.1752	-0.0287	-0.0708
Upside-Risk MSSP Rate	3.6529	3.3506	2.8878	2.7818	2.2248	2.0052	2.2802	1.6840
# of Active MDs per 100K	0.4960	0.0000	0.5092	0.0000	0.5426	0.0000	0.5635	0.0000
# Health Centers per 100K	0.5019	0.0000	0.5095	0.0000	0.5137	0.0000	0.5521	0.0000
High School Completion Rate	1.0406	0.0000	1.0378	0.0000	1.0152	0.0000	0.9418	0.0000
# Hospital Beds per 100K	-0.5825	0.0000	-0.5458	0.0000	-0.4297	0.0000	-0.3968	0.0000
Medicare Advantage Rate	-21.4997	-17.6180	-18.1405	-14.6137	-17.1479	-13.9917	-17.3137	-12.3741
Median Household Income	0.6958	0.0000	0.6784	0.0000	0.6827	0.0000	0.5929	0.0000
# Non-Physician PCPs per 100K	0.6394	0.0000	0.6304	0.0000	0.6615	0.0000	0.7069	0.0000
# PCPs per 100K	0.9192	0.0000	0.9151	0.0000	0.9380	0.0000	0.9292	0.0000
Rurality	1.1740	0.0000	1.1861	0.0000	1.1490	0.0000	1.1006	0.0000
College Completion Rate	1.1106	0.4014	1.1201	0.4070	1.1003	0.3997	0.9858	0.1140
% Below Poverty Line	-0.5714	0.0102	-0.5579	0.0129	-0.5464	0.0284	-0.4871	0.0113
Unemployment Rate	-1.3472	-0.6311	-1.3403	-0.6416	-1.3296	-0.6214	-1.2651	-0.5009
% Uninsured	-3.6726	-2.5635	-3.5952	-2.5483	-3.6300	-2.5779	-3.4192	-3.1906

Appendix Exhibit D.2.10. Medicare ACO-Level Covariate Balance: Beneficiary-Level Sociodemographic and Eligibility Characteristics

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Age 65 to 69	0.0118	0.0000	0.0050	0.0000	0.0083	0.0000	-0.0236	0.0000
Age 70 to 74	-0.0156	0.0000	-0.0133	0.0000	-0.0141	0.0000	-0.0162	0.0000
Age 75 to 79	-0.0392	0.0000	-0.0396	0.0000	-0.0376	0.0000	-0.0278	0.0000
Age 80 to 84	-0.0128	0.0000	-0.0155	0.0000	-0.0267	0.0000	-0.0283	0.0000
Age 85+	-0.0174	0.0000	-0.0096	0.0000	-0.0069	0.0000	-0.0047	0.0000
Death During Year	0.0032	0.0000	0.0123	0.0000	0.0065	0.0000	-0.0010	0.0000
Disabled	0.0697	0.0000	0.0709	0.0000	0.0754	0.0000	0.1167	0.0000
ESRD	-0.1006	0.0000	-0.1144	0.0000	-0.1058	0.0000	-0.0892	0.0000
Long-Term Care in Prior Year	-0.0579	0.0000	-0.0294	0.0000	-0.0305	0.0000	-0.0031	0.0000
Male	0.0111	0.0000	0.0099	0.0000	0.0143	0.0000	0.0073	0.0000
Months of Alignment	-0.0052	0.0000	-0.0187	0.0000	-0.0068	0.0000	0.0023	0.0000
Months of Part D Coverage	0.1086	0.0000	0.2423	0.0000	0.2479	0.0000	0.2136	0.0000
Dual-Eligible	0.2693	0.0000	0.2805	0.0000	0.2634	0.0000	0.2529	0.0000
Race: Black	-1.2770	0.0000	-1.2203	0.0000	-1.2009	0.0000	-0.9492	0.0000
Race: Hispanic	-0.4300	0.0000	-0.4386	0.0000	-0.4523	0.0000	-0.4082	0.0000
Race: Asian/Pacific Islander	-0.1410	0.0000	-0.1523	0.0000	-0.1500	0.0000	-0.1491	0.0000
Race: Other	0.0441	0.0000	0.0553	0.0000	0.0645	0.0000	0.0766	0.0000

Appendix Exhibit D.2.11. Medicare ACO-Level Covariate Balance: Beneficiary-Level Chronic Conditions

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Alzheimer's Disease	-0.0527	0.0000	-0.0314	0.0000	-0.0298	0.0000	-0.0236	0.0000
Dementia	-0.0823	0.0000	-0.0687	0.0000	-0.0771	0.0000	-0.0592	0.0000
Acute Myocardial Infarction	0.0087	0.0000	0.0080	0.0000	0.0219	0.0000	0.0228	0.0000
Anemia	-0.1118	0.0000	-0.1321	0.0000	-0.1693	0.0000	-0.1469	0.0000
Asthma	0.0132	0.0000	0.0103	0.0000	0.0201	0.0000	-0.0140	0.0000
Atrial Fibrillation	0.0021	0.0000	-0.0038	0.0000	-0.0065	0.0000	-0.0298	0.0000
Cataracts	-0.0692	0.0000	-0.0565	0.0000	-0.0447	0.0000	-0.0349	0.0000
Congestive Heart Failure	-0.1495	0.0000	-0.1420	0.0000	-0.1377	0.0000	-0.1219	0.0000
Chronic Kidney Disease	-0.1378	0.0000	-0.1415	0.0000	-0.1432	0.0000	-0.1900	0.0000
Breast Cancer	-0.0150	0.0000	-0.0210	0.0000	-0.0122	0.0000	-0.0567	0.0000
Colorectal Cancer	-0.0310	0.0000	-0.0390	0.0000	-0.0371	0.0000	-0.0356	0.0000
Endometrial Cancer	0.0119	0.0000	0.0059	0.0000	0.0102	0.0000	0.0103	0.0000
Lung Cancer	0.0071	0.0000	-0.0002	0.0000	-0.0078	0.0000	-0.0097	0.0000
Prostate Cancer	-0.0272	0.0000	-0.0269	0.0000	-0.0171	0.0000	-0.0485	0.0000
COPD	-0.0477	0.0000	-0.0455	0.0000	-0.0400	0.0000	-0.0454	0.0000
Depression	0.0836	0.0000	0.0760	0.0000	0.0712	0.0000	0.0372	0.0000
Diabetes	-0.1392	0.0000	-0.1459	0.0000	-0.1542	0.0000	-0.1544	0.0000
Glaucoma	0.0369	0.0000	0.0441	0.0000	0.0425	0.0000	0.0166	0.0000
Hip/Pelvic Fracture	0.0034	0.0000	-0.0066	0.0000	-0.0080	0.0000	-0.0011	0.0000
Hyperlipidemia	-0.2577	0.0000	-0.3205	0.0000	-0.3495	0.0000	-0.4757	0.0000
Benign Prostatic Hyperplasia	-0.0273	0.0000	-0.0606	0.0000	-0.0585	0.0000	-0.1154	0.0000
Hypertension	-0.2561	0.0000	-0.2680	0.0000	-0.2683	0.0000	-0.3036	0.0000
Acquired Hypothyroidism	-0.1479	0.0000	-0.1689	0.0000	-0.1775	0.0000	-0.1880	0.0000
Ischemic Heart Disease	-0.1584	0.0000	-0.1498	0.0000	-0.1297	0.0000	-0.1335	0.0000
Osteoporosis	-0.1122	0.0000	-0.1063	0.0000	-0.1031	0.0000	-0.0928	0.0000
Rheumatoid Arthritis/Osteoarthritis	-0.1233	0.0000	-0.1082	0.0000	-0.0970	0.0000	-0.1356	0.0000
Stroke/TIA	-0.0687	0.0000	-0.0733	0.0000	-0.0712	0.0000	-0.0708	0.0000

Appendix Exhibit D.2.12. Medicare ACO-Level Covariate Balance: Beneficiary-Level Other Chronic and Potentially Disabling Conditions

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
ADHD and Other Conduct Disorders	0.0538	0.0000	0.0515	0.0000	0.0558	0.0000	0.0445	0.0000
Alcohol Use Disorders	0.0184	0.0000	0.0194	0.0000	0.0221	0.0000	0.0229	0.0000
Anxiety Disorders	0.0777	0.0000	0.0745	0.0000	0.0729	0.0000	0.0530	0.0000
Autism Spectrum Disorders	0.0454	0.0000	0.0298	0.0000	0.0241	0.0000	-0.0054	0.0000
Bipolar Disorder	0.0118	0.0000	0.0034	0.0000	0.0033	0.0000	0.0013	0.0000
Traumatic Brain Injury	0.0023	0.0000	-0.0085	0.0000	-0.0008	0.0000	0.0140	0.0000
Cerebral Palsy	0.0047	0.0000	0.0043	0.0000	0.0107	0.0000	0.0161	0.0000
Cystic Fibrosis	-0.0133	0.0000	-0.0249	0.0000	-0.0513	0.0000	-0.0971	0.0000
Major Depressive Affective Disorder	0.0941	0.0000	0.0837	0.0000	0.0781	0.0000	0.0195	0.0000
Drug Use Disorders	0.0428	0.0000	0.0454	0.0000	0.0567	0.0000	0.0280	0.0000
Epilepsy	-0.0107	0.0000	-0.0045	0.0000	-0.0126	0.0000	-0.0085	0.0000
Fibromyalgia, Chronic Pain, and Fatigue	-0.0521	0.0000	-0.0526	0.0000	-0.0512	0.0000	-0.0564	0.0000
Deafness and Hearing Impairment	0.0457	0.0000	0.0510	0.0000	0.0486	0.0000	0.0173	0.0000
Viral Hepatitis	-0.0052	0.0000	-0.0106	0.0000	0.0002	0.0000	0.0031	0.0000
HIV/AIDS	-0.0232	0.0000	-0.0118	0.0000	-0.0103	0.0000	-0.0074	0.0000
Intellectual Disabilities	-0.0078	0.0000	-0.0076	0.0000	-0.0102	0.0000	-0.0162	0.0000
Learning Disabilities	0.0258	0.0000	0.0294	0.0000	0.0219	0.0000	-0.0004	0.0000
Leukemias and Lymphomas	0.0068	0.0000	-0.0006	0.0000	0.0018	0.0000	-0.0088	0.0000
Liver Disease	-0.0320	0.0000	-0.0232	0.0000	-0.0271	0.0000	-0.0563	0.0000
Migraine	0.0162	0.0000	0.0117	0.0000	0.0070	0.0000	-0.0027	0.0000
Mobility Impairments	-0.0333	0.0000	-0.0314	0.0000	-0.0297	0.0000	-0.0317	0.0000
Multiple Sclerosis and Transverse Myelitis	0.0119	0.0000	0.0098	0.0000	0.0173	0.0000	0.0159	0.0000
Muscular Dystrophy	0.0105	0.0000	0.0004	0.0000	0.0042	0.0000	0.0105	0.0000
Obesity	-0.0269	0.0000	-0.0588	0.0000	-0.1019	0.0000	-0.2990	0.0000
Other Developmental Delays	0.0368	0.0000	0.0334	0.0000	0.0348	0.0000	0.0180	0.0000
Personality Disorders	0.0599	0.0000	0.0568	0.0000	0.0686	0.0000	0.0581	0.0000

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Post-Traumatic Stress Disorder	0.1103	0.0000	0.1039	0.0000	0.1070	0.0000	0.1042	0.0000
Peripheral Vascular Disease	-0.2291	0.0000	-0.2405	0.0000	-0.2317	0.0000	-0.2237	0.0000
Schizophrenia	-0.0037	0.0000	-0.0080	0.0000	-0.0070	0.0000	0.0095	0.0000
Other Psychotic Disorders	-0.0212	0.0000	-0.0269	0.0000	-0.0239	0.0000	0.0076	0.0000
Spina Bifida	-0.0004	0.0000	0.0047	0.0000	0.0071	0.0000	0.0043	0.0000
Spinal Cord Injury	0.0014	0.0000	0.0157	0.0000	0.0074	0.0000	-0.0243	0.0000
Tobacco Use Disorders	0.0504	0.0000	0.0453	0.0000	0.0472	0.0000	0.0075	0.0000
Pressure Ulcers and Chronic Ulcers	-0.0363	0.0000	-0.0437	0.0000	-0.0323	0.0000	-0.0242	0.0000
Blindness and Visual Impairment	-0.0366	0.0000	-0.0191	0.0000	-0.0290	0.0000	-0.0060	0.0000

Appendix Exhibit D.2.13. Medicare ACO-Level Covariate Balance: County-Level COVID-19 PHE Characteristics

	PY 4 (2021)	
	Unweighted	**Weighted**
COVID-19 Vaccination Rate	0.2455	-0.8781
# COVID-19 Cases per 100K	-0.6943	0.0487
# COVID-19 Deaths per 100K	-4.2072	0.0000
COVID-19 Case Fatality Rate	-6.1197	-0.3360

Appendix Exhibit D.2.14. Medicare State-Level Covariate Balance: Area-Level Sociodemographic and Market Characteristics

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Downside-Risk MSSP Rate	0.2390	-0.1192	0.2992	-0.1975	-0.0467	-0.0317	-0.0415	0.1108
Upside-Risk MSSP Rate	3.2010	3.2056	2.6976	2.8759	2.1982	2.0968	2.1983	2.0830
# of Active MDs per 100K	0.3698	0.0000	0.3855	0.0000	0.3920	0.0000	0.4068	0.0000
# Health Centers per 100K	0.7104	0.0000	0.7014	0.0000	0.7634	0.0000	0.7732	0.0000
High School Completion Rate	0.8338	0.0000	0.8353	0.0000	0.8297	0.0000	0.7086	0.0000
# Hospital Beds per 100K	-0.7133	0.0000	-0.6749	0.0000	-0.5648	0.0000	-0.4961	0.0000
Medicare Advantage Rate	-24.7060	-15.8867	-20.8315	-13.1813	-20.2711	-12.5402	-20.0487	-10.5373
Median Household Income	0.3776	0.0000	0.3776	0.0000	0.3569	0.0000	0.2335	0.0000
# Non-Physician PCPs per 100K	0.6569	0.0000	0.6575	0.0000	0.6680	0.0000	0.7079	0.0000
# PCPs per 100K	0.8216	0.0000	0.8002	0.0000	0.8146	0.0000	0.8242	0.0000
Rurality	1.4335	0.0000	1.4322	0.0000	1.4432	0.0000	1.4374	0.0000
College Completion Rate	1.0223	0.5649	1.0239	0.5429	1.0226	0.5408	0.8599	0.2032
% Below Poverty Line	-0.4875	-0.0272	-0.4782	-0.0177	-0.4676	-0.0247	-0.3817	-0.0760
Unemployment Rate	-1.2629	-0.7250	-1.2601	-0.7132	-1.2250	-0.6752	-1.1068	-0.5326
% Uninsured	-3.1481	-2.3070	-3.2043	-2.3741	-3.1832	-2.4028	-2.9088	-2.8892

Appendix Exhibit D.2.15. Medicare State-Level Covariate Balance: Beneficiary-Level Sociodemographic and Eligibility Characteristics

