Evaluation of the Home Health Value-Based Purchasing (HHVBP) Model

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NOTICE
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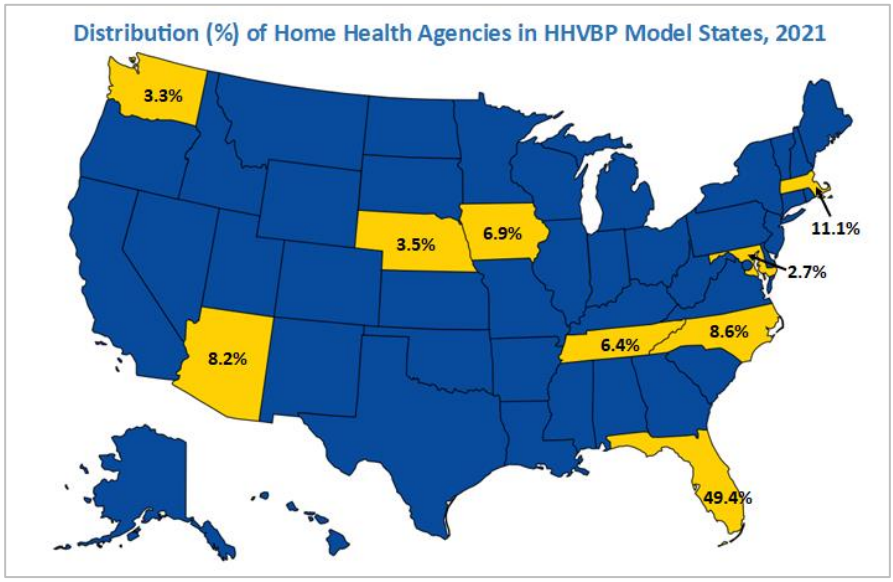
Acronym List

Acronym	Term
AAPI	Asian American/Pacific Islander
ACH	Acute Care Hospitalization
ACO	Accountable Care Organization
AI/AN	American Indian/Alaskan Native
APM	Alternative Payment Model
BPCI	Bundled Payment for Care Improvement
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
CJR	Comprehensive Care for Joint Replacement
CMMI	Center for Medicare & Medicaid Innovation
CMS	Centers for Medicare and Medicaid Services
COPs	Conditions of Participation
CY	Calendar Year
D-in-D	Difference-in-Differences
D-in-D-in-D	Difference-in-Difference-in-Differences
DME	Durable Medical Equipment
ED	Emergency Department
EOC	End of Care
ESRD	End-Stage Renal Disease
FFS	Fee-for-Service
HCC	Hierarchical Condition Category
HH	Home Health
HHA	Home Health Agency
HHC	Home Health Compare
HHCAHPS	Home Health Consumer Assessment of Healthcare Providers and Systems
HH PPS	Home Health Prospective Payment System
HHRG	Home Health Resource Groups
HHS	Health and Human Services
HHVBP	Home Health Value-Based Purchasing
ICD	International Classification of Diseases
iQIES	internet Quality Improvement and Evaluation System
IRF	Inpatient Rehabilitation Facility
LTCH	Long-Term Care Hospital
LUPA	Low Utilization Payment Adjustment
MA	Medicare Advantage
MBSF	Master Beneficiary Summary File
MS-DRG	Medicare Severity Diagnosis Related Group
MSSP	Medicare Shared Savings Program
OASIS	Outcome and Assessment Information Set
OCM	Oncology Care Model
PAC	Post-acute Care
PDGM	Patient-Driven Groupings Model
PEP	Partial Episode Payment
PHE	Public Health Emergency

Acronym	Term
POS	Provider of Services
PPS	Prospective Payment System
QI	Quality Improvement
RCD	Review Choice Demonstration
SNF	Skilled Nursing Facility
SOC	Start of Care
SSP	Shared Savings Program
TNC	Total Normalized Composite
TPS	Total Performance Score

Executive Summary

Background



From January 2016 to December 2021, the Center for Medicare & Medicaid Innovation (CMMI) of the Centers for Medicare & Medicaid Services (CMS) implemented the original Home Health Value-Based Purchasing (HHVBP) Model in nine randomly selected states: Arizona, Florida, Iowa, Massachusetts, Maryland, Nebraska, North Carolina, Tennessee, and Washington. CMS designed the original HHVBP Model to test the impact of providing financial incentives to home health agencies (HHAs) for improvements in quality of care by adjusting Medicare payments upward or downward based on their Total Performance Score (TPS), a composite score of an agency's quality achievement/ improvement. The budget neutral adjustment process redistributes Medicare payments among agencies within a state to reward agencies with relatively higher achieved quality or improved quality and reduce payments to agencies with lower levels of performance.

The primary goals of this evaluation are to understand how the shift in financial incentives under the original HHVBP Model may influence agency behavior and, in turn, aspects of home health care. To achieve the goals of this evaluation, we employ a mixed methods research design that incorporates results from our agency survey and interviews with our analyses that examine a range of outcomes of interest, including the HHVBP performance measures used to calculate an agency's TPS throughout the model's implementation (i.e., 2016-2021) as well as measures of Medicare spending. We also explore additional topics of interest, including whether there are differential impacts on patient subgroups that have implications for health equity (including patients with Medicaid coverage and in racial and ethnic minority groups), if the model impacts use of or access to home health care, and agencies' perceptions on the model's effect on their operations captured through interviews and a survey. We use multivariate linear regression within a difference-in-differences (D-in-D) framework to evaluate the effects of the original HHVBP Model, comparing changes observed in the nine HHVBP states with those in the 41 comparison states based on a baseline period prior to HHVBP (2013-2015) and cumulatively post-HHVBP implementation (2016-2021).

This Annual Report focuses on the experience of home health patients and agencies through 2021, the fourth and final year that eligible agencies in the nine original HHVBP states received an adjustment to their Medicare payment amounts under the Home Health Prospective Payment System (HH PPS). An agency's performance in 2019 was the basis for their payment adjustment of up to ±7 percent in 2021, reflecting an increase in the payment adjustment from previous years (e.g., up to ±6 percent in 2020).

Key Findings

Exhibit ES-1 provides an overview of our key findings, and we provide a summary of our evaluation findings below.

Exhibit ES-1. Overview of Key Findings on the Original HHVBP Model in the Sixth Annual Report

Total Performance Scores	↑ ▪ 6% greater average scores than the comparison group in 2021 ▪ Continued positive impact of HHVBP on overall agency performance all 6 years	
Spending during and after Home Health Care	↓ ▪ Total Medicare spending ▪ Medicare spending on inpatient and skilled nursing facility stays ▪ Medicare spending on home health care	↑ ▪ Medicare spending on emergency department visits and observation stays
Utilization during and after Home Health Care	↓ ▪ Unplanned acute care hospitalizations ▪ Skilled nursing facility visits ⇄ ▪ No effect on total ED use	↑ ▪ Outpatient emergency department visits
Quality/Patient Experience	↑ ▪ Patients discharged to community ▪ Improvement in mobility, self-care, management of oral medications	↓ ▪ Professional care provided by agencies ▪ Agency communication with patients ▪ Discussion of care with patients
Access and Equity*	⇄ ▪ No overall change in use of home health services or adverse effect on access to home health care ⇄ ▪ No overall change in existing racial/ethnic inequities in use of lower quality agencies*	↑ ▪ Modest growth in disparities by Medicaid coverage*
Agency Operations	⇄ ▪ From survey and interviews with agencies, few differences between original HHVBP model and comparison states in quality improvement initiatives with model viewed as an intensifier for existing activities rather than key driving force	

** We assessed whether the HHVBP Model had an impact on existing disparities in outcomes among home health patients, but note that the model was not explicitly designed to address health inequities. Up arrows reflect statistically significant (p<0.10) increase; Down arrows reflect statistically significant (p<0.10) decrease; two parallel arrows reflect no statistically significant (p<0.10) change. Gray shading indicates unintended impacts.*

The HHVBP impacts on quality, utilization, and Medicare spending in the final year of the original model are similar overall to previous years. We continued to find an overall reduction in Medicare spending for Part A and Part B services, modest declines in some but not all aspects of utilization, and modest improvements in most quality measures for the sixth and final year of the original HHVBP Model, and the fourth year of the HHVBP payment adjustments. These results are largely similar to what we found for the earlier years of the model, despite two substantial exogenous events that first emerged in 2020 and had implications for our evaluation: the introduction of the Patient-Driven Groupings Model (PDGM) for Medicare payment of all fee-for-service (FFS) home health claims and the onset of the COVID-19 Public Health Emergency (PHE). We observed similar trends in COVID-19 diagnoses and COVID-19 hospitalizations among home health episodes in both HHVBP and non-HHVBP states during 2020-2021, suggesting there was not a differential impact of the COVID-19 PHE between the two groups.

When comparing the impact of the HHVBP Model between the initial years (2016-2017) with the later years when HHAs received a payment adjustment (2018-2021), we found evidence among some, but not all, measures of successively larger impacts of HHVBP in later years of the model. In particular, we found evidence of growing intended impacts for Medicare spending and for unplanned hospitalizations and skilled nursing facility (SNF) use among all episodes. We also found evidence of growing intended impacts between the initial and later years of the model for one of the OASIS-based measures

(Discharged to Community) and unintended but modest impacts for three of the five patient experience measures derived from the Home Health Care Consumer Assessment of Healthcare Providers and Systems (HHCAHPS) survey. Collectively, these findings seem driven to a large extent by the increase in the HHVBP impact on these measures in the two most recent years (2020-2021) relative to the prior four years of the model. Given exogenous events in 2020 and 2021 that included implementation of the PDGM – a major revision of the HH PPS – the onset and continuation of the COVID-19 PHE, and uncertainty about potential confounding related to these events, we urge caution with interpretation of the larger HHVBP impacts on these outcomes in 2020 and 2021 than in earlier years of the model. Our finding of sustained impacts of HHVBP that began in the first year of the original model implementation (2016) may reflect effects of the model's performance incentives, whereby agencies anticipated that their performance in 2016 as well as in subsequent years would affect their future Medicare payments.

Agency Total Performance Scores are higher in each of the six years of the original model. The TPS values serve as broad indicators of HHA performance and are the basis for adjusting Medicare FFS payments to agencies in the nine model states. For each of the six years of the original model (2016-2021), the TPS for agencies in HHVBP states were higher relative to the TPS we calculated for agencies in the 41 non-model states. The most recent year's TPS is not comparable to earlier years of the model due to changes in the scoring methodology, but we found a continued positive impact of HHVBP on overall agency performance for 2021, the fourth payment year under the model with the highest potential HHVBP payment adjustments (up to ±7 percent). Similar to previous years, we also continued to find no patterns in agency performance based on patient social risk factors that might indicate risks related to quality of care or access to care for some beneficiaries under the model.

HHVBP Model Snapshot, 2021

- **1,952** home health agencies in operation
- **2,121,783** home health episodes provided
- **751,099** Medicare FFS beneficiaries covered

Cumulative decline of $1.38 billion in overall Medicare spending for FFS beneficiaries receiving home health services during 2016-2021, largely driven by reduced spending for inpatient services. Over the six years of the original model, we estimated a 1.9 percent decline in average Medicare expenditures per day among FFS beneficiaries in HHVBP relative to the comparison group during and within 30 days following home health episodes (Exhibit ES-2). The cumulative (2016-2021) reduction in total Medicare spending during and within 30 days following home health episodes for FFS beneficiaries receiving home health care in the model was $1.38 billion (average annual reduction of $230 million). The overall decline in spending is largely explained by the slower rate of growth in HHVBP states relative to the non-HHVBP states in spending *during* the home health episode, rather than in the subsequent 30 days. We found evidence of HHVBP leading to larger reductions in Medicare spending for FFS beneficiaries receiving home health services in the last four years of the model in which payment adjustments were applied (2018-2021) compared to the earlier years of the original model (2016-2017), a difference that appears to be strongly influenced by the larger savings estimate for 2020 and 2021.

The declines in overall Medicare spending among home health beneficiaries due to HHVBP continue to be largely driven by a reduction in spending for inpatient services, and we continue to find a reduction in spending for SNF services (Exhibit ES-2). Our D-in-D analyses point to a 3.4 percent decline in average Medicare spending per day for inpatient services and a 3.9 percent decline in average spending for SNF

Exhibit ES-2. Impact of HHVBP on Medicare Spending among FFS Home Health Beneficiaries, Overall and Components

Medicare Spending (in millions $)	Cumulative (2016-2021) D-in-D Impact (95% CI)	2016	2017	2018	2019	2020	2021
Total Medicare Parts A and B Spending during and following FFS Episode of Care*							
*Per day impact***	-$2.63 (-$4.29, -$0.96)	-$1.12 (-$1.92, -$0.32)	-$2.00 (-$3.26, -$0.75)	-$1.98 (-$3.62, -$0.34)	-$2.68 (-$4.72, -$0.64)	-$3.52 (-$5.96, -$1.08)	-$4.82 (-$7.60, -$2.05)
Aggregate Impact	-$1,378.2 (-$2,248.0, -$503.1)	-$100.5 (-$172.3, -$28.7)	-$176.9 (-$288.4, -$66.3)	-$178.9 (-$327.0, -$30.7)	-$237.4 (-$418.1, -$56.7)	-$286.6 (-$485.3, -$87.9)	-$412.0 (-$649.6, -$175.2)
% Impact	-1.9%	-0.8%	-1.4%	-1.4%	-1.9%	-2.7%	-3.7%
Inpatient Spending							
Aggregate Impact	-$807.0 (-$1,383.4, -$235.8)	-$73.6 (-$125.6, -$22.4)	-$97.3 (-$171.6, -$23.9)	-$101.2 (-$197.9, -$4.5)	-$159.5 (-$279.0, -$39.9)	-$127.0 (-$256.5, $2.4)	-$258.1 (-$411.1, -$104.3)
% Impact	-3.4%	-1.8%	-2.4%	-2.5%	-3.9%	-3.6%	-6.9%
Outpatient ED and Observation Stays Spending							
Aggregate Impact	$99.6 ($41.9, $152.0)	$11.7 ($6.3, $16.2)	$15.9 ($9.7, $23.0)	$19.0 ($9.0, $28.9)	$19.5 ($8.0, $31.0)	$18.7 ($6.5, $31.8)	$13.7 (-$0.9, $29.1)
% Impact	6.1%	4.1%	5.7%	6.7%	7.0%	7.6%	5.3%
Skilled Nursing Facility Spending							
Aggregate Impact	-$235.8 (-$424.5, -$41.9)	-$27.8 (-$44.0, -$10.8)	-$42.5 (-$66.3, -$17.7)	-$47.9 (-$79.5, -$16.3)	-$56.7 (-$93.9, -$19.5)	-$31.8 (-$76.5, $13.0)	-$27.4 (-$81.2, $26.5)
% Impact	-3.9%	-2.7%	-4.2%	-4.7%	-5.6%	-3.2%	-2.6%
Home Health Spending							
Aggregate Impact	-$283.0 (-$613.1, $47.2)	$12.6 (-$9.9, $35.0)	-$19.5 (-$59.3, $20.3)	$6.3 (-$48.8, $62.3)	$6.2 (-$63.8, $75.3)	-$152.3 (-$229.6, -$74.1)	-$148.7 (-$242.7, -$54.7)
% Impact	-1.3%	0.3%	-0.5%	0.2%	0.2%	-4.9%	-4.5%
Number of Agencies	12,260	10,851	10,438	10,102	9,754	9,428	9,329
Number of FFS Beneficiaries	11,273,829	3,267,484	3,216,977	3,260,150	3,184,899	2,862,121	2,949,557

*CI= Confidence Interval. D-in-D = difference in differences. Cumulative estimate is a weighted average of the yearly D-in-D estimates with 2016-2019 HHVBP impacts estimated from one regression model and 2020-2021 impact estimated from another regression model that reflects a post-PDGM approach to defining the spending measure. The percent impact reflects the estimated change in spending among HHVBP states relative to comparison group. * Reflects Medicare spending during the home health episode and up to 30 days after home health care. ** Per day impact is not in millions.*

services, which translates to cumulative savings across all six years (2016-2021) of $807.0 million and $235.8 million, respectively. These savings due to HHVBP continue to be partly offset by an estimated 6.1 percent increase in Medicare spending for outpatient emergency department (ED) visits and observation stays through 2021, which translates to a cumulative (2016-2021) increase in spending of $99.6 million for these services. Unlike in the early years of the model, there is also evidence of a reduction in Medicare spending for home health services, though only at the 0.10 level of significance (p=0.09 for the cumulative D-in-D estimate), which corresponds to a 1.3% decline and a cumulative savings estimate of $283 million.

Reductions in unplanned hospitalizations and use of skilled nursing facilities. Throughout the six years of the original HHVBP Model, we continued to find a modest impact of the model on the claims-based utilization measures that apply to FFS beneficiaries receiving home health services. This includes declines of 0.38 percentage points in unplanned hospitalization rates among all home health episodes, which corresponds to a 2.2 percent decrease from average measure values pre-HHVBP implementation. We also found HHVBP to result in a 0.40 percentage point decline in the use of SNFs among home health beneficiaries, which corresponds to an 8.2 percent decrease in average measure values relative to pre-HHVBP implementation.

Increase in outpatient emergency department use accompanied by a decrease in emergency department use leading to an inpatient admission. In contrast to the observed declines in inpatient hospitalizations and SNF visits due to HHVBP, we found a 0.24 percentage point increase in outpatient ED use, which corresponds to a 2.1 percent increase relative to average measure values prior to HHVBP. However, we also found that HHVBP led to a 0.21 percentage point *decrease* in ED use resulting in an inpatient hospital stay, or a 1.5 percent decrease relative to average HHVBP baseline values. When examining ED use regardless of whether it resulted in an inpatient hospital stay, we found no cumulative impact of HHVBP on overall ED use. Together, these results suggest that the increase in outpatient ED use attributed to HHVBP is related to the reduced likelihood of ED use followed by an inpatient hospital stay. To better understand factors contributing to higher outpatient ED use in HHVBP states, we expanded our analyses of examining common causes for ED visits to include a broader array of conditions, and found that genitourinary system and a collection of less common diagnoses pooled into an “other” group contribute to the pattern of increasing outpatient ED use attributed to HHVBP.

Modest growth in disparities for patients with Medicaid coverage and differential impacts based on race and ethnicity on patient outcomes, coupled with persisting inequities by race and ethnicity in the use of lower quality agencies. The original HHVBP Model’s focus was on improving home health quality overall. However, if HHVBP does not uniformly affect all patients in the same way, the model could have important implications for health equity. While there is potential for the quality incentives under HHVBP to encourage greater gains among populations who initially had worse outcomes and thereby improve health equity, a potential unintended consequence of the model is that it may lead to greater health inequities if the benefits of quality improvement are limited for historically underserved populations. The overall impacts of the HHVBP Model leading to fewer unplanned hospitalizations and greater improvements in functioning were not observed among Medicaid patients. We found differential but inconsistent patterns in the implications of the model’s effect for racial and ethnic minority groups, with larger gains among Black non-Hispanic patients but smaller gains among Hispanic patients relative to outcomes for White non-Hispanic patients.

Since patient outcomes may depend on the quality of home health care that is available, we also examined inequities in the use of lower quality HHAs. Overall, we do not find evidence that the original HHVBP Model led to an overall change in existing racial and ethnic inequities in the use of lower quality HHAs. Racial and ethnic minority beneficiaries were more likely to live in areas served by lower quality HHAs with differential patterns across race and ethnicity subpopulations. Additionally, our analysis of county-level changes in use of lower quality agencies among a subgroup of counties found evidence of pre-existing racial and ethnic inequities in many counties in both HHVBP and non-HHVBP states, with no change in the pattern of inequities between the two groups during HHVBP. As the use of VBP in the home health care setting continues to evolve and is expanded to all states, it will be important to understand its implications for health equity.

Modest gains in quality of care include greater improvements in functional outcomes. There continues to be a strong pattern of relatively small but positive effects of HHVBP on the Outcome and Assessment Information Set (OASIS)-based outcome measures used to calculate TPS through the end of the original model. They include a measure of discharge to the community and four measures of improvement in functional status, including the two composite measures introduced in 2019. These effects reflect improvements over time in functional status during home health episodes in HHVBP states that exceed those observed in non-HHVBP states. These relative gains also occurred in a context where average measure rates for many of the quality measures exceeded 51 percent prior to implementation of HHVBP. Interviews with agencies suggest there have been changes in agency perspectives on administering OASIS assessments which may also have influenced results.

Related, we examined whether changes in how care is delivered since HHVBP implementation have contributed to observed improvement on functional status reported on the OASIS assessment. While we observed changes in the timing, intensity, and mix of visits delivered to a subgroup of home health patients, these changes in clinical care delivery did not substantially account for increased rates of improvements in functional status reported in OASIS assessments. Our findings suggest that changes in how HHAs document functional status in the OASIS assessment are an important driver of reported functional status improvements which also has potential implications for the interpretation of these OASIS-based measures.

Modest increase in shift of skilled nursing and therapy visits to early weeks of home health episode among HHVBP agencies. Updating and expanding on our previous work, we found that HHVBP agencies increased the use of frontloading; that is providing more skilled nursing and therapy visits early in the episode of care relative to the distribution of visits in comparison states over the same time period. We also found evidence that frontloading the first episode in a sequence of episodes was associated with a reduced likelihood of unplanned hospitalizations but note that other factors accounted for a much greater role in the HHVBP impact. We also found no evidence that HHVBP contributes to challenges among beneficiaries at-risk of limited functional improvement in receiving early intensive visits from home health agency providers.

Modest, unintended impact on some aspects of patient experience. Performance scores for the five patient experience measures derived from the HHCAHPS survey remained stable and relatively high over time in both HHVBP states and non-HHVBP states. Our D-in-D analyses continued to suggest no impact on the two global HHCAHPS-based performance measures throughout the six years of the original

HHVBP Model (that is, patients' ratings of overall care from the agency and likelihood of recommending the agency). For the three composite measures that rate professionalism, communication, and discussion of care by the agencies, we found that HHVBP was associated with a -0.3 to -0.5 percentage point relative decline. While unintended, this does not translate to an especially meaningful impact of HHVBP on these aspects of patient experience with care, given the high overall levels of performance on these measures (i.e., ranging from 82 percent to 89 percent).

No evidence of changes in the overall use of home health services among FFS Medicare beneficiaries or of an adverse impact on beneficiary access to home health care. As part of our evaluation, we explored whether the model has induced changes in the use of home health services and the patient population receiving these services as a potential strategy among HHAs for improving performance under the model in ways that were not intended (e.g., by admitting patients with a more favorable case-mix). We continue to find declines in home health utilization in both HHVBP and non-HHVBP states and did not find evidence of an overall HHVBP effect on the percentage of FFS beneficiaries receiving home health care nor on the number of home health days per FFS beneficiary through 2021.

While we continued to observe a pattern of increasing clinical severity over time among home health patients for multiple case-mix measures, these trends were generally similar in HHVBP and non-HHVBP states. For one of five broad measures of case-mix examined, we saw modestly lower growth in severity among patients in HHVBP states relative to non-HHVBP states. To examine impacts on the use of potential substitutes for home health care, we explored whether the HHVBP Model contributed to changes in the percentage of hospital discharges that transition to alternative types of post-acute care, including home health. We continue to observe a small increase in the share of discharges from acute inpatient settings admitted to home health care in HHVBP states. We also found that HHVBP did not contribute to any changes in use of home health care among beneficiaries recently discharged from the hospital and at risk of limited functional improvement, nor among discharges under the care of accountable care organizations. Together, these findings are consistent with our other analyses that show no signs of emerging access problems due to HHVBP.

Survey and interviews with home health agencies suggest the model was an intensifier for existing activities rather than a key driving force with few differences between agencies in the HHVBP and comparison states. Agencies in both original HHVBP Model and comparison states that we spoke with in 2022 noted an increased emphasis on quality and performance improvement over the past decade, but did not view the original HHVBP Model as a key driving force. Rather, some agencies in HHVBP states and affiliated with national chains indicated that the original HHVBP Model intensified existing efforts on performance improvement. Performance improvement efforts tended to focus on data analytics and monitoring, staffing and training, and clinical strategies and approaches to these activities did not vary substantially between HHVBP and the comparison states. Similarly, the agency survey we fielded in 2022 to explore how agency behavior may have changed subsequent to the original HHVBP Model found few differences between agencies in the model and comparison states in their quality improvement approaches, with most agencies using multiple activities to target quality indicators based on OASIS, HHCAHPS, and Medicare claims data. Agencies in HHVBP and non-HHVBP states reported similar challenges in the broader home health industry, including obtaining high HHCAHPS and Quality of Patient Care Star

Ratings and improving the accuracy of OASIS assessments, and a high proportion of agencies in both groups reported challenges with recruiting and retaining staff.

Chain-affiliated agencies perform similarly across HHVBP and comparison states. Building on previous findings from interviews with leaders at large home health chains who highlighted how many of their quality improvement initiatives were formulated at the corporate level and rolled out to affiliated HHAs regardless of whether the HHA was in an HHVBP state, we examined the association of chain ownership with selected HHVBP outcomes. Comparing six chains that operate HHAs in both HHVBP and non-HHVBP states against non-chain affiliated HHAs (independent HHAs) in HHVBP and non-HHVBP states, we found overall patterns in changes in performance among these chain-affiliated HHAs remained largely similar, regardless of HHVBP status. Given how similarly chain-affiliated HHAs perform and the growth in chain ownership and consolidation, the role of chains is a critical consideration in weighing the potential impact of HHVBP incentives on HHA behavior and for understanding changes under the expanded HHVBP Model.

State-level impacts continue to vary across measures. Given the diversity in some agency and home health beneficiary characteristics across HHVBP states, our findings continue to reflect varying state-level impacts of HHVBP relative to regional comparison groups and were not sensitive to any single HHVBP state. Four of the nine HHVBP states – Arizona, Maryland, North Carolina, and Tennessee – continued to be the drivers of the overall higher agency TPS values. For the claims-based utilization measures, Florida was the main driver of many of the intended impacts, including reductions in unplanned hospitalizations and SNF use, as well as the unintended impacts for outpatient ED use. We observed overall Medicare savings due to HHVBP in six of the original HHVBP states – Arizona, Florida, Iowa, Massachusetts, Nebraska, and Tennessee – while Maryland continued to demonstrate relative increases in Medicare spending. Arizona was the most consistent driver for the positive impacts on the OASIS-based measures while Florida and Massachusetts continued to be the drivers behind the unintended impacts for the HHCAHPS measures.

Exhibit ES-3. Summary of Primary D-in-D Findings in the Sixth Annual Report

Measure Domain	Impact Measure	Cumulative HHVBP Model Effect	D-in-D Estimate	Relative Change (%) with reference to 2013-2015 Average in HHVBP States
Utilization	*Unplanned Hospitalization among First FFS HH Episodes*	↓ **Decrease**	-0.19%	-1.2%
	Unplanned Hospitalization among All FFS HH Episodes	↓ **Decrease**	-0.38%	-2.2%
	ED Use (no Hospitalization) among First FFS HH Episodes	↑ **Increase**	0.24%	2.1%
	ED Use followed by Inpatient Admission among First FFS HH Episodes	↓ **Decrease**	-0.21%	-1.5%
	Total ED Use (Outpatient or Inpatient Claims) among First FFS HH Episodes	⇄ **N.S.**	0.03%	0.1%
	SNF Use among All FFS HH Episodes	↓ **Decrease**	-0.40%	-8.2%
Medicare Spending	Average Medicare Spending per Day among FFS HH Beneficiaries during and following HH Episodes of Care	↓ **Decrease**	-$2.63	-1.9%
	Average Medicare Spending per Day among FFS HH Beneficiaries during HH Episodes of Care	↓ **Decrease**	-$2.63	-1.8%
	Average Medicare Spending per Day among FFS HH Beneficiaries following HH Episodes of Care	⇄ **N.S.**	-$0.25	-0.3%
Quality Measures	*Discharged to Community*	↑ **Increase**	1.08%	1.5%
	Total Normalized Composite Change in Self Care	↑ **Increase**	0.04	2.9%
	Total Normalized Composite Change in Mobility	↑ **Increase**	0.01	2.3%
	Improvement in Management of Oral Medications	↑ **Increase**	2.26%	4.4%
	Improvement in Dyspnea	⇄ **N.S.**	-0.38%	-0.6%
Patient Experience	*How often the HH team gave care in a professional way (Professional Care)*	↓ **Decrease**	-0.27%	-0.3%
	How well did the HH team communicate with patients (Communication)	↓ **Decrease**	-0.31%	-0.4%
	Did the HH team discuss medicines, pain, and home safety with patients (Discussion of Care)	↓ **Decrease**	-0.41%	-0.5%
	How do patients rate the overall care from the HH agency (Overall Care)	⇄ **N.S.**	-0.09%	-0.1%
	Would patients recommend the HH agency to friends and family (Likely to Recommend)	⇄ **N.S.**	-0.07%	-0.1%

Cumulative effect reflects CY 2016-CY 2021. HHVBP measures for CY 2021 are in italics. N.S. = not significant. Statistical significance identified with p-values ≤ 0.10.

Conclusions

Through the six years of the original model (2016-2021), we continue to find reduced rates of growth in Medicare spending for FFS beneficiaries receiving home health care as well as larger improvements in many measures of quality of care in the nine original HHVBP states relative to the 41 non-HHVBP states. These effects include declines in unplanned hospitalizations and SNF use that continue to be important drivers of the favorable impact on overall Medicare spending. Our analyses continue to suggest increasing savings over time due to HHVBP, based on slightly larger estimates in later years of the original model. However, while we modified our analytic approach to account for potential effects of both the introduction of PDGM and the onset of the COVID-19 PHE, we recommend caution in relying too strongly on 2020-2021 data to conclude there is a growing impact of HHVBP.

Our continued findings of reductions in unplanned hospitalizations and in Medicare spending for inpatient services provide evidence of the original HHVBP Model's achievement of intended impacts. Hospitalization is an important indicator of health status and the largest driver of expenditures for FFS beneficiaries receiving home health services, accounting for approximately one-third of Medicare spending. Our finding of increased use of frontloading skilled nursing and therapy visits during home health episodes that follow an inpatient stay represents a potential mechanism being used by HHAs to reduce unplanned hospitalizations under the model. The increase in outpatient ED use and associated expenditures that we observed may be an artifact of reductions in ED use that were followed by an inpatient admission, and partially offset other savings. Overall, the observed impacts translate to a cumulative savings to Medicare of over $1.3 billion during 2016-2021.

The magnitude of the effects of the quality-based HHVBP payment adjustments may be moderated by levels of overall agency profitability. The payment adjustments in 2021 reached a maximum of ±7 percent, which was larger than in previous years of the model. However, only 20 percent of HHVBP agencies received adjustments exceeding ±3 percent in 2021 (Arbor Research, 2022). Similarly, in 2020, payment adjustments reached a maximum of ±6 percent but only 29 percent of agencies received adjustments exceeding ±2 percent (Arbor Research, 2021). These adjustments were applied in an environment where agency median profit margins were over 22 percent (MedPAC, 2022). Of note, maximum payment adjustments of ±5 percent correspond to what CMS will use to adjust payments in 2025 (based on 2023 performance) to all agencies under the expanded HHVBP Model.

Altogether, our analyses do not suggest substantial unintended impacts of the original HHVBP Model. We do not find evidence that HHVBP adversely affected beneficiary access to care, and the declines we observe in certain aspects of patient experience were small in the context of measures where performance levels were relatively high. We did find a pattern of inequities involving underserved populations that largely persisted throughout the six years of the model, and in certain instances widened somewhat over time. For example, the favorable impacts of the model on unplanned hospitalizations and improvements in functional outcomes were not observed for Medicaid patients or among Hispanic patients, and we also found that racial and ethnic minority beneficiaries continued to be more likely to live in areas served by lower quality HHAs. In a context of ongoing inequities in home health quality, there may be a need for other quality improvement initiatives or activities that focus on reducing such inequities.

1. Introduction

The Centers for Medicare & Medicaid Services (CMS) designed the original Home Health Value-Based Purchasing (HHVBP) Model to improve the quality and delivery of home health care services to Medicare beneficiaries with specific goals to:

1. Provide incentives to home health agencies (HHAs) under Medicare to provide better quality care with greater efficiency;
2. Study new potential quality and efficiency measures for appropriateness in the home health setting; and
3. Enhance the current public reporting process regarding home health quality measures (CMS, 2016).

By design, the original HHVBP Model aimed to give HHAs a financial incentive for quality achievement and improvement through adjustments to Medicare payments for home health services. The HHVBP payment adjustments were determined based on an agency's quality performance measures relative to peers in its state. The adjustments were designed to be budget neutral within a state, redistributing Medicare payments to reward agencies with relatively higher achieved quality or improved quality and reduce payments to agencies with lower levels of performance. When implemented in January of 2016, CMS required all HHAs in nine states – Arizona, Florida, Iowa, Massachusetts, Maryland, Nebraska, North Carolina, Tennessee, and Washington – to participate in the original HHVBP Model from calendar year (CY) 2016 through CY 2022.[1] These states were selected at random from nine state regional groupings that contained five to six states each, with each CMS-defined grouping based on geographic location, utilization, demographics, and clinical characteristics (HHS, 2015a).

Under the original HHVBP Model, the maximum adjustment range to an agency's Medicare payment amount increased each year between CY 2018 and CY 2021 (CMS, 2016) with the adjustments modifying the otherwise applicable payment rates for HHAs under the Medicare home health prospective payment system (HH PPS). The first two years of the model (CY 2016-CY 2017) were used as reporting years to set the rates used later in the model (Exhibit 1). Starting in January of 2018, each eligible HHA in the HHVBP states had its Medicare payments adjusted by up to ±3 percent based on the relative Total Performance Score (TPS) it achieved in 2016.

In CY 2021 – the most recent year of data included in this report – the payment adjustments had a maximum range between -7 percent and 7 percent based on HHA quality performance levels achieved during CY 2019. Based on CMS' original design of the HHVBP Model, the performance of agencies in the nine model states during 2020 would have determined payment adjustments of up to ±8 percent in 2022. However, plans for CY 2022 were modified when CMS' proposal to expand the HHVBP Model nationally was finalized in November of 2021 (HHS, 2021). By expanding the model, CMS identified CY 2022 as a pre-implementation year in which no HHVBP payment adjustments will be applied to agencies in the nine states included in the original model. Furthermore, in late 2022, CMS announced that they were changing the baseline year for the expanded from CY 2019 to CY 2022 (HHS, 2022). CY 2023 will be the first performance year of the expanded model, and agency performance in CY 2023 will be used to adjust fee-for-service (FFS) payments of up to ±5 percent to agencies nationally in CY 2025.

[1] As discussed below plans for CY 2022 were modified when CMS' proposal to expand the HHVBP Model nationally was finalized in November of 2021 (HHS, 2021), ending the original model one year early.

Exhibit 1. Original HHVBP Model Payment Adjustment Amounts, by Calendar Year

Calendar Year	Payment Adjustment?	Maximum Payment Adjustment
2016	No	--
2017	No	--
2018	Yes, based on 2016 TPS	±3%
2019	Yes, based on 2017 TPS	±5%
2020	Yes, based on 2018 TPS	±6%
2021	Yes, based on 2019 TPS	±7%
2022	Originally yes, based on 2020 TPS; but in November 2021, CMS decided not to apply adjustments in 2022*	±8%

**In November 2021, CMS finalized its plans to expand the HHVBP Model nationally in January 2023 and ended the original HHVBP Model one year early with no HHVBP payment adjustments applied in the original nine model states in CY 2022 (HHS, 2021).*

CMS contracted with Arbor Research Collaborative for Health (Arbor Research), in collaboration with L&M Policy Research, to understand how the financial incentives under the original HHVBP Model may influence agency behavior and impact quality of care, Medicare expenditures, beneficiary experience, and the utilization of Medicare services. This is our sixth Annual Report that examines these and other outcomes of interest. We begin with a brief background about the Medicare home health care benefit and HH PPS to provide context for understanding how HHVBP modified the existing payment approach under Medicare and corresponding financial incentives. We then discuss the original HHVBP Model measures and conclude with an overview of the analyses presented in this report.

1.1 Background: Medicare's Home Health Benefit and Payment System

In 2020 Medicare served approximately 3.1 million beneficiaries and paid a total of $17.1 billion for home health care under the HH PPS, reflecting a decrease from the previous year's spending of $17.9 billion (MedPAC, 2022). Medicare's home health care benefit covers skilled nursing, physical therapy, occupational therapy, speech therapy, aide services, and medical social work services provided to Medicare beneficiaries who need intermittent skilled care or therapy services and cannot leave their homes without considerable effort. The goal of home health care is to treat illness and injury to enable patients to regain or maintain independence. While the need for skilled care is a requirement for home health eligibility, Medicare standards do not require that skilled visits comprise the majority of services a patient receives. A physician may initiate home health care as follow-up after a hospitalization or post-acute care stay (26 percent of initial home health episodes in 2020) or as a referral from the community (74 percent of initial home health episodes) (MedPAC, 2022). That is, unlike skilled nursing facility (SNF) services, Medicare coverage of home health services does not require a preceding hospitalization (and the share of these home health episodes has steadily increased since 2001) but expects HHAs and physicians to follow program requirements for determining medical necessity and beneficiary care needs. Medicare's standards of care permit a broad range of services that can be delivered under the home health care benefit but does not include services such as homemaker or personal care or more than intermittent care. Similarly, although being homebound is a requirement for receiving home health care, many patients use physician visits or some form of outpatient services (likely with assistance) during their home health care episode, as the homebound requirement does not prohibit receipt of Medicare services outside of the home (CMS, 2012; see Section 30.1).

Since 2001, home health services are paid for under Medicare's HH PPS, which pays HHAs a predetermined amount for each 60-day episode of care that is adjusted for case-mix, service use, geographic variation in wages, as well as other factors to account for episodes associated with especially low or high resource use overall.[2] On January 1, 2020, CMS implemented the Patient-Driven Groupings Model (PDGM), a new method for determining the per FFS episode reimbursement amount for HHAs. Changes to this new case-mix adjustment methodology include using a 30-day period as the basis for payment, rather than 60 days; placing greater emphasis on clinical characteristics to assign patients to payment categories; and eliminating the use of counts of therapy services to determine case-mix adjusted payments (HHS, 2019). The PDGM uses patient characteristics (e.g., diagnosis, functional status, and comorbid conditions), timing of episode, and admission source to categorize home health episodes into 432 case-mix groups, or home health resource groups (HHRGs) to distinguish relatively uncomplicated patients from those who have more severe medical conditions or functional limitations. Each of the 432 HHRGs has a relative weight designed to reflect the average costliness of patients in that group relative to the average Medicare home health patient.

Under the PDGM, CMS generates the HHRGs' weights using Medicare home health FFS claims as well as data obtained from the Outcome and Assessment Information Set (OASIS), an instrument used to conduct a comprehensive assessment of adult home care patients.[3] HHAs are required to complete and submit OASIS assessments for all their served Medicare and Medicaid beneficiaries, as well as patients with other insurance coverage. As discussed in the next section, OASIS assessments, FFS claims, and other data sources are also integral to home health quality measurement, including Home Health Compare (HHC), the Star Ratings program that allows consumers to more easily assess agency quality, and for measuring agency performance under HHVBP.

1.2 Original HHVBP Performance Measures and Scores

1.2.1 HHVBP Performance Measures and Data Sources

As noted above, an agency's TPS determined the payment adjustments for eligible HHAs in the nine original HHVBP states. For the first two performance years (2016-2017), an HHA's TPS was derived from its performance on 20 HHVBP Model performance measures (see Exhibit 2 below). Since then, the composition of the measure set evolved:

- In performance year 2018, CMS removed the Drug Education on Medications Provided to Patient/Caregiver OASIS-based process measure from the HHVBP measure set for 2018 and subsequent performance years (HHS, 2017).
- In performance year 2019:
    - CMS removed the remaining two OASIS-based process measures (Influenza Immunization Received for Current Flu Season and Pneumococcal Polysaccharide Vaccine Ever Received) for 2019 and subsequent performance years.
    - CMS replaced three improvement OASIS-based outcome measures (Improvement in Bathing, Improvement in Bed Transferring, and Improvement in Ambulation-Locomotion) with two composite function measures: Total Normalized Composite (TNC)

[2] For example, the HH PPS had an outlier policy to adjust payment for short-stay and high-cost outliers, including a low-utilization payment adjustment (LUPA) and partial episode payment (PEP) adjustment (HHS, 2017).
[3] Agencies do not have to complete OASIS for patients under 18 years of age or those receiving services for pre- or post-natal conditions.

Change in Self-Care and TNC Change in Mobility (HHS, 2018). The HHVBP Implementation contractor calculated these two composite measures from OASIS data for HHAs in the HHVBP states.

- In performance year 2020, CMS removed the OASIS-based outcome measure, Improvement in Pain Interfering with Activity from the HHVBP measure set for 2021 (HHS, 2019).

Except for three HHA self-reported measures, the measures included in the original HHVBP measure set are already collected from the following sources: Medicare claims; OASIS; or the Home Health Care Consumer Assessment of Healthcare Providers and Systems (HHCAHPS), a survey designed to measure the experiences of individuals receiving home health care from Medicare-certified HHAs. Additionally, most of these measures are publicly reported on CMS' HHC site and included in the CMS Star Ratings prior to the start of the model (Exhibit 2).

1.2.2 Agency Total Performance Scores

2021 was the fourth year in which agencies received payment adjustments under the original HHVBP Model with an adjustment of up to ±7 percent based on their performance in 2019 (Exhibit 1).[4] To determine the payment adjustments for each HHA, the HHVBP Implementation contractor calculated a TPS for each HHA based on its scores for each of the performance measures achieved two years prior to that year. For the 12 HHVBP performance measures that were identified for 2021,[5] HHAs received points based either on their achievement level relative to baseline threshold values or improvement relative to their baseline performance; these points were calculated separately for each measure in each model state.[6] For HHAs that were in operation prior to the start of 2015, their baseline period for measuring improvement was 2015. For HHAs that opened during 2015 or later, their baseline period for measuring improvement was determined based on their first full calendar year in operation. For the three HHA self-reported measures, HHAs received points for reporting these measures; the agency's performance on these measures did not affect the TPS.

[4] While Medicare HH PPS payments were not adjusted in the first two performance years of the original HHVBP Model (i.e., 2016 and 2017), agencies in HHVBP states were still incentivized to achieve high TPS values since scores from each of those years affected payment rates in CY 2018 and CY 2019, respectively.
[5] See 2 below for HHVBP performance measures used for earlier years.
[6] For states with at least eight small HHAs (i.e., exempt from collecting HHCAHPS performance measures), CMS calculates the resulting payment adjustment separately for large HHAs and small HHAs.

Exhibit 2. HHVBP Performance Measures for Years 1-6 of the Original HHVBP Model (CY 2016-2021)

HHVBP Performance Measures	Measure Type	Data Source	Publicly Reported
Emergency Department (ED) Use without Hospitalization	Utilization Outcome	Medicare claims	HHC
Unplanned Acute Care Hospitalization (ACH)	Utilization Outcome	Medicare claims	HHC, Used in Star Ratings
Discharged to Community	Outcome	OASIS	N/A
Improvement in Ambulation-Locomotion[1]	Outcome	OASIS	HHC, Used in Star Ratings
Improvement in Bathing[1]	Outcome	OASIS	HHC, Used in Star Ratings
Improvement in Bed Transferring[1]	Outcome	OASIS	HHC, Used in Star Ratings
Improvement in Dyspnea	Outcome	OASIS	HHC, Used in Star Ratings
Improvement in Management of Oral Medications[2]	Outcome	OASIS	HHC
Improvement in Pain Interfering with Activity[3]	Outcome	OASIS	HHC, Used in Star Ratings
Total Normalized Composite (TNC) Change in Self-Care[4]	Composite Outcome	OASIS	N/A
Total Normalized Composite (TNC) Change in Mobility[4]	Composite Outcome	OASIS	N/A
Drug Education on Medications Provided to Patient/Caregiver during Episodes of Care[5]	Process	OASIS	N/A
Influenza Immunization Received for Current Flu Season[1]	Process	OASIS	HHC
Pneumococcal Polysaccharide Vaccine Ever Received[1]	Process	OASIS	HHC
How often the home health team gave care in a professional way (Professional Care)	Patient Experience Outcome	HHCAHPS	HHC, Used in Star Ratings
How well did the home health team communicate with patients (Communication)	Patient Experience Outcome	HHCAHPS	HHC, Used in Star Ratings
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)	Patient Experience Outcome	HHCAHPS	HHC, Used in Star Ratings
How do patients rate the overall care from the home health agency (Overall Care)	Patient Experience Outcome	HHCAHPS	HHC, Used in Star Ratings
Would patients recommend the home health agency to friends and family (Likely to Recommend)	Patient Experience Outcome	HHCAHPS	HHC, Used in Star Ratings
Influenza Vaccination Coverage for Home Health Care Personnel	Process	HHA Self-report	N/A
Herpes Zoster (Shingles) Vaccination for Patient	Process	HHA Self-report	N/A
Advance Care Plan	Process	HHA Self-report	N/A

Source: (HHS, 2016), (CMS, 2018a), (HHS, 2019). HHC=Home Health Compare. Note that CMS granted an exception to the HH Quality Reporting Program for Q4 2019-Q2 2020 due to the COVID-19 Public Health Emergency (CMS, 2020b).
[1] These measures were dropped for performance year 2019 and all subsequent years of the HHVBP Model (HHS, 2018).
[2]This measure was added to the CMS Star Ratings in April 2019 (CMS, 2018a).
[3]Agencies were required to submit data for this measure through CY 2020, but it was dropped from public reporting in April 2020 (HHS, 2019). Because data were not available for CY 2021, we did not analyze this measure for this Annual Report.
[4]These measures were added for performance year 2019 and all subsequent years of the HHVBP Model (HHS, 2018).
[5]This measure was dropped for performance year 2018 and all subsequent years of the HHVBP Model (HHS, 2017) and dropped from the CMS Star Ratings in April 2019 (CMS, 2018b).

For the TPS calculation, HHAs received the maximum points of either their achievement score or improvement score for each performance measure. In calculating an HHA's TPS, one sums and adjusts the points for each measure for the number of eligible measures reported. To be eligible for inclusion in the TPS calculations and subsequent payment adjustments, an agency must have data for at least five measures in both the baseline and performance periods, with 20 or more episodes of care (for OASIS- and claims-based measures) and/or at least 40 completed HHCAHPS surveys (for HHCAHPS-based measures) in both the baseline and performance periods. Agencies must also have a Medicare participation date prior to their baseline year for measuring improvement. Therefore, to receive a TPS for 2021, agencies must have a Medicare participation date prior to 2020. In addition, to be eligible for a payment adjustment, agencies must be in operation for the entire performance year.[7]

1.3 Scope of this Annual Report

This Sixth Annual Report examines the entire six years of the original HHVBP Model (CY 2016-CY 2021), including the fourth and final year that HHAs in the nine original HHVBP states were subject to payment adjustments (of up to ±7 percent). We use data available from CY 2013-CY 2021 which includes the baseline period (CY 2013-CY 2015) that we use in our analyses.

In addition to addressing the impact of HHVBP on cost, quality utilization, and patient experience, this report expands upon our analyses from previous reports to better understand the changes occurring in response to the original model. Of note, we have expanded our analyses of historically underserved populations to examine potential implications of the model for health equity, including analyzing whether HHVBP affected patient outcomes or aspects of care delivery differently based on Medicaid coverage or patient race and ethnicity. We examine whether there are inequities in the use of lower quality HHAs, and how this may have changed under HHVBP. We also examine whether HHVBP affected access to care or care delivery for patients at risk of limited or no improvement in functioning.

We have expanded other analyses as well, including whether changes in care delivery during the HHVBP Model contributed to the functional status improvements observed in OASIS assessments and the longer-term impacts of frontloading home health visits. Building on previous primary data collection efforts, we fielded a survey and conducted interviews with HHAs in both original HHVBP and comparison states to assess how the model's financial incentives shaped agency operations and care delivery activities. We also explore potential chain-driven spillover from large, national chains who operate in both original HHVBP and comparison states. We conclude the report with a summary of our plans for the final year of evaluating the original HHVBP Model.

[7] Since the performance of HHAs prior to their closure is of interest for this evaluation, we include agencies that close during their final HHVBP performance year in the analyses of TPS for this report.

2. Evaluation Approach

This section summarizes our approach for the evaluation. We provide an overview of our evaluation design for the original HHVBP Model, including quantitative analyses of claims, OASIS, and HHCAHPS data, selection of a comparison group for individual and aggregated HHVBP states, and analysis of agency TPS and a survey fielded to agencies. We also discuss our qualitative approach for interviews with agencies. We provide additional details regarding our analytic approach in the Technical Appendix.

2.1 Overview of the HHVBP Evaluation Design

Our evaluation of the model spans a seven-year timeframe that covers the original HHVBP Model's entire period (HHS, 2021; 2022).[8] We employ a mixed methods research design that incorporates quantitative and qualitative analytic approaches. This evaluation examines how impact measures of interest related to Medicare spending and the quality of home health care change over time in the original HHVBP Model states, reflecting changes for a comparison population that would have been observed in the absence of the HHVBP Model. Primary research questions addressed over the course of this evaluation are:

- What is the impact of the HHVBP Model on the performance measures of quality, utilization, and patient experience used in the HHVBP Model for payment adjustments?
- What is the impact of HHVBP on home health utilization and other home health quality, Medicare home health costs and payments, and home health beneficiary experience measures, other than the model's performance measures?
- How does HHVBP impact HHA operations, characteristics of HHAs in operation, and fiscal solvency?
- Are there unintended consequences of HHVBP?
- Do other CMS initiatives, external initiatives, or other policies have implications for the effects of HHVBP?
- What is the impact of HHVBP on Medicare more broadly?

This year's evaluation analyzes secondary data (e.g., Medicare fee-for-service (FFS) claims and OASIS data) to provide information about the behavior of providers under the model and the potential impact on beneficiaries. We also fielded a survey to over 4,000 agencies as well as conducted 75 interviews with agencies in both the original HHVBP and comparison states to better understand how the original model may have influenced agency operations over time. Analysis of these primary data collection efforts help provide context for interpreting our other analytic results.

2.2 Quantitative Analytic Approach

We designed our quantitative analysis to address the question: What was the impact of the original HHVBP Model on the quality of health care, health care utilization, health outcomes, and health care costs? Our analyses examine whether the original HHVBP Model achieved its overarching goal—to

[8] As discussed in Section 1, CMS finalized its plan to expand the HHVBP Model to all Medicare-certified HHAs in the 50 states, territories and District of Columbia beginning January 1, 2023, with CY 2022 functioning as a pre-implementation year in which no HHVBP payment adjustments were applied in the original nine model states (HHS, 2021). Furthermore, in October of 2022, CMS changed the baseline year for the expanded model from CY 2019 to CY 2022 (HHS, 2022). CY 2023 will be the first performance year of the expanded model, and agency performance in 2023 will be used to adjust CMS payments of up to ±5 percent to all agencies in CY 2025, the first payment year of the expanded model.

improve the quality of home health services and efficiency of care—and examines potential unintended consequences (see Section A.1.3 [Page 5] in the Technical Appendix for details of the evaluation's conceptual framework). To address the research questions of interest for this evaluation, we examined a range of impact measures (Exhibit 3).