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Age 65 to 69	0.0086	0.0000	0.0043	0.0000	0.0049	0.0000	-0.0207	0.0000
Age 70 to 74	0.0020	0.0000	0.0043	0.0000	0.0019	0.0000	-0.0041	0.0000
Age 75 to 79	-0.0285	0.0000	-0.0311	0.0000	-0.0189	0.0000	-0.0135	0.0000
Age 80 to 84	-0.0107	0.0000	-0.0128	0.0000	-0.0194	0.0000	-0.0283	0.0000
Age 85+	-0.0190	0.0000	-0.0154	0.0000	-0.0164	0.0000	-0.0204	0.0000
Death During Year	-0.0205	0.0000	-0.0120	0.0000	-0.0154	0.0000	-0.0286	0.0000
Disabled	0.0465	0.0000	0.0491	0.0000	0.0477	0.0000	0.0956	0.0000
ESRD	-0.1301	0.0000	-0.1327	0.0000	-0.1320	0.0000	-0.1225	0.0000
Long-Term Care in Prior Year	-0.0953	0.0000	-0.0853	0.0000	-0.0937	0.0000	-0.0814	0.0000
Male	0.0067	0.0000	0.0147	0.0000	0.0172	0.0000	0.0063	0.0000
Months of Alignment	0.0161	0.0000	0.0076	0.0000	0.0117	0.0000	0.0327	0.0000
Months of Part D Coverage	0.1284	0.0000	0.2613	0.0000	0.2560	0.0000	0.2242	0.0000
Dual-Eligible	0.2345	0.0000	0.2442	0.0000	0.2199	0.0000	0.2054	0.0000
Race: Black	-1.3853	0.0000	-1.3307	0.0000	-1.3386	0.0000	-1.0540	0.0000
Race: Hispanic	-0.6988	0.0000	-0.6726	0.0000	-0.6950	0.0000	-0.6378	0.0000
Race: Asian/Pacific Islander	-0.3276	0.0000	-0.3168	0.0000	-0.3326	0.0000	-0.3421	0.0000
Race: Other	0.0241	0.0000	0.0393	0.0000	0.0501	0.0000	0.0652	0.0000

Appendix Exhibit D.2.16. Medicare State-Level Covariate Balance: Beneficiary-Level Chronic Conditions

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Alzheimer's Disease	-0.0876	0.0000	-0.0748	0.0000	-0.0750	0.0000	-0.0624	0.0000
Dementia	-0.1186	0.0000	-0.1142	0.0000	-0.1206	0.0000	-0.1141	0.0000
Acute Myocardial Infarction	0.0135	0.0000	0.0089	0.0000	0.0207	0.0000	0.0213	0.0000
Anemia	-0.1837	0.0000	-0.1864	0.0000	-0.2300	0.0000	-0.2152	0.0000
Asthma	-0.0208	0.0000	-0.0199	0.0000	-0.0169	0.0000	-0.0322	0.0000
Atrial Fibrillation	-0.0031	0.0000	-0.0034	0.0000	0.0001	0.0000	-0.0317	0.0000
Cataracts	-0.0413	0.0000	-0.0324	0.0000	-0.0079	0.0000	-0.0122	0.0000
Congestive Heart Failure	-0.1808	0.0000	-0.1733	0.0000	-0.1669	0.0000	-0.1598	0.0000
Chronic Kidney Disease	-0.1815	0.0000	-0.1806	0.0000	-0.1942	0.0000	-0.2396	0.0000
Breast Cancer	-0.0231	0.0000	-0.0209	0.0000	-0.0240	0.0000	-0.0657	0.0000
Colorectal Cancer	-0.0312	0.0000	-0.0379	0.0000	-0.0392	0.0000	-0.0371	0.0000
Endometrial Cancer	0.0125	0.0000	0.0079	0.0000	0.0116	0.0000	0.0076	0.0000
Lung Cancer	-0.0022	0.0000	-0.0102	0.0000	-0.0059	0.0000	-0.0148	0.0000
Prostate Cancer	-0.0332	0.0000	-0.0264	0.0000	-0.0271	0.0000	-0.0467	0.0000
COPD	-0.0651	0.0000	-0.0618	0.0000	-0.0566	0.0000	-0.0534	0.0000
Depression	0.0558	0.0000	0.0466	0.0000	0.0433	0.0000	0.0126	0.0000
Diabetes	-0.1557	0.0000	-0.1568	0.0000	-0.1681	0.0000	-0.1667	0.0000
Glaucoma	0.0231	0.0000	0.0308	0.0000	0.0335	0.0000	0.0002	0.0000
Hip/Pelvic Fracture	-0.0016	0.0000	-0.0105	0.0000	-0.0092	0.0000	-0.0058	0.0000
Hyperlipidemia	-0.2680	0.0000	-0.3239	0.0000	-0.3583	0.0000	-0.4651	0.0000
Benign Prostatic Hyperplasia	-0.0557	0.0000	-0.0773	0.0000	-0.0755	0.0000	-0.1332	0.0000
Hypertension	-0.2588	0.0000	-0.2673	0.0000	-0.2729	0.0000	-0.2909	0.0000
Acquired Hypothyroidism	-0.1559	0.0000	-0.1747	0.0000	-0.1780	0.0000	-0.1895	0.0000
Ischemic Heart Disease	-0.2032	0.0000	-0.1823	0.0000	-0.1678	0.0000	-0.1721	0.0000
Osteoporosis	-0.1403	0.0000	-0.1338	0.0000	-0.1345	0.0000	-0.1275	0.0000
Rheumatoid Arthritis/Osteoarthritis	-0.1470	0.0000	-0.1281	0.0000	-0.1153	0.0000	-0.1568	0.0000
Stroke/TIA	-0.0907	0.0000	-0.1011	0.0000	-0.0924	0.0000	-0.0835	0.0000

Appendix Exhibit D.2.17. Medicare State-Level Covariate Balance: Beneficiary-Level Other Chronic and Potentially Disabling Conditions

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
ADHD and Other Conduct Disorders	0.0454	0.0000	0.0485	0.0000	0.0553	0.0000	0.0472	0.0000
Alcohol Use Disorders	0.0135	0.0000	0.0139	0.0000	0.0154	0.0000	0.0109	0.0000
Anxiety Disorders	0.0611	0.0000	0.0623	0.0000	0.0576	0.0000	0.0477	0.0000
Autism Spectrum Disorders	0.0239	0.0000	0.0122	0.0000	0.0062	0.0000	-0.0130	0.0000
Bipolar Disorder	-0.0021	0.0000	-0.0033	0.0000	-0.0110	0.0000	-0.0065	0.0000
Traumatic Brain Injury	-0.0063	0.0000	-0.0124	0.0000	-0.0049	0.0000	0.0031	0.0000
Cerebral Palsy	-0.0033	0.0000	-0.0045	0.0000	-0.0030	0.0000	0.0008	0.0000
Cystic Fibrosis	-0.0488	0.0000	-0.0589	0.0000	-0.0898	0.0000	-0.1306	0.0000
Major Depressive Affective Disorder	0.0625	0.0000	0.0515	0.0000	0.0397	0.0000	-0.0080	0.0000
Drug Use Disorders	0.0182	0.0000	0.0232	0.0000	0.0201	0.0000	-0.0030	0.0000
Epilepsy	-0.0306	0.0000	-0.0313	0.0000	-0.0365	0.0000	-0.0382	0.0000
Fibromyalgia, Chronic Pain, and Fatigue	-0.0647	0.0000	-0.0692	0.0000	-0.0792	0.0000	-0.0985	0.0000
Deafness and Hearing Impairment	0.0291	0.0000	0.0357	0.0000	0.0275	0.0000	-0.0016	0.0000
Viral Hepatitis	-0.0394	0.0000	-0.0383	0.0000	-0.0336	0.0000	-0.0263	0.0000
HIV/AIDS	-0.0647	0.0000	-0.0574	0.0000	-0.0467	0.0000	-0.0346	0.0000
Intellectual Disabilities	-0.0193	0.0000	-0.0219	0.0000	-0.0275	0.0000	-0.0318	0.0000
Learning Disabilities	0.0185	0.0000	0.0243	0.0000	0.0149	0.0000	-0.0036	0.0000
Leukemias and Lymphomas	0.0007	0.0000	0.0003	0.0000	-0.0006	0.0000	-0.0177	0.0000
Liver Disease	-0.0540	0.0000	-0.0491	0.0000	-0.0528	0.0000	-0.0706	0.0000
Migraine	0.0111	0.0000	0.0081	0.0000	-0.0004	0.0000	-0.0056	0.0000
Mobility Impairments	-0.0560	0.0000	-0.0620	0.0000	-0.0628	0.0000	-0.0609	0.0000
Multiple Sclerosis and Transverse Myelitis	0.0082	0.0000	0.0072	0.0000	0.0145	0.0000	0.0098	0.0000
Muscular Dystrophy	0.0104	0.0000	0.0069	0.0000	0.0049	0.0000	0.0091	0.0000
Obesity	-0.0367	0.0000	-0.0714	0.0000	-0.1111	0.0000	-0.2594	0.0000
Other Developmental Delays	0.0304	0.0000	0.0268	0.0000	0.0250	0.0000	0.0133	0.0000
Personality Disorders	0.0495	0.0000	0.0524	0.0000	0.0657	0.0000	0.0576	0.0000

	BY 3 (2014)		BY 2 (2015)		BY 1 (2016)		PY 4 (2021)	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Post-Traumatic Stress Disorder	0.1089	0.0000	0.1078	0.0000	0.1100	0.0000	0.1070	0.0000
Peripheral Vascular Disease	-0.2696	0.0000	-0.2821	0.0000	-0.2972	0.0000	-0.3036	0.0000
Schizophrenia	-0.0245	0.0000	-0.0196	0.0000	-0.0221	0.0000	-0.0141	0.0000
Other Psychotic Disorders	-0.0466	0.0000	-0.0464	0.0000	-0.0502	0.0000	-0.0278	0.0000
Spina Bifida	0.0002	0.0000	0.0042	0.0000	0.0016	0.0000	-0.0006	0.0000
Spinal Cord Injury	0.0001	0.0000	0.0134	0.0000	-0.0030	0.0000	-0.0355	0.0000
Tobacco Use Disorders	0.0289	0.0000	0.0335	0.0000	0.0270	0.0000	0.0043	0.0000
Pressure Ulcers and Chronic Ulcers	-0.0671	0.0000	-0.0624	0.0000	-0.0575	0.0000	-0.0552	0.0000
Blindness and Visual Impairment	-0.0751	0.0000	-0.0603	0.0000	-0.0632	0.0000	-0.0229	0.0000

Appendix Exhibit D.2.18. Medicare State-Level Covariate Balance: County-Level COVID-19 PHE Characteristics

	PY 4 (2021)	
	Unweighted	**Weighted**
COVID-19 Vaccination Rate	-0.0311	-0.9124
# COVID-19 Cases per 100K	-0.4381	0.3559
# COVID-19 Deaths per 100K	-3.7503	0.0000
COVID-19 Case Fatality Rate	-5.5431	-0.7321

Medicaid Descriptive Analysis. The Medicaid descriptive analysis is structured to reflect the VTAPM Medicaid ACO's current attribution algorithm (the "expanded attribution methodology"), in which Vermont Medicaid members are attributed to the model regardless of historical enrollment or utilization. The expanded attribution methodology for the VTAPM Medicaid ACO was implemented in 2020 and continued in 2021. **Appendix Exhibit D.2.19** shows the eligibility criteria and counts of members in the analytic population at each step. Although the model identified attributed Medicaid members prospectively, similar to the Medicare analysis we use a "concurrent" approach to identify Medicaid members attributed to the model based on their enrollment within a PY.

Appendix Exhibit D.2.19. PY 4 Medicaid Descriptive Analysis Step-Down Table

Eligibility Criteria	PY 3 (2020)	PY 4 (2021)
Member must live in Vermont	180,523	198,666
Member must be over 1 year old	176,232	194,595
Member must not be dually eligible for Medicare	142,519	160,400
Member must not have evidence of additional sources of insurance coverage (for example, commercial)	134,839	150,011
Member must not have received a limited Medicaid benefits package (for example, pharmacy-only benefits)	134,750	149,929

SOURCE: NORC analysis of T-MSIS Analytic File (TAF) enrollment data.

Appendix D.3. Specifications for the Claims-Based Evaluation Measures

Appendix Exhibit D.3.1 details definitions for the claims-based outcome measures for which we assess the model's impacts. The outcome measures are total Medicare spending, 8 categories of Medicare spending by care setting and service, 13 Medicare utilization measures, 2 Medicare quality-of-care measures, and 3 Medicaid SUD diagnosis and treatment outcomes.

Appendix Exhibit D.3.1. Definitions for Claims-Based Outcome Measures

Measure	Definition
Medicare Spending	
Total Medicare Parts A & B spending PBPY	Total Medicare Parts A & B spending (2021 USD) PBPY aligned with the VTAPM or comparison group. Spending includes Medicare paid amount on Parts A & B claims from the start of the year until the end of the year or until the end date for when the beneficiary remained aligned (that is, until s/he was excluded due to alignment exclusion criteria), for the treatment or comparison group.
Medicare Utilization	
Acute care hospital *stays* per 1,000 beneficiaries per year (BPY)	Number of acute care hospital stays per 1,000 BPY aligned with the VTAPM or comparison group. Stays that included transfers between facilities were counted as one stay. Stays that commenced after the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
Acute care hospital *days* per 1,000 BPY	Number of acute care hospital days per 1,000 BPY aligned with the VTAPM or comparison group. Inpatient days after the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
Emergency department (ED) visits (including observation stays) per 1,000 BPY	Number of ED visits including observational stay per 1,000 BPY aligned with the VTAPM or comparison group. Visits that included transfers between ED facilities were counted as one visit. Visits from the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
Primary care E&M visits per 1,000 BPY	Number of evaluation and management (E&M) visits with primary care practitioners per 1,000 BPY aligned with the VTAPM or comparison group. Primary care practitioners include 01 (general practice); 08 (family practice); 11 (internal medicine); 12 (osteopaths); 16 (obstetrics/gynecology); 35 (chiropractors); 38 (geriatric medicine); 48 (podiatrists); 50 (nurse practitioner); 80 (licensed clinical social worker); 84 (preventive medicine); and 97 (physician assistant). AWVs are excluded from this measure.
Specialty care E&M visits per 1,000 BPY	Number of E&M visits with specialist providers (excluding hospital and ED visits) per 1,000 BPY during the year through alignment end date, divided by months of alignment eligibility. Specialist providers are defined as all those who are not primary care practitioners, noted above.
SNF *stays* per 1,000 BPY	Number of SNF stays per 1,000 BPY aligned with the VTAPM or comparison group. SNF stays that commenced after the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
SNF *days* per 1,000 BPY	Number of SNF days per 1,000 BPY aligned with the VTAPM or comparison group. SNF days after the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
Home health visits per 1,000 BPY	Number of home health (HH) visits per 1,000 BPY aligned with the VTAPM or comparison group. The numbers of HH visits were identified based on lines with revenue center codes 420-449 and 550-599. Visits from the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.

Measure	Definition
Home health episodes per 1,000 BPY	Number of episodes of HH for 1,000 BPY during the period aligned with the VTAPM or comparison group. Episodes include sum of 60-day HH episodes, as well as HH episodes with low-utilization payment adjustments (LUPAs) and partial episode payment (PEP) adjustments.
Hospice days per 1,000 BPY	Number of days of hospice service use per 1,000 BPY aligned with the VTAPM or comparison group. Days of hospice use counted using the claim from and through dates on hospice claims. Hospice days after the start of the year until the end of the year, or until the date the beneficiary remained aligned with the treatment or comparison group, are counted toward the measure.
Imaging, procedures, and tests per 1,000 BPY	Counts of imaging, procedures, and tests per 1,000 BPY aligned with the VTAPM or comparison group. These were computed using the Berenson-Eggers Type of Service (BETOS) codes on the carrier claims and were specified as the number of claims for a beneficiary with codes "PXX," "TXX," and "IXX" incurred between the beneficiary's alignment start and end dates in each year.
Medicare Access to and Quality of Care	
Beneficiaries with *Annual Wellness Visit* (AWV) per 1,000 per year	Number of beneficiaries with an AWV in the year, per 1,000 beneficiaries aligned to the VTAPM or comparison group. This measure reflects the likelihood of beneficiaries receiving an AWV visit in the year. AWV codes on Medicare claims include G0438 (for the initial visit) and G0439 (for subsequent visits).
Beneficiaries with acute care hospitalizations for *ambulatory care-sensitive conditions (ACSCs)* per 1,000 per year	Number of beneficiaries with one or more ACSC acute care hospitalizations in the year, per 1,000 beneficiaries aligned with the VTAPM or comparison group. This measure reflects the likelihood of beneficiaries being hospitalized for ACSCs during the year. ACSC hospitalizations include diabetes short-term complications, diabetes long-term complications, chronic obstructive pulmonary disease or asthma in older adults, hypertension, heart failure, dehydration, bacterial pneumonia, urinary tract infection, uncontrolled diabetes, asthma in younger adults, and lower-extremity amputation among patients with diabetes.[12,13]
Beneficiaries with *unplanned readmissions within 30 days after hospital discharge* per 1,000 per year	Number of beneficiaries with one or more occurrences of unplanned hospital readmissions within 30 days of discharge in the year, per 1,000 beneficiaries aligned with the VTAPM or comparison group. This measure reflects the likelihood of beneficiaries having unplanned readmissions in the year. We used CMS's risk-standardized all-condition readmission measure for ACOs (ACO #8) to identify eligible hospitalizations and unplanned readmissions.[14]
Medicaid SUD Diagnosis and Treatment	
SUD diagnosis	Number of members with an SUD diagnosis during the performance year.
SUD treatment	Number of members receiving medication-assisted treatment or any SUD treatment services, facility claim, or pharmacy claim with an associated SUD diagnosis during the performance year.
ED visits for SUD services	Number of ED or observation visits for alcohol, opioid, or other drug abuse and dependence during the year. This measure is a subset of the Medicaid members receiving any SUD treatment.

NOTE: For providers in ACOs who opted for population-based payments (PBP) or all-inclusive-population-based-payments (AIPBPs), we used the actual amount Medicare would have paid for services absent the population-based payments.

[12] Agency for Healthcare Research and Quality. *Prevention Quality Overall Composite Technical Specifications, Prevention Quality Indicator 90*, Version 6.0. 2016; http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V60-ICD09/TechSpecs/PQI_90_Prevention_Quality_Overall_Composite.pdf.

[13] For claims prior to October 1, 2015, with ICD-9 codes, we used Version 5.0 of PQI 90. For claims after October 1, 2015, with ICD-10 codes, we used Version 6.0 of PQI 90.

[14] Centers for Medicare & Medicaid Services. *A Blueprint for the CMS Measures Management System, ACO #8 Risk Standardized All Condition Readmission,* Version 1.0. 2012; https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/Downloads/Measure-ACO-8-Readmission.pdf.

Appendix D.4. Analytic Approach to Estimating Medicare Impact

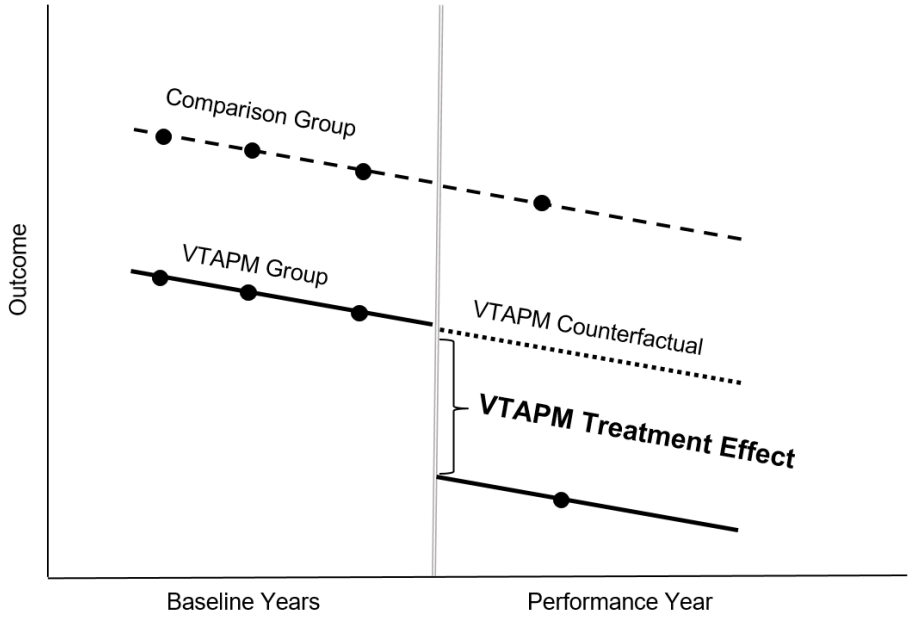
In this section, we describe the specification of our difference-in-differences (DID) regression models to assess the impact of the VTAPM on Medicare claims-based outcomes and provide the rationale and tests we used to guide various analytic decisions.

Difference-in-Differences Estimation

Using the DID design, we assessed the impact of VTAPM in PY 4 and cumulatively over the first three PYs (total Medicare spending only) for both the ACO-level and state-level analyses. The design compares differences in outcomes for the VTAPM and EB-weighted comparison beneficiaries in PY 4 against differences in outcomes for the treatment and comparison groups in three BYs (BY 3, BY 2, and BY 1). The comparison group is used to obtain an appropriate counterfactual of what would have happened to the VTAPM beneficiaries in PY 4 in the absence of the model. The DID models net out time-invariant unobservable factors that influence the VTAPM and comparison groups. Together with EB weights, this approach mitigates biases from unobserved differences between the VTAPM and comparison group.

As shown in **Appendix Exhibit D.4.1**, DID compares differences in outcomes for the VTAPM and propensity score-weighted comparison beneficiaries in a given PY to differences in outcomes for the treatment and comparison groups in BY 3, BY 2, and BY 1.

Appendix Exhibit D.4.1. Difference-in-Differences Estimation of the VTAPM Treatment Effect



Estimating impacts in PY 4. We estimated impacts using DID regression models for each of the state- and ACO-level analyses separately. We report impact estimates in PY 4 as relative increases or relative decreases, in relation to the VTAPM counterfactual absent the model. Impacts for PY 4 are estimated in separate models due to the differences in model practitioners for the ACO-level analysis; for both the ACO- and state-level analyses, a single cumulative estimate is produced as a weighted average of the three PY-specific impact estimates. While all impact estimates are at the beneficiary level, we describe impacts as relative increases or decreases PBPY for spending outcomes and per 1,000 BPY for utilization and quality-of-care outcomes. Estimates are reported at the p<0.1, p<0.05, and p<0.01 levels of statistical significance.

Equations D.1 and D.2 show the general specification of the DID model that we used to estimate ACO- and state-level impacts of the VTAPM in a given PY, respectively.

Equation D.1: DID model for estimating ACO-level impact in a given PY, with fixed effects for years, controlling for beneficiary, community, and practice characteristics

$$E(Y_{ijkt}) = \alpha_0 + \beta_1 VTAPM + \gamma_1 BY2 + \gamma_2 BY1 + \gamma_3 PY + \delta_1 VTAPM * PY + \sigma_1 VTAPM * YEAR + \theta_1 BENE_{ijkt} + \varphi_2 CNTY_j + \omega_2 PRAC_k + \varepsilon_{ijkt}$$

- $\alpha 0$ is the intercept, the mean outcome for the beneficiaries in the comparison group during the baseline period.
- ***VTAPM*** is the binary indicator for belonging to the treatment group. The coefficient $\beta 1$ captures the difference between the treatment and comparison group in the baseline period.
- ***BY2***, ***BY1***, and ***PY*** represent fixed effects for each BY and PY. The coefficients $\gamma 1$, $\gamma 2$, and $\gamma 3$ capture change in outcome relative to the reference period ***BY3.***
- The interaction term ***VTAPM * PY*** is the binary indicator for treatment group beneficiaries in ***PY***. The coefficient δ_1 is the DID estimate and represents the impact of VTAPM's initiatives in ***PY.***
- ***σ1 VTAPM * YEAR*** is the linear group-specific interaction term (treatment effect interacted with linear year), included to address the common trends assumption (see **Appendix D.6**).
- ***BENE*** and ***CTNY*** are a vector of beneficiary-level characteristics and the characteristics of their county of residence. The vectors $\theta 1$ and $\varphi 2$ are the coefficients associated with these characteristics.
- $PRAC_k$ is a fixed effect for each VTAPM and MSSP practice. The coefficient ω_2 captures the practice-specific time-invariant differences.
- $\varepsilon ijkt$ is the random error term.

Equation D.2: DID model for estimating state-level impact in a given PY, with fixed effects for years, controlling for beneficiary and community characteristics

$$E(Y_{ijkt}) = \alpha_0 + \beta_1 VT + \gamma_1 BY2 + \gamma_2 BY1 + \gamma_3 PY + \delta_1 VT * PY + \sigma_1 VT * YEAR + \theta_1 BENE_{ijkt} + \varphi_2 CNTY_j + \varepsilon_{ijkt}$$

- $E(Y_{ijkt})$ is the outcome for the ***ith*** beneficiary in the treatment or comparison group (that is, residing in Vermont or a comparison county and receiving the majority of their care from within their state of residence) in year ***t.***

- α_0 is the intercept, the mean outcome for the beneficiaries in the comparison group during the baseline period.
- ***VT*** is the binary indicator for belonging to the treatment group. The coefficient β_1 captures the difference between the treatment and comparison group in the baseline period.
- ***BY2***, ***BY1***, and ***PY*** represent fixed effects for each BY and PY. The coefficients γ_1, γ_2, and γ_3 capture change in outcome relative to the reference period ***BY3.***
- The interaction term ***VT * PY*** is the binary indicator for treatment group beneficiaries in PY. The coefficient $\delta 1$ is the DID estimate and represents the impact of Vermont's statewide initiatives in PY.
- ***σ1 VTAPM * YEAR*** is the linear group-specific interaction term (treatment group interacted with linear year), included to address the common trends assumption (see **Appendix D.6**).
- ***BENE*** and ***CNTY*** are vectors of beneficiary-level characteristics and the characteristics of county of residence. The vectors ϑ_1 and φ_2 are the coefficients associated these characteristics.
- ε_{ijkt} is the random error term.

We include the following covariates in both the ACO- and state-level regression model:

- **Beneficiary-level covariates** include age; gender; race/ethnicity; disability; ESRD status; dual eligibility; Part D coverage; number of months of alignment in the year; death in the year; and disease burden at the end of the preceding year (using indicators for 62 chronic conditions); flag for utilization of long-term care; and an indicator for whether a beneficiary was aligned using primary or specialty care visits.
- **ZCTA-level covariates** include number of alignment-eligible providers within 10 miles per 1,000 population, percent of population with a high school degree, percent with a bachelor's degree, percent below the federal poverty level, rurality, rural-urban continuum code, percent of population unemployed, percent of population uninsured, percent of population receiving Supplemental Security Income, and median household income.
- **County-level covariates** include total population; number of hospital beds per 1,000 population; number of active MDs per 1,000 population; number of RHCs per 1,000 population; number of FQHCs per 1,000 population; number of physician assistants per 1,000 population; number of nurse practitioners per 1,000 population; number of certified nursing specialists per 1,000 population; number of hospital-based primary care practitioners per 1,000 population; number of office-based primary care practitioners per 1,000 population; U.S. Department of Agriculture Economic Research Service economic typology code; HRSA health professional shortage area (HPSA) code; mental health HPSA code; and rate of participation of ACOs with downside risk.
- **Year-level covariates** include binary indicators for year.

The ACO-level model also included a fixed effect for practice, grouping all practices who saw fewer than 500 attributed BPY. Both ACO- and state-level models include the previously described EB weights for the comparison group; all VTAPM group beneficiaries receive a weight of one (1). We provide details of the estimation of the models based on Equations D.1 and D.2. All models were estimated using Stata 17.0.[15]

[15] StataCorp. *Stata Statistical Software: Release 17.* 2021; College Station, TX: StataCorp LP.

Modelling Outcomes of Medicare Spending, Utilization, and Quality of Care

Appendix Exhibit D.4.2 summarizes the models used for the 15 claims-based outcome measures for the Medicare state- and ACO-level analyses for PY 4. Outcome measures for spending and utilization were modelled as continuous variables, using generalized linear models (GLM). For outcomes where more than 15% of the sample had zero values, we used two-part models (TPMs), with a probit model to assess the likelihood of a non-zero outcome and GLM to assess levels of the outcome for those with non-zero outcomes. We determined the appropriate distributional form using a modified Park test.[16] The modified Park test examines the heteroscedasticity of the error term to ascertain the appropriate distribution; we ran the test using all observations for outcomes with GLMs and using only non-zero observations for outcomes with TPMs. The two quality-of-care measures were modelled as binary measures.[17] All models used standard errors clustered at the state-level and included a log link.

Appendix Exhibit D.4.2. Model Specifications for Medicare Outcome Measures, PY 4 (2021)

Outcome	ACO	State
Total Medicare spending	Gamma	Gamma
Acute care stays	TPM Inverse Gaussian	TPM Inverse Gaussian
Acute care days	TPM Inverse Gaussian	TPM Inverse Gaussian
ED visits	TPM Inverse Gaussian	TPM Inverse Gaussian
Primary E&M visits	Poisson	Poisson
Specialist E&M visits	Gamma	Gamma
SNF stays	TPM Inverse Gaussian	TPM Inverse Gaussian
SNF days	TPM Poisson	TPM Gamma
HH visits	TPM Inverse Gaussian	TPM Inverse Gaussian
HH episodes	TPM Inverse Gaussian	TPM Inverse Gaussian
Hospice days	TPM Poisson	TPM Poisson
Imaging, procedures, tests	Poisson	Poisson
AWVs	Logit	Logit
ACS hospitalizations	Logit	Logit
Unplanned 30-day readmissions	Logit	Logit

NOTE: TPM = Two-part model.

[16] Manning W, Mullahy J. Estimating Log Models: To Transform or Not to Transform? J Health Econ. 2001;20:461-494.

[17] A Medicare beneficiary is eligible for a single wellness visit annually. For ACSC hospitalizations, unplanned 30-day hospital readmissions, and unplanned hospitalizations 30-day post SNF readmissions, few beneficiaries had events (4.9% for ACS hospitalizations, 16.6% for 30-day readmissions, and 18.9% for 30-day post-SNF readmissions), and fewer had more than one event. We chose to model these as binary measures, whether or not the beneficiary had the event during the year. We tested that our conclusions were robust to modelling the latter three measures as counts.

Post-estimation calculations. We performed the following four post-estimation calculations:

- Because we used nonlinear models for the outcome variables, we employed the approach suggested by Puhani (2012) to express the DID $\boldsymbol{\delta_1}$ coefficient in Equation D.1 and D.2 as the estimated outcome for the treated VTAPM group relative to its expected outcome absent the treatment.[18] We calculated these results using post-estimation predictions, computing the marginal effect for all treated beneficiaries and subtracting the marginal effect for these beneficiaries with the DID interaction term set to zero.[19] We computed confidence intervals using the delta method.[20]
- We expressed the estimated impact as a percent of the expected outcome for the VTAPM group in a given PY absent the model. We computed the percentage change from the DID coefficient for outcomes estimated with log-linear models.[21] For outcomes estimated with two-part models, we computed the predicted level of outcomes for VTAPM beneficiaries in the PY absent VTAPM incentives by summing the adjusted mean for the comparison group in the PY and the adjusted difference between the VTAPM and the comparison group in the BYs.[22] We obtained the latter from the average predicted and adjusted outcomes for the VTAPM and comparison group in the BYs, which we calculated post-estimation.
- We used post-estimation marginal effects to predict the average adjusted outcomes (such as the conditional means) for the VTAPM and comparison group in the baseline period (all BYs) and PY. We report these for the VTAPM and comparison group in **Appendix F**, alongside the impact estimates to understand if the latter were driven by improved performance for the VTAPM group or deteriorating performance for the comparison group or both.
- Finally, we expressed impact estimates for measures of spending and utilization from our annual models as per beneficiary per year (PBPY) and per 1,000 BPY, respectively.