Exhibit 3. Impact Measures Used to Evaluate the HHVBP Model

Measure	Unit of Analysis
HHA Total Performance Score (TPS) [a] (Section 5)	HHA-Level
Home Health Utilization Measures (Section 3)	
Percent of FFS Beneficiaries with at Least One HH Episode	County-Year
Number of HH Days of Care per FFS Beneficiary	County-Year
FFS Claims-Based and OASIS-Based Case-Mix Measures (Section 3)	
Hierarchical Condition Categories (HCC) Score at the Start of Care	FFS Episode-Level
Count of Hierarchical Condition Categories (HCC) Present at Start of Care	OASIS Episode-Level
Total Normalized Composite (TNC) Mobility at Start of Care	OASIS Episode-Level
Total Normalized Composite (TNC) Self-Care at Start of Care	OASIS Episode-Level
FFS Beneficiaries with at Least One HH Episode [b]	Beneficiary-Year
FFS Claims-Based Measures Examining Post-Acute Care [c] (Section 3)	
Home Health Care	FFS Hospital Discharge-Level
Any Institutional Post-Acute Care (i.e., SNF, Inpatient Rehabilitation, or Long-term care hospitalization)	FFS Hospital Discharge-Level
Hospital Outpatient Therapy	FFS Hospital Discharge-Level
Self-Care (i.e., no formal Post-Acute Care)	FFS Hospital Discharge-Level
FFS Claims-Based HHA Operations Measures (Section 4)	
Frontloading Skilled Nurse Visits	FFS Episode-Level
Frontloading Therapy Visits	FFS Episode-Level
Utilization Measures (Section 6)	
FFS Claims-Based Utilization Measures	
Unplanned Acute Care Hospitalization/First FFS HH Episodes	FFS Episode-Level
Outpatient ED Use (No Hospitalization)/First FFS HH Episodes [d]	FFS Episode-Level
ED Use Followed by Inpatient Admission/First FFS HH Episodes [d]	FFS Episode-Level
Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes	FFS Episode-Level
Unplanned Acute Care Hospitalization/All FFS HH Episodes	FFS Episode-Level
Skilled Nursing Facility (SNF) Use/All FFS HH Episodes	FFS Episode-Level
Medicare Advantage Utilization Measures	
Unplanned Acute Care Hospitalization/All Medicare Advantage OASIS HH Episodes [e]	Medicare Advantage OASIS Episode-Level
Percent of Medicare Advantage Beneficiaries with at Least One OASIS HH Episode*	Medicare Advantage Beneficiary-Year
FFS Claims-Based Spending Measures [f] (Section 7)	
Average Medicare Spending per Day <u>during and following</u> FFS HH Episodes of Care	FFS Episode-Level
Average Medicare Spending per Day <u>during</u> FFS HH Episodes of Care	FFS Episode-Level
Average Medicare Spending per Day <u>following</u> FFS HH Episodes of Care	FFS Episode-Level
OASIS-Based Outcome Quality Measures (Section 8)	

Measure	Unit of Analysis
Discharged to Community	OASIS Episode-Level
Total Normalized Composite (TNC) Change in Self-Care	OASIS Episode-Level
Total Normalized Composite (TNC) Change in Mobility	OASIS Episode-Level
Improvement in Dyspnea	OASIS Episode-Level
Improvement in Management of Oral Medications	OASIS Episode-Level
FFS Claims-Based Quality Measure (Section 8)	
Mortality Rate/All FFS Home Health Episodes	FFS Episode-Level
HHCAHPS-Based Patient Experience Measures (Section 9)	
How often the home health team gave care in a professional way (Professional Care)	HHA-Level
How well did the home health team communicate with patients (Communication)	HHA-Level
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)	HHA-Level
How do patients rate the overall care from the home health agency (Overall Care)	HHA-Level
Would patients recommend the home health agency to friends and family (Likely to Recommend)	HHA-Level

*Section numbers refer to corresponding sections in the main report. Measures in the original HHVBP Model indicated by italic text. | All measures have a baseline period of 2013-2015 except for HHA TPS which has a baseline period of 2015 | [a] As discussed in Section 2.2.5, a D-in-D approach is not used for analysis of agency TPS. | [b] We analyzed stratified by presence of conditions at risk of limited functional improvement during HH care (see Exhibit A-44 [Page 69] in the Technical Appendix for a list of Hierarchical Condition Categories identified as at-risk). | [c] We analyzed stratified by presence of conditions at risk of limited functional improvement during home health care and alignment with Accountable Care Organization. | [d] For outpatient ED use and ED use followed by inpatient admission, we analyzed common condition specific categories as defined by Part C (Chapter-Specific Coding Guidelines) of the International Classification of Diseases (ICD)-10-CM Official Guidelines for Coding and Reporting FY 2021. For details, please refer to Technical Appendix Exhibits A-50 and A-51 (page 81). | [e] There are two versions of this measure with numerator calculated two ways - using shadow claims and Medicare Advantage inpatient encounters. For details, please refer to Exhibit A-59 (page 89) in the Technical Appendix. * We did not do D-in-D analysis on these measures, they were used for descriptive analyses | [f] For each of the three spending measures, we also analyze their components: Medicare Part B carrier and durable medical equipment (DME) combined, home health, Hospice, Inpatient, Outpatient ED and Observation Stays, other Outpatient/Outpatient types combined, and SNF.*

To evaluate the impact of HHVBP, we used a difference-in-differences (D-in-D) framework to compare changes in impact measures observed over time in the HHVBP states with those in the comparison group, consisting of home health populations receiving care from HHAs located in the 41 states that were not selected for inclusion in the original HHVBP Model. The D-in-D design enables us to control for common changes to all beneficiaries over time, as well as for unmeasured differences between model and comparison states that do not change over time. Positive (or negative) D-in-D estimates can be interpreted to mean the HHVBP group has higher (or lower) measure values than estimated in the absence of HHVBP. The D-in-D framework offers a quasi-experimental design that can address many threats to validity and rests on the critical assumption that, in the absence of the HHVBP Model, the impact measures in the two groups would have changed in a parallel manner over time.

We established a common comparison group approach for use across all of the quantitative analyses to ease interpretation of findings across impact measures. A key challenge for the evaluation is that there are numerous and diverse impact measures of interest that correspond to different sub-populations (e.g., based on insurance providers and other patient characteristics), involve different units of analysis (e.g., episode, agency), and are measured using different data sources (e.g., Medicare claims, OASIS assessments, HHCAHPS). Claims-based measures correspond to Medicare FFS beneficiaries who receive home health care, while other measures (e.g., OASIS-based measures) include all home health patients with Medicare or Medicaid coverage. Some measures are applicable only to a subset of home health patients based on their functional or clinical status (e.g., OASIS outcome measures of improvement in functioning); there is also considerable variation in the proportion of OASIS episodes that contribute to several impact measures of interest. Further, certain impact measures, such as agency TPS, are only defined at the agency level.

To avoid biased and imprecise impact estimates, we aimed to define a comparison population with characteristics that were as similar as possible to the HHVBP population during the baseline period. The randomized selection of the nine original HHVBP states and mandatory participation of all HHAs in these selected states helps to guard our analysis against selection bias, which would occur if HHAs with greater ability to improve the quality and efficiency of services were more likely to participate in the HHVBP Model. Such selection bias, if not accounted for, would result in attribution of more favorable effects to the model than its true effects. The results of our descriptive analyses (Section B.1 [Page 141] in the Technical Appendix) show similarity in most beneficiary and HHA characteristics associated with the impact measures of interest between HHVBP and non-HHVBP states, providing assurance that the randomization of states for the intervention was effective for many characteristics.

Given the diversity in beneficiary and HHA characteristics and treatment patterns across states, randomization at the state level alone was not able to achieve similarity on all factors between the HHVBP and comparison states during the three-year baseline period or to avoid differential yearly trends in all factors during this period. We therefore used statistical methods to control for imbalances observed between treatment and comparison populations in the baseline period for a few factors, including beneficiary race, agency chain affiliation, and agency size. We also controlled for unmeasured differences between states' markets and beneficiary populations that do not change over time on average (see Sections A.1.4 [Page 9] and A.1.5 [Page 25] in the Technical Appendix for more details).

Despite adjusting for covariates that helped to achieve balance in the baseline period between the HHVBP and non-HHVBP states and importantly, satisfied the parallel trends assumption for the measures, there were measure sets (e.g., FFS claims-based Medicare spending measures and OASIS-based outcome measures) that still showed evidence of a lack of parallel trends during the baseline period. We incorporated state-specific linear time trends for the HHVBP and comparison populations to control for these differences. Details regarding the revised covariate list, approaches used to test the parallel trends assumption of our D-in-D approach, and steps taken to mitigate non-parallel trends in cases that do not satisfy tests to support this assumption (e.g., state linear trends), are provided in Section A.1.4.2 (Page 10), Section A.1.5.2 (Page 27), and Section A.1.5.4 (Page 48) of the Technical Appendix. For additional information regarding the D-in-D approach and the methods used to control for differences between the HHVBP and comparison populations, see Section A.1.5 (Page 25) in the

Technical Appendix. Due to how the agency TPS is calculated, we use an alternative analytic approach for examining these values (see Section 2.2.5 below).[9]

Given the phase-in structure of original HHVBP Model payment adjustments, we examined if there was a difference in the impact of the HHVBP Model on measures between early years (2016-2017) versus later years (2018-2021) of the post-implementation period. In particular, we compared the average estimated HHVBP impacts on the measures in 2018-2021, when HHAs received performance-based payment adjustments, versus the average impact during HHVBP Model years 2016-2017, prior to payment adjustments. For details on estimation of these effects, see Section A.1.5.1 (Page 25) in the Technical Appendix.

2.2.1 Impact of Other CMS Initiatives

Alternative Payment Models

A potential confounder for our evaluation of the original HHVBP Model involves other CMS initiatives and Alternative Payment Models (APMs) that may affect HHA operations, beneficiary use of home health services, and outcomes for beneficiaries using home health services. Some of these other models were either introduced or expanded during the time period for our evaluation. We therefore adjusted for the impact of beneficiary alignment to Innovation Center APMs on HHVBP outcomes of interest. We ascertained whether FFS beneficiaries were aligned to three Accountable Care Organization (ACO)-based APMs at any time during a home health episode: the Medicare Shared Savings Program (MSSP), the Pioneer ACO model, and the Next Generation ACO model. We also determined beneficiary alignment to the Comprehensive Care for Joint Replacement (CJR) and Oncology Care Models (OCM), both of which began in 2016. Similarly, we ascertained beneficiary alignment to Models 2 and 3 of the Bundled Payment for Care Improvement (BPCI) initiative and the BPCI Advanced model (which succeeded BPCI at the end of 2018). Given observed differences in APM penetration between HHVBP and non-HHVBP states during the time period of our evaluation (see Exhibit A-7 [Page 21] of the Technical Appendix), changes in APMs may potentially affect our claims-based impact measures of interest. Hence, we incorporated an adjustment for individual APMs in our D-in-D regression models for FFS beneficiaries receiving home health care.

Review Choice Demonstration

In 2020, CMS commenced or continued implementation of the Review Choice Demonstration (RCD) in five demonstration states (Illinois, Ohio, Texas, North Carolina and Florida). The demonstration began in Illinois in June of 2019. Home health claims in these states with billing periods beginning during a participation cycle are subject to review under the requirements of the choice selected by each HHA. The RCD may impact how HHAs provide care and potentially on the case-mix of patients admitted to home health care in those five states. The demonstration was still in its early stages in all five states during the period of our analysis, and its full impact is undetermined at this time. Home health claims in all demonstration states with billing periods beginning on or after August 31, 2020 were subject to review under the requirements of the demonstration. Due to the COVID-19 pandemic, CMS phased in participation in the RCD for some HHAs in participating states to help ease transition during the public health emergency (PHE). CMS discontinued exercising the phased-in participation for home health RCD

[9] We do not include reporting rates for the three self-reported measures in the original HHVBP Model (Influenza Vaccination Coverage for Home Health Care Personnel, Herpes Zoster [Shingles] Vaccination for Patient, Advance Care Plan).

providers in North Carolina and Florida and full implementation began effective September 1, 2021. We included covariate adjustments in our claims-based analyses to mitigate any potential confounding threat this may pose for estimation of HHVBP impacts. The risk-adjustment covariates are episode-level variables that indicate one of three situations: (1) the agency was participating in the RCD at the time of the episode start date; (2) the agency had previously participated but was not actively participating in the RCD at the time of the episode start; or (3) the agency was not a participant in the RCD at the time the episode started. Like the APMs discussed above, we incorporated an adjustment for these RCD covariates in our D-in-D regression model for FFS beneficiaries receiving home health care to account for any effect that this initiative may have on HHA performance.

2.2.2 Changes in 2020 and Continuing in 2021

There were two major exogenous events that happened in 2020 and continue in 2021 that had implications for our evaluation of the original HHVBP Model: the introduction of the Patient-Driven Groupings Model (PDGM); and the onset of the COVID-19 PHE. If either of these changes affect our outcomes of interest in the nine original HHVBP states differently than those in the 41 comparison states, our estimates of the impact of HHVBP during 2020 and 2021 may be biased. We discuss how we mitigated this concern for each event below.

Implementation of PDGM

In January 2020, CMS implemented the PDGM, a revised case-mix adjustment methodology for payment for all FFS home health claims. Among PDGM's changes was a change in the unit of payment from 60-day to 30-day episodes of care. This change from 60-day to 30-day episodes did not affect the two HHVBP claims-based measures (Unplanned hospitalizations and Emergency Department (ED) Use [No Hospitalization] among First Home Health Episodes) nor two of the other claims-based measures we analyze (ED Use Followed by Inpatient Admission and Total ED Use [Outpatient or Inpatient Claims] among First FFS Home Health Episodes). The denominator for these four measures is restricted to only the first home health episode in the sequence, and the measure lookout period is 60 days from the start of the episode, regardless of the length of the episode (see Section A.2.2 [Page 75] in the Technical Appendix for additional details on measure definitions). However, this change in episode length affected our definitions for other measures we examine that include all home health episodes in a sequence. This included our measures of Medicare spending as well as the other two claims-based utilization measures (e.g., Unplanned Hospitalizations and Skilled Nursing Facility (SNF) Use among All FFS HH Episodes). Each group of measures are discussed below.

For the spending measures, we noted a differential change in the follow-up period between HHVBP and non-HHVBP states. PDGM is likely to be the driver of a differential shift in eligible days for our measure of spending during home health episodes of care and, consequently, in average spending per day between HHVBP and non-HHVBP states. The concern for our evaluation is that based on our D-in-D analyses, we might falsely attribute a change in average spending in HHVBP states relative to non-HHVBP states in 2020 and 2021 to the HHVBP Model instead of attributing it to PDGM. To mitigate this potential source of bias due to PDGM, we opted for an alternative approach to defining Medicare spending measures in 2020 and 2021. For the estimation of impacts in 2020 and 2021, we used a standardized follow-up period for measuring spending during home health episodes of care rather than an approach that based the measurement period on the timing of the last home health visit during the episode (i.e., the approach used in previous Annual Reports). The standardized approach used to estimate impacts in 2020 and 2021 reflects use of a standard 60-day follow-up period for model years

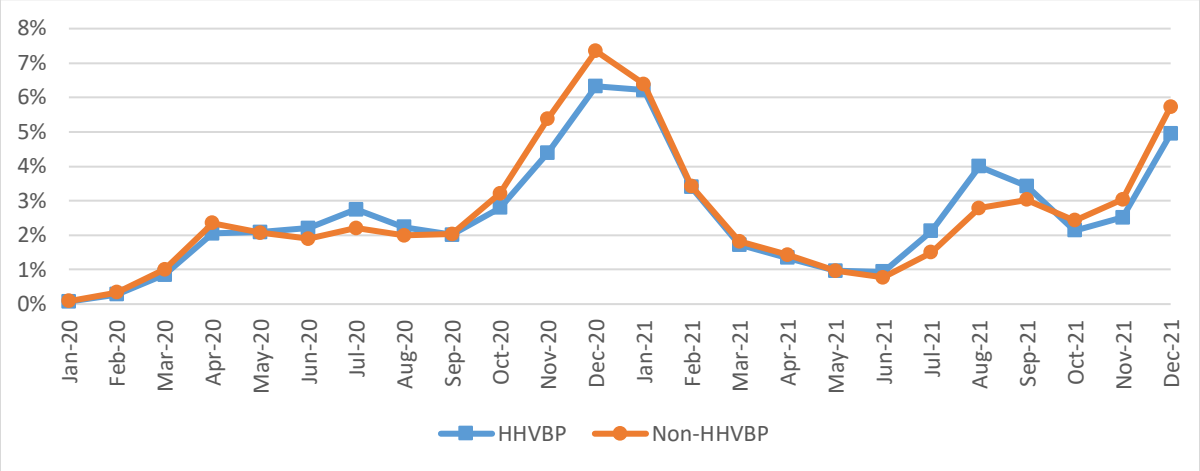
prior to 2020, and a standard 30-day follow-up period during 2020 and 2021. This approach thereby avoids a PDGM-induced differential change between HHVBP and non-HHVBP states in the follow-up period for spending per day measures. For our analysis of model impacts in 2016-2019, we continue to use the same approach that was followed in the previous Annual Reports (see Exhibits A-47 through A-49 [Page 75] in the Technical Appendix). Hence, we estimated impacts on spending measures for 2016 through 2019 from one regression model and impacts for 2020 and 2021 from a separate regression model using the alternative approach. For more details, please refer to Section A.1.4.2 in (Page 10) in the Technical Appendix.

For the two utilization measures that included all home health episodes in a sequence (Unplanned Hospitalizations among All Home Health Episodes, SNF Use/All FFS HH Episodes), the decline in the follow-up days with the introduction of PDGM was relatively similar in both HHVBP and non-HHVBP states. Though this does not suggest that PDGM represents an important source of confounding, we conducted a sensitivity analysis to examine the impact of the HHVBP Model on all-episode utilization measures where we standardized the follow-up period of the episodes in 2020 and 2021 to also be 60 days. We adjusted the timing of the subsequent episodes so that the follow-up period of all the episodes in 2020 and 2021 was equivalent to that in the pre-PDGM years. This is discussed more in Section 6 below and in Section A.2.10 (Page 103) of the Technical Appendix.

COVID-19

The onset of the COVID-19 PHE in 2020 and continuing in 2021 was a development that was exogenous to the original HHVBP Model. To explore the potential implications of the COVID-19 PHE for evaluating the effects of the HHVBP Model, we compared the incidence of COVID-19 among FFS home health beneficiaries in HHVBP and non-HHVBP states (Exhibit 4). Overall, we observed relatively similar trends in the percentage of home health episodes for beneficiaries with an initial COVID-19 diagnosis in the two groups of states throughout 2020 and 2021. The first wave of COVID-19 resulted in approximately 2 percent of FFS home health beneficiaries having an initial COVID-19 diagnosis reported in claims in both HHVBP and non-HHVBP states in April of 2020. After remaining at similar levels through September 2020, the incidence of COVID-19 reported in claims rose more steeply in the final quarter of 2020 in both HHVBP and non-HHVBP states. The rates hit a two-year peak in December 2020 for both the HHVBP (6.3 percent) and comparison groups (7.4 percent), then fell for both groups through early 2021. There was another spike in initial COVID-19 diagnoses amongst home health beneficiaries in the third quarter of 2021, though lower in magnitude compared to the peak in 2020, with slightly higher rates in HHVBP states compared to non-HHVBP states (3.9 percent vs. 2.8 percent). Overall, these trends in initial COVID-19 diagnoses were very similar in both groups and do not suggest that the pandemic had a markedly different impact on home health beneficiaries in HHVBP states and non-HHVBP states during 2020 and 2021.

Exhibit 4. Percentage of Home Health Episodes for Beneficiaries with an Initial COVID-19 Diagnosis, January to December 2020



Though we observed similar trends between the two groups, we included covariate adjustments in our D-in-D models of claims-based measures to account for potential confounding of HHVBP Model effects due to the COVID-19 PHE. The risk-adjustment variables we included are: (1) county-month-level rates of Medicare FFS inpatient stays associated with COVID-19 diagnoses; (2) county-month-level rates of incidence of COVID-19 diagnoses from USAFacts.org; and (3) episode-level variables that indicate a COVID-19 diagnosis found in claims data during the episode, following the episode through 30 days, or within 90 days prior to the episode start (see Exhibits A-4 and A-5 [Page 17] in the Technical Appendix). For our analyses of OASIS-based and HHCAHPS-based measures, we included covariate adjustment for the two county-month-level rates only since episode-level COVID-19 diagnoses were not available for the non-FFS patients (see Section A.2.1.2 [Page 67] of the Technical Appendix for more details). Our approach assumes that unobserved geographic variation due to COVID-19 is similar to observed variation in the COVID-19 indicators that we control for in the D-in-D models.[10]

2.2.3 Subgroup Analyses

In this year's report, we also continued to evaluate possible heterogeneity in model impacts among subgroups of beneficiaries that may have implications for health equity. Specifically, we examined whether there are differential impacts of the HHVBP model based on Medicaid coverage or based on race and ethnicity as well as whether there were inequities by race and ethnicity in the use of lower quality HHAs. These analyses are presented in Section 11.

We also examined the impact of HHVBP on the likelihood of admission to home health care among subgroups determined by alignment with an ACO and among subgroups of patients who have conditions that put them at risk of limited improvement in functional status while receiving home health care (see Sections 3.4 and 3.5). Furthermore, we estimated heterogeneous impacts of HHVBP on the use of frontloading—that is, distributing a greater share of home health visits earlier in home health episodes—by skilled nurses and therapists across subgroups determined by presence or absence of conditions that put patients at risk of limited improvement in functional status while receiving home

[10] We also conducted a sensitivity analysis and evaluated the impact of HHVBP from a regression model that did not adjust for these COVID-19 covariates. Details are provided in Section A.2.10 (Page 103) of the Technical Appendix.

health care, as identified through diagnoses in claims from the year preceding the start of home health care (Section 4.3). We explored whether declines in reported functional status could be attributed to a different case-mix of patients for a subgroup of patients with three specific conditions and also analyzed selected outcomes for six home health chains that operated in both HHVBP and non-HHVBP states to examine potential chain-driven spillover (Sections 4.4 and 4.5, respectively).

2.2.4 Comparison Groups for State-Level Analyses

In addition to analyzing measures at the national level, we evaluated the impact of HHVBP for the nine individual states included in the original model. In establishing what would have happened to home health patients in each HHVBP state if the HHVBP Model had not been implemented, we aimed to define comparison groups with characteristics that were as similar as possible to the HHVBP state during the baseline period. We examined the regional group from which the HHVBP states were randomly selected (Exhibit 5).[11] Collectively, these groups included all 41 states not selected for inclusion in the model, so a comparison group approach based on these regional groups helps to reconcile findings at the national level with those at the state level.

For each HHVBP state and its respective regional group (Exhibit 5), we used the same statistical adjustment approach as for the national-level analyses to account for the minority of factors for which the comparison group differed significantly on average from the HHVBP states.

Exhibit 5. HHVBP States and their Corresponding Regional Group

HHVBP State	Non-HHVBP States in Regional Group
Arizona	New Mexico, California, Nevada, Utah, Colorado
Florida	Texas, Oklahoma, Louisiana, Mississippi
Iowa	North Dakota, South Dakota, Montana, Wisconsin, Minnesota
Massachusetts	Vermont, Maine, Connecticut, Rhode Island, New Hampshire
Maryland	Delaware, New Jersey, Pennsylvania, New York
North Carolina	Alabama, Georgia, South Carolina, Virginia
Nebraska	Ohio, West Virginia, Indiana, Missouri, Kansas
Tennessee	Illinois, Kentucky, Arkansas, Michigan
Washington	Oregon, Alaska, Hawaii, Wyoming, Idaho

As discussed in the Third Annual Report, we assessed the validity of the comparison group by testing the assumption of parallel baseline trends in impact measures between the HHVBP states and their respective regional comparison groups (Arbor Research, 2020). The tests concluded that using a regional group (Exhibit 5) as the comparison group for each of the nine HHVBP states helped to achieve an overall pattern of reasonably similar baseline trends for many of the impact measures of interest for this evaluation. As we did at the national level for impact measures exhibiting a lack of parallel trends during the baseline period, we incorporated state-specific linear time trends for measure sets where this was relevant at the state level. At the state level, these measure sets were FFS claims-based utilization

[11] As explained in the Third Annual Report, the states in regional groups were already determined to closely resemble each other in terms of utilization, demographics, and clinical characteristics, lending support to the parallel trends assumption for a D-in-D approach (Arbor Research, 2020).

measures, FFS claims-based Medicare spending measures, and the OASIS-based measures. Further details are included in Section A.1.6 (Page 53) of the Technical Appendix.

2.2.5 Analytic Approach for Agency Total Performance Scores

As a metric that combines agency performance on the range of quality measures included in HHVBP, and that is used to determine Medicare payment adjustments for HHAs in the HHVBP states, the TPS represents a broad measure of agency performance under HHVBP. As such, the TPS is of interest as an overall performance indicator for comparison between agencies in model states with those in non-model states where this metric does not affect Medicare payments to HHAs. To evaluate the impact of the original HHVBP Model on overall agency performance, we compared CY 2016-CY 2021 TPS in model states with those in non-model states using multivariate linear regression, with adjustments for agency size, chain status, ownership type, age, and freestanding versus hospital-based, as well as indicators of patient demographic characteristics, and insurance.