[18] Puhani P. The Treatment Effect, the Cross Difference, and the Interaction Term in Nonlinear 'Difference-in-Differences' Models. Econ Lett. 2012;115()1:85-87.

[19] Karaca-Mandic P, Norton EC, Dowd B. Interaction Terms in Nonlinear Models. Health Serv Res. 2012;47(1pt1):255-274.

[20] Dowd BE, Greene WH, Norton EC Computation of Standard Errors. Health Serv Res. 2014;49(2):731-750.

[21] For a log-linear model with a dummy variable D: $\ln[E(Y)] = a + bX + cD + \varepsilon$; if D switches from 0 to 1, then the percentage impact of D on Y is $100[\exp(c) - 1]$, where c is the coefficient on the dummy variable.

[22] McWilliams J, Michael LA, Hatfield ME, Chernew ME, Landon BE, Schwartz AL. Early Performance of Accountable Care Organizations in Medicare. NEJM. 2016;374(24):2357-2366.

Appendix D.5. Assessment of Common Baseline Trends

A key assumption of the DID design is that the VTAPM and the comparison group had similar trends in outcomes during the BYs before the start of VTAPM. This assumption of common trends allows the comparison group to establish a reliable representation of the VTAPM group in a given PY in the absence of the VTAPM model. We tested this assumption using two methods (see **Appendix Exhibits F.19** and **F.20** for results from these two methods):

- Equation D.3 shows the specification of a model to estimate the average marginal effect for VTAPM in BY 1 relative to BY 3. We assessed whether the coefficient ϑ_{-2} for the leading interaction term in BY 1 was significantly different from zero ($p<0.05$). If this was significantly different, the assumption of common trends did not hold.

Equation D.3: Test of common trends via estimation of VTAPM's average marginal effect in BY 1 over BY 3

$$E(Y_{ijkt}) = \alpha_0 + \beta_1 VTAPM + \gamma_1 BY2 + \gamma_1 BY1 + \gamma_1 PY + \theta_{-2} VTAPM_j * BY1_t + \theta_1 VTAPM_j * PY_t + \theta_1 BENE_{ijkt} + \varphi_2 CNTY_j + \varepsilon_{ijkt}$$

- To mitigate the effect of non-common trends between the VTAPM and comparison groups, we included a term $\sigma 1\ VTAPM * YEAR$ (linear year*treatment interaction term) in our DID models (see Equations D.1 and D.2). As an additional check for common trends, we assessed whether the coefficient σ_1 for the interaction term was significantly different from zero ($p<0.05$).

Appendix D.6. Net Impact Estimation

In addition to estimating the gross impact of the VTAPM model on total Medicare Parts A and B spending, we also calculate the net spending impact of the VTAPM by accounting for incentive payments from CMS for shared savings or losses for VTAPM and comparison practitioners in the BYs and PYs. Incentive payments estimated for the treatment and comparison group populations include the following:

- **Treatment providers, PY**: MAPCP incentives received during the PY + shared savings/losses for treatment practitioners in the PY.
- **Treatment providers, BYs**: MAPCP incentives received during the BYs + shared savings/losses for treatment practitioners who participated in the SSP, Pioneer, or NGACO models in the BYs.
- **Comparison providers, PY**: Shared savings/losses paid to comparison practitioners who participated in the SSP, Pioneer, or NGACO in the PY.
- **Comparison providers, BYs**: Shared savings/losses paid to comparison practitioners who participated in the SSP, Pioneer, or NGACO models in the BYs.

The $9.5 million in Medicare start-up funding provided by CMS in the 2017 cooperative payment agreement is not included in the net spending estimation. **Appendix Exhibit D.6.1** shows the total PBPY dollar amount of CMS incentive payment amounts that are included in the net impact estimation for the ACO- and state-level analyses in PY 4.

Appendix Exhibit D.6.1. CMS Incentive Payments for VTAPM and Comparison Practitioners

		PY 1		PY 2		PY 3		PY 4	
		BYs	PY	BYs	PY	BYs	PY	BYs	PY
ACO	**VTAPM**	$102.06	$240.05	$102.06	$160.99	$107.19	$263.28	$110.71	$131.29
	Comparison	$40.35	$52.71	$32.74	$48.44	$24.92	$100.59	$36.95	$109.44
State	**Vermont**	$102.49	$168.59	$102.49	$140.05	$107.10	$194.27	$111.09	$122.74
	Comparison	$16.64	$30.04	$16.75	$44.32	$17.01	$44.60	$17.20	$41.33

NOTE: All estimates are presented per beneficiary per year in 2021 USD. Total net incentive payments for VTAPM in each PY are the treatment group's net incentive payments (PY payments minus BY payments), minus the comparison group's net incentive payments (PY payments minus BY payments).

To estimate PBPY incentives for VTAPM providers in the baseline and comparison providers in the baseline and PYs, we used the following methods:

- For the ACO-level analysis, we identified beneficiaries attributed by the ACO-level concurrent alignment receiving a meaningful level of care during a year from providers participating in SSP, Pioneer, or NGACO models based on the CMS MDM, then applied the PBPY incentive costs associated for those ACOs using publicly available data on annual shared savings/losses incurred by providers in CMS models.
- For the state-level analysis, we identified beneficiaries attributed by the state-level concurrent alignment who were also attributed to SSP, Pioneer, or NGACO models based on the CMS MDM file, then linked the data to publicly available data on annual shared savings/losses for those ACOs at the beneficiary level.

We weighted PBPY estimates for both the ACO- and state-level analyses using the analytic EB weights. To calculate the net incentive amount, we subtracted the PY-BY difference in the comparison group from the PY-BY difference in the treatment group. The net incentive amount is subtracted from the gross Medicare spending estimate to calculate the net Medicare spending estimate presented in the report.

Appendix D.7. Effect of the UVM Health Network Cyberattack on Medicare Claims

To determine the potential effect of the 2020 cyberattack on the UVM Health Network on our PY 4 (2021) Medicare analyses, we analyzed claims for Vermont Medicare beneficiaries from 2019 through 2021 for Vermont beneficiaries. We looked at total Medicare spending from all Vermont practitioners (regardless of whether the practitioner was in the model), as well as spending broken out by practitioner participation in the model, to assess potential trends driven by the cyberattack in early 2021.

First, we looked at monthly average and total spending for Vermont Medicare beneficiaries by model participation status of the practitioner providing care. Regardless of model participation status for the practitioner, Medicare spending for Vermont Medicare beneficiaries decreased in 2020 from 2019 spending levels (**Appendix Exhibit D.7.1**). However, spending on care provided by VTAPM practitioners continued to decline in 2021, while spending on care provided by non-VTAPM practitioners in 2021 increased and exceeded 2019 spending.

Appendix Exhibit D.7.1. Total Medicare Spending for Vermont Medicare Beneficiaries, 2019-2021

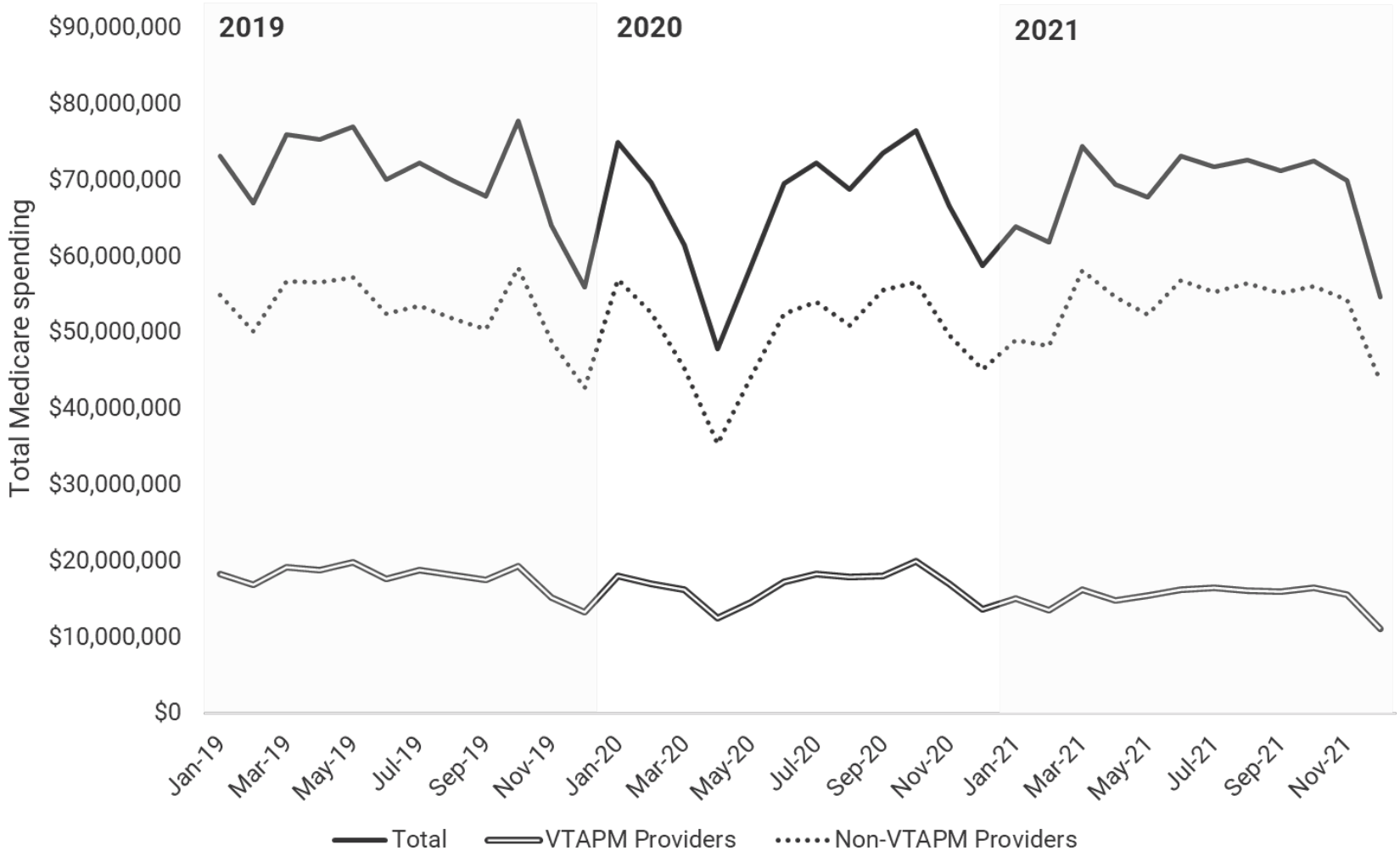
	All Vermont Practitioners		VTAPM Practitioners		Non-VTAPM Practitioners	
	Monthly Average	Total	Monthly Average	Total	Monthly Average	Total
2019	$70,518,064	$846,216,773	$17,715,205	$212,582,454	$52,802,860	$633,634,318
2020	$66,540,567	$798,486,804	$16,672,688	$200,072,257	$49,867,879	$598,414,547
2021	$68,578,815	$822,945,784	$15,247,199	$182,966,392	$53,331,616	$639,979,392

SOURCE: NORC analysis of 2019-2021 Medicare claims.

Next, we considered Medicare spending monthly, by model participation status of the practitioner providing care (**Appendix Exhibit D.7.2**). When considering Medicare spending trends in late 2020 into early 2021, we do not see a clear effect that can be attributed to the cyberattack on the UVM Health Network. Based on our qualitative interviews, we know that delayed care, delayed claims processing, and forgone or unbilled care were common in the months following the cyberattack in October 2020; however, we do not see this clearly reflected in the data as of early 2021. Further complicating our understanding of these trends is that Vermont saw its highest COVID-19 caseload to date in early 2021; similar to previous surges, we would expect to see lower spending and utilization at that time.

There are also fairly large decreases in December of each year, followed by an increase in the first two months of the following year, which may reflect potential delays in care during the holiday season. Thus, we expect that the trends in early 2021 are due to various factors, including the worsening COVID-19 PHE, potential delayed effects from the cyberattack, and ongoing changes in care-seeking behavior. Given the uncertainty in key drivers of trends during 2021 and no clear effect of the cyberattack on the UVM Health Network, we ultimately decided not to pursue a sensitivity analysis specific to the cyberattack in PY 4 (2021).

Appendix Exhibit D.7.2. Monthly Medicare Spending for Vermont Medicare Beneficiaries, 2019–2021



Appendix D.8. Sensitivity Analyses

We conducted the following sensitivity tests to assess the robustness of our estimates to different assumptions in PY 4:

- **Include CY 2017 as baseline** – The scale and intensity of Vermont's delivery system reform initiatives in the baseline period may have contributed to a permanent structural change in the long-term Medicare spending trajectory. The impact of these initiatives may have persisted into the model's "ramp-up" year (2017) and performance periods. Inclusion of 2017 as a BY allows us to account for some of the delayed impacts of the baseline period initiatives. Additionally, the Medicare ACO initiative was not implemented until 2018, so, although 2017 was a model PY, no Medicare ACO initiative activities were in place. For this sensitivity analysis, we include CY 2017 and consider it in the model as a fourth year in the baseline period.
- **No COVID-19 PHE variable in EB weight** – In estimation of the EB weights, we excluded the COVID-19 PHE covariate (number of cumulative deaths per 100,000 population in PY 4) from the balancing model.
- **Cumulative COVID-19 deaths and COVID-19 vaccination rate included in weight** – In estimation of the EB weights, we included the COVID-19 PHE covariate (number of cumulative deaths per 100,000 population in PY 4) and county-level COVID-19 vaccination rate in PY 4 in the balancing model.
- **Cap spending at 99th percentile** – We capped the Medicare spending outcome at the 99th percentile to assess the robustness of the impact estimates to the possibility of random variation in the highest spenders between the VTAPM and comparison group.
- **Alternative model distribution** – Instead of using the distribution recommended by the Park test, we used the second-best distribution, which was Poisson for both the ACO- and state-level analyses. This tests the robustness of our results to different distributional assumptions.
- **No linear interaction term** – We removed the linear interaction term from the DID model statement, which accounts for differences in the linear trend in the baseline period between the treatment and comparison groups.
- **Include upside ACO rate covariate** – We added a covariate to the DID model statement representing the percent of beneficiaries in a county who participated in an ACO with upside risk.
- **Include MA rate covariate** – We added a covariate to the DID model statement representing the percent of beneficiaries in a county who had one or more months of MA coverage.

Appendix Exhibits D.8.1 and D.8.2 present the findings from each of these analyses for PY 4. While we observe a moderate amount of variation from the results of the main DID model presented in this report, findings were overall similar to the main findings and showed no significant impact of VTAPM on total Medicare spending.

Appendix Exhibit D.8.1. Medicare ACO-Level PY 4: Sensitivity Analyses for Total Medicare Spending

	Baseline (2014–2016)		PY 4 (2021)							
					Difference-in-Differences					
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI	% Impact	p
Main spending model	$11,953	$12,731	$10,668	$12,653	-$1,207.28	-$1,285	-$78	-$2,597.86, $183.31	-9.36	0.153
Include CY 2017 as baseline	$12,032	$12,686	$11,210	$12,589	-$725.41	-$822	-$97	-$1,728.74, $277.93	-5.84	0.234
No COVID-19 PHE variable in EB weight	$11,922	$12,649	$10,431	$12,429	-$1,270.01	-$1,491	-$220	-$2,623.61, $83.59	-9.85	0.123
Cumulative COVID-19 deaths and COVID-19 vaccination rate included in weight	$11,879	$12,856	$10,540	$12,500	-$983.45	-$1,339	-$356	-$2,357.74, $390.85	-7.83	0.239
Cap spending at 99th percentile	$11,753	$11,751	$10,373	$11,516	-$1,144.06	-$1,380	-$235	-$2,343.33, $55.22	-9.16	0.117
Alternative model distribution	$10,921	$11,437	$10,101	$11,403	-$786.71	-$820	-$34	-$2,041.49, $468.07	-6.81	0.302
No linear interaction term	$12,114	$12,556	$11,807	$12,484	-$235.37	-$307	-$72	-$752.11, $281.36	-1.97	0.454
Include upside ACO rate covariate	$11,894	$12,798	$10,482	$12,718	-$1,332.68	-$1,412	-$80	-$2,832.99, $167.63	-10.2	0.144
Include MA rate covariate	$11,826	$12,881	$10,667	$12,793	-$1,071.85	-$1,159	-$88	-$2,427.90, $284.20	-8.50	0.194

NOTE: Impacts are PBPY, in 2021 USD. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group, respectively, between PY 4 and the baseline; cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.

Appendix Exhibit D.8.2. Medicare State-Level PY 4: Sensitivity Analyses for Total Medicare Spending

	Baseline (2014–2016)		PY 4 (2021)							
					Difference-in-Differences					
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI	% Impact	p
Main spending model	$11,869	$12,578	$9,920	$12,374	-$1,745.05**	-$1,949	-$204	-$3,062.99, -$417.12	-13.2	0.029
Include CY 2017 as baseline	$11,999	$12,511	$10,803	$12,276	-$960.55*	-$1,196	-$235	-$1,872.72, -$48.38	-7.73	0.083
No COVID-19 PHE variable in EB weight	$11,831	$12,578	$10,059	$12,135	-$1,329.46*	-$1,772	-$443	-$2,580.55, -$78.36	-10.4	0.080
Cumulative COVID-19 deaths and COVID-19 vaccination rate included in weight	$11,862	$12,576	$10,010	$12,327	-$1,603.29**	-$1,852	-$249	-$2,919.68, -$286.89	-12.2	0.045
Cap spending at 99th percentile	$11,425	$12,028	$9,476	$11,692	-$1,612.95**	-$1,949	-$336	-$2,794.57, -$431.34	-12.8	0.025
Alternative model distribution	$10,952	$11,529	$9,388	$11,356	-$1,391.51*	-$1,564	-$173	-$2,709.40, -$73.62	-11.5	0.082
No linear interaction term	$12,043	$12,392	$11,213	$12,197	-$635.23***	-$830	-$195	-$1,008.60, -$261.86	-5.25	0.005
Include upside ACO rate covariate	$12,297	$12,138	$11,237	$11,954	-$875.84	-$1,060	-$184	-$2,250.35, $498.66	-7.01	0.295
Include MA rate covariate	$11,807	$12,647	$9,883	$12,440	-$1,717.29**	-$1,924	-$207	-$3,025.89, -$408.68	-13.0	0.031

NOTE: Impacts are PBPY, in 2021 USD. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group between PY 4 and the baseline; cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.

We also conducted sensitivity analyses to test the impact of the inclusion of COVID-19 PHE-specific variables in PY 4 (2021) as covariates in our main DID model. We tested four variations as part of our sensitivity testing, including individual-level covariates, area-level covariates, and a combination of both. All variables were coded as non-zero values in the PY 4 (2021) data and zeroes for all prior years. We tested the inclusion of the following covariates in the DID model:

- **Flag for COVID-19 diagnosis** – An individual-level flag indicating that a beneficiary had a diagnosis of COVID-19 in their Medicare claims.
- **Percent vaccinated against COVID-19 covariate** – This is the estimated percentage of the population vaccinated against COVID-19 in the county.
- **Cumulative number of deaths per 100,000 population** – A county-level flag that indicates the cumulative number of deaths per 100,000 population in a beneficiary's county in PY 4 (2021).
- **Flag for COVID-19 diagnosis *and* number of cumulative deaths per 100,000 population *and* percent vaccinated against COVID-19 covariate** – The final sensitivity test includes the covariate for individual-level flag for COVID-19 diagnosis, the covariate for county-level cumulative number of deaths per 1,000 in the same DID model, and the covariate for the percent of a beneficiary's county that was vaccinated against COVID-19 in PY 4 (2021).

Appendix Exhibits D.8.3 and D.8.4 present the findings from each of these COVID-19 PHE-related sensitivity analyses for PY 4 for the ACO- and state-level impact analyses. While we observe a moderate amount of variation from the results of the main DID model presented in this report, sensitivity findings were overall similar to the main findings (that is, in the same direction and of a relatively similar magnitude) and do not change our overall interpretation of the main findings.

Appendix Exhibit D.8.3. Medicare ACO-Level PY 4: Sensitivity Tests of COVID-19 PHE Covariates for Total Medicare Spending

	Baseline (2014–2016)		PY 4 (2021)							
					Difference-in-Differences					
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI	% Impact	p
Main spending model	$11,953	$12,731	$10,668	$12,653	-$1,207.28	-$1,285	-$78	-$2,597.86, $183.31	-9.36	0.153
+ COVID-19 Diagnosis Covariate	$11,922	$12,690	$11,085	$12,960	-$1,107.13	-$837	$270	-$2,466.99, $252.72	-8.84	0.181
+ Percent Vaccinated against COVID-19 Covariate	$11,938	$12,748	$10,891	$12,672	-$970.18	-$1,047	-$76	-$2,203.56, $263.20	-8.10	0.196
+ Cumulative Deaths Covariate	$11,948	$12,737	$10,648	$12,657	-$1,221.05	-$1,300	-$80	-$2,619.92, $177.81	-9.41	0.151
+ COVID-19 Diagnosis Covariate + Cumulative COVID-19 Deaths Covariate + Percent Vaccinated against COVID-19 Covariate	$11,898	$12,717	$11,305	$12,989	-$863.65	-$593	$272	-$2,075.88, $348.59	-7.44	0.241

SOURCE: NORC analysis of Medicare claims.

NOTE: Impacts are PBPY, in 2021 USD. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. Cumulative deaths covariate is the cumulative number of deaths per 100,000 population. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group between PY 4 and the baseline; cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.

Appendix Exhibit D.8.4. Medicare State-Level PY 4: Sensitivity Tests of COVID-19 PHE Covariates for Total Medicare Spending

	Baseline (2014–2016)		PY 4 (2021)							
					Difference-in-Differences					
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI	% Impact	p
Main spending model	$11,869	$12,578	$9,920	$12,374	-$1,745.05**	-$1,949	-$204	-$3,062.99, -$417.12	-13.2	0.029
+ COVID-19 Diagnosis Covariate	$11,823	$12,544	$10,439	$12,701	-$1,541.73*	-$1,384	$157	-$2,846.07, -$237.40	-12.1	0.052
+ Percent Vaccinated against COVID-19 Covariate	$11,872	$12,578	$10,289	$12,364	-$1,368.63*	-$1,583	-$214	-$2,567.26, -$169.99	-11.4	0.060
+ Cumulative Deaths Covariate	$11,866	$12,587	$9,846	$12,366	-$1,799.29**	-$2,020	-$221	-$3,143.96, -$454.61	-13.2	0.028
+ COVID-19 Diagnosis Covariate + Cumulative COVID-19 Deaths Covariate + Percent Vaccinated against COVID-19 Covariate	$11,821	$12,554	$10,633	$12,684	-$1,317.63*	-$1,188	$130	-$2,613.21, -$22.06	-10.8	0.094

SOURCE: NORC analysis of Medicare claims.

NOTE: Impacts are PBPY, in 2021 USD. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. Cumulative deaths covariate is the cumulative number of deaths per 100,000 population. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group between PY 4 and the baseline; cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.

Appendix D.9. Medicaid Data Quality Assessment

In constructing the VTAPM Medicaid measures, we assessed the quality of the Medicaid data using CMS's Data Quality (DQ) Atlas. The DQ Atlas is "an interactive, web-based tool that helps policy makers, analysts, researchers, and other stakeholders explore the quality and usability of the Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF) to determine whether the data can meet their analytic needs. These needs include the ability to conduct insightful, methodologically sound analyses of key Medicaid and Children's Health Insurance Program (CHIP) topics such as enrollment, claims, expenditures, and service use."[23] The DQ Atlas examines each state's TAF data and ranks data elements by level of concern: low concern, medium concern, high concern, unusable, or unclassified.

We use claims from four T-MSIS tables for measure construction: inpatient, long-term care, other services, and pharmacy. According to the DQ Atlas, linking claims and expenditures (spending) to beneficiaries and providers between these tables is of low concern, so we can reliably create measures that use claims for more than one table. Medicaid enrollment benchmarking and claim volume for three of the tables (inpatient, long-term care, and pharmacy) are also rated as low concern, indicating that the files are complete enough for reliable analysis; claims volume for the other services table is of medium concern, indicating that some data may be missing.

Appendix Exhibit D.9.1 summarizes relevant notes from the DQ Atlas and the status of these measures in this report. Many of the data elements we considered using were rated as high concern or unusable, including spending, category of service code, beneficiary zip code and eligibility group code, and inpatient hospital type and facility characteristics. Additionally, in subsequent data quality checks, we found that the revenue code field, which typically would be used to designate ED visits, was inconsistently populated on Vermont T-MSIS files. Thus, in this report we do not include outcomes for the Medicaid population that reflect spending, hospitalizations, or ED visits. Data elements required to calculate the three SUD measures (such as procedure and diagnosis codes), were rated as low concern in the DQ Atlas; thus, those measures are included in this report.

Appendix Exhibit D.9.1. Data Quality Notes for Proposed Medicaid Outcomes

Measure	Data Quality Notes	Status
Hospitalizations	▪ The *hospital type* field is unusable in the monthly inpatient TAF claims files	Not included in AR3; exploring options for future reports
ED visits		Not included in AR3; exploring options for future reports
Total Medicaid spending	▪ The completeness and quality of the TAF spending data is of high concern ▪ Elevated percentage of missing, zero, or negative payment amounts on TAF FFS claims	Not included in AR3; exploring options for future reports

[23] https://www.medicaid.gov/dq-atlas/landing/resources/about

Measure	Data Quality Notes	Status
Medicaid members with a substance use disorder (SUD) diagnosis	▪ 100% of claims files records have valid ICD-10 diagnosis codes and procedure codes	Included in AR3
Medicaid members receiving any SUD treatment	▪ No missingness in the type of service fields	Included in AR3
ED visits for SUD services	▪ Little to no missing or invalid admission and discharge dates	Included in AR3

SOURCE: NORC analysis of the DQ Atlas.

For future reports, we plan to explore the feasibility of using an alternative methodology to define hospitalization and ED visit outcomes that does not rely on the hospital type field. Instead, we aim to use a combination of revenue codes, HCPCS codes, type of service codes, and place of service codes.

Appendix E. Supporting Documentation for Chapter 2

Appendix Exhibit E.1. Payer ACO Initiatives by Health Service Area in PY 4 (2021)

Health Service Area	Home Hospital	Payer ACO Initiatives				
		Medicare	Medicaid	BCBSVT QHP	BCBSVT Primary	MVP QHP
Brattleboro	Brattleboro Memorial Hospital	✓	✓	✓	✓	✓
Bennington	Southwestern Vermont Medical Center	✓	✓	✓	✓	✓
Berlin	Central Vermont Medical Center	✓	✓	✓	✓	✓
Burlington	University of Vermont Medical Center	✓	✓	✓	✓	✓
Lebanon	Dartmouth-Hitchcock Medical Center		✓	✓	✓	✓
Middlebury	Porter Medical Center	✓	✓	✓	✓	✓
Morrisville	Copley Hospital		✓			✓
Newport	North Country Hospital		✓	✓	✓	✓
Randolph	Gifford Medical Center		✓			✓
Rutland	Rutland Regional Medical Center	✓	✓		✓	✓
Springfield	Springfield Hospital		✓	✓	✓	✓
St. Albans	Northwestern Medical Center	✓	✓	✓	✓	✓
St. Johnsbury	Northeastern Regional Hospital		✓		✓	✓
Townsend	Grace Cottage					
Windsor	Mt. Ascutney Hospital	✓	✓	✓	✓	

SOURCE: OneCare Vermont's FY 2022 Budget Submission (October 1, 2021).

Appendix Exhibit E.2. Participation by Provider Type, PY 4 (2021)

Provider Type	Total in Model's Provider Network as of PY 4 (2021)
Hospital	14
FQHCs	9
Primary Care Practices	127
Specialty Care Practices	274
Home Health and Hospice	10
SNFs	22
Designated Mental Health Agencies & Specialized Service Agencies	15
Other	6

SOURCE: OneCare Vermont's 2021 Budget Presentation. October 28, 2020, available at https://gmcboard.vermont.gov/sites/gmcb/files/documents/2021%20OneCare%20Budget%20Presentation%20Final.pdf

Appendix Exhibit E.3. Practitioner Participation by VTAPM ACO Initiative and County

	Medicare		Medicaid		Commercial	
	Participants	Eligible Non-Participants	Participants	Eligible Non-Participants	Participant	Eligible Non-Participants
Addison	136	57	144	300	144	300
Bennington	245	96	212	489	212	489
Caledonia	2	194	153	361	153	361
Chittenden	1,646	496	1,653	2,937	1,653	2,937
Essex	-	6	6	15	6	15
Franklin	174	48	164	321	164	321
Grand Isle	18	6	18	18	18	18
Lamoille	4	113	107	264	107	264
Orange	-	113	105	236	105	236
Orleans	-	140	72	255	72	255
Rutland	284	121	283	570	283	570
Washington	383	134	375	735	375	735
Windham	278	161	257	697	257	697
Windsor	116	153	172	776	172	776
Non-Vermont	38	-	1,120	-	1,120	-

SOURCE: NORC analysis of VTAPM ACO Provider Lists, Medicare Professional FFS claims, and CMS Public Use File (PECOS & NPPES).

NOTE: We used the VTAPM Provider Files to identify the VTAPM ACO participants. We identified the eligible non-participants based on their specialty designation; non-participants needed to have one or more of the specialty designations held by the participants. For the Medicare ACO participants and eligible non-participants, we used Medicare claims to measure the volume of services provided in each county by the practitioners and attributed the practitioners to the county in which they provided the plurality of the services. We used specialty codes in NPPES to identify non-participating practitioners who were eligible to participate in the Medicaid and BCBS ACO initiatives; NORC did not have access to usable Medicaid and BCBS claims data to validate the eligibility criteria. We used a combination of PECOS and NPPES data to attribute Medicaid and BCBS ACO participants and eligible non-participants to a specific Vermont county. Medicaid and commercial participants have 100% overlap in their individual physician practitioner lists.

Appendix Exhibit E.4. Practice Participation by Practice Type and Practitioner Participation by Specialty Designation

	Performance Year 4						
		VTAPM Participants					
			VTAPM Participants Participating in…				
	Total	All VTAPM Participants	All-Payer Initiatives	Medicare ACO	Medicaid ACO	Commercial ACO	Non-Participants
Practices and Health Centers							
Practices (TIN)	966	92	59	62	89	89	874
Critical Access Hospitals	8	7	2	2	7	7	1
Federally Qualified Health Centers	49	43	20	20	23	23	6
Rural Health Centers	9	8	0	0	8	8	1
Practitioners (NPI)							
All Practitioners Affiliated with Eligible Practices	6,672	5,173	2,992	3,324	4,841	4,841	1,499
Primary Care Specialty	2,411	2,021	1,227	1,333	1,915	1,915	390
Non-Physician Primary Care Specialists	1,272	1,050	635	701	984	984	222
Eligible Specialists	639	549	346	374	521	521	90
Other§	3,622	2,603	1,419	1,617	2,405	2,405	1,019

SOURCE: Analysis of Medicare provider and claims data by NORC.