A D-in-D approach to examining TPS is not optimal over the duration of this evaluation since the methodology for computing TPS has changed over time, including changes to the HHVBP measure set during performance years 2018 (HHS, 2017) and 2019 (HHS, 2018).[12] Additionally, CMS changed the weighting distribution of the measures for CY 2019, which translated to a substantial increase in the weights for the claims-based measures (HHS, 2018). These changes in TPS methodology make TPS values from different payment years less comparable, as changes in TPS values across payment years may, in part, reflect changes in the components of the TPS rather than changes in agency performance. Additionally, as discussed in Section 1.2.2, the TPS already captures changes over time in an agency's performance.[13] For these reasons, we employed a cross-sectional regression analysis, rather than a D-in-D approach, for examining agency TPS values. Section A.1.7 (Page 54) in the Technical Appendix contains further details regarding our rationale for using this analytic approach.

2.2.6 Analytic Approach for Agency Survey

We conducted a survey of HHAs to examine key agency structural and operational characteristics and the impact of the HHVBP Model on agency operations in the original HHVBP states compared to similar agencies in the comparison states. Among the nine original HHVBP states, we surveyed all HHAs. To construct a comparable sample of HHAs in non-HHVBP states, we sampled non-HHVBP HHAs such that the distribution of their characteristics mimicked that of the original HHVBP Model state agencies in terms of ownership type, chain affiliation, setting, and agency size. Agencies were excluded from either sample if they had fewer than 20 episodes reported in claims in 2020. We fielded the survey to 4,751 HHAs from late April through September 2022, using a mixed mode approach of mail and web administration with telephone follow-up to non-responders. We received 1,148 responses—395 from original HHVBP Model agencies and 753 from agencies in comparison states — for an overall response rate of 24.2 percent (response rate for agencies in HHVBP states and non-HHVBP states was 24.6 percent and 24.0 percent, respectively; see Section A.3.14 (Page 114) in the Technical Appendix for more detail). Among HHAs invited to participate in the survey, response rates by key agency characteristics and patient characteristics are largely comparable between HHAs in HHVBP states and non-HHVBP states (see Exhibits B-72 and B-73 [Page 215] in the Technical Appendix).

[12] See Section 1.2.1 above for more detail on the HHVBP measure set.
[13] See Section A.2.7 (Page 99) in the Technical Appendix for more information on the TPS calculation.

The HHA survey provides quantitative information on agency responses to HHVBP not available from other data sources (e.g., claims). We used the survey results to provide explanatory context to the quantitative impact analyses, which rely on FFS claims, OASIS assessments, and other administrative data. The results also provide a quantitative backdrop for the qualitative data collected through interviews with HHAs (discussed below).

2.2.7 Exploration of New Data Sources

Previous years' findings motivated our exploration for this report of new data sources, including Medicare Advantage (MA) encounters and shadow claims data (submitted by hospitals to Medicare Administrative Contractors for services to MA beneficiaries), to evaluate potential spillover effects of HHVBP among home health care patients covered by MA plans. Examining utilization patterns for non-FFS Medicare beneficiaries helps us to understand if the impact of the original HHVBP Model, in which payment adjustments to agencies and some key performance measures apply only to services for FFS beneficiaries, resulted in changes to agency behavior that impact a broader population. These analyses are presented in Section 6, and details on data sources are included in the Section A.3.13 (Page 113) of the Technical Appendix.

2.3 Qualitative Analytic Approach

We present findings from 75 interviews with home health agencies from both HHVBP states and non-HHVBP comparison states, conducted from April through September of 2022. These interviews comprise the primary source of information on how the original HHVBP Model may have influenced agency operations over time. Because there is no uniform data available from agencies about their operations, these interviews offered the only explicit opportunity to assess how the model's financial incentives shape agency operations and care delivery activities. The interviews provided real-world context to interpret trends in the quality, spending, and utilization outcomes examined in our quantitative analyses.

As in previous years, we interviewed HHA key informants to assess qualitatively how model incentives may have shaped agency operations. The research team explored how agency operations had changed since the beginning of the HHVBP Model and the extent to which those changes may be attributed to the introduction of the model. The goals of the interviews were to: 1) understand how HHA performance improvement activities and operations have changed since the original HHVBP Model began; and 2) how these activities differ between HHAs in HHVBP and comparison states. Using a semi-structured interview guide, we asked interviewees to focus on what was driving agency behavior both in terms of the HHVBP Model and the broader context in which they operate – and how agency operations have changed over the past six years since early model implementation.

These agencies reflect a purposive sample of agencies across several key characteristics, designed to capture the experiences of a variety of agencies: ownership; chain affiliation; and size (measured by the number of Medicare episodes). The data are not representative of all HHVBP HHAs, nor are they intended to quantify the extent to which model incentives are changing agency operations. However, the diversity of agency characteristics and geographies reflected in the sample contributes to a comprehensive picture of issues and factors that may affect the broader agency population. We provide a more detailed description of the primary data collection and analysis in Section A.3.15 (Page 116) in the Technical Appendix.

2.4 Interpreting the Findings

Adhering to best practices for evaluation research (Wasserstein, 2019), we synthesized the evidence presented in this report to identify meaningful patterns in results across multiple analyses. We carefully weighed the strength of the evidence in terms of magnitude of point estimates, consistency with prior hypotheses about impacts, consistency of impact findings over multiple time periods and HHVBP states analyzed, statistical significance at the $p<0.10$ level, and support from this and previous years' qualitative findings to draw conclusions about impacts of the HHVBP Model. We expect this strategy to continue to facilitate policymakers' use of the findings for decision-making purposes.

2.5 Structure of the Following Sections

The following Sections present key findings based on our evaluation of the experience of home health patients, agencies, and chain organizations throughout the six years of the original HHVBP Model (2016-2021). Section 3 examines changes in agency entry and exit, home health utilization, case-mix of beneficiaries receiving care, and the use of alternative post-acute care options relative to home health care. In Section 4, we study the frequency and types of visits and impact of frontloading of visits during home health episodes, as well as whether declines in reported functional status could be attributed to a different mix of patients and the relationship between chain ownership and selected outcomes to examine potential chain-driven spillover. Section 5 presents our analyses of the impact of the HHVBP Model on overall agency performance by comparing TPS in HHVBP states with those in non-HHVBP states. We examine HHVBP impacts on Medicare utilization by both FFS and MA home health beneficiaries and Medicare FFS spending in Sections 6 and 7, respectively, before presenting results for the OASIS-based quality measures and mortality in Section 8. In Section 9, we examine patient experience with care, and in Section 10, we report findings from interviews and surveys of HHA representatives. We consider potential implications for health equity by testing for differential changes in patient outcomes and use of lower quality HHAs among beneficiary subgroups in Section 11, and conclude with a discussion of future activities in Section 12.

3. Results: No Evidence That HHVBP Has Adversely Impacted Overall Access to Home Health Care

3.1 Introduction

In this section, we evaluate whether the original HHVBP Model had implications for beneficiary access to home health care. We consider multiple ways in which the model could affect access to care, either positively or negatively. In establishing quality performance incentives for HHAs and aiming to promote improvements in the quality of care, HHVBP may have the unintended consequence of reducing access to home health care for some beneficiaries. In seeking to meet or exceed quality performance standards under the model, which have financial implications for HHAs, HHAs may be discouraged from serving populations of beneficiaries either having certain characteristics or located in certain geographic areas that they perceive as limiting the likelihood that they can be successful under the model. Alternatively, by establishing financial incentives for the delivery of higher quality care, the model could improve beneficiary access to high quality home health care.

We begin this section with an overview of characteristics of the home health industry in the original HHVBP and non-HHVBP states, followed by analyses of the utilization of home health care and the case-mix of beneficiaries receiving home health care in the two groups of states. While the number of HHAs did not change between 2020 and 2021, the utilization of home health care among FFS beneficiaries continued to decline over time, building on declines that predated the model. Based on data through the entire six years of the original HHVBP Model, we continued to find no evidence of lower utilization emerging among Medicare FFS beneficiaries in HHVBP states compared with non-HHVBP states as a potential unintended consequence of the model.

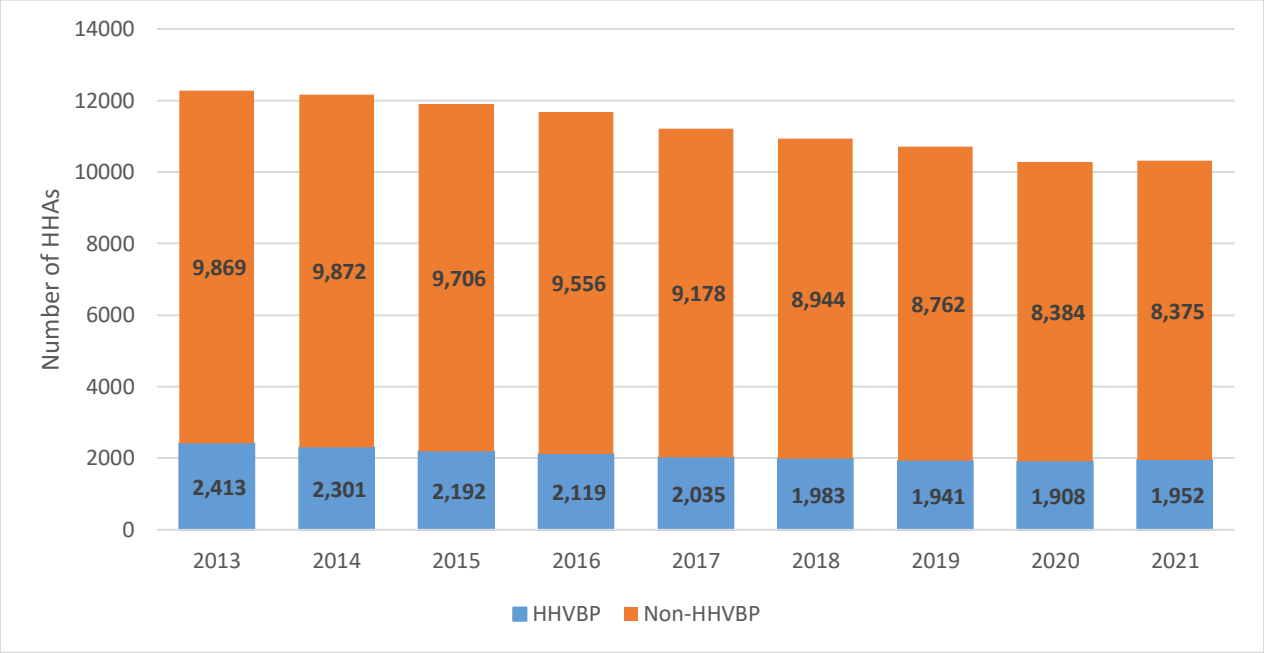
Further, while we observed a pattern of increasing clinical severity over time among home health patients for multiple case-mix measures, these trends were generally similar in HHVBP and non-HHVBP states. We found no evidence of HHVBP impacts for four of our five measures related to health and functional status at the start of care. For the remaining measure – HCC risk score – we found evidence of lower growth in severity among patients receiving care from agencies in HHVBP states relative to agencies in non-HHVBP states post implementation. Because the HCC risk score is the only indicator for which we find evidence of possible case-mix selection from multiple analyses testing for such an effect of HHVBP, we conclude there is not strong evidence of a significant agency response to HHVBP to select beneficiaries based on case-mix, which is consistent with our previous findings based on a slightly different set of case-mix measures (Arbor Research, 2020; 2021; 2022).

In a hospital discharge-level analysis, we found evidence in each of the four most recent years (2018-2021) that HHVBP contributed to a slightly greater likelihood of beneficiaries transitioning to home health care within 14 days relative to other forms of post-acute care (PAC). Furthermore, we found no evidence that HHVBP contributes to any changes in PAC use of home health care among hospital discharges for beneficiaries at risk of limited functional improvement from home health care nor among discharges under the care of ACOs. These findings are consistent with other analyses reported in this section that showed no signs of emerging access problems due to HHVBP.

3.2 No Change in the Number of Home Health Agencies After Years of Steadily Declining

There were 10,327 HHAs in 2021, a 0.3 percent increase from 2020, suggesting no meaningful change in the national number of HHAs; this is in contrast to the steady decline observed from 2013-2020 in both HHVBP and non-HHVBP states which began prior to the HHVBP Model implementation (Exhibit 6). From 2020 to 2021, the total number of HHAs in non-HHVBP states decreased by just nine HHAs (-0.1 percent change) while there was an increase of 44 HHAs in HHVBP states (2.3 percent change), resulting in a net increase of 35 HHAs nationally. Florida – which accounted for almost half (49 percent) of HHVBP HHAs in 2021 – was the largest contributor to the growth of HHAs in HHVBP states between 2020 and 2021, with 49 new HHAs (see Exhibit B-7 [Page 158] in the Technical Appendix). There were only small decreases or no change in the number of HHAs in 2021 for the other eight HHVBP states.

Exhibit 6. Number of Home Health Agencies Leveling Off After Steadily Declining in Both HHVBP and Non-HHVBP States

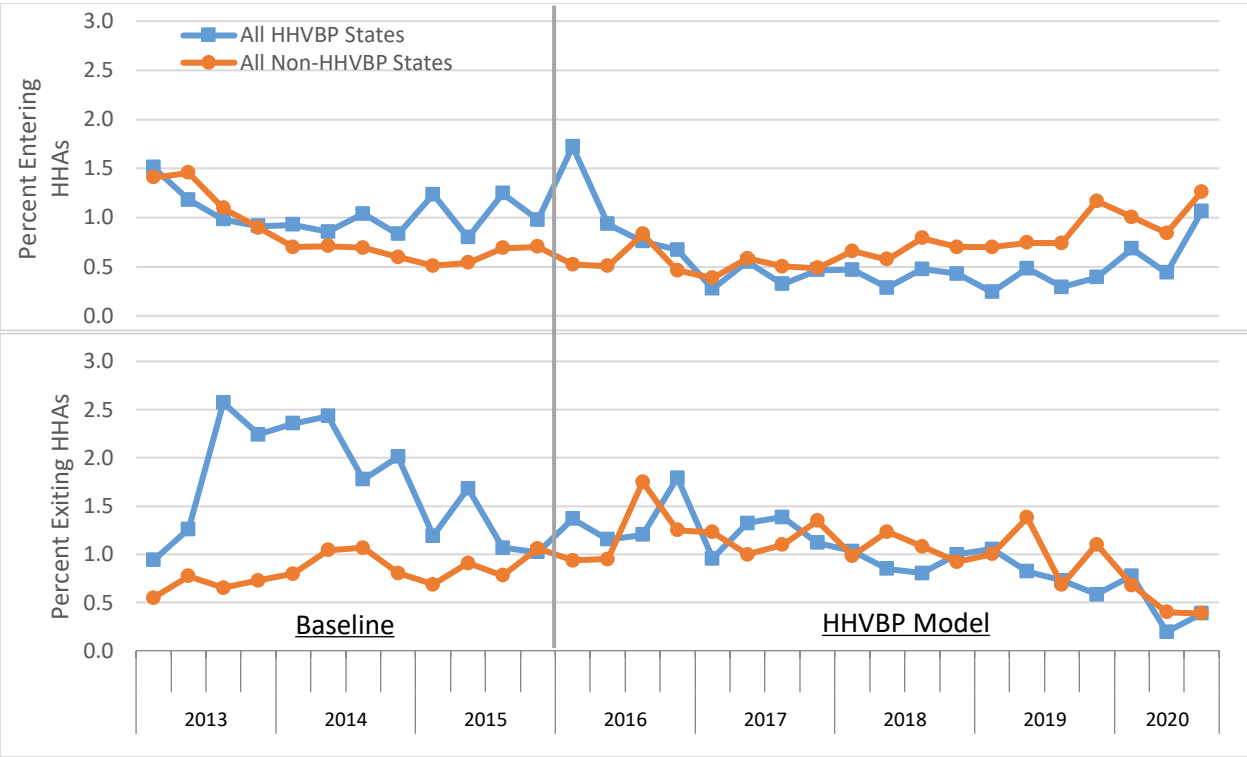


The original HHVBP Model could affect the delivery of home health services by influencing the market entry and exit decisions of HHAs, which, in turn, could affect availability of agencies with implications for utilization of home health services and beneficiary access to home health care. Coupled with declines in the number of HHAs that preceded the model in both HHVBP and non-HHVBP states, we also examined whether the model may have affected the overall rate at which new agencies appeared or terminated.

In general, prior to the implementation of HHVBP in January 2016, HHVBP states had higher agency entry rates and higher agency exit rates than non-HHVBP states, indicating greater volatility in the supply of HHAs in HHVBP states (Exhibit 7). In Q1 of 2013, approximately 1.5 percent of all open agencies in HHVBP and non-HHVBP states were new, and this percentage decreased over time, with a larger decline in non-HHVBP states through 2014. An exception is the spike in the number of new agencies in HHVBP states in 2016 Q1 which was largely due to new agencies in Massachusetts. While

agency entry rates were similar in HHVBP and non-HHVBP states during the first two years of the HHVBP Model, trends diverged between the two groups in 2018 due to an increase in entry rates in non-HHVBP states until 2019 Q4 when entry rates in HHVBP states began to increase. By Q3 2020, entry rates in HHVBP and non-HHVBP states were both approximately 1 percent (Exhibit 7).

Exhibit 7. Similar Quarterly Percentages of Terminating HHAs in HHVBP States and Non-HHVBP States Following the Implementation of HHVBP and an Increase in New HHAs in Non-HHVBP States Since 2018 that is Not Observed in HHVBP States, 2013 Q1-2020 Q3



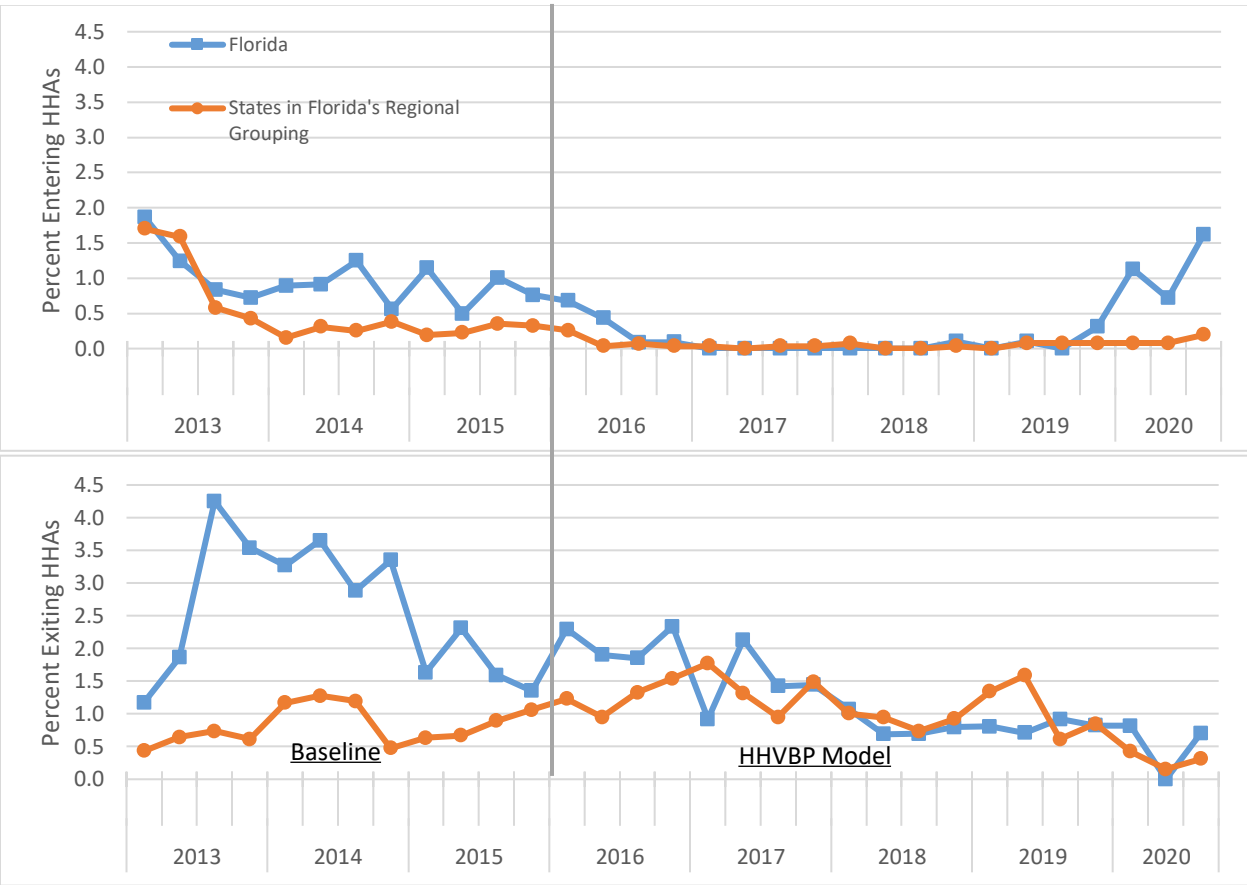
Due to data migration issues in the internet Quality Improvement and Evaluation System (iQIES) system, agency entry and exit were only available through Q3 2020.

Unlike entry rates, we observed large differences in quarterly agency exit rates between HHVBP and non-HHVBP states prior to HHVBP implementation, with rates sometimes twice as high in HHVBP states compared with non-HHVBP states. For example, exit rates of HHAs in HHVBP states ranged from 0.9 percent to 2.6 percent from 2013 through 2015 but ranged from 0.5 percent to 1.1 percent in non-HHVBP states during the same time period (bottom panel of Exhibit 7). Post-implementation, quarterly agency exit rates have remained similar for the two groups through Q3 of 2020.

A number of HHVBP states—specifically, Florida, Massachusetts, Arizona, and Iowa —strongly influenced the differences observed between HHVBP and non-HHVBP states during the pre-implementation period, with the majority of new agencies in HHVBP states located in these states. The number of agencies opening in Florida decreased after implementation of the HHVBP Model and eventually stopped completely (Exhibit 8), reflecting the effect of the CMS moratorium on new Medicare HHAs in Florida. Meanwhile, agencies continued to open in other HHVBP states (Exhibit 9)—primarily in Massachusetts, Arizona, and Iowa. In Florida, we observed new HHAs opening in late 2019 after CMS lifted the moratorium earlier that year (CMS, 2021).

Florida also influenced the relatively high exit rates among HHVBP states observed in the pre-implementation period, although its difference from states in its regional grouping became smaller in late 2015 (Exhibit 8). As with the overall rates at which new agencies entered (Exhibit 7), agency exit rates were relatively similar overall for Florida and its regional grouping in the post-implementation period.

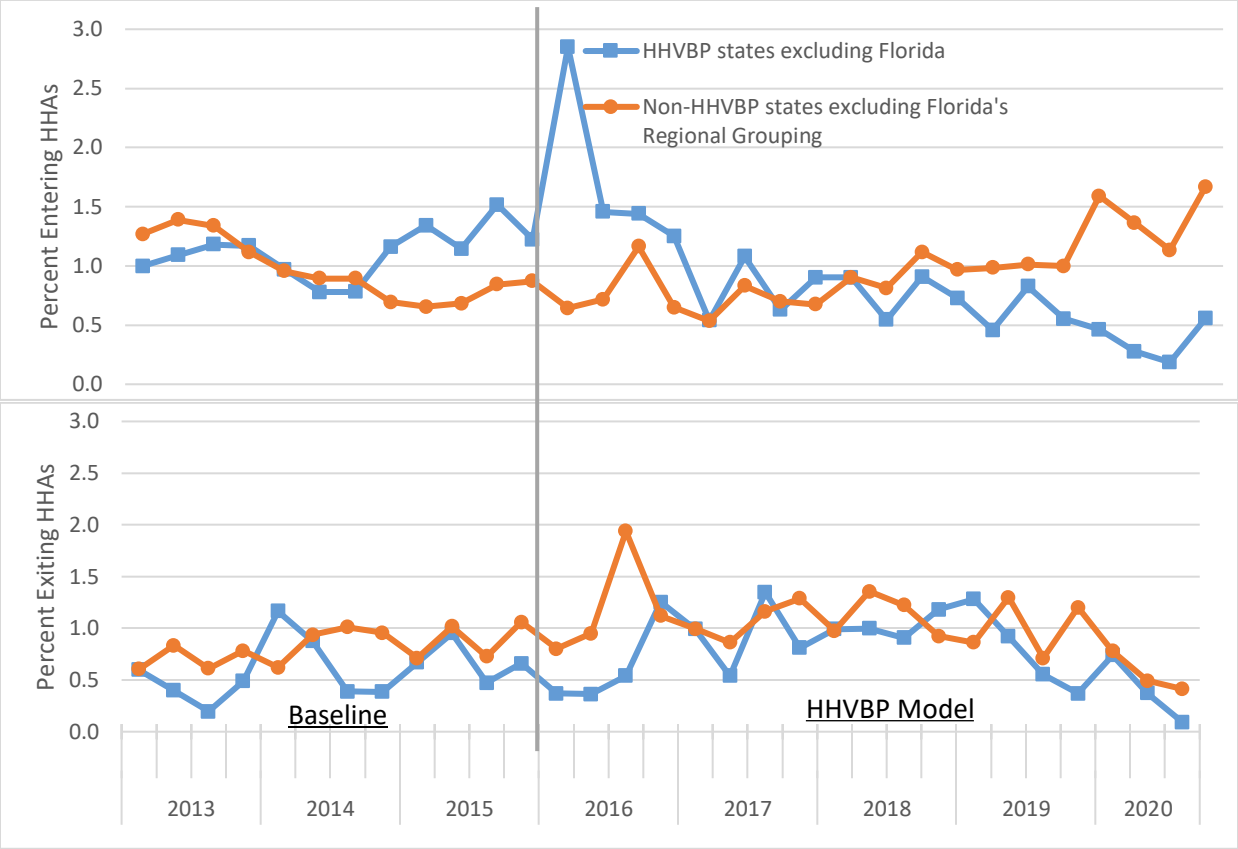
Exhibit 8. Quarterly Percentages of New and Terminating HHAs in Florida Generally Remained Similar to its Regional Grouping during the Post-Implementation Period, 2013 Q1-2020 Q3



For Regional Grouping definitions, see Exhibit 5. Due to Provider of Services (POS) data migration in iQIES, entry and exit analyses are shown through Q3 2020.