NOTE: §Other represents attribution-ineligible practitioners. VTAPM participants include all practices and practitioners listed in the VTAPM ACO Provider Files. Eligible non-participants are practitioners with one or more eligible specialty designations who billed Medicare for services rendered within Vermont in the PY.

Appendix Exhibit E.5. Practice Participation in the VTAPM Medicare ACO Initiative

	Performance Year 4			
	Medicare Attribution-Eligible Practices			
	Total (Excludes Preferred Practices) (N)	Participants (N)	Non-Participants (N)	Preferred Practices (N)
Practices and Health Centers				
Practices (TIN)	220	30	190	27
CAHs	8	2	6	-
FQHCs	41	15	26	-
RHCs	8	0	8	-
Practice Size: 1-6 Practitioners	188	16	172	11
Practice Size: 6-30 Practitioners	62	17	45	5
Practice Size: 31+ Practitioners	25	14	11	-
Prior Medicare SSP Experience	92	36	56	12

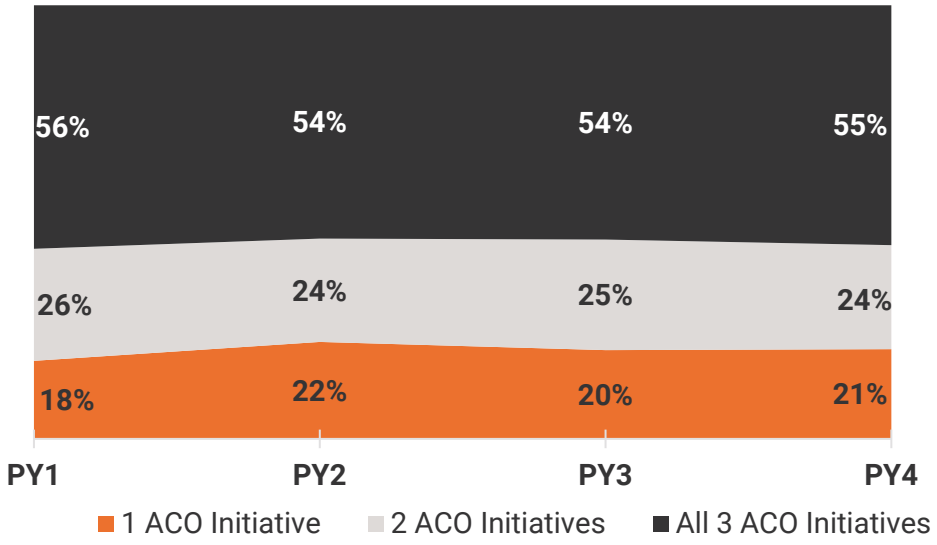
SOURCE: Analysis of Medicare provider and claims data by NORC.

NOTE: We used the VTAPM Provider Files to identify the VTAPM ACO participants. We identified the eligible non-participants based on their specialty designation; non-participants needed to have one or more of the specialty designations held by the participants. For the Medicare ACO participants and eligible non-participants, we used Medicare claims to measure the volume of services provided in each county by the practitioners and attributed the practitioners to the county in which they provided the plurality of the services. Preferred practitioners are selected by the VTAPM ACO for their ability to contribute to the VTAPM ACO's success, but their patient panels do not qualify for attribution to the Medicare ACO initiative, and they are not required to participate in quality reporting. Definition from: https://www.jonesday.com/en/insights/2015/04/hhs-announces-next-generation-aco-model-of-payment-and-care-delivery.

Appendix Exhibit E.6. Vermont, VTAPM, and Scale Target Populations by Payer, PY 4

Payer	2021 Vermont Population	Scale Target Denominator	Population Participating in Scale Target ACO Initiatives
Medicare	124,021	116,270	62,392 (54%)
Medicaid	146,904	141,274	111,532 (79%)
Commercial: Self-Insured	159,147	159,147	35,052 (22%)
Commercial: Fully Insured	133,622	86,138	32,798 (38%)
Total	645,570	530,469	241,774 (46%)

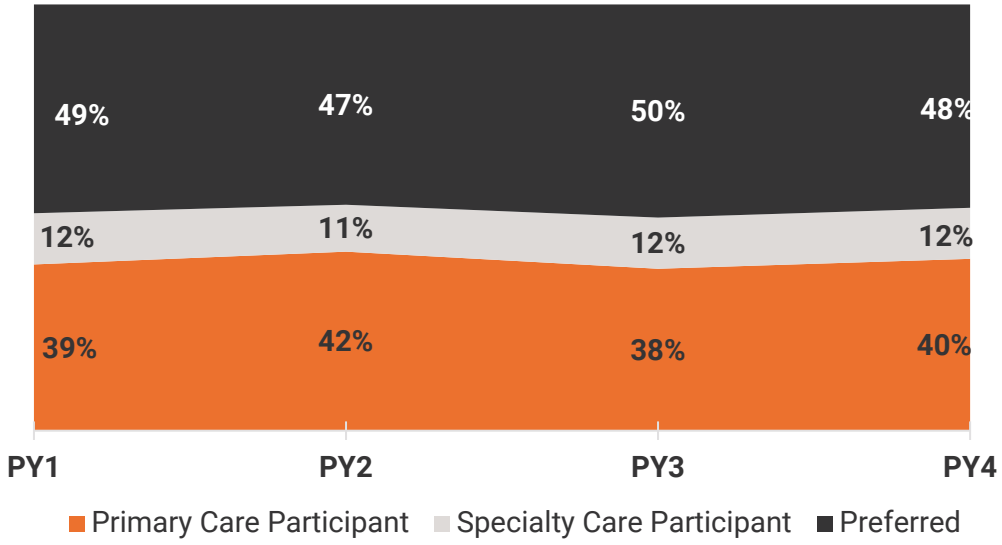
Appendix Exhibit E.7. Practitioner Participation in ACO Payer Initiatives, PY 1–PY 4



SOURCE: OneCare 2021 Provider Network (Appendix 2, FY 2021 budget; October 2021); PY 2021 Medicare Provider List (October 2021).

NOTE: All OneCare contracted participant and preferred practitioners are shown in this exhibit. Numbers may not add to 100% due to rounding.

Appendix Exhibit E.8. Model Practitioners by Specialty, PY 1–PY 4



SOURCE: OneCare 2021 Provider Network (Appendix 2, FY 2021 budget; October 2021); PY 2021 Medicare Provider List (October 2021); NPPES.

NOTE: All OneCare contracted participant and preferred practitioners are shown in this exhibit. Participant practitioners can attribute beneficiaries to the model; preferred practitioners cannot.

Appendix F. Supporting Documentation for Chapter 3

Appendix Exhibit F.1. PY 4 Medicare ACO-Level: Descriptive Characteristics of VTAPM and Weighted Comparison Beneficiaries

	Baseline Period						Performance Period	
	BY 3		BY 2		BY 1		PY 4	
	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison
Number of Beneficiaries	44,958	44,958	47,600	47,600	50,811	50,811	53,115	53,115
Total Person-Months	530,415	530,415	560,437	560,437	599,540	599,540	627,189	627,189
Mean Months of Alignment ± SD	11.8 ± 1.2	11.8 ± 1.2	11.8 ± 1.3	11.8 ± 1.3	11.8 ± 1.2	11.8 ± 1.2	11.8 ± 1.2	11.8 ± 1.2
Mean Age ± SD	71.5 ± 13.0	71.5 ± 13.0	71.7 ± 12.8	71.6 ± 12.9	71.7 ± 12.6	71.7 ± 12.7	72.5 ± 11.8	72.5 ± 11.9
Gender (%)								
Male	43.0	43.0	43.1	43.1	43.3	43.3	43.7	43.7
Race/Ethnicity (%)								
White	96.2	96.2	95.7	95.7	95.3	95.3	93.6	93.6
Black	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4
Hispanic	0.8	0.8	0.8	0.8	0.7	0.7	0.8	0.8
Asian	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.7
Other	2.1	2.1	2.5	2.5	3.0	3.0	4.5	4.5
Disability/ESRD (%)								
Disability	18.3	18.3	17.8	17.8	17.4	17.4	13.8	13.8
ESRD	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Coverage (%)								
Any Dual Eligibility	33.7	33.3	33.0	33.0	32.1	31.3	25.0	24.8
Any Part D Coverage	75.3	75.3	82.3	82.2	83.3	83.1	83.6	83.5
Chronic Conditions								
Mean No. of Chronic Conditions ± SD	4.2 ± 3.3	4.2 ± 3.3	4.2 ± 3.3	4.2 ± 3.4	4.2 ± 3.4	4.2 ± 3.4	4.2 ± 3.5	4.2 ± 3.5
Alzheimer's/Dementia (%)	6.5	6.5	6.4	6.4	6.3	6.3	6.2	6.2
Chronic Kidney Disease (%)	11.4	11.4	11.8	11.8	13.1	13.1	17.7	17.7
COPD (%)	9.8	9.8	9.8	9.8	10.1	10.1	8.4	8.4
Congestive Heart Failure (%)	8.7	8.7	8.5	8.5	8.5	8.5	8.8	8.8
Diabetes (%)	22.4	22.4	22.1	22.1	21.5	21.5	20.4	20.4
Ischemic Heart Disease (%)	22.0	22.0	21.7	21.7	21.8	21.8	21.3	21.3

	Baseline Period						Performance Period	
	BY 3		BY 2		BY 1		PY 4	
	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison
Depression (%)	20.3	20.3	20.2	20.2	20.6	20.6	19.6	19.6
RA/OA (%)	26.3	26.3	27.0	27.0	28.2	28.2	29.4	29.4
Stroke/TIA (%)	2.5	2.5	2.4	2.4	2.4	2.4	2.2	2.2
Cancer (%)	7.7	7.6	7.6	7.6	7.6	7.6	7.2	7.2
Mortality (%)								
Death in Reference Period	3.7	3.7	3.9	3.9	3.7	3.7	3.6	3.6
Community Characteristics								
Median Income ($ ± SD)	58,815 ± 13,384	62,240 ± 20,117	58,822 ± 13,444	62,495 ± 20,965	59,099 ± 13,649	62,476 ± 20,682	59,742 ± 14,092	62,536 ± 21,325
Below Poverty Line (% ± SD)	11.2 ± 6.1	11.2 ± 5.9	11.2 ± 6.1	11.1 ± 5.9	11.2 ± 6.1	11.1 ± 5.9	11.0 ± 6.1	11.3 ± 6.4
Bachelor's Degree or Higher (% ± SD)	37.6 ± 13.3	34.4 ± 15.6	37.6 ± 13.3	34.7 ± 15.8	37.7 ± 13.4	34.6 ± 15.7	37.9 ± 13.6	36.9 ± 15.1
Unemployment (% ± SD)	4.9 ± 2.2	6.1 ± 3.4	4.9 ± 2.1	6.1 ± 3.4	4.9 ± 2.1	6.1 ± 3.5	4.9 ± 2.1	5.9 ± 4.1
Uninsured (% ± SD)	4.9 ± 2.0	9.5 ± 4.9	4.9 ± 2.0	9.5 ± 5.0	4.9 ± 2.0	9.5 ± 5.0	4.9 ± 2.1	11.0 ± 6.2
SSI (% ± SD)	6.0 ± 2.6	4.3 ± 2.7	6.0 ± 2.6	4.1 ± 2.7	6.0 ± 2.6	4.1 ± 2.7	5.9 ± 2.7	4.0 ± 2.9
Rurality (%)	70.6	66.1	70.4	67.0	69.1	65.9	67.9	67.2
Alignment-Eligible Providers (per 1,000)	2.7 ± 1.6	1.6 ± 1.4	2.7 ± 1.6	1.7 ± 1.5	2.7 ± 1.6	1.8 ± 1.5	3.1 ± 1.8	2.3 ± 1.8
Participation in Medicare ACOs and Other Innovation Center Initiatives (%)								
Pioneer/MSSP	88.9	24.3	82.9	32.8	73.5	41.9	0.4	82.6
FAI	0.0	0.6	0.0	1.0	0.0	1.0	0.0	0.3
IAH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CPC	0.0	1.1	0.1	1.4	0.0	1.4	0.2	5.2
BPCI	0.1	0.2	0.2	1.0	0.2	1.5	0.0	1.1
CJR	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
OCM	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0

NOTE: SD=standard deviation; ESRD=end-stage renal disease; COPD=chronic obstructive pulmonary disease; RA=rheumatoid arthritis; OA=osteoarthritis; TIA=transient ischemic attack; SSI=Supplemental Security Income; MSSP=Medicare Shared Savings Program; FAI=Financial Alignment Initiative; IAH=Independence at Home; CPC=Comprehensive Primary Care (including CPC Plus); BPCI=Bundled Payments for Care Improvement; CJR=Comprehensive Care for Joint Replacement; OCM=Oncology Care Model.

Appendix Exhibit F.2. PY 4 Medicare State-Level: Descriptive Characteristics of Vermont and Weighted Comparison Beneficiaries

	Baseline Period						Performance Period	
	BY 3		BY 2		BY 1		PY 4	
	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison
Number of Beneficiaries	79,313	79,313	78,840	78,840	81,885	81,885	83,529	83,529
Total Person-Months	934,831	934,831	927,865	927,865	965,023	965,023	985,703	985,703
Mean Months of Alignment ± SD	11.8 ± 1.2	11.8 ± 1.2	11.8 ± 1.3	11.8 ± 1.3	11.8 ± 1.3	11.8 ± 1.3	11.8 ± 1.2	11.8 ± 1.2
Mean Age ± SD	71.8 ± 13.0	71.7 ± 13.0	71.9 ± 12.8	71.8 ± 12.8	72.0 ± 12.5	71.9 ± 12.6	72.5 ± 11.8	72.5 ± 11.7
Gender (%)								
Male	42.9	42.9	43.5	43.5	43.7	43.7	43.8	43.8
Race/Ethnicity (%)								
White	96.4	96.4	95.9	95.9	95.5	95.5	93.8	93.8
Black	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Hispanic	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Asian	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6
Other	2.1	2.1	2.5	2.5	3.0	3.0	4.6	4.6
Disability/ESRD (%)								
Disability	17.9	17.9	17.5	17.5	17.0	17.0	14.0	14.0
ESRD	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Coverage (%)								
Any Dual Eligibility	34.3	33.9	33.3	33.2	32.5	31.7	26.3	26.0
Any Part D Coverage	76.3	76.2	82.5	82.3	83.4	83.2	83.9	83.7
Mean No. of Chronic Conditions ± SD	4.2 ± 3.3	4.2 ± 3.3	4.1 ± 3.3	4.1 ± 3.3	4.2 ± 3.4	4.2 ± 3.4	4.2 ± 3.5	4.2 ± 3.5
Alzheimer's/Dementia (%)	6.8	6.8	6.7	6.7	6.6	6.6	6.4	6.4
Chronic Kidney Disease (%)	10.9	10.9	11.4	11.4	12.5	12.5	16.7	16.7
COPD (%)	9.8	9.8	9.7	9.7	10.0	10.0	8.3	8.3
Congestive Heart Failure (%)	8.8	8.8	8.7	8.7	8.6	8.6	8.6	8.6
Diabetes (%)	22.5	22.5	22.2	22.2	21.7	21.7	20.4	20.4
Ischemic Heart Disease (%)	21.5	21.5	21.4	21.4	21.3	21.3	20.3	20.3
Depression (%)	19.6	19.6	19.6	19.6	20.2	20.2	19.4	19.4
RA/OA (%)	26.1	26.1	27.1	27.1	28.2	28.2	28.5	28.5
Stroke/TIA (%)	2.4	2.4	2.3	2.3	2.4	2.4	2.2	2.2
Cancer (%)	7.5	7.4	7.4	7.4	7.4	7.3	7.0	7.0

	Baseline Period						Performance Period	
	BY 3		BY 2		BY 1		PY 4	
	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison	VTAPM	Comparison
Mortality (%)								
Death in Reference Period	3.9	3.9	4.0	4.0	3.9	3.9	3.8	3.8
Community Characteristics								
Median Income ($ ± SD)	56,788 ± 14,134	59,676 ± 21,654	57,099 ± 14,225	60,146 ± 22,326	57,022 ± 14,257	59,357 ± 21,457	57,183 ± 14,342	60,341 ± 24,450
Below Poverty Line (% ± SD)	11.7 ± 6.0	12.0 ± 6.1	11.6 ± 6.0	11.9 ± 6.1	11.6 ± 6.0	12.0 ± 6.1	11.5 ± 5.9	12.3 ± 6.6
Bachelor's Degree or Higher (% ± SD)	35.8 ± 13.5	32.7 ± 16.2	36.1 ± 13.5	33.3 ± 16.4	36.0 ± 13.4	32.9 ± 15.9	35.9 ± 13.5	36.4 ± 15.9
Unemployment (% ± SD)	5.0 ± 2.2	6.4 ± 3.7	4.9 ± 2.2	6.4 ± 3.7	5.0 ± 2.2	6.4 ± 3.7	5.0 ± 2.2	6.2 ± 3.6
Uninsured (% ± SD)	5.3 ± 2.3	9.9 ± 5.1	5.2 ± 2.3	9.8 ± 5.1	5.2 ± 2.3	9.9 ± 5.2	5.3 ± 2.3	11.1 ± 5.7
SSI (% ± SD)	6.1 ± 2.9	4.6 ± 2.9	6.1 ± 2.8	4.4 ± 2.9	6.1 ± 2.8	4.5 ± 2.8	6.1 ± 2.9	4.3 ± 3.1
Rurality (%)	75.5	75.5	74.9	75.8	75.0	76.4	75.6	76.9
Alignment-Eligible Providers (per 1,000)	2.7 ± 1.5	1.8 ± 1.4	2.6 ± 1.5	1.8 ± 1.5	2.6 ± 1.6	1.9 ± 1.5	3.1 ± 1.8	2.4 ± 1.7
Participation in Medicare ACOs and Other Innovation Center Initiatives (%)								
Pioneer/MSSP	73.2	19.4	65.6	23.5	59.7	26.3	0.4	29.1
FAI	0.0	0.8	0.0	1.2	0.0	1.3	0.0	0.9
IAH	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CPC	0.0	2.6	0.0	3.4	0.0	3.4	0.2	9.0
BPCI	0.1	0.1	0.1	0.9	0.2	1.3	0.0	0.9
CJR	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
OCM	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0

NOTE: SD=standard deviation; ESRD=end-stage renal disease; COPD=chronic obstructive pulmonary disease; RA=rheumatoid arthritis; OA=osteoarthritis; TIA=transient ischemic attack; SSI=Supplemental Security Income; MSSP=Medicare Shared Savings Program; FAI=Financial Alignment Initiative; IAH=Independence at Home; CPC=Comprehensive Primary Care (including CPC Plus); BPCI=Bundled Payments for Care Improvement; CJR=Comprehensive Care for Joint Replacement; OCM=Oncology Care Model.

Appendix Exhibit F.3. PY 4 Medicare ACO-Level: Unadjusted Total Medicare Spending for VTAPM and Weighted Comparison Beneficiaries

	Total Medicare Spending			
	Vermont		Comparison	
	Mean	SD	Mean	SD
BY 3 (2014)	$10,682	$21,849	$11,185	$23,064
BY 2 (2015)	$11,246	$22,836	$11,514	$23,887
BY 1 (2016)	$11,110	$22,669	$11,292	$24,659
BY 0 (2017)	$11,273	$23,402	$11,223	$24,228
PY 1 (2018)	$11,376	$24,681	$11,370	$24,906
PY 2 (2019)	$11,175	$23,716	$11,303	$23,922
PY 3 (2020)	$10,239	$23,314	$10,949	$27,014
PY 4 (2021)	$10,747	$23,870	$11,551	$27,158

NOTE: Mean and standard error (SE) estimates are presented in 2021 USD ($) per beneficiary per year (PBPY).

Appendix Exhibit F.4. PY 4 Medicare ACO-Level: Unadjusted Utilization for VTAPM and Weighted Comparison Beneficiaries: Acute Inpatient Stays, Acute Inpatient Days, and ED Visits and Observation Stays

	Acute Inpatient Stays				Acute Inpatient Days				ED visits and observation stays			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	238	676	264	726	1,155	4,688	1,217	4,369	606	1,609	592	1,503
BY 2 (2015)	252	706	270	755	1,243	5,107	1,259	4,841	607	1,651	590	1,469
BY 1 (2016)	249	684	254	725	1,203	4,885	1,167	4,599	601	1,602	592	1,498
BY 0 (2017)	253	701	253	701	1,207	4,903	1,169	4,637	579	1,412	583	1,471
PY 1 (2018)	251	699	249	700	1,238	5,096	1,111	4,296	588	1,533	566	1,400
PY 2 (2019)	247	708	238	666	1,230	5,237	1,057	4,189	577	1,556	570	1,377
PY 3 (2020)	212	647	200	599	1,108	5,069	997	4,782	476	1,366	470	1,198
PY 4 (2021)	209	644	192	605	1,138	5,127	999	4,607	518	1,375	520	1,362

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.5. PY 4 Medicare ACO-Level: Unadjusted Utilization for VTAPM and Weighted Comparison Beneficiaries: E&M Visits, Primary E&M Visits, and Specialty E&M Visits

	E&M visits				Primary E&M visits				Specialty E&M visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	14,796	13,263	13,058	12,210	8,301	8,039	6,731	7,648	6,494	8,132	6,327	7,592
BY 2 (2015)	15,232	13,816	13,060	11,742	7,737	7,846	6,431	6,939	7,495	8,879	6,629	7,533
BY 1 (2016)	15,505	13,888	13,279	11,947	7,675	7,826	6,508	7,023	7,830	8,934	6,771	7,538
BY 0 (2017)	15,341	13,570	13,108	11,847	7,570	7,824	6,537	7,073	7,771	8,598	6,572	7,515
PY 1 (2018)	15,477	13,727	13,115	11,894	7,375	7,869	6,583	7,174	8,102	8,778	6,533	7,363
PY 2 (2019)	15,142	13,538	12,969	11,809	7,175	7,657	6,543	6,935	7,966	8,697	6,426	7,402
PY 3 (2020)	12,806	12,383	11,381	10,939	7,152	7,914	6,302	7,074	5,654	7,151	5,079	6,306
PY 4 (2021)	14,120	13,206	12,398	11,706	8,212	8,671	6,878	7,808	5,908	7,523	5,519	6,582

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.6. PY 4 Medicare ACO-Level: Unadjusted Utilization for VTAPM and Weighted Comparison Beneficiaries: SNF Stays, SNF Days, and Home Health Visits

	SNF stays				SNF days				Home health visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	60	309	64	319	1,607	9,626	1,497	8,768	2,659	14,573	2,125	10,952
BY 2 (2015)	65	315	65	329	1,654	9,371	1,563	9,197	2,806	14,561	2,113	10,790
BY 1 (2016)	62	309	59	303	1,586	9,285	1,300	7,895	2,780	14,970	2,084	10,557
BY 0 (2017)	68	333	56	295	1,686	9,643	1,212	7,710	2,840	15,056	2,010	10,294
PY 1 (2018)	65	330	54	294	1,617	9,453	1,146	7,371	2,820	14,962	2,031	10,480
PY 2 (2019)	62	325	47	265	1,463	8,665	1,031	6,991	2,524	13,455	1,966	10,271
PY 3 (2020)	48	272	36	237	1,195	7,900	853	6,702	2,224	11,981	1,358	7,726
PY 4 (2021)	49	274	40	245	1,288	8,335	906	6,598	2,282	11,677	1,494	7,930

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.7. PY 4 Medicare ACO-Level: Unadjusted Utilization for VTAPM and Weighted Comparison Beneficiaries: Home Health Episodes, Hospice Days, and Imaging, Procedures, and Tests

	Home health episodes				Hospice days				Imaging, procedures, and tests			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	122	398	101	361	950	12,465	1,245	14,055	32,056	38,026	35,885	39,139
BY 2 (2015)	128	407	102	367	1,242	14,392	1,480	15,487	31,485	37,000	35,651	38,887
BY 1 (2016)	128	409	99	360	1,320	14,722	1,701	16,957	31,055	34,943	35,453	38,382
BY 0 (2017)	128	404	97	362	1,592	16,711	1,533	16,051	30,781	34,576	35,417	38,744
PY 1 (2018)	129	407	95	353	1,636	17,184	1,637	16,808	31,390	35,771	35,668	39,676
PY 2 (2019)	125	406	94	355	1,697	18,066	1,481	15,902	31,726	36,190	36,346	39,633
PY 3 (2020)	182	686	110	503	1,649	17,411	1,485	15,958	26,951	32,731	32,245	38,344
PY 4 (2021)	197	716	124	537	1,552	16,893	1,453	15,498	31,109	35,238	36,325	41,474

NOTE: Mean and standard error (SE) estimates are presented per 1,000 BPY.

Appendix Exhibit F.8. PY 4 Medicare ACO-Level: Unadjusted Telehealth Utilization for VTAPM and Weighted Comparison Beneficiaries

	Telehealth visits				Total E&M telehealth visits				Primary care E&M telehealth visits				Specialist care E&M telehealth visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	Mean	Mean	Mean	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	3	128	12	268	2	115	11	260	1	35	3	99	2	109	8	234
BY 2 (2015)	3	147	12	267	3	147	10	248	1	44	3	94	2	134	8	222
BY 1 (2016)	4	283	21	377	4	281	19	364	1	55	4	148	2	276	14	310
BY 0 (2017)	24	724	28	490	24	716	26	479	19	581	8	273	5	316	19	353
PY 1 (2018)	9	327	17	303	5	285	16	289	1	46	5	175	4	281	11	216
PY 2 (2019)	18	540	20	359	18	538	19	353	1	95	9	254	16	521	10	236
PY 3 (2020)	2,277	4,835	1,651	3,526	2,211	4,694	1,604	3,442	1,430	3,259	1,031	2,588	781	2,882	572	1,855
PY 4 (2021)	1,645	5,066	1,298	4,070	1,610	5,002	1,253	3,827	959	3,375	760	2,870	651	3,266	493	2,053

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.9. PY 4 Medicare ACO-Level: Unadjusted Quality-of-Care Measures for VTAPM and Weighted Comparison Beneficiaries

	Annual wellness visit				ACS hospitalizations				Unplanned 30-day readmissions			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	227	419	192	394	37	189	38	192	112	316	115	319
BY 2 (2015)	246	430	211	408	33	178	36	187	112	316	126	331
BY 1 (2016)	265	441	241	428	31	172	30	171	118	322	108	310
BY 0 (2017)	280	449	300	458	32	176	32	177	116	321	115	319
PY 1 (2018)	298	457	334	472	31	173	29	169	119	324	113	316
PY 2 (2019)	313	464	373	483	31	173	28	164	120	325	104	306
PY 3 (2020)	284	451	331	471	25	157	22	146	112	315	98	297
PY 4 (2021)	330	470	415	493	23	150	21	142	119	323	113	317

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.10. PY 4 Medicare ACO-Level: Unadjusted COVID-19 Outcomes for VTAPM and Weighted Comparison Beneficiaries

	Total number of COVID-19 deaths per 100K population				Total number of COVID-19 cases per 100K population			
	Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PY 3 (2020)	22,542	16,680	22,542	17,167	1,199,043	351,301	3,252,199	2,050,607
PY 4 (2021)	51,523	23,593	51,523	30,590	8,965,871	2,132,984	8,861,910	2,455,920
	Case fatality rate (percent over entire year)				Maximum percentage of vaccination in year			
	Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PY 3 (2020)	2.97	1.71	1.45	1.55	--	--	--	--
PY 4 (2021)	0.0056	0.0015	0.0061	0.0038	57.82	13.31	69.51	9.81

Appendix Exhibit F.11. PY 4 Medicare State-Level: Unadjusted Total Medicare Spending for Vermont and Weighted Comparison Beneficiaries

	Total Medicare Spending			
	Vermont		Comparison	
	Mean	SD	Mean	SD
BY 3 (2014)	$10,747	$22,511	$11,184	$23,504
BY 2 (2015)	$11,369	$23,255	$11,613	$24,140
BY 1 (2016)	$11,162	$22,959	$11,349	$25,043
BY 0 (2017)	$11,205	$23,262	$11,368	$24,105
PY 1 (2018)	$11,458	$24,465	$11,550	$24,687
PY 2 (2019)	$11,351	$24,009	$11,614	$24,784
PY 3 (2020)	$10,200	$23,499	$10,931	$25,741
PY 4 (2021)	$10,646	$23,835	$11,506	$26,277

NOTE: Estimates are presented in 2021 USD ($) per beneficiary per year (PBPY).

Appendix Exhibit F.12. PY 4 Medicare State-Level: Unadjusted Utilization for Vermont and Weighted Comparison Beneficiaries: Acute Inpatient Stays, Acute Inpatient Days, and ED Visits and Observation Stays

	Acute Inpatient Stays				Acute Inpatient Days				ED visits and observation stays			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	239	671	258	696	1,163	4,697	1,175	4,254	601	1,564	584	1,542
BY 2 (2015)	256	709	263	709	1,239	4,875	1,197	4,394	616	1,617	598	1,531
BY 1 (2016)	252	694	253	694	1,213	4,922	1,148	4,450	602	1,538	593	1,479
BY 0 (2017)	254	700	252	691	1,181	4,783	1,133	4,366	587	1,399	583	1,481
PY 1 (2018)	254	699	247	691	1,237	5,084	1,111	4,313	595	1,488	564	1,454
PY 2 (2019)	249	705	238	674	1,232	5,196	1,068	4,277	591	1,547	564	1,448
PY 3 (2020)	204	630	188	587	1,051	4,838	928	4,295	473	1,313	469	1,294
PY 4 (2021)	202	627	190	611	1,087	4,967	985	4,490	513	1,347	503	1,314

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.13. PY 4 Medicare State-Level: Unadjusted Utilization for Vermont and Weighted Comparison Beneficiaries: E&M Visits, Primary E&M Visits, and Specialty E&M Visits

	E&M visits				Primary E&M visits				Specialty E&M visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	13,929	12,878	12,605	11,665	7,618	7,650	6,664	7,345	6,311	8,075	5,940	7,304
BY 2 (2015)	14,537	13,378	12,841	11,610	7,259	7,505	6,571	7,144	7,278	8,785	6,270	7,257
BY 1 (2016)	14,665	13,309	13,054	11,802	7,153	7,398	6,670	7,228	7,512	8,789	6,384	7,350
BY 0 (2017)	14,656	13,164	12,912	11,651	7,168	7,436	6,701	7,229	7,488	8,581	6,212	7,205
PY 1 (2018)	14,714	13,168	13,019	11,757	7,061	7,437	6,714	7,222	7,653	8,571	6,305	7,221
PY 2 (2019)	14,549	13,126	12,839	11,673	6,985	7,419	6,731	7,312	7,564	8,517	6,108	7,088
PY 3 (2020)	12,292	12,136	11,248	11,011	6,803	7,701	6,496	7,482	5,489	7,176	4,752	6,112
PY 4 (2021)	13,287	12,727	11,926	11,532	7,644	8,345	6,696	7,793	5,643	7,353	5,229	6,487

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.14. PY 4 Medicare State-Level: Unadjusted Utilization for Vermont and Weighted Comparison Beneficiaries: SNF Stays, SNF Days, and Home Health Visits