When comparing trends for the eight HHVBP states other than Florida and their combined regional groupings, we note a divergence in entry rates between the two groups since 2018 that is due to an increase in entries among the non-HHVBP states (Exhibit 9). In contrast, exit rates have remained relatively similar for the two groups following model implementation.

Exhibit 9. Similar Quarterly Percentages of Terminating HHAs in HHVBP and Non-HHVBP States When Excluding Florida and its Regional Grouping and a Divergence in New HHAs between the Two Groups Since 2018, 2013 Q1-2020 Q3



For Regional Grouping definitions, see Exhibit 5. Due to Provider of Services (POS) data migration in iQIES, entry and exit analyses are only available through Q3 2020.

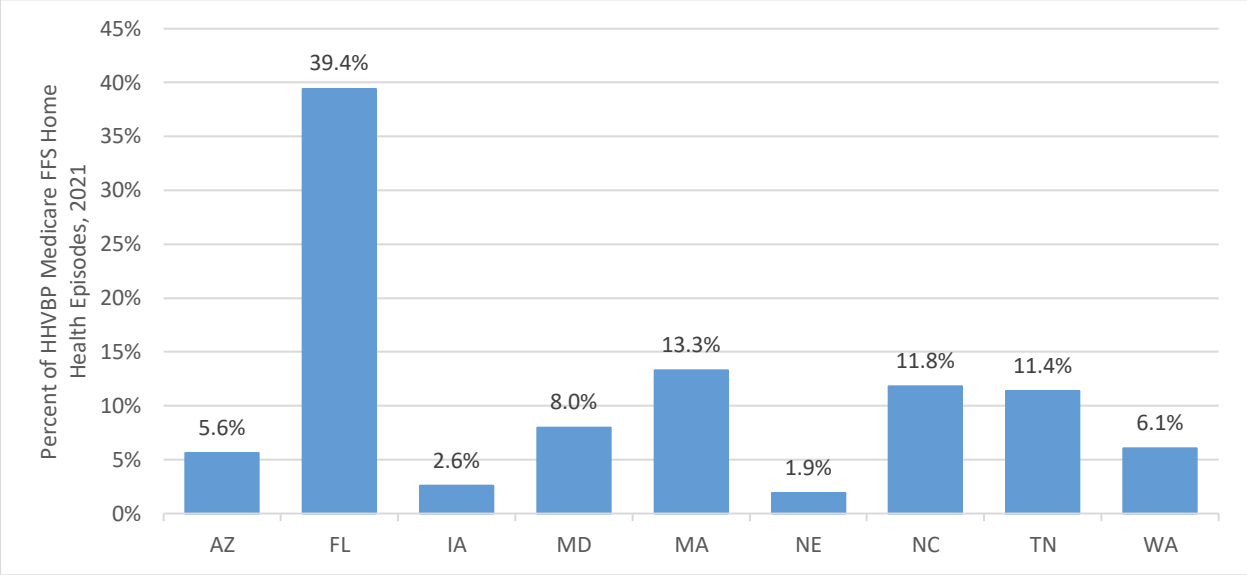
3.3 Overall Decline in Utilization of Home Health Care by FFS Beneficiaries

As discussed in the previous section, CMS implemented the original HHVBP Model in an environment where the number of agencies in operation nationally had been declining over time. While there has been no apparent overall impact of HHVBP on the number of agencies in operation, including any wide-ranging effects on the market entry and exit decisions of agencies, we also examined whether utilization of home health care among Medicare FFS beneficiaries has changed because of the model. However, in evaluating effects of the model, it is important to understand how the characteristics of the home health populations in the HHVBP and non-HHVBP states compared to each other before model implementation.

Overall, the nine HHVBP states and 41 non-HHVBP states were largely similar with regard to a range of home health beneficiary, agency, and episode characteristics during 2013-2015 (see Section B.1 [Page 141] in the Technical Appendix for additional information). These comparisons informed the development of our analytic approach, including the use of regression adjustment to account for factors with somewhat less balance between the treatment and comparison groups (see Section A.1 [Page 4] in the Technical Appendix). In 2021, the 1,952 HHAs operating in HHVBP states (Exhibit 6) provided over 2.1 million home health episodes to 751,099 Medicare FFS beneficiaries; the 8,375 HHAs in the 41 non-

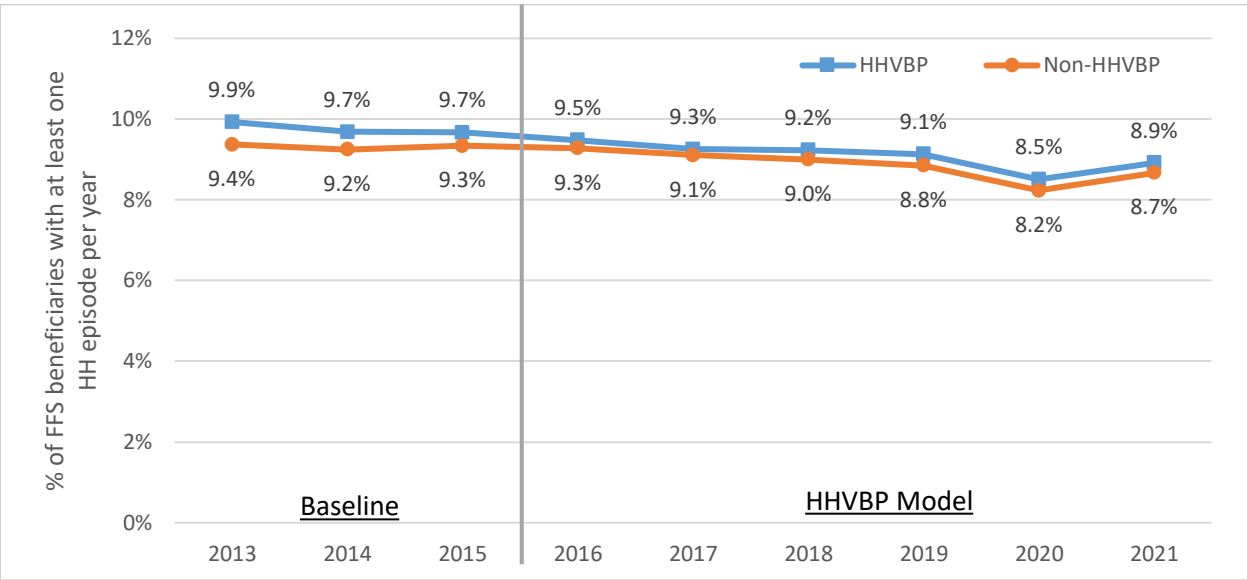
HHVBP states provided nearly 7.1 million home health episodes to 2.3 million Medicare FFS beneficiaries (see Exhibit B-4 [Page 148] in the Technical Appendix). The states that comprise the HHVBP group differ substantially in the size of their home health populations. As Exhibit 10 shows, Florida alone accounted for 39.4 percent of all FFS home health episodes in the HHVBP states in 2021. At the other extreme, Nebraska and Iowa accounted for just 1.9 percent and 2.6 percent of episodes in the HHVBP states, respectively. To explore the potential impact of HHVBP on home health utilization, we examined trends among Medicare FFS beneficiaries in HHVBP and non-HHVBP states using two measures: the percent of Medicare FFS beneficiaries with at least one home health episode in a given year, and the number of home health days of care per FFS beneficiary per year.

Exhibit 10. Florida Accounts for Largest Percent of HHVBP Medicare FFS Home Health Episodes, 2021



Just under one in ten Medicare FFS beneficiaries utilized home health services each year from 2013-2021 in HHVBP and non-HHVBP states (Exhibit 11). Throughout the nine years examined, the percentage of the Medicare FFS population utilizing home health care has remained slightly higher in HHVBP states compared with non-HHVBP states, and there was a decrease in both groups both before and after implementation of HHVBP. Between the year prior to model implementation (2015) and the most recent year of the model (2021), there was a 0.8 percentage point decline in HHVBP states and a 0.6 percentage point decline in non-HHVBP states. Both HHVBP and non-HHVBP states had a slight uptick in 2021 compared to 2020, the year with the largest decline (from 8.5 to 8.9 percent in HHVBP states, and from 8.2 to 8.7 percent in non-HHVBP states; Exhibit 11). This uptick in 2021 returned rates that were closer to what was observed immediately preceding the COVID-19 PHE (e.g., in HHVBP states, 8.9 percent in 2021 compared to 9.1 percent in 2019).

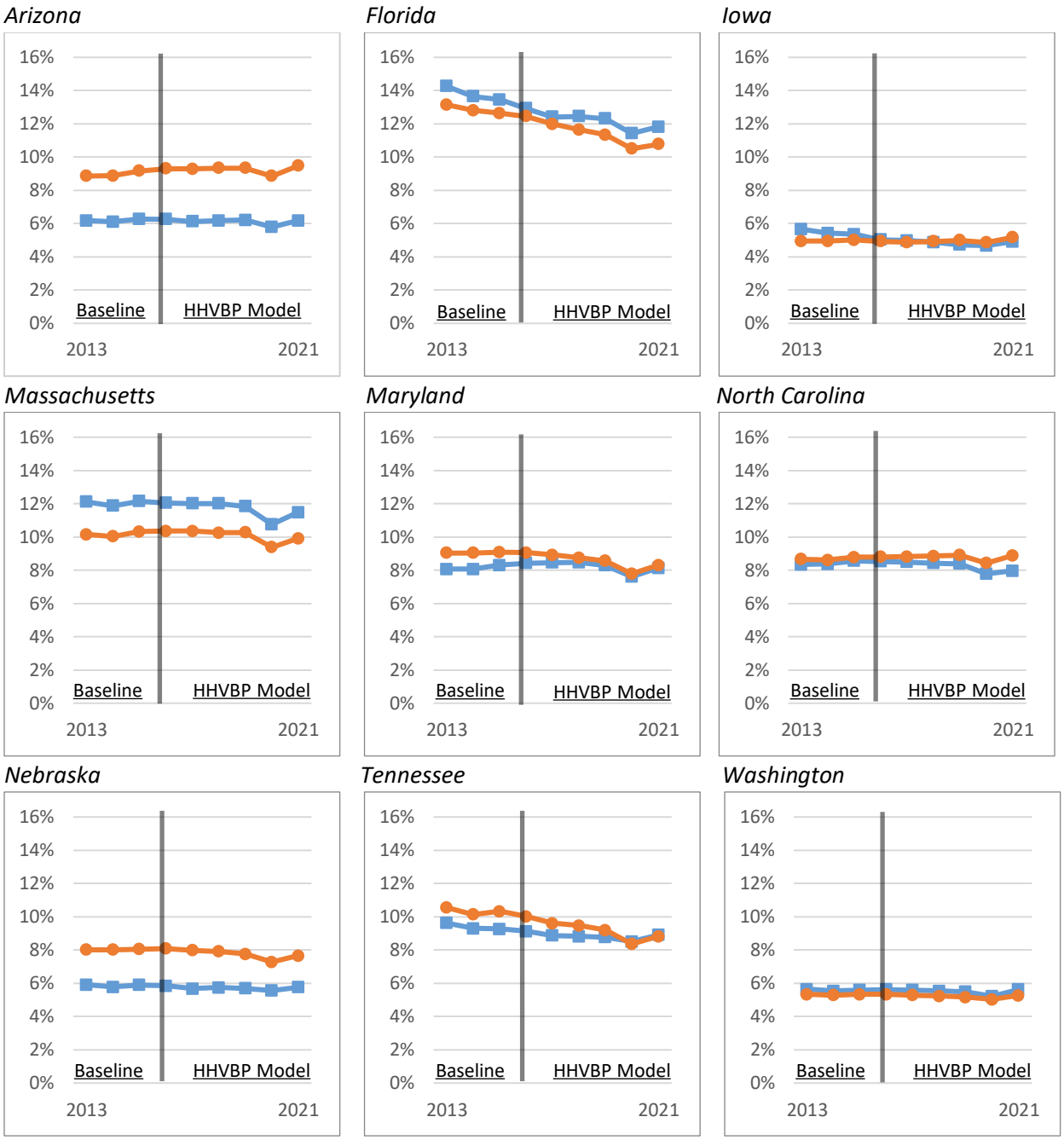
Exhibit 11. Slight Decline in Home Health Utilization among Medicare FFS Beneficiaries in both HHVBP and Non-HHVBP States, 2013-2021



Prior to implementation of the original HHVBP Model, levels of home health utilization varied across HHVBP states, but trends in home health utilization for each HHVBP state were similar to trends in the other states in their regional grouping, which are used as the comparison groups for state-level analyses in this report (Exhibit 12). Among the nine HHVBP states, the percentage of Medicare FFS beneficiaries using home health services during the pre-HHVBP period ranged from approximately 14 percent in Florida to approximately five percent in Iowa. The patterns observed across states remained relatively similar from 2013 to 2021, with the percent of Medicare FFS beneficiaries utilizing home health care remaining approximately 2.5 times higher in Florida than in Iowa during both the pre-HHVBP and post-HHVBP periods.

The overall pattern of a decline in home health utilization among Medicare FFS beneficiaries in 2020 followed by a slight increase in 2021 (Exhibit 11) was also observed in all nine HHVBP states and their regional groupings (Exhibit 12). In the prior years, there was variation across the HHVBP states, with declines in home health utilization among Medicare FFS beneficiaries in Florida and also to a lesser extent in Iowa, Massachusetts, and Tennessee. Meanwhile, home health utilization remained relatively more stable over the nine-year period in Arizona, Maryland, Nebraska, North Carolina, and Washington.

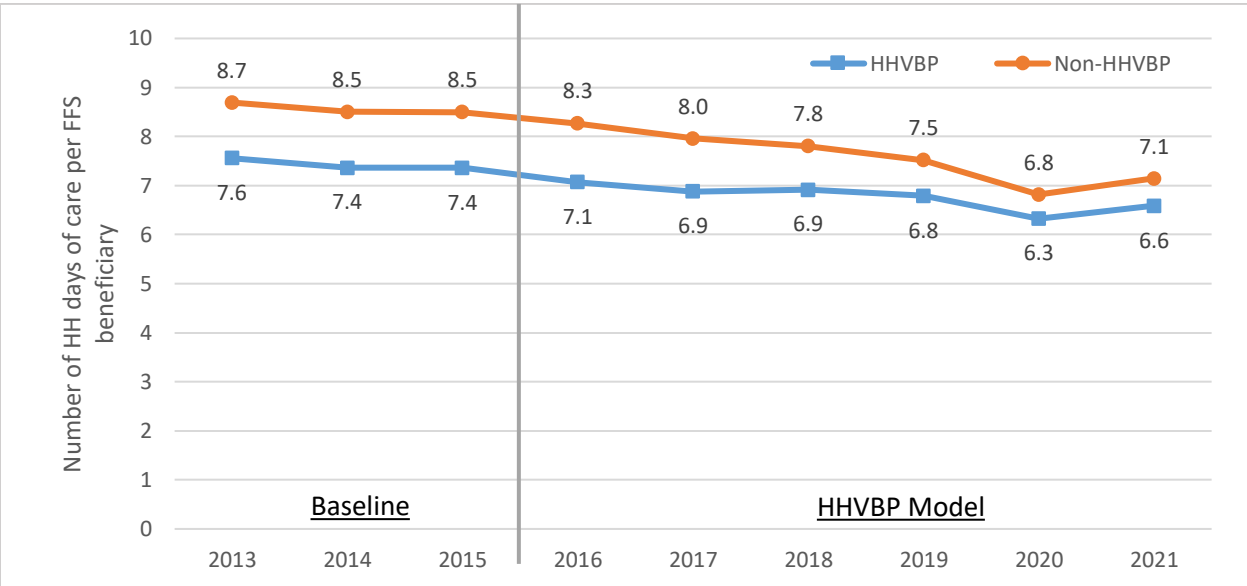
Exhibit 12. Similar Trends in the Utilization of Home Health Services among Medicare FFS Beneficiaries in HHVBP States and their Corresponding Regional Groupings, 2013-2021



"Non-HHVBP" reflects the states in the corresponding HHVBP state's Regional Grouping (Exhibit 5).

We also examined home health utilization based on a measure of volume: the number of home health days of care per Medicare FFS beneficiary. This measure of the volume of home health services reflects a combination of the frequency of home health episodes and duration of episodes that is similarly applicable both before and after the introduction of PDGM.[14] Nationally, differences during the pre-HHVBP baseline years (2013-2015) were consistent with a difference of about 1.1 home health days of care per FFS beneficiary between HHVBP and non-HHVBP states for each of the three years (Exhibit 13). Similar to our findings above, we found evidence of a decline over time in the number of home health days of care per FFS beneficiary for both groups prior to implementation of HHVBP, declining by -2.6 percent in HHVBP states between 2013 and 2015 (from 8.7 to 8.5 days per beneficiary) and by -2.3 percent in non-HHVBP states (from 7.6 to 7.4 days per beneficiary). This downward trend continued into the post-implementation period for HHVBP and non-HHVBP states. With the introduction of PDGM in 2020, the duration of home health episodes changed from 60 days to 30 days under the HH PPS. Similar to the other home health utilization measure explored above (Exhibit 11), the largest decline in volume of home health care was also in 2020 (from 6.8 to 6.3 days in HHVBP states, and from 7.5 to 6.8 days in non-HHVBP states; Exhibit 13) followed by a slight increase in 2021 where rates were more similar to pre-COVID values in both groups (e.g., in HHVBP states, 7.1 days in 2021 compared to 7.5 days in 2019).

Exhibit 13. Average Number of Home Health Days of Care Trends Downward among Medicare FFS Beneficiaries in Both HHVBP and Non-HHVBP States, 2013-2021



Expanding on our descriptive analyses that showed similar declines in home health utilization across HHVBP and non-HHVBP states, we conducted D-in-D analyses of both utilization measures with adjustment for a limited number of FFS beneficiary characteristics, state fixed effects, and state-specific linear time trends. These analyses yielded non-significant D-in-D estimates, suggesting that the original HHVBP Model did not impact home health utilization for Medicare FFS beneficiaries differentially in

[14] In previous reports, we used home health episodes per 1,000 FFS beneficiaries to examine home health volume. With the introduction of the PDGM in 2020 that changed the length of home health episodes from 60 days to 30 days, we instead use home health days per FFS beneficiary to examine home health volume so that the measure is comparable both pre- and post-PDGM for this and last year's analyses (Arbor Research, 2022). See Exhibit A-45 [Page 75] in the Technical Appendix for additional information.

HHVBP states relative to non-HHVBP states, either overall during its entire six years or in most individual years of the model (Exhibit 14).

Exhibit 14. Difference-in-Differences Analyses Reveal No Impact of HHVBP on Home Health Utilization among FFS Beneficiaries, 2016-2021

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D	p-value	Lower 90% CI	Upper 90% CI		
Percent of FFS Beneficiaries with at Least One HH Episode[a]						
2016	-0.07	0.05	-0.13	-0.01	9.76%	-0.7%
2017	-0.003	0.97	-0.13	0.12		-0.03%
2018	0.19	0.23	-0.07	0.46		1.9%
2019	0.34	0.19	-0.09	0.77		3.5%
2020	0.42	0.21	-0.13	0.97		4.3%
2021	0.44	0.31	-0.27	1.14		4.5%
Cumulative	0.22	0.30	-0.13	0.56		2.3%
Number of HH Days of Care per FFS Beneficiary						
2016	-0.11	0.22	-0.26	0.04	7.43	-1.5%
2017	0.07	0.62	-0.17	0.32		0.9%
2018	0.31	0.20	-0.09	0.71		4.2%
2019	0.52	0.15	-0.08	1.11		7.0%
2020	0.74	0.10	-0.01	1.48		10.0%
2021	0.62	0.27	-0.30	1.54		8.3%
Cumulative	0.35	0.24	-0.14	0.84		4.7%

[a] D-in-D and 90% CI values represent percentage point changes. | CI= Confidence Interval. | See Section A.1.4.2 [Page 10] of the Technical Appendix for a description of the beneficiary characteristics included in the D-in-D models. | See Exhibit 14n (Page 240) in the Technical Appendix for each measure's sample size.

As with our findings for all HHVBP states combined, we found no evidence of an HHVBP effect on home health utilization in most individual states. The exceptions include Iowa, Nebraska, and Tennessee, where there is evidence of a relative increase in home health utilization compared with their regional groupings. Based on the D-in-D models, the cumulative D-in-D estimate for the percent of FFS beneficiaries with at least one home health episode was 0.69 percent for Tennessee, which corresponds to a 7.3 percent change from its baseline average of 9.4 percent. Results from the cumulative D-in-D model for number of home health days of care per FFS beneficiary suggested similar patterns for Tennessee and Iowa, with a 16 percent and 17 percent increase, respectively, while Nebraska had a smaller effect of 11 percent. See Exhibit B-10 (Page 159) in the Technical Appendix for additional detail.

3.4 Four of Five Patient Case-Mix Indicators Show Little Evidence that HHVBP Causes Agency to Select Less Sick Patients

The CY 2020 final rule for the HHVBP Model noted many public comments that expressed concern that if the HHVBP Model measures do not sufficiently account for the risk of improvement, the model's financial incentives could be detrimental to patients who expect to benefit from home health care by remaining stable rather than improving (HHS, 2019). The risk adjustment methodology for the two OASIS-based TNC change measures was designed to account for instances where the goal of home health care is to maintain the patient's current condition or prevent or slow further deterioration (HHS,

2021). However, it remains an empirical question whether the risk adjustment of these model measures adequately mitigates incentives that agencies may face to avoid patients who are unlikely to improve.

We explored how HHVBP may have affected home health utilization and access to care for patients with greater risk of health complications and limited improvement by examining changes in the case-mix of home health beneficiaries. The change in financial incentives faced by HHAs in HHVBP states may affect agencies' decisions to accept patients for care. For example, agencies may engage in patient selection to obtain a favorable risk profile that enables them to obtain a higher TPS. However, such patient selection would be contrary to the intended impacts of HHVBP if this behavior reduced access to quality home health care for some patients at greater risk of hospitalization.

To understand how HHVBP may affect agencies' acceptance of patients based on their risk for health complications, we examined five patient case-mix measures:

(1) HCC score during the year prior to the start of the earliest episode in a sequence – which we refer to as, "HCC score at the start of care" – based on Medicare claims.
(2) A composite measure of mobility at the start of care, which includes OASIS information about ambulation/locomotion, toilet transferring, and bed transferring. This is the start of care measure used in the total normalized composite (TNC) change in mobility measure.
(3) A composite measure of self-care at the start of care, which includes OASIS information about ability to groom, to dress upper and lower body, bathing, toileting hygiene, and eating. This is the start of care measure used in the TNC change in self-care measure.
(4) The count of HCC conditions present at the start of care, using primary and secondary diagnosis codes from OASIS.
(5) A measure of home health utilization among all Medicare FFS beneficiaries, stratified by risk of limited functional improvement based on HCC categories from the prior year.

For the first four measures, which are continuous or count measures, higher values indicate increased patient severity. For the stratified measure of utilization among all Medicare FFS beneficiaries, the presence of specific HCC conditions indicates greater severity. See Section A.5.1.1 (Page 121) of the Technical Appendix for more detail on these case-mix measures.

To evaluate possible unintended adverse effects of HHVBP on access to home health care for patients at risk of limited improvement, we updated one of the measures in our case-mix analysis (measure (5) listed above). We created this measure using HCC indicators from all Medicare FFS beneficiaries, focusing on home health utilization by Medicare FFS beneficiaries at risk of limited functional improvement. We defined conditions at risk of limited functional improvement as HCC conditions that are associated with lower average TNC change in self-care and TNC change in mobility measure values before the original HHVBP Model took effect (see Exhibit A-44 [Page 69] in the Technical Appendix to see baseline averages by HCC condition). The association between this new indicator and lower improvement in self-care and mobility during the baseline period made it a good candidate to identify patients who were relatively less likely to improve in functional status and allowed us to evaluate if these patients were less likely to be selected for care based on receiving care in an HHVBP state.

Broadly, we found increases of 11 to 26 percent over time in patient severity measures from 2013-2021 for four of the measures of case-mix in HHVBP and non-HHVBP states (Exhibit 15). For example, average HCC scores at the start of care increased by 0.3 (11 and 12 percent of the respective baseline values) in

both groups, from 2.7 in the baseline period to 3.0 in the HHVBP states and from 2.6 to 2.9 in non-HHVBP states. In contrast, we saw very little change over time in home health utilization among all Medicare FFS beneficiaries at risk of limited functional improvement. HHVBP states had a slightly higher increase in the two TNC start of care case-mix measures between the baseline period and post-HHVBP period compared to the non-HHVBP states.

Exhibit 15. Small Increases in Means for Measures of Case-Mix Severity from Baseline to Post-HHVBP Period in Both HHVBP and Non-HHVBP States

Measure	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
HCC Score at the Start of Care	2.7	3.0	2.6	2.9	0.3	0.3
TNC Mobility at Start of Care	5.0	6.3	5.0	6.2	1.3	1.2
TNC Self-Care at Start of Care	9.7	11.6	9.6	11.3	1.9	1.7
Count of HCC Conditions Present at Start of Care	1.7	1.9	1.8	2.0	0.2	0.2
Home health utilization among all Medicare FFS beneficiaries at risk of limited functional improvement	28.4%	28.4%	25.8%	26.1%	0.0	0.3

For each of the four continuous and count measures of patient case-mix, we estimated a D-in-D model, adjusted for agency characteristics (i.e., agency size, chain affiliation, ownership type), county level characteristics (i.e., rural status, education), interactions between HHVBP status and agency characteristics and county characteristics, county-level COVID-19 rate categories, county-level COVID-19 inpatient hospitalization rate, state fixed effects, and state-specific linear trends to examine differences between HHVBP and non-HHVBP states.[15] We report the findings of our analyses of these four patient case-mix measures in Section 3.4.1 below.

For the fifth measure (home health utilization among all Medicare FFS beneficiaries stratified by risk of limited improvement), we estimated a difference-in-difference-in-differences (D-in-D-in-D) model to determine if there are differential impacts of HHVBP on access of beneficiaries at-risk and not at-risk of limited improvement. These analyses allow for differences in the D-in-D estimates for patient subgroups. In specifying these tests, we supplemented the interactions of treatment group and post-HHVBP indicators in our standard D-in-D models with a third interaction involving the patient subgroup of interest. For additional details regarding the D-in-D-in-D methods used, see Section A.5.1.7 [Page 127] in the Technical Appendix. We report our findings of access for beneficiaries at risk of limited improvement in Section 3.4.2 below.

[15] We included state linear trends in the regression models to account for a lack of parallel trends found in the baseline period between HHVBP and non-HHVBP states in three of these four health status measures (see Section A.1.5.4 [Page 48] of the Technical Appendix).

3.4.1 Greater Declines in Average HCC Score Measured in the Year Prior to the Start of Home Health Care in HHVBP States, but No Effect on Three Other Measures of Case-Mix

We found a decline in average HCC score measured during the year prior to the start of home health care in HHVBP states relative to non-HHVBP states cumulatively as well as individually for each of the six years (Exhibit 16). The cumulative average estimate of -0.08 for this measure translates to a decrease of 3 percent relative to the baseline average of 2.67. In the context of an upward trend over time in average HCC scores (Exhibit 15), the D-in-D model results suggest relatively slower growth in patient severity based on HCC score in HHVBP states relative to non-HHVBP states. Given the relationship between HCC scores and average spending in the entire Medicare FFS population (CMS, 2018), which was approximately $10,369 per Medicare FFS beneficiary during the HHVBP Model period, the average estimated impact on HCC score of -0.08 translates into an annual impact on predicted spending of approximately -$830 per beneficiary. The yearly estimate of this impact on HCC risk score continues to increase in magnitude each year (Exhibit 16). In contrast, we did not find evidence of a cumulative impact of HHVBP on patient severity measured at the start of care for the two composite measures of functional status but observed a decline in functional impairment for the most recent three years (2019-2021) in HHVBP states compared with non-HHVBP states (Exhibit 16). There is no evidence of a difference between HHVBP and non-HHVBP states cumulatively or yearly in the count of HCC conditions at the start of care.

Our state-specific analysis suggests that our finding of an overall association of HHVBP with a significant decline in HCC score at start of care is primarily driven by agency behavior in four states: Arizona, Florida, Iowa, and Tennessee. Our state-level D-in-D analyses for the other case-mix measures showed no consistent significant patterns across multiple HHVBP states relative to their respective regional comparison groups. See Exhibit B-12 (Page 161) in the Technical Appendix for additional detail on state-level findings.

Exhibit 16. Slower Growth in Patient Severity for One of Five Case-mix Measures in HHVBP States Compared to Non-HHVBP States

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	Percent Relative Change
	D-in-D	p-value	Lower 90% CI	Upper 90% CI		
HCC Score at the Start of Care						
2016	-0.01	0.03	-0.02	-0.003	2.67	-0.4%
2017	-0.04	<0.001	-0.06	-0.02		-1.5%
2018	-0.07	<0.001	-0.09	-0.05		-2.6%
2019	-0.10	<0.001	-0.13	-0.07		-3.7%
2020	-0.12	<0.001	-0.15	-0.08		-4.5%
2021	-0.13	<0.001	-0.17	-0.09		-4.9%
Cumulative	-0.08	<0.001	-0.11	-0.06		-3.0%
TNC Mobility at Start of Care						
2016	0.04	0.14	-0.01	0.08	4.98	0.8%
2017	0.04	0.43	-0.04	0.11		0.8%
2018	-0.03	0.55	-0.13	0.06		-0.6%
2019	-0.12	0.11	-0.24	0.002		-2.4%
2020	-0.21	0.03	-0.36	-0.05		-4.2%
2021	-0.23	0.03	-0.41	-0.05		-4.6%
Cumulative	-0.09	0.18	-0.19	0.02		-1.8%
TNC Self-Care at Start of Care						
2016	0.05	0.22	-0.02	0.13	9.71	0.5%
2017	0.02	0.85	-0.12	0.15		0.2%
2018	-0.10	0.38	-0.28	0.08		-1.0%
2019	-0.25	0.09	-0.49	-0.005		-2.6%
2020	-0.43	0.02	-0.74	-0.13		-4.4%
2021	-0.52	0.01	-0.87	-0.17		-5.4%
Cumulative	-0.20	0.10	-0.41	0.001		-2.1%
Count of HCC Conditions Present at Start of Care						
2016	0.003	0.70	-0.01	0.02	1.67	0.2%
2017	0.02	0.22	-0.01	0.04		1.2%
2018	0.01	0.55	-0.02	0.03		0.6%
2019	0.005	0.80	-0.03	0.03		0.3%
2020	-0.01	0.62	-0.05	0.03		-0.6%
2021	-0.03	0.36	-0.07	0.02		-1.8%
Cumulative	-0.001	0.97	-0.03	0.02		-0.06%

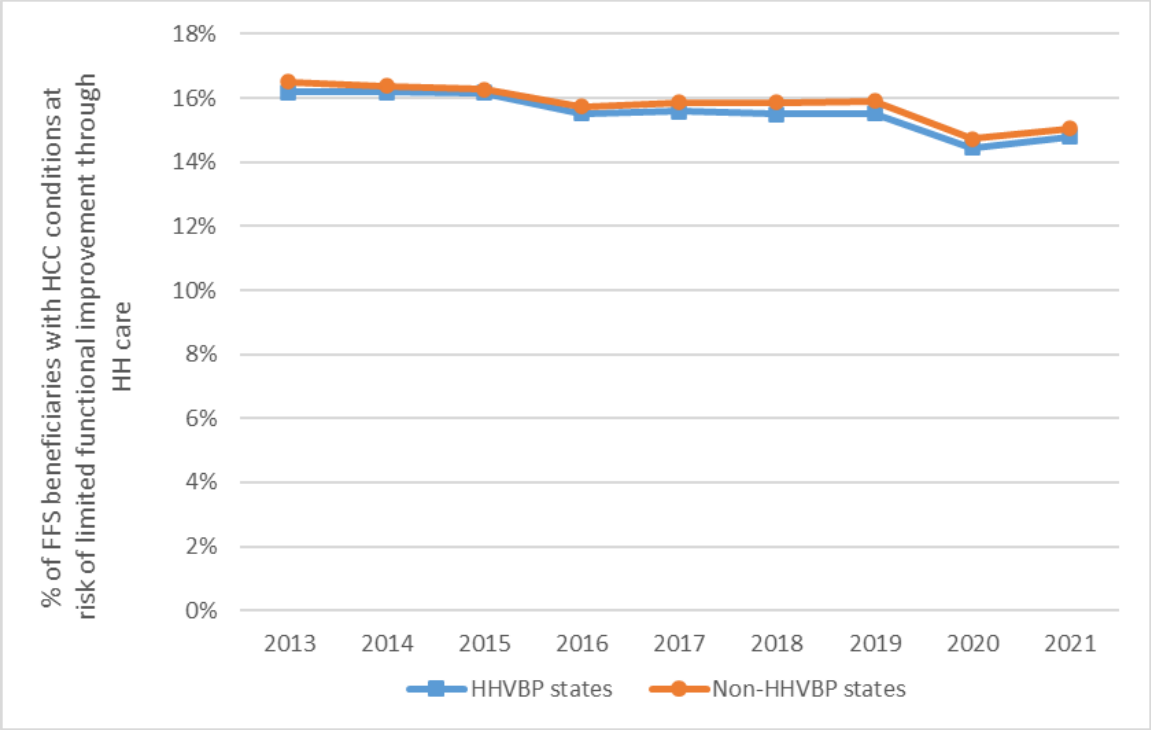
D-in-D and 90% CI values represent percentage point changes. | CI = Confidence Interval. | See Exhibit 16n (Page 240) in the Technical Appendix for each measure's sample size.

3.4.2 HHVBP Does Not Affect Access to Home Health Care for Medicare FFS Beneficiaries Who Have Conditions at Risk of Limited Improvement

We examined if home health agencies may respond to HHVBP incentives by avoiding patients who may not be expected to improve (thereby increase their TPS). More specifically, we analyzed use of home health care among Medicare FFS beneficiaries with conditions we have found to be associated with limited improvement in functional status. We used all diagnoses found in Part B professional carrier, inpatient, and outpatient claims to identify HCCs that are associated with lower average baseline TNC change in self-care and change in mobility measure values (see Exhibit A-44 [Page 69] in the Technical Appendix for baseline averages by HCC condition). Evaluating the impacts of the original HHVBP Model on access to home health care among all Medicare FFS beneficiaries at risk of limited improvement (referred to as "at-risk beneficiaries" from here onward) contributes to understanding whether the risk adjustment of HHVBP Model performance measures adequately mitigates incentives that agencies may face to avoid patients for whom a goal of stabilizing function may be more appropriate than a goal of improving function.

The percentage of at-risk beneficiaries fell slightly, from just over 16 percent in 2013 to approximately 15 percent in 2021 in both HHVBP and non-HHVBP states, with non-HHVBP states having a slightly greater percentage relative to HHVBP states throughout the study period (Exhibit 17).

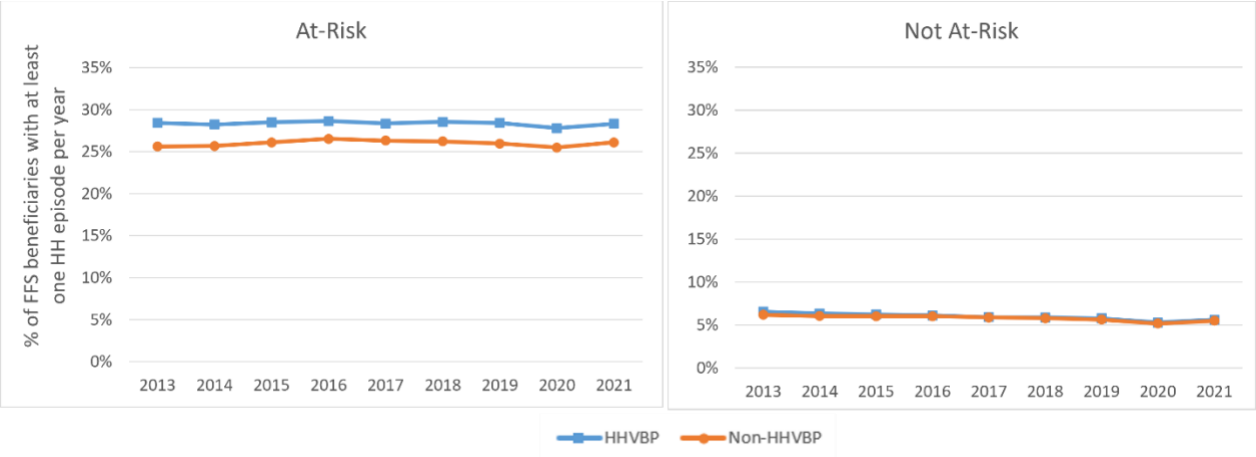
Exhibit 17. Prevalence of Conditions at Risk of Limited Functional Improvement from Home Health Care Retain Similar Levels in the Medicare FFS Population in HHVBP and Non-HHVBP States, Declining Slightly in Later Years, 2013 - 2021



The percentage of at-risk beneficiaries who had at least one home health episode in a year remained approximately constant at 28 and 26 percent in HHVBP and non-HHVBP states, respectively, during 2013 to 2021 (Exhibit 18, left panel). The percentage of beneficiaries not at-risk who had at least one home health episode in a year was much lower relative to the percentage among at-risk beneficiaries and

declined very slightly in both HHVBP and non-HHVBP states from 6.6 to 5.6 percent in HHVBP states and from 6.2 to 5.5 percent in non-HHVBP states during the study period (Exhibit 18, right panel).

Exhibit 18. Home Health Utilization Among Beneficiaries at Risk of Limited Functional Improvement is Significantly Greater than among Beneficiaries not at Risk in HHVBP and Non-HHVBP States, 2013 - 2021



Based on the D-in-D-in-D analysis of the subgroups of at-risk and not at-risk Medicare FFS beneficiaries, our analysis does not support the contention that home health agencies avoided at-risk beneficiaries. We found that the HHVBP Model had no significant impact on probability of home health care use within the at-risk or not at-risk subgroups, nor was there a significant difference in HHVBP impacts across the two subgroups (Exhibit 19).

Exhibit 19. Finding of No HHVBP Impact on Home Health Utilization among Medicare FFS Beneficiaries does not Differ Significantly for Beneficiaries with HCCs at Risk of Limited Improvement During Home Health Care, 2013-2021

Measure	At-Risk HCC			Other			At-Risk HCC *minus* Other		
	D-in-D	p-value	% Relative Change[b]	D-in-D	p-value	% Relative Change[c]	D-in-D-in-D	p-value	% Relative Change[b]
Home Health Care [a]	-0.27	0.49	-0.9%	-0.17	0.39	-2.7%	-0.09	0.63	-0.3%

See Section A.5.1.7 (Page 127) of the Technical Appendix for details regarding model specifications. [a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for beneficiaries at-risk based on HCCs in HHVBP states (shown in Exhibit A-14 [Page 35] of the Technical Appendix). [c] Calculated by dividing the model estimate by the baseline mean for other patients in HHVBP states (shown in Exhibit A-14 [Page 35] of the Technical Appendix).

3.5 HHVBP May Contribute to a Small Increase in the Likelihood that Medicare FFS Beneficiaries Receive Home Health Care after Hospital Discharge Relative to Other Post-Acute Care Services

Given the degree of discretion that HHAs have over how they provide care, the original HHVBP Model's incentives may lead HHAs to engage in patient selection that produces changes in the use of alternative forms of care that can substitute for home health care (e.g., SNF services) among beneficiaries eligible for multiple forms of post-acute care. Growing financial disincentives for HHAs to care for beneficiaries

with relatively complex health needs may lead to an increase in the use of costly substitutes for home health care, which may result in some beneficiaries receiving sub-optimal PAC relative to their circumstances. Alternatively, HHAs may respond to the HHVBP incentives by admitting more patients who are well-suited to receiving home health care while other patients – better suited to an alternative PAC setting – may receive referrals to institutional PAC settings such as SNFs, inpatient rehabilitation facilities (IRFs), or referrals to hospital outpatient therapy (encompassing physical, occupational, and speech therapy).

To examine patterns in use across PAC options and potential HHVBP impacts on PAC substitution, we used Medicare FFS claims to identify use of PAC within 14 days following discharge from short-term acute care and critical access hospitals. We focused the analysis on four categories of PAC:

(1) home health care;
(2) institutional PAC (SNF, IRF, long-term care hospital [LTCH]);
(3) hospital outpatient therapy (physical, occupational, speech); and
(4) self-care at home (no claims for other forms of PAC or institutional care found in the 14-day period).

We chose to observe the start of PAC within a 14-day period from acute care discharge to align with how CMS designates a home health episode as having an institutional source for the purpose of payment adjustment under the home health PPS. We conducted our analysis of discharges from short-term acute care and critical access hospitals among all Medicare FFS beneficiaries who had a primary diagnosis that fell within the ten most common Major Diagnostic Categories (MDCs) among beneficiaries who receive home health PAC (see Exhibit 20 for the list of MDCs).

Demographic and clinical characteristics of this group of hospital discharges did not substantially change from the baseline period (2013-2015) to the intervention period (2016-2021) (Exhibit 20). The most common MDC during both periods for HHVBP and non-HHVBP states was the set of primary diagnoses in the Circulatory System category, which rose slightly in prevalence from 21.9 percent to 22.4 percent in HHVBP states and from 21.9 percent to 22.3 percent in non-HHVBP states. Categories of conditions that had noteworthy changes in prevalence from the baseline to the post-intervention period include the MDCs for Respiratory System (-1.3 percentage point changes for discharges in both HHVBP and non-HHVBP states), Digestive System (-1.1 and -1.0 percentage point changes for HHVBP and non-HHVBP, respectively) and for Infectious and Parasitic Diseases (2.0 and 2.2 percentage point increases for HHVBP and non-HHVBP, respectively).

Exhibit 20. No Substantial Changes in Most Characteristics of Medicare FFS Beneficiary Acute Care Hospitalization Discharges between Baseline and Post-HHVBP Period

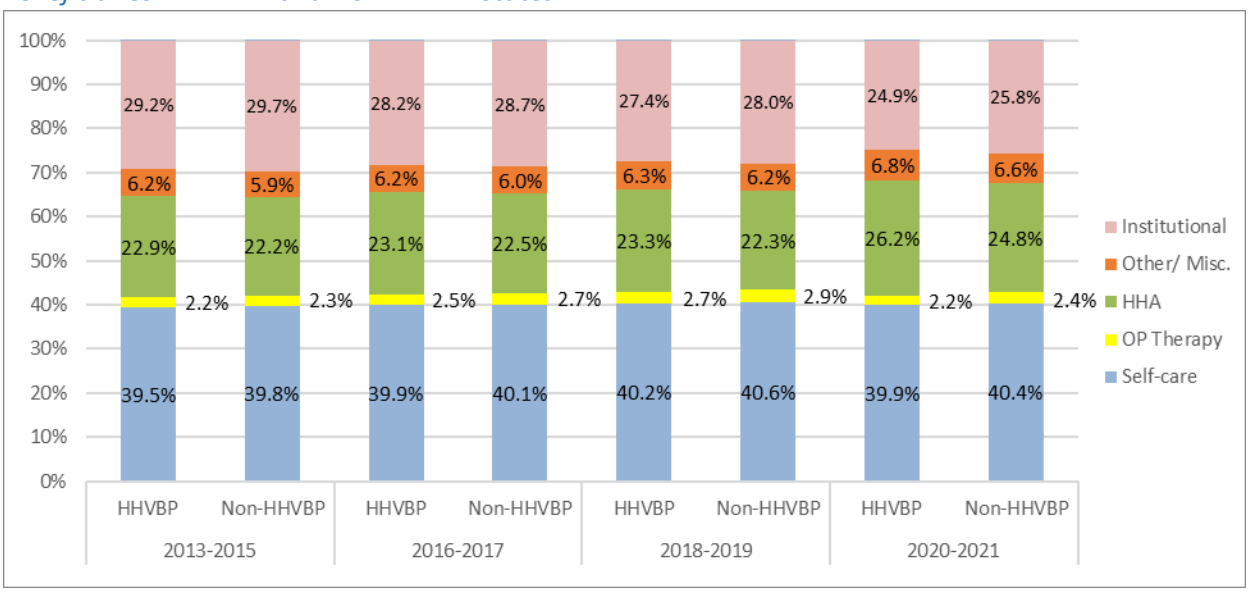
Characteristics of Acute Care Hospitalization Discharges	HHVBP States		Non-HHVBP States	
	Baseline (2013-2015)	Post-Period (2016-2021)	Baseline (2013-2015)	Post-Period (2016-2021)
Beneficiary Characteristics				
Age				
0-64	16.6%	14.9%	17.9%	16.3%
65-84	60.2%	63.1%	59.4%	62.3%
85 and older	23.2%	22.0%	22.7%	21.3%

Characteristics of Acute Care Hospitalization Discharges	HHVBP States		Non-HHVBP States	
	Baseline (2013-2015)	Post-Period (2016-2021)	Baseline (2013-2015)	Post-Period (2016-2021)
Female	56.0%	54.6%	56.3%	54.8%
Race/Ethnicity				
White, non-Hispanic	83.3%	83.1%	82.1%	81.9%
Black, non-Hispanic	11.9%	11.4%	12.1%	11.4%
Other, non-Hispanic	2.8%	3.6%	3.7%	4.6%
Hispanic, (regardless of race)	2.0%	1.9%	2.1%	2.2%
Have HCCs at risk of limited improvement during home health care ("at risk discharges")	25.7%	26.4%	26.2%	26.8%
Characteristics of the precipitating hospital stay				
Discharged from short-term acute care hospital	97.3%	97.6%	96.5%	96.8%
Discharged from Critical Access Hospital	2.7%	2.4%	3.5%	3.1%
SNF Eligibility	71.0%	66.5%	71.8%	67.2%
Length of Inpatient Stay (days)	4.7	4.7	4.8	4.7
Rural Hospital Location	6.7%	6.3%	9.9%	9.8%
County-level characteristics				
County-Level Median Household Income 2011-2015, Average	$59,225	$59,756	$59,672	$60,304
County-Level Percent of Persons 25+ Yrs w/<High School Diploma 2011-15, Average	11.9%	11.7%	13.0%	12.9%
County Level Percent of Persons in Deep Poverty 2013-17, Average	6.5	6.4	6.7	6.6
MDC group				
Nervous System	8.6%	8.6%	8.6%	8.5%
Respiratory System	15.7%	14.4%	15.8%	14.5%
Circulatory System	21.9%	22.4%	21.9%	22.3%
Digestive System	12.4%	11.3%	12.0%	11.0%
Hepatobiliary System And Pancreas	2.9%	2.9%	2.9%	2.8%
Musculoskeletal System And Connective Tissue	15.4%	15.5%	14.9%	15.0%
Skin, Subcutaneous Tissue And Breast	3.0%	2.6%	3.0%	2.6%
Endocrine, Nutritional And Metabolic System	3.9%	4.1%	4.2%	4.4%
Kidney And Urinary Tract	9.0%	8.7%	8.8%	8.7%
Infectious and Parasitic Diseases	7.4%	9.4%	8.0%	10.2%
APM Flags*				
BPCI2	1.8%	2.7%	1.8%	2.4%
BPCI3	0.1%	0.2%	0.2%	0.2%
BPCI Advanced	0.0%	4.0%	0.0%	3.9%
ACO SSP	19.1%	32.6%	16.3%	31.1%
ACO Next Generation	0.0%	6.0%	0.0%	3.2%
ACO Pioneer	4.2%	0.6%	2.0%	0.1%
CJR	0.0%	0.8%	0.0%	0.9%
OCM	0.0%	1.6%	0.0%	1.6%

** Not all APMs were active for all years of the baseline and intervention periods (see Exhibit A-69 [Page 99] in the Technical Appendix for additional detail). BPCI = Bundled Payments for Care Improvement |ACO = Accountable Care Organization |CJR = Comprehensive Care for Joint Replacement |OCM = Oncology Care Models*

The unadjusted percentages of home health care, self-care, and hospital outpatient therapy post acute stay relatively similar from the baseline period (2013-2015) through the first four years of the HHVBP Model (2016-2019) and into 2020-2021 (Exhibit 21). Discharge to self-care without any other form of PAC had the largest share of discharges—approximately 40 to 41 percent in each period in HHVBP and non-HHVBP states. Use of home health care slightly increased in HHVBP states, going from 22.9 to 23.3 percent from the baseline period to the middle HHVBP period (2018 – 2019) with a larger increase to 26.2 percent in later years (2020-2021), likely due in part to the decreased use of institutional settings that occurred in 2020-2021 associated with the COVID-19 PHE. Meanwhile, use of home health care remained close to 22 percent in non-HHVBP states from the baseline period through 2019, and, as in HHVBP states, experienced a noteworthy increase to 24.8 percent in 2020-2021. Although accounting for a much smaller share of PAC, between two and three percent, use of outpatient therapy visits also increased slightly in HHVBP and non-HHVBP states from the baseline period to the 2018/2019 period but then drifted back down to 2.2 and 2.4 percent, respectively, in later years (2020-2021)—levels that resembled the baseline period. Use of institutional PAC was the only form of PAC to have a (moderate) decline, from 29.2 percent of discharges in HHVBP states during 2013-2015 to 24.9 percent during 2020-2021 period, and a similar decline in non-HHVBP states from 29.7 percent to 25.8 percent during the same periods (Exhibit 21).

Exhibit 21. Similar Trends in Use of Alternative Post-Acute Care Options among FFS Medicare Beneficiaries in HHVBP and Non-HHVBP States



We used a D-in-D approach with regression adjustment to test whether the original HHVBP Model contributed to changes in the percent of hospital discharges that transition to each form of PAC. Although we found key characteristics of discharges well balanced between HHVBP and non-HHVBP states, we adjusted the D-in-D model for a few characteristics, including beneficiary age, rural hospital location, and participation in a CMS ACO, all of which had greater baseline differences than most across the two groups (Exhibit 20; see also Section A.1.5 [Page 25] of the Technical Appendix).

Based on our D-in-D analyses, we found that the original HHVBP Model contributed to a slight increase in the use of home health care among FFS beneficiaries who had an inpatient stay cumulatively as well

as annually for the last four years of the model (Exhibit 22). The increase was greatest during 2020 with a 3.9 percent increase relative to a baseline average of 22.9 percent in HHVBP states. The estimated impact in 2021 was smaller and closer to the estimated impact in 2019 (2.8 and 2.0 percent, respectively; Exhibit 22). We did not find statistically significant average annual HHVBP impacts on the use of other forms of PAC. In a robustness test of our D-in-D model, we adjusted for additional demographic and clinical covariates listed in Exhibit 20 as well as the Medicare Severity-Diagnosis Related Group (MS-DRG) of the index hospitalization and found similar impacts of HHVBP, particularly during the later two years, on transitions to home health care after hospital discharge (see Exhibit B-18 [Page 166] in the Technical Appendix).