	SNF stays				SNF days				Home health visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	65	322	68	326	1,712	9,907	1,701	9,739	2,561	14,129	1,903	10,237
BY 2 (2015)	70	330	69	329	1,740	9,682	1,743	9,815	2,748	14,346	1,903	10,181
BY 1 (2016)	64	316	64	322	1,566	9,110	1,545	9,139	2,642	14,170	1,889	10,156
BY 0 (2017)	67	332	62	313	1,591	9,245	1,485	8,881	2,738	14,569	1,871	10,100
PY 1 (2018)	66	329	60	315	1,583	9,302	1,427	8,692	2,765	14,688	1,885	10,147
PY 2 (2019)	63	322	55	293	1,466	8,747	1,296	8,222	2,576	13,689	1,769	9,673
PY 3 (2020)	46	267	44	262	1,126	7,683	1,129	7,940	2,223	12,115	1,248	7,354
PY 4 (2021)	49	276	45	266	1,249	8,252	1,099	7,708	2,277	12,024	1,381	7,913

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.15. PY 4 Medicare State-Level: Unadjusted Utilization for Vermont and Weighted Comparison Beneficiaries: Home Health Episodes, Hospice Days, and Imaging, Procedures, and Tests

	Home health episodes				Hospice days				Imaging, procedures, and tests			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	118	392	93	348	957	12,321	1,343	15,188	31,673	36,947	35,121	38,441
BY 2 (2015)	125	400	93	347	1,139	13,798	1,474	15,995	31,660	36,698	35,532	38,848
BY 1 (2016)	125	401	91	346	1,258	14,432	1,484	16,313	31,193	35,231	34,884	37,795
BY 0 (2017)	125	398	90	346	1,479	16,008	1,518	16,348	31,106	34,994	34,905	38,239
PY 1 (2018)	126	401	90	344	1,569	16,962	1,499	16,058	31,496	35,698	35,280	38,840
PY 2 (2019)	122	398	87	337	1,634	17,816	1,545	16,798	31,883	36,145	35,878	39,420
PY 3 (2020)	179	689	101	483	1,594	17,359	1,458	15,846	26,937	32,722	31,034	37,159
PY 4 (2021)	192	715	115	521	1,604	17,386	1,553	16,660	30,520	34733	35,030	39,536

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.16. PY 4 Medicare State-Level: Unadjusted Telehealth Utilization for Vermont and Weighted Comparison Beneficiaries

	Telehealth visits				E&M telehealth visits				Primary care E&M telehealth visits				Specialist care E&M telehealth visits			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	Mean	Mean	Mean	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	7	219	14	276	5	181	13	266	3	143	3	106	2	99	9	240
BY 2 (2015)	7	295	17	332	6	283	15	319	1	39	4	134	6	276	11	275
BY 1 (2016)	6	305	24	405	4	240	23	395	1	52	8	204	3	233	16	320
BY 0 (2017)	31	751	35	502	30	741	33	486	25	639	12	289	5	261	21	358
PY 1 (2018)	9	305	26	380	5	241	24	360	1	50	9	230	4	235	15	258
PY 2 (2019)	30	839	27	466	30	837	25	460	4	281	11	265	25	784	14	365
PY 3 (2020)	2,268	4,975	1,556	3,550	2,206	4,847	1,506	3,414	1,387	3,267	967	2,598	819	3,084	539	1,842
PY 4 (2021)	1,671	5,126	1,278	3,845	1,633	5,047	1,237	3,714	959	3,393	714	2,620	675	3,270	523	2,219

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.17. PY 4 Medicare State-Level: Unadjusted Quality-of-Care Measures for Vermont and Weighted Comparison Beneficiaries

	Annual wellness visit				ACS hospitalizations				Unplanned 30-day readmissions			
	Vermont		Comparison		Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BY 3 (2014)	210	407	186	389	38	192	37	188	114	318	111	314
BY 2 (2015)	237	425	214	410	35	184	35	184	116	321	119	324
BY 1 (2016)	250	433	237	425	32	177	30	171	119	323	108	310
BY 0 (2017)	266	442	277	447	34	182	31	173	114	318	110	312
PY 1 (2018)	290	454	306	461	33	178	29	169	116	320	110	313
PY 2 (2019)	310	463	336	472	32	175	28	164	119	324	107	310
PY 3 (2020)	288	453	274	446	25	155	20	140	111	314	100	300
PY 4 (2021)	334	472	346	476	23	151	20	140	116	321	108	311

NOTE: Estimates are presented per 1,000 BPY.

Appendix Exhibit F.18. PY 4 Medicare State-Level: Unadjusted COVID-19 Outcomes for Vermont and Weighted Comparison Beneficiaries

	Total number of COVID-19 deaths per 100K population				Total number of COVID-19 cases per 100K population			
	Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	Mean	Mean	Mean	Mean	SD
PY 3 (2020)	19,309	15,543	19,309	18,278	1,143,366	336,053	2,699,069	2,283,019
PY 4 (2021)	54,213	23,238	54,213	36,660	9,159,329	2,233,680	8,364,287	3,406,759
	Case fatality rate (percent over entire year)				Maximum percentage of vaccination in year			
	Vermont		Comparison		Vermont		Comparison	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
PY 3 (2020)	2.56	1.78	1.13	1.47	-	-	-	-
PY 4 (2021)	0.0058	0.0015	0.0069	0.0051	56.49	12.81	68.18	10.41

Appendix Exhibit F.19. PY 4 Medicare ACO-Level: Common Baseline Trend Metrics for VTAPM and Weighted Comparison Beneficiaries

	BY 3 vs. BY 2			BY 3 vs. BY 1			Linear Interaction Term		
	Effect	Std. Error	p	Effect	Std. Error	p	Effect	Std. Error	p
Spending ($ PBPY)									
Total Medicare spending (Parts A and B)	320.07	339.94	0.35	320.31	260.31	0.22	162.45	127.09	0.20
Utilization (per 1,000 BPY)									
Acute care stays	8.28	6.83	0.23	20.72	7.35	0.00	9.61	3.47	0.01
Acute care days	27.82	45.43	0.54	66.63	40.36	0.10	33.74	20.67	0.10
ED visits and observation stays	1.97	11.25	0.86	4.74	13.95	0.73	2.73	7.03	0.70
Total E&M visits	423.46	214.93	0.05	449.62	318.45	0.16	149.72	142.98	0.30
Primary E&M visits	-310.04	248.57	0.21	-492.31	283.69	0.08	-186.58	133.51	0.16
Specialty E&M visits	806.88	213.37	0.00	1051.73	259.46	0.00	355.07	90.98	0.00
SNF stays	-0.59	1.93	0.76	3.56	2.78	0.20	2.25	1.36	0.10
SNF days	-100.17	85.52	0.24	191.75	80.26	0.02	56.98	38.61	0.14
Home health visits	302.59	140.11	0.03	275.88	174.90	0.11	126.88	78.50	0.11
Home health episodes	4.75	4.07	0.24	7.90	4.66	0.09	3.59	2.32	0.12
Hospice days	515.02	535.42	0.34	613.02	693.08	0.38	60.35	98.03	0.54
Imaging, procedures, and tests	-293.28	372.23	0.43	-645.07	587.76	0.27	-286.06	277.07	0.30
Quality of Care (per 1,000 BPY)									
Annual wellness visit	-1.40	7.67	0.86	-14.98	14.67	0.31	-9.51	7.67	0.22
ACS hospitalizations	-1.96	1.67	0.24	2.67	2.33	0.25	0.68	0.80	0.39
Unplanned 30-day readmissions	-8.23	8.83	0.35	12.90	7.46	0.08	6.68	3.71	0.07

SOURCE: NORC analysis of Medicare claims.

NOTE: PBPY=per beneficiary per year; BPY=beneficiary per year. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01.

Appendix Exhibit F.20. PY 4 Medicare State-Level: Common Baseline Trend Metrics for Vermont and Weighted Comparison Beneficiaries

	BY 3 vs. BY 2			BY 3 vs. BY 1			Linear Interaction Term		
	Effect	Std. Error	p	Effect	Std. Error	p	Effect	Std. Error	p
Spending ($ PBPY)									
Total Medicare spending (Parts A and B)	288.23	270.66	0.29	344.95	242.87	0.16	178.67	123.69	0.15
Utilization (per 1,000 BPY)									
Acute care stays	15.37	5.16	0.00	22.74	5.01	0.00	11.16	2.46	0.00
Acute care days	79.10	37.15	0.03	107.62	35.84	0.00	50.92	17.00	0.00
ED visits and observation stays	3.66	9.09	0.69	-4.02	9.10	0.66	-2.03	4.37	0.64
Total E&M visits	416.70	181.37	0.02	366.17	238.67	0.12	153.54	116.59	0.19
Primary E&M visits	-157.27	145.01	0.28	-305.09	153.53	0.05	-143.24	74.20	0.05
Specialty E&M visits	592.15	113.85	0.00	673.63	144.78	0.00	288.09	73.57	0.00
SNF stays	4.47	2.35	0.06	4.16	3.35	0.21	1.98	1.61	0.22
SNF days	-18.43	83.23	0.82	41.76	97.68	0.67	19.00	43.85	0.66
Home health visits	318.55	103.80	0.00	74.05	115.37	0.52	31.33	47.09	0.51
Home health episodes	8.23	3.89	0.03	10.84	3.83	0.00	4.95	1.75	0.00
Hospice days	73.62	107.45	0.49	182.98	115.08	0.11	140.33	72.23	0.05
Imaging, procedures, and tests	-486.71	285.36	0.09	-312.90	407.17	0.44	-167.94	206.21	0.42
Quality of Care (per 1,000 BPY)									
Annual wellness visit	-0.53	7.33	0.94	-9.46	9.91	0.34	-6.31	5.51	0.25
ACS hospitalizations	-1.20	0.95	0.21	1.18	0.97	0.22	0.53	0.41	0.19
Unplanned 30-day readmissions	-3.12	5.22	0.55	9.40	4.91	0.06	4.74	2.45	0.05

SOURCE: NORC analysis of Medicare claims.

NOTE: PBPY=per beneficiary per year; BPY=beneficiary per year. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01.

Appendix Exhibit F.21. PY 4 Medicare ACO-Level: Impact of VTAPM on Spending, Utilization, and Quality of Care

	Baseline (2014–2016)		PY 4 (2020)							
					Difference-in-Differences					
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI	% Impact	p
Spending ($ PBPY)										
Total Medicare spending (Parts A and B)	$11,953	$12,731	$10,668	$12,653	-$1,207.28	-$1285	-$78	-$2,597.86, $183.31	-9.36	0.153
Utilization (per 1,000 BPY)										
Acute care stays	287	294	201	231	-22.37	-86	-63	-59.21, 14.47	-10.0	0.318
Acute care days	1,191	1,466	939	1,310	-96.92	-252	-156	-311.63, 117.79	-9.36	0.458
ED visits and observation stays	523	626	452	545	9.92	-71	-81	-42.86, 62.69	2.244	0.757
Total E&M visits	16,216	12,357	14,410	11,578	-1,027.64	-1,806	-779	-2,570.50, 515.22	-6.32	0.273
Primary E&M visits	8,421	6,165	9,966	6,445	1,265.19	1,545	280	-262.51, 2,792.89	17.32	0.173
Specialty E&M visits	7,932	6,236	4,312	5,154	-2,536.66***	-3,620	-1,082	-3,913.70, -1,159.63	-27.1	0.002
SNF stays	26	75	1	53	-2.12	-25	-22	-7.87, 3.63	-66.5	0.545
SNF days	590	1,921	-85	1,307	-60.11	-675	-614	-225.19, 104.96	243.7	0.549
Home health visits	3,178	3,021	2,070	2,512	-598.73	-1,108	-509	-1,544.94, 347.49	-22.4	0.298
Home health episodes	145	115	182	142	9.82	37	27	-30.09, 49.73	5.704	0.686
Hospice days	2,992	1,369	2,990	1,440	-73.09	-2	71	-3,251.22, 3,105.04	-2.38	0.970
Imaging, procedures, and tests	35,498	32,055	36,165	32,208	513.20	667	153	-1,874.03, 2,900.43	1.51	0.724
Quality of Care (per 1,000 BPY)										
Annual wellness visit	247	215	303	354	-83.17	56	139	-169.49, 3.15	-21.5	0.113
ACS hospitalizations	30	38	18	25	0.57	-12	-13	-4.90, 6.03	3.318	0.865
Unplanned 30-day readmissions	100	133	75	136	-28.00	-25	3	-66.99, 10.99	-27.1	0.238

SOURCE: NORC analysis of Medicare claims.

NOTE: PBPY=per beneficiary per year; BPY=beneficiary per year. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group between PY 4 (2021) and the baseline; minor deviations are due to rounding. Cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.

Appendix Exhibit F.22. PY 4 Medicare State-Level: Impact of Vermont on Spending, Utilization, and Quality of Care

	Baseline (2014–2016)		PY 4 (2021)								
					Difference-in-Differences						
	VTAPM	Comp.	VTAPM	Comp.	DID Estimate	VTAPM Change	Comp. Change	90% CI		% Impact	p
Spending ($ PBPY)											
Total Medicare spending (Parts A and B)	$11,869	$12,578	$9,920	$12,374	-$1,745.05**	-$1,949	-$204	-$3,062.99,	-$427.12	-13.2	0.029
Utilization (per 1,000 BPY)											
Acute care stays	272	308	167	242	-38.51**	-105	-66	-66.53,	-10.49	-18.7	0.024
Acute care days	1,444	1,533	1,012	1,354	-253.14*	-432	-179	-474.75,	-31.53	-20.0	0.060
ED visits and observation stays	639	619	575	558	-3.35	-64	-61	-43.66,	36.96	-0.57	0.891
Total E&M visits	14,032	13,161	12,160	12,194	-905.25	-1,872	-967	-1,982.02,	171.52	-6.43	0.167
Primary care E&M visits	7,371	6,609	8,624	6,775	1,086.25***	1,253	166	501.46,	1,671.05	16.97	0.002
Specialty care E&M visits	6,749	6,634	3,550	5,420	-1,984.35***	-3,199	-1,214	-2,794.15,	-1,174.54	-25.8	0.000
SNF stays	70	78	43	58	-6.12	-27	-20	-20.32,	8.08	-12.4	0.478
SNF days	2,040	2,113	1,455	1,472	56.94	-585	-641	-324.15,	438.04	4.072	0.806
Home health visits	3,943	3,094	3,602	2,407	345.33	-341	-687	-310.88,	1,001.55	10.60	0.387
Home health episodes	144	121	170	148	-0.87	26	27	-35.73,	33.99	-0.50	0.967
Hospice days	1,038	1,561	738	1,681	-420.20	-300	120	-1,406.53,	566.12	-36.2	0.483
Imaging, procedures, and tests	32,084	34,552	31,558	33,949	76.72	-526	-603	-1,869.41,	2,022.85	0.25	0.948
Quality of Care (per 1,000 BPY)											
Annual wellness visit	234	211	359	326	9.84	125	115	-61.46,	81.13	2.821	0.820
ACS hospitalizations	34	35	21	22	-0.13	-13	-13	-3.77,	3.5	-0.64	0.951
Unplanned 30-day readmissions	109	120	86	119	-21.48	-23	-1	-46.46,	3.49	-20.0	0.157

SOURCE: NORC analysis of Medicare claims.

NOTE: PBPY=per beneficiary per year; BPY=beneficiary per year. Asterisks denote significance at *p<0.10, **p<0.05, ***p<0.01. VTAPM Change and Comp. Change columns indicate the change in average adjusted outcome for the VTAPM or comparison group between PY 4 (2021) and the baseline; minor deviations are due to rounding. Cells highlighted in blue indicate a decrease between PY 4 (2021) and the baseline for the VTAPM or comparison group.