Exhibit 22. HHVBP Results in Increase in the Use of Home Health Care during Later Years of the Model among FFS Medicare Beneficiaries who had an Inpatient Stay

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
Home Health Care						
2016	0.03	0.80	-0.17	0.23	22.9%	0.1%
2017	0.06	0.73	-0.21	0.32		0.3%
2018	0.40	0.03	0.09	0.71		1.7%
2019	0.46	0.03	0.11	0.80		2.0%
2020	0.89	<0.001	0.49	1.28		3.9%
2021	0.64	0.01	0.23	1.06		2.8%
Cumulative	0.38	0.03	0.10	0.66		1.7%
Institutional Care						
2016	-0.21	0.07	-0.40	-0.02	29.2%	-0.7%
2017	-0.05	0.74	-0.27	0.18		-0.2%
2018	-0.14	0.35	-0.40	0.11		-0.5%
2019	-0.14	0.41	-0.42	0.14		-0.5%
2020	-0.43	0.04	-0.77	-0.09		-1.5%
2021	-0.26	0.20	-0.60	0.08		-0.9%
Cumulative	-0.19	0.17	-0.43	0.04		-0.7%
Self-Care						
2016	0.16	0.24	-0.06	0.38	39.5%	0.4%
2017	0.10	0.52	-0.16	0.37		0.3%
2018	-0.11	0.57	-0.41	0.20		-0.3%
2019	-0.07	0.72	-0.39	0.25		-0.2%
2020	-0.34	0.11	-0.69	0.01		-0.9%
2021	-0.27	0.25	-0.65	0.11		-0.7%
Cumulative	-0.07	0.68	-0.33	0.20		-0.2%
Hospital Outpatient Therapy						
2016	0.03	0.43	-0.03	0.09		1.4%

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
2017	-0.004	0.92	-0.07	0.06	2.2%	-0.2%
2018	-0.01	0.74	-0.09	0.06		-0.5%
2019	-0.08	0.10	-0.16	<0.001		-3.6%
2020	-0.01	0.78	-0.09	0.06		-0.5%
2021	0.01	0.91	-0.07	0.08		0.5%
Cumulative	-0.01	0.70	-0.07	0.040.04		-0.5%

[a] D-in-D and 90% CI values represent percentage point changes. | CI = Confidence Interval. | See Exhibit 22n (Page 240) in the Technical Appendix for each measure's sample size.

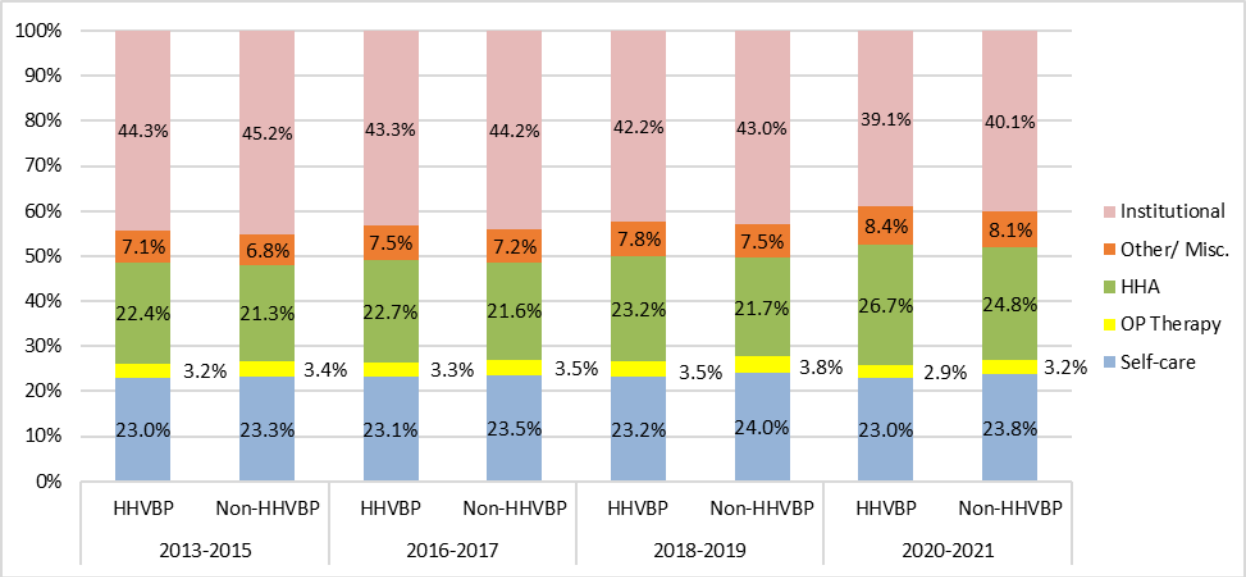
3.5.1 Limited Impacts of the HHVBP Model on Post-Acute Care Selection Did Not Differ Substantially for Beneficiaries at Risk of Limited Improvement During Home Health Care

Given potential incentives that agencies in the original HHVBP Model states may have faced to limit the number or share of their patients with clinical features that may present challenges to achieving high quality performance despite risk adjustment of performance measures, we examined PAC selection for acute care discharges with specific conditions we have found to be associated with limited improvement in functional status (see Section 3.4 of this report). More specifically, we used primary or secondary diagnoses on the acute hospitalization claims to identify discharges with HCC conditions that are associated with lower average baseline TNC change in self-care and TNC change in mobility measure values before the original HHVBP Model took effect (see Exhibit A-44 [Page 69] in the Technical Appendix to see baseline averages by HCC condition). Evaluating the impacts of the original model on access to home health care among post-acute patients at risk of limited improvement (referred to as "at-risk discharges" from here onward) contributes to understanding whether the risk adjustment of the original HHVBP Model performance measures adequately mitigates incentives that agencies may face to avoid patients for whom goals of stabilizing function may be more appropriate than a goal of improvement during home health care.

The subgroup of at-risk discharges accounted for approximately 26 percent of all discharges in the baseline and intervention period in both HHVBP and non-HHVBP states with a slight increase to nearly 27 percent in non-HHVBP states during the intervention period (Exhibit 20). Also, within this subgroup, the levels and trends in unadjusted percentages of starts to home health care (Exhibit 23) were similar to those found in the overall population of discharges (Exhibit 21). However, discharges to institutional PAC have a notably greater share in this subgroup relative to the prevalence of this option among all discharges in both HHVBP and non-HHVBP. Specifically, the share of discharges to institutional PAC in the at-risk subgroup decreased over the study period from 44.3 and 45.2 percent in HHVBP and non-HHVBP states, respectively, in the baseline period to 39.1 and 40.1 percent, respectively, in 2020-2021 (Exhibit 23). Discharges to self-care have a notably smaller share in the at-risk subgroup relative to their prevalence among all discharges, remaining nearly constant at 23 percent of discharges in HHVBP states while increasing slightly in non-HHVBP states from 23.3 percent to 23.8 percent (Exhibit 23). Use of outpatient therapy visits among the subgroup of at-risk discharges had levels about one percentage

point greater and trends similar to what they exhibited among all discharges. In general, the relatively larger share of institutional PAC and smaller share of self-care among these at-risk discharges reflects their more complex health needs, which makes them an important group for testing potential unintended effects of HHVBP on access to home health care.

Exhibit 23. Trends in Use of Alternative Post-Acute Care Options among FFS Medicare Beneficiaries at Risk of Limited Improvement during Home Health Care in HHVBP and Non-HHVBP States



To test whether the impacts of HHVBP varied among patient subgroups defined based on at-risk status, we conducted D-in-D-in-D analyses. These analyses allow for differences in the D-in-D estimates between patient subgroups. In specifying these tests, we supplemented the interactions of treatment group and post-HHVBP indicators in our standard D-in-D models with a third interaction involving the patient subgroup of interest. For details regarding our methods, see Section A.5.1.7 [Page 127] in the Technical Appendix.

Based on the D-in-D-in-D analysis of the subgroups of at-risk and not at-risk discharges, we found that the original HHVBP Model significantly increased selection of home health care within the at-risk and not at-risk subgroups by 0.36 and 0.41 percentage points respectively (increases of 1.6 and 1.8 percent, respectively, relative to baseline levels within each subgroup; Exhibit 24). However, we found no significant difference in HHVBP impacts between the two subgroups (shown under At-Risk HCC *minus* Other in Exhibit 24). We also found a negative impact of HHVBP on use of institutional care in the group not at risk of limited improvement (-0.28 percentage points; -1.2 percent change relative to baseline) and a negative HHVBP impact on selection of self-care in the at-risk subgroup (0.28 percentage points; -1.2 percent relative to baseline). However, we did not find evidence of a significant impact on selection of institutional care in the at-risk subgroup, nor an impact on self-care for discharges not at risk, nor any impacts on selection of hospital outpatient therapy in either subgroup (Exhibit 24).

Exhibit 24. Limited Impacts of HHVBP on PAC Selection Do Not Differ Significantly for Beneficiaries with HCCs at Risk of Limited Improvement During Home Health Care, 2013-2021

Measure	At-Risk HCC			Other			At-Risk HCC *minus* Other		
	D-in-D	p-value	% Relative Change[b]	D-in-D	p-value	% Relative Change[c]	D-in-D-in-D	p-value	% Relative Change[b]
Home Health Care [a]	0.36	0.02	1.6%	0.41	0.03	1.8%	-0.05	0.72	-0.2%
Institutional Care [a]	0.004	0.98	0.01%	-0.28	0.05	-1.2%	0.28	0.02	0.6%
Self-care [a]	-0.28	0.03	-1.2%	-0.001	1.00	-0.002%	-0.28	0.05	-1.2%
Hospital Outpatient Therapy [a]	-0.03	0.39	-0.9%	-0.008	0.83	-0.4%	-0.03	0.57	-0.9%

See Section A.5.1.7 (Page 127) of the Technical Appendix for details regarding model specifications. [a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for patients at-risk based on HCCs in HHVBP states (shown in Exhibit B-15 [Page 163] of the Technical Appendix). [c] Calculated by dividing the model estimate by the baseline mean for other patients in HHVBP states (shown in Exhibit B-15 [Page 163] of the Technical Appendix).

3.5.2 Limited Impacts of the HHVBP Model on Post-Acute Care Selection Did Not Differ Substantially for Beneficiaries aligned with Accountable Care Organizations

We conducted supplementary analyses to determine if effects of HHVBP differ for Medicare FFS beneficiaries who are aligned with ACOs, which may seek to limit spending on PAC by favoring the substitution of less costly forms, such as home health care (McWilliams, 2017). We hypothesized that to the extent that original HHVBP Model incentives may contribute to agencies avoiding patients with complex health needs, such incentives may be more muted in the context of beneficiaries aligned with ACOs. Thus, we might expect to find a negative effect of HHVBP on post-acute admissions to home health care among non-ACO-aligned patients relative to ACO-aligned patients.[16]

The share of acute care discharges who were aligned with an ACO increased substantially from the baseline period to post-HHVBP. By far the most prevalent ACO program of those represented in our data is the Medicare Shared Savings Program (SSP), which grew in prevalence from 19.1 and 16.3 percent of discharges in HHVBP and non-HHVBP states, respectively, during the baseline period to 32.6 and 31.1 percent, respectively, from 2016-2021 period (Exhibit 20). The Pioneer ACO Model (which ended in 2016) accounted for only 4.2 and 2 percent of discharges respectively in HHVBP and non-HHVBP states during the 2013 through 2015 period. The Next Generation ACO program was not active during the baseline period of the HHVBP Model and accounted for only 6 and 3.2 percent of discharges in HHVBP and non-HHVBP states, respectively, during the six years of the HHVBP Model.

The subgroup of ACO-aligned discharges had a pattern of shares of discharges represented across each PAC option that was similar to the general population of discharges used in our analysis (see Exhibit B-17 [Page 165] in the Technical Appendix for additional details). Based on a D-in-D-in-D analysis of the subgroups of ACO-aligned and non-ACO-aligned (other) discharges, we found no significant HHVBP

[16] We chose to focus this analysis on ACO participation rather than CMMI models with similar incentive features (e.g., BPCI and CJR) because overlap between HHVBP episodes and participation in other such CMMI models in our data set was considerably more limited (see Exhibit 20).

impact on selection of home health care, nor on selection of any of the other three types of PAC within either of these subgroups (Exhibit 25). We found marginally significant evidence of differences in the impacts of HHVBP on selection of home health care and hospital outpatient therapy across the two subgroups (shown under ACO-Aligned *minus* Non-ACO-Aligned in Exhibit 25). However, we found no evidence to suggest that HHVBP diminishes access to home health care in either the ACO or non-ACO subgroups.

Exhibit 25. Limited Impacts of HHVBP on PAC Selection do not Indicate Diminished Access Among FFS Medicare Beneficiaries Receiving or Not Receiving Care from ACOs, 2013-2021

Measure	ACO-Aligned			Non-ACO-Aligned			ACO-Aligned *minus* Non-ACO-Aligned		
	D-in-D	P-value	% Relative Change [b]	D-in-D	P-value	% Relative Change [c]	D-in-D-in-D	P-value	% Relative Change[b]
Home Health Care [a]	-0.27	0.31	-1.1%	0.25	0.17	1.1%	-0.52	0.08	-2.1%
Institutional Care [a]	0.34	0.29	1.2%	-0.13	0.45	-0.4%	0.47	0.20	1.6%
Self-care [a]	-0.03	0.94	-0.1%	-0.09	0.61	-0.2%	0.07	0.84	0.2%
Hospital Outpatient Therapy [a]	0.08	0.17	3.8%	-0.04	0.24	-1.8%	0.12	0.05	5.7%

See Section A.5.1.7 (Page 127) of the Technical Appendix for details regarding model specifications. [a]D-in-D values represent percentage point changes. [b]Calculated by dividing the model estimate by the baseline mean for acute care patients treated in ACOs in HHVBP states (shown in Exhibit B-14 [Page 162] of the Technical Appendix). [c]Calculated by dividing the model estimate by the baseline mean for acute care patients not treated in ACOs in HHVBP states (shown in Exhibit B-14 [Page 162] of the Technical Appendix).

3.5.3 HHVBP Impacts on Selection of Home Health as a Post-Acute Care Alternative is Driven by Florida and Maryland

Our analyses of state-specific impacts on selection of PAC suggests that our overall finding of a significant increase in home health use following discharge from acute care (Exhibit 22) primarily reflects impacts in two states: Florida and Maryland (see Exhibit B-20 [Page 167] in the Technical Appendix). In particular, we found evidence of a positive impact of HHVBP in Florida and Maryland relative to their regional comparison groups on selecting home health in a post-acute care setting. Florida had an annual average impact estimate of 1 percentage point (4.1 percent relative to Florida's baseline average) and Maryland had an annual average impact estimate of 2.3 percentage points (12.0 percent relative to Maryland baseline average). We found no impacts, and in some cases, negative impacts, in other HHVBP states relative to their regional comparison states (see Exhibit B-20 [Page 167] in the Technical Appendix).

3.6 Discussion

Overall, we observed similar declines in the number of home health agencies and levels of home health utilization in HHVBP and non-HHVBP states, as well as similar increases in the severity of home health beneficiaries treated. Our analyses of new and terminating agencies also did not point to a clear impact of HHVBP on market entry and exit decisions. Rather, agency entry and exit rates continue to be similar in HHVBP and non-HHVBP states and relatively stable since model implementation.

Our findings for measures of numbers of agencies and levels of utilization suggest that, for the nine original HHVBP states combined, the implementation of HHVBP has not affected the overall rate of home health care utilization among Medicare FFS beneficiaries. For most HHVBP states, trends in utilization were similar to those of their regional comparison groups. In particular, while there has been a more pronounced decline in utilization in Florida, we observed a similarly high level and rate of decline in Florida's regional comparison group.

Four out of five analyses of home health patient case-mix indicated no average difference between HHVBP and non-HHVBP states in the trend of increasing patient severity occurring in both groups of states, including new analyses focusing on access to home health care by patients less likely to improve in functional status during home health care. However, we did find evidence that the average HCC score at the start of care for a beneficiary's first home health episode increased at a slightly slower rate in HHVBP states compared with non-HHVBP states, which was largely driven by Arizona, Florida, Iowa, and Tennessee. Because the HCC risk score is the only indicator for which we find a consistent pattern of possible case-mix selection from extensive analyses testing for such an effect of HHVBP, we do not conclude there is strong evidence of a significant agency response to HHVBP to select beneficiaries based on case-mix. Continuing to monitor patient selection by HHAs and its potential impact on access to home health care for medically complex patients can be informative as CMS expands the HHVBP Model to encompass all states.

During the four latest years of the model, we find evidence that HHVBP incentives contributed to modest increases in admissions to home health care among patients transitioning from acute inpatient settings within 14 days. This finding is consistent with other analyses in this section that showed no signs of emerging access problems due to HHVBP. Furthermore, we found no evidence that HHVBP contributes to any changes in PAC use of home health care among beneficiaries recently discharged from a hospital who are at risk of limited functional improvement from home health care nor among discharges not under the care of ACOs. The findings from these subgroup analyses do not indicate particular challenges among these beneficiaries in accessing home health care despite possible incentives for HHAs to avoid serving these patients under the HHVBP Model or for referring providers to divert patients to other forms of PAC.

4. Results: Home Health Agencies' Visit Practice Patterns and Chain Affiliation Impact HHVBP Effects

4.1 Introduction

This section examines the impact of the original HHVBP Model on practice patterns of home health visits by agencies. We also explore whether changes in how care is delivered since HHVBP implementation have contributed to observed improvement on functional status assessments, as well as the relationship between chain ownership and selected outcomes to examine potential chain-driven spillover.

Updating and expanding on our previous work, we found evidence that ***HHVBP increased the use of frontloading—that is, HHVBP agencies shifted the distribution of skilled nursing and therapy visits toward more visits during the first week of care relative to changes in the distribution of home health visits in comparison states over the same time period***. In our updated analyses, we also found evidence that frontloading the first episode in a sequence of claims-based episodes was associated with reduced likelihood of unplanned hospitalizations in claims-based measures averaged across all episodes, including those later in sequence. However, in other analyses, we find that unspecified mechanisms other than frontloading visits account for a much greater share of the total impact of HHVBP on select patient outcomes.

We also tested for heterogeneous impacts of frontloading and HHVBP on use of frontloading related to patients at risk of limited functional improvement during home health care, based on the presence of specific hierarchical condition categories (HCCs) from the year prior to starting home health. Because such medically vulnerable patients may be perceived as challenging to agencies to achieve high performance scores on functional improvement measures, there is concern that HHVBP may provide incentives to shirk high quality care to such patients during home health episodes. However, we found no evidence of HHVBP impeding beneficiaries at-risk of limited functional improvement from receiving early intensive visits.

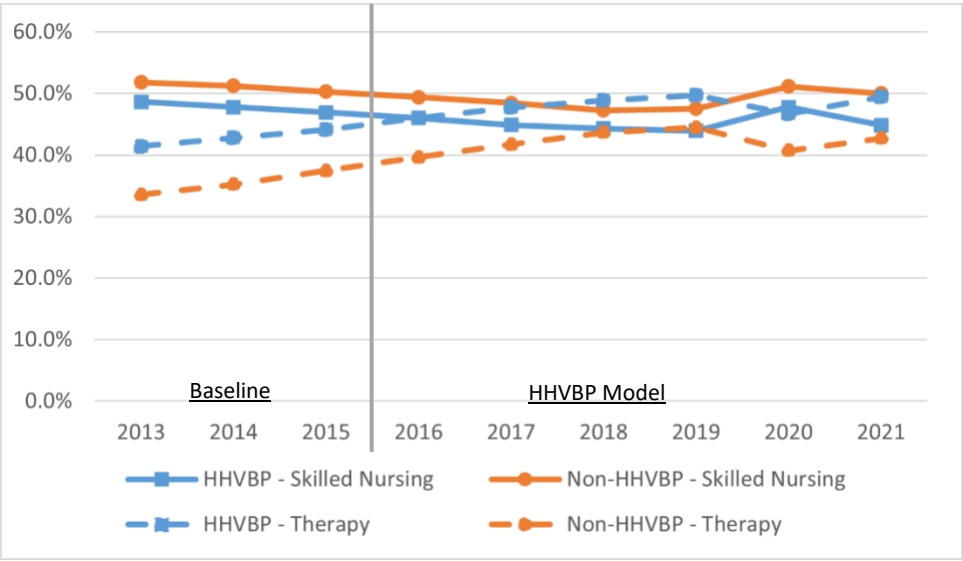
In other analyses, we find that measures of clinical care delivery – including timing, intensity, and type of visits – are unable to substantially explain trends in improvement in functional status. This finding reinforces our results in previous annual reports suggesting that changes in how home health agencies complete the OASIS start of care assessment are an important driver of reported functional status improvements. Finally, in an analysis of the association of chain ownership and selected HHVBP outcomes that compared home health chains that operate in both HHVBP and non-HHVBP states with non-chain affiliated HHAs (that is, independent HHAs) in HHVBP and non-HHVBP states, we found that overall patterns in performance changes among chain-affiliated HHAs remained largely similar, regardless of HHVBP status.

4.2 Visit Shares by Provider Profession during Home Health Episodes

As discussed in Section 1, Medicare home health care consists of skilled nursing, physical therapy, occupational therapy, speech therapy, aide services, and medical social services provided to beneficiaries in their homes. To inform our frontloading analyses, we focused our analyses of visit practices on the two home health professions that account for the largest share of home health visits—skilled nurses and all therapists (combining physical therapists, occupational therapists, and speech therapists into one category). Throughout the study period of 2013-2021, skilled nurses and therapists each accounted for more than 40 percent of home health visits per year among all Medicare FFS home

health episodes in HHVBP states (Exhibit 26). During the same period in non-HHVBP states, skilled nurses accounted for 47-52 percent of the annual share of visits among all Medicare FFS episodes, while therapists' annual visit share was in the range of 33-45 percent (Exhibit 26; also see Exhibit B-5 [Page 153] in the Technical Appendix for more details). The share of total visits per episode provided by skilled nurses generally declined in both HHVBP and non-HHVBP states from 2013 through 2019, while the share of visits provided by therapists generally grew during the same years. However, these trends reversed between 2019 to 2020, as expected due to the national implementation of the PDGM in 2020, which eliminates the use of therapy service volume to determine case-mix adjusted payments. From 2019 to 2020, skilled nurses' share of visits increased in both HHVBP states (44 to 48 percent) and non-HHVBP states (48 to 51 percent), but then declined slightly in 2021 to 45 and 49 percent in HHVBP and non-HHVBP states, respectively. Meanwhile, therapists' share of visits followed an opposite pattern for both groups, decreasing from 2019 to 2020 followed by slight increases in 2021 after a long gradual increase took place from 2013-2019 (Exhibit 26).

Exhibit 26. Share of Total HH Episode Visits by Skilled Nurses and Therapists Changed at Similar Rates in HHVBP and Non-HHVBP States, 2013 - 2021



In contrast to the larger shares of visits provided by skilled nurses and therapists, the share of visits by home health aides is much smaller and has steadily declined over the years from nine to six percent in HHVBP states and 14 to 8 percent in non-HHVBP states during the study period (not shown). Visits by medical social services professionals also continue to account for a small fraction of total visits—less than 0.8 percent of visits in all years in both groups (not shown). See Exhibit B-5 (Page 153) in the Technical Appendix for additional details about visit type.

These general trends do not indicate that HHVBP contributed to significant differences in change over time among profession-specific visit shares. However, they do highlight how HHAs nationwide have altered their mix of visits by profession type in response to payment incentives that favored increasing the share of therapy visits through 2019, with a noteworthy reversal of the trend in 2020 as PDGM was implemented, favoring relatively fewer therapist visits compared to skilled nurse visits. It is likely that the introduction of PDGM was most responsible for the change in trends in 2020, but the COVID-19 PHE may have also influenced the mix of episodes requiring less therapy services relative to skilled nursing.

4.3 Frontloading Skilled Nurse and Therapy Visits is Associated with Lower Risk of Unplanned Hospitalizations in Some Circumstances and HHVBP Incentives Caused Moderately More Frontloading of Visits

During the last two decades, HHAs have altered the volume of visits and mix of profession types providing services in response to shifting payment incentives. For example, after the implementation of the HH PPS in 2001, which included marginal payment increases for additional therapy but not for other types of visits, agencies responded by increasing therapy visits and decreasing skilled nurse and aide visits (MedPAC, 2020). Under HHVBP, which further adjusts HHA payments based on their TPS (see Section 5), we expect other changes in the number, timing, and types of visits provided, because agencies may perceive changes to these inputs as helpful to achieve higher quality home health care. Specifically, the findings of this analysis suggest that agencies may believe that slowing the trend of decreasing skilled nurse visits early in episodes and accelerating the trend of increasing therapy visits early in episodes can help achieve favorable quality scores under HHVBP. In this manner, HHVBP incentives both restrain and amplify different aspects of agency responses to the HH PPS observed prior to the HHVBP Model.

Our findings of slower growth in claims-based utilization and spending measures in HHVBP states compared to non-HHVBP states that is attributable to the original HHVBP Model (see Sections 6 and 7) suggest that HHAs respond to the HHVBP incentives by making changes to their operations and practices to prevent some unplanned hospitalizations. Furthermore, anecdotal reports from our interviews with home health chain organizations and HHAs in 2019 mentioned the use of timely initiation of care and frequent visits early in the episode of care, practices collectively referred to as *frontloading*, as strategically important to achieve HHVBP-related goals (Arbor Research, 2020). The benefits of frontloading may come through a variety of mechanisms. For instance, a timely start of care visit and multiple early visits in an episode can help the home health care providers: 1) evaluate the patients' needs and initiate a timely needs-based care plan; 2) accurately assess the patient's capacity for self-care and the availability and effectiveness of other care-giving resources, such as family members; 3) reconcile medications to avoid errors and assure adherence to a treatment plan; and 4) provide education to patients about self-care (Jones, 2017; Topaz, 2018).

Frontloading is a concept that is widely discussed in the home health industry as a means to provide high quality care to home health patients, but it lacks a standard definition. In our Fourth Annual Report, we examined alternative approaches to define frontloading operationally using claims-based visit-level data for home health episodes and focused our analysis on episodes that followed within 14 days from an institutional discharge due to the greater risk such episodes have for subsequent unplanned hospitalizations (Arbor Research, 2021).[17] We found robust evidence with an extensive set of case-mix adjustments that first home health episodes with frontloaded visits—defined here as more skilled nursing or therapy visits during the first week relative to the second week—were associated with reduced likelihood of unplanned hospitalizations and ED visits (without hospitalization). Furthermore, we found that the HHVBP Model contributed to increased use of frontloading during first home health episodes relative to the change in frontloaded episodes over the same years in non-HHVBP states. Together, these findings suggested that HHAs view these practices as conducive to improving quality. Moreover, the pattern of increasing magnitudes in the impacts of HHVBP for the first four model years

[17] Institutional settings include ACH, SNF, IRF, LTCH, and inpatient psychiatric facility.

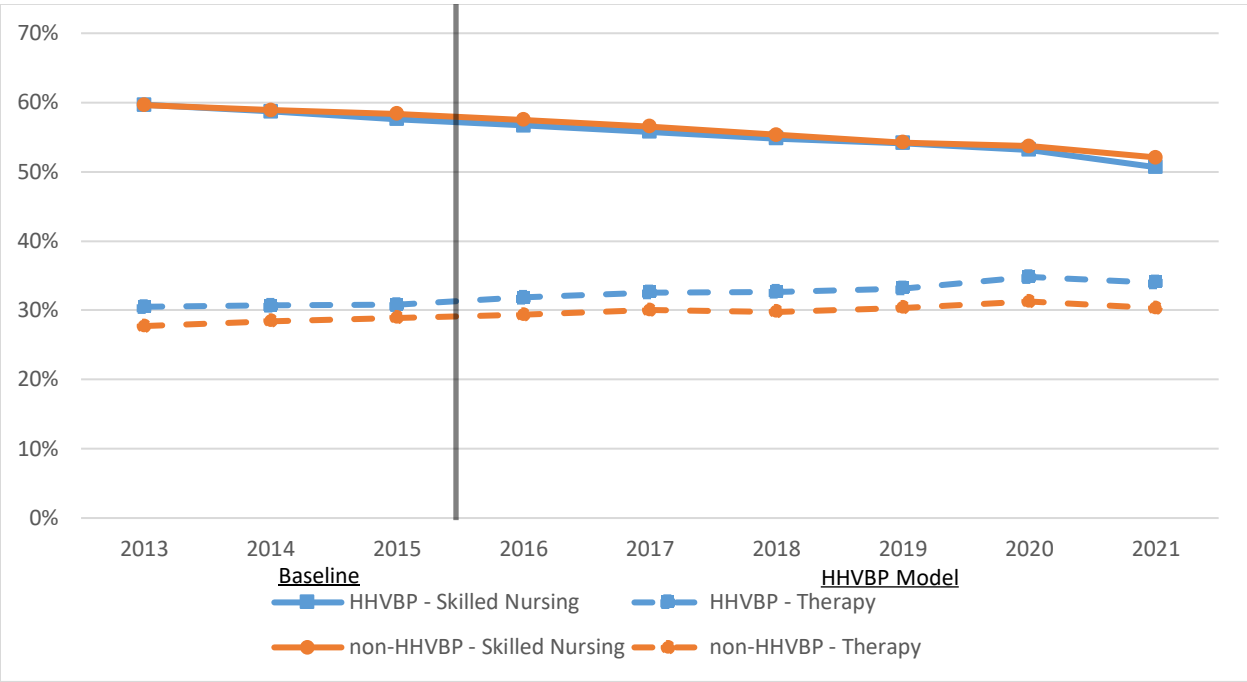
(2016-2019) suggested possible agency responsiveness to increasing maximum payment adjustments over this period (Exhibit 26). In our previous report, we also observed greater impacts of HHVBP on frontloading among those admitted to home health following a hospital stay as compared to community-referred beneficiaries (Arbor Research, 2022).

4.3.1 Summary of Approach

For this annual report, we again identified frontloaded home health episodes as those with more visits of a particular profession (skilled nurses or therapists) in the first week of the episode relative to the second week. Prior results summarized in our Fifth Annual Report showed greater association between frontloading and reduced unplanned hospitalizations for post-institutional relative to community-referred episodes and also greater impacts of HHVBP on increasing frontloading in the post-institutional group. Because of this previous evidence consistent with post-institutional episodes having a more pronounced benefit from frontloaded episodes, we focused this year's analyses on patients referred to home health care by institutional providers. We also conducted a subgroup analysis to test for differences in the role of frontloading for patients with and without particular clinical features observed preceding the start of home health care and associated with a risk of limited functional improvement during home health. We used a regression-adjusted D-in-D approach to determine if the original HHVBP Model had a discernible impact on agencies' use of frontloading as we have measured it and if those impacts varied according to risk of limited functional improvement. We hypothesized that HHAs make use of frontloading with skilled nursing and therapy visits to differing degrees depending on the severity of clinical conditions and comorbidities, reflecting variation in the marginal benefit to quality from additional visits by each profession type for patients at risk of limited functional improvement relative to those not at risk. Furthermore, we hypothesized that the impact of the original HHVBP Model on agency use of frontloading will vary across episodes with differing risk of functional improvement for the same reason. Another hypothesis is that agencies may be reluctant to expend resources through frontloading patients whom the agencies' view as less likely to improve. In that case, we would expect to find a smaller impact of HHVBP on use of frontloading relative to its average impact among all home health beneficiaries.

Exhibit 27 shows unadjusted trends for percentage of post-institutional first episodes frontloaded, stratified by HHVBP and non-HHVBP episodes and by profession type of visit (i.e., skilled nurse or therapy). The prevalence of frontloading post-institutional first episodes is similar between HHVBP and non-HHVBP episodes, with a larger share of episodes frontloaded with skilled nurse visits relative to therapist visits in each year (Exhibit 27). The observed trends in unadjusted percentages appear to have started early in the baseline years without any significant shift post-HHVBP implementation.

Exhibit 27. Unadjusted Trends in the Percentage of Post-institutional Home Health Episodes Frontloaded Show a Decrease in Skilled Nursing and an Increase in Therapy Frontloaded Episodes, by HHVBP and Non-HHVBP States



Trends displayed above represent a subset of post-institutional first home health FFS episodes in a sequence, that lasted at least 14 days without a hospitalization occurring during that time that belong to the claims-based analytic sample (see Section A.5.1.2 [Page 122] of the Technical Appendix).

To verify the validity of the modeling approach for our frontloading analysis, we examined the extent to which our measure was associated with changes in the risk of unplanned hospitalizations and ED visits that did not result in hospitalization (i.e., outpatient ED use) during a home health episode after the first two weeks of care. We evaluated associations of frontloading home health visits during the first two weeks of the episode with hospitalizations and outpatient ED use after those initial two weeks under the assumption that unplanned hospitalizations and outpatient ED use that occur after two weeks of home health care are more likely to reflect the quality of care provided by HHAs rather than unplanned utilization that occurs earlier in a first episode. New to this year's annual report, we also examined the association of frontloading in a first-in-sequence episode with two key all-episode claims-based utilization outcome measures: acute care hospitalizations and SNF visits. We used regression adjustment to account for confounding due to differences in case-mix that are associated with differences in the number of visits provided and outcomes. The covariates used for adjustment included all covariates used in our claims-based D-in-D models as well as the number of outpatient ED visits and the number of skilled nurse and therapist visits during the first two weeks of episodes.[18]

We found that frontloading in post-institutional episodes was associated with a significant decrease in the probability of an unplanned hospitalization after the second week of the episode (Exhibit 28);

[18] See Section A.1.4.2 (Page 10) in the Technical Appendix for the list of covariates used in the analyses. We omitted episodes in which a hospitalization occurred during the first two weeks in order to avoid confounding between frontloading and hospitalizations.

specifically, a -0.50 percentage point difference for skilled nursing visits and a -0.24 percentage point difference for and therapy visits during first-in-sequence post-institutional episodes, and -0.25 and -0.13 percentage point differences, respectively, for *all* post-institutional episodes. The estimates for post-

Exhibit 28. Frontloading Skilled Nursing or Therapy Visits Associated with a Decrease in the Probability of Unplanned Hospitalization and an increase in the probability of SNF use, but No Consistent Association with ED Use After Two Weeks of Home Health Care, 2013-2020

Measure	Model Estimates				Average in All States (2013-2021)	% Relative Difference[c]
	Point Estimate [a]	p-value	Lower 90% CI [a]	Upper 90% CI [a]		
Unplanned Acute Care Hospitalization/First FFS HH Episodes						
Frontloading Skilled Nursing Visits[b]	-0.50	<0.001	-0.54	-0.45	13.6%	-3.7%
Frontloading Therapy Visits[b]	-0.24	<0.001	-0.29	-0.20	13.6%	-1.8%
ED Use (No Hospitalization)/First FFS HH Episodes						
Frontloading Skilled Nursing Visits[b]	-0.04	0.15	-0.08	0.01	13.6%	-0.3%
Frontloading Therapy Visits[b]	-0.07	<0.01	-0.11	-0.03	13.6%	-0.5%
Unplanned Acute Care Hospitalization/All FFS HH Episodes						
Frontloading Skilled Nursing Visits[b]	-0.25	<0.001	-0.29	-0.21	15.0%	-1.7%
Frontloading Therapy Visits[b]	-0.13	<0.001	-0.17	-0.08	15.0%	-0.9%
SNF Use/All FFS HH Episodes						
Frontloading Skilled Nursing Visits[b]	0.14	<0.001	0.12	0.16	3.3%	4.2%
Frontloading Therapy Visits[b]	0.30	<0.001	0.28	0.32	3.3%	9.1%

CI= Confidence Interval. Analysis was performed on a subset of home health FFS episodes without a hospitalization occurring during the first 14 days, and that belong to the claims-based analytic sample (see Sections A.2.1.2 [Page 67] and A.5.1.2 [Page 122] of the Technical Appendix). Frontloading was evaluated in first episodes only. [a] Point estimate and CI represent percentage point changes. [b] Frontloading is defined as a binary where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise. [c] Percent relative difference is calculated as 100 multiplied by the point estimate divided by the average in all states.

institutional first episodes correspond to 3.7 percent and 1.8 percent decreases in the probability of unplanned hospitalizations associated with frontloading of skilled nursing and therapy visits, respectively, relative to the 13.6 percent national average of first home health episodes with an unplanned hospitalization (Exhibit 28). Frontloading of first episodes also had downstream impacts, as evidenced by relative decreases in unplanned hospitalizations among *all* post-institutional episodes,

corresponding to 1.7 percent and 0.9 percent decreases for skilled nursing and therapy visits, respectively, relative to the national average rate of 15.0 percent. For ED use without hospitalization, we found associations between it and frontloading were closer to zero for both visit types and not statistically significant for skilled nursing visits (Exhibit 28). In contrast to the association between frontloading and unplanned hospitalizations, frontloading of both skilled nursing and therapy visits were associated with statistically significant *increases* in SNF utilization among all FFS home health episodes (Exhibit 28).

4.3.2 Impacts of HHVBP on Frontloading of Skilled Nurse and Therapist Visits by Agencies

Having found evidence that frontloading visits in the first week of first home health episodes is associated with a lower probability of unplanned hospitalizations among post-institutional episodes, we tested whether HHAs responded to HHVBP by increasing their use of frontloading for first episodes in a sequence. In particular, we conducted a D-in-D analysis of the impact of HHVBP on the probability that agencies frontload skilled nurse visits, and separately, frontload therapist visits in the first week, relative to the second week of episodes.

Exhibit 29. HHVBP Results in Increase in Frontloading of Skilled Nurse or Therapist Visits During the First Two Weeks of Home Health Care for Post-Institutional Episodes

Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI [a]	Upper 90% CI [a]		
Frontloading Skilled Nursing Visits[b]						
2016	0.26	0.44	-0.29	0.81	58.7%	0.4%
2017	0.91	0.08	0.05	1.77		1.6%
2018	1.26	0.06	0.16	2.36		2.1%
2019	1.93	0.02	0.59	3.27		3.3%
2020	2.19	0.02	0.62	3.75		3.7%
2021	1.88	0.09	0.03	3.73		3.2%
Cumulative	1.39	0.04	0.26	2.52		2.4%
Frontloading Therapy Visits[b]						
2016	1.02	<0.001	0.51	1.52	30.7%	3.3%
2017	1.39	<0.01	0.62	2.16		4.5%
2018	2.20	<0.001	1.18	3.21		7.2%
2019	2.80	<0.001	1.50	4.11		9.1%
2020	4.06	<0.001	2.52	5.59		13.2%
2021	4.71	<0.001	2.91	6.52		15.3%
Cumulative	2.64	<0.001	1.56	3.72		8.6%

CI = Confidence Interval. See Exhibit 29n (Page 240) in the Technical Appendix for each measure's sample size. Analysis was performed on a subset of first home health FFS episodes in sequences, only including post-institutional home health episodes that lasted at least 14 days without a hospitalization occurring during that time, and that belong to the claims-based analytic sample (see Sections A.2.1.2 [Page 67] and A.5.1.2 [Page 122] of the Technical Appendix). [a] D-in-D and CI values represent percentage point changes. [b] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

Overall, we found evidence that the HHVBP incentives resulted in agencies increasing the use of frontloading (i.e., changing the distribution of visits within episodes). Relative to changes over time in non-HHVBP states, agencies in HHVBP states increased frontloading of skilled nursing visits by an annual average of 1.39 percentage points for post-institutional episodes (Exhibit 29). This change corresponds to an annual average increase of 2.4 percent, relative to the baseline level. Furthermore, HHVBP agencies increased frontloading of therapy visits in the first week of care by an annual average of 2.64 percentage points (8.6 percent increase relative to the baseline level) for post-institutional episodes.

Measures of frontloading by both profession types had a pattern of positive impacts of HHVBP increasing in magnitude for each year from 2016 through 2020 (Exhibit 29). In 2021, the impact estimate for the HHVBP effect on frontloading of therapy visits continued to increase in magnitude, while frontloading of skilled nursing visits decreased slightly from its 2020 level of 2.19 to 1.88 percentage points (Exhibit 29). Moreover, we found significantly greater average impacts in 2018-2021 (the four most recent model years in which agencies received payment adjustments) in contrast with average impacts in 2016-2017 (the two model years preceding payment adjustments) for frontloading of both skilled nurse and therapist visits (not shown).

4.3.3 Factors Other than Frontloading Visit Practices Account for Substantially More of the Impact of HHVBP on Key Claims-Based Utilization Outcomes

Our analyses in this and previous reports have shown (1) significant impacts of the original HHVBP Model on the agency practice of frontloading, (2) significant associations between frontloading and improvement in unplanned hospitalizations as measured in claims data, and (3) a significant impact of HHVBP on reducing unplanned hospitalizations. In a new analytic approach for this report, we examined frontloading as a mediator of the HHVBP Model's impacts on select claims-based utilization outcomes by examining differences between HHVBP impact estimates with and without adjustment for frontloading.

We performed this analysis on a subset of FFS home health episodes that were at least two weeks long and without a hospitalization during the first two weeks of home health and had an adjustment for 14-day ED visit count in order to control for potential confounding with frontloading of visits during the first two weeks of home health care. Among this subset of episodes, we did not find that inclusion of frontloading skilled nursing or therapy visits substantially changed the estimates of HHVBP impacts on key claims-based outcome measures. Our D-in-D estimates for models that incorporate the standard frontloading baseline exclusions (row 2 of Exhibit 30) resulted in smaller effect sizes of the HHVBP Model relative to the main model estimates of impacts on unplanned hospitalizations reported in Section 6 of this report (row 1 of Exhibit 30). Obtaining the difference between the HHVBP effect estimate in a model adjusted for frontloading (i.e., the direct effect of HHVBP) from the HHVBP effect estimate in a model without adjustment for frontloading, we calculated an indirect effect, mediated through frontloading, that is less than 0.01 percentage points for each of these measures, quite small relative to the total size of HHVBP impact estimates (Exhibit 30). Despite the findings of our analyses reported above, these results suggest that other factors aside from frontloading visit practices account for substantially more of the impact of HHVBP on outcomes such as unplanned hospitalizations, ED use without hospitalization, and skilled nursing facility use.

Exhibit 30. Cumulative Difference-in-Differences Impact Estimates for HHVBP Impact on Select Claims-based Utilization Measures with and without Adjustment for Skilled Nursing or Therapy Frontloading Suggest Unobserved Factors Other than Frontloading Account for Most of HHVBP Impacts

Difference-in-Differences Model Specification [a]	Reference or adjusted for frontloading	Unplanned Acute Care Hospitalization/First FFS HH Episodes	Outpatient ED Use (No Hospitalization)/ First FFS HHS Episodes	Unplanned Acute Care Hospitalization/ All FFS HH Episodes	SNF Use/All HH Episodes
Main Claims-based Utilization (see Chapter 6)	Reference (main impact analyses)	-0.19**	0.24**	-0.38**	-0.40**
Claims-based Utilization Models with exclusions to control for confounding during first 14 days	Reference (no frontloading adjustment; adjusted for confounders)	-0.13**	0.18**	-0.17**	-0.26**
Claims-based Utilization Models with exclusions – Adjusted for Skilled Nursing Frontloading [b,c]	Adjusted for frontloading	-0.13**	0.18**	-0.17**	-0.26**
Claims-based Utilization Models with exclusions – Adjusted for Therapy Frontloading [b,c]	Adjusted for frontloading	-0.13**	0.18**	-0.17**	-0.26**

*Analysis was performed on a subset of home health FFS episodes in sequences, only including post-institutional home health episodes that lasted at least 14 days without a hospitalization occurring during that time, and that belong to the claims-based analytic sample (see Sections A.2.1.2 [Page 67] and A.5.1.2 [Page 122] of the Technical Appendix). See Exhibit 30n (Page 240) in the Technical Appendix for each measure's sample size. [a] D-in-D values represent percentage point changes. [b] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise. [c] D-in-D estimates represent the direct effect of the HHVBP model on outcomes. Indirect effect (not shown) is equivalent to the difference between the impact estimates for model without adjustment for frontloading (row 2) and the impact estimates for respective models with adjustment for frontloading (Skilled Nurse and Therapy in rows 3 and 4 respectively). ** D-in-D estimates statistically significant at p<0.05 level.*

4.3.4 Subgroup Analyses Found No Evidence That HHVBP Adversely Affected Use of Frontloaded Skilled Nurse or Therapist Visits in Episodes at Risk of Limited Functional Improvement Relative to Episodes Not at Risk

We conducted supplementary analyses to determine if our overall findings described above varied among patients at risk or not-at-risk of limited functional improvement (referred to as "at-risk" episodes from here onward). Similar to other analyses described earlier in this report, we defined at-risk status based on the presence of diagnoses found in Part B professional carrier, inpatient, and outpatient claims during the year prior to the start of home health care that correspond to HCCs associated with lower average baseline TNC change in self-care and change in mobility measure values (for additional

information on the determination of "at-risk" status, see Section 3.4 in this report and Section A.2.1.2 [Page 67] of the Technical Appendix).

To evaluate the effects of the original HHVBP Model on the use of frontloading stratified by the risk of limited functional improvement, we first examined the unadjusted pre- and-post-HHVBP skilled nurse and therapist frontloading rates. In both HHVBP and comparison states, there were slightly higher rates of skilled nurse and therapy frontloading in the not-at-risk subgroup compared to the at-risk subgroup in both the pre- and post-HHVBP periods (Exhibit 31).

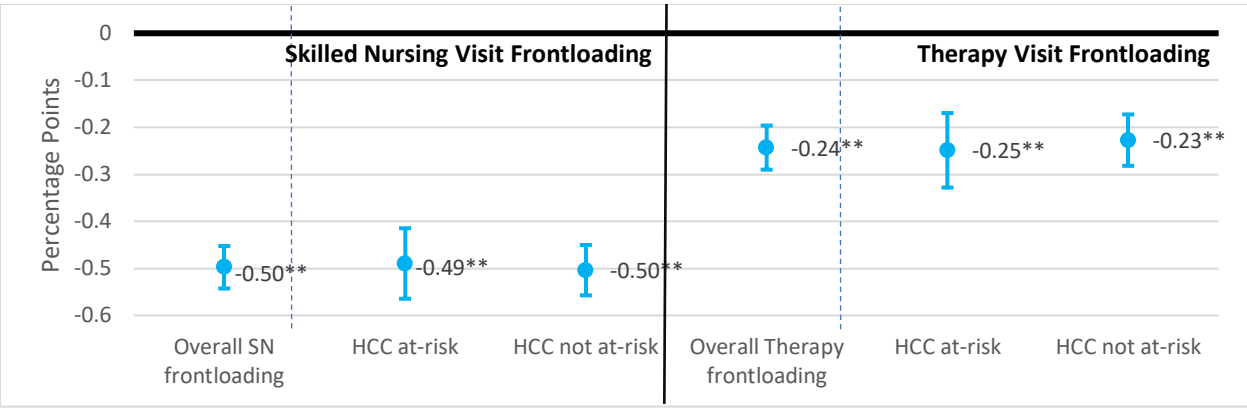
Exhibit 31. Lower Unadjusted Skilled Nursing and Therapy Visits Frontloaded Among At-Risk First Episodes in Both HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)		Post Period (2016-2021)	
	At-Risk HCC	Not At-Risk	At-Risk HCC	Not At-Risk
Frontloading Skilled Nursing Visits[a] (Visit Distribution)				
HHVBP	57.4%	59.5%	53.0%	55.1%
Non-HHVBP	58.3%	59.4%	54.7%	55.2%
Frontloading Therapy Visits[a] (Visit Distribution)				
HHVBP	28.1%	32.0%	30.7%	34.6%
Non-HHVBP	25.8%	29.8%	27.4%	31.8%

[a] *Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.*

Regression analyses stratified by at-risk HCC status found similar impacts of frontloading on unplanned hospitalizations during first post-institutional home health episodes (Exhibit 32). For skilled nursing frontloading, we find a 0.50 percentage point decrease in unplanned hospitalizations for the not-at-risk group and a 0.49 percentage point decrease for the at-risk group (Exhibit 32; left panel). The association between frontloaded therapy visits and unplanned hospitalizations was also negative and statistically significant, although about half the magnitudes of the associations with frontloaded skilled nursing visits, for both at-risk and not-at-risk subgroups (Exhibit 32; right panel). We did not detect a significant difference in the effect sizes of the frontloading impact between the at-risk and not-at-risk subgroups for either visit type (not shown).

Exhibit 32. Decrease in the Probability of Unplanned Hospitalizations Associated with Frontloading Skilled Nursing Visits and Frontloading Therapy Visits, but No Differences by At-Risk Status Among Post-Institutional, First in Sequence Episodes



*Graph shows 90% confidence intervals | **p < 0.05 | Each plotted point estimate comes from a regression model estimated on a subgroup of episodes defined based on the presence of at least one of 20 HCC categories found to be associated with limited functional improvement over the course of home health care, based on analysis of baseline average TNC Self-Care and Mobility scores. For more information about at-risk status, see Sections A.2.1.2 [Page 67] and A.5.1.2 [Page 122] of the Technical Appendix.*

To test whether the impact of the HHVBP Model on agency practice of frontloading varied among beneficiary subgroups defined based on risk of limited functional improvement, we conducted a D-in-D-in-D analysis (see Section A.5.1.7 [Page 127] in the Technical Appendix for additional details). Analytic findings suggest that the HHVBP effect on skilled nursing frontloading was significantly positive and similar between the at-risk (1.2 percentage points increase reflecting a 2.1 percent increase relative to the baseline level; Exhibit 33) and not-at-risk subgroups (1.48 percentage points, a 2.5 percent increase relative to baseline level; Exhibit 33). The HHVBP effect on frontloading therapy visits was also significantly positive in the at-risk and not at-risk subgroups (bottom row of Exhibit 33). However, unlike with frontloading skilled nursing visits, there was a statistically significant differential HHVBP effect on therapy frontloading, such that HHVBP affected a relatively greater increase in therapy frontloading in the at-risk subgroup relative to the impact in the subgroup not-at-risk (0.58 percentage points, a 2.1 percent increase relative to the baseline level in the HHVBP at-risk subgroup; Exhibit 33).

Exhibit 33. HHVBP Associated with Larger Improvements in Therapy Frontloading for Episodes of Patients At-Risk of Limited Functional Improvement.

Measure	At-Risk HCC			Not At-Risk			At-Risk HCC *minus* Not At-Risk		
	D-in-D	p-value	% Relative Change [b]	D-in-D	p-value	% Relative Change [c]	D-in-D-in-D	p-value	% Relative Change [b]
Frontloading Skilled Nursing Visits[d] (Visit Distribution) [a]	1.2	0.08	2.1%	1.48	0.03	2.5%	-0.28	0.29	-0.5%

Measure	At-Risk HCC			Not At-Risk			At-Risk HCC *minus* Not At-Risk		
	D-in-D	p-value	% Relative Change [b]	D-in-D	p-value	% Relative Change [c]	D-in-D-in-D	p-value	% Relative Change [b]
Frontloading Therapy Visits[d] (Visit Distribution) [a]	2.97	<0.001	10.6%	2.39	<0.001	7.5%	0.58	0.01	2.1%

[a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for at-risk discharge patients in HHVBP states (shown in Exhibit 31).[c] Calculated by dividing the model estimate by the baseline mean for not at-risk discharge patients in HHVBP states (shown in Exhibit 80).[d] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise. The differences between cumulative impacts were estimated by means of a difference-in-differences-in-differences model; see Section A.5.1.7 (Page 127) of the Technical Appendix for details regarding model specification.

4.4 Declines in Reported Functional Status on Start of Care OASIS Assessment Not Accounted for by Changes in Visit Mix, Timing, or Intensity

Our prior analyses have documented substantial increases in OASIS-based improvement scores among HHAs in both HHVBP and non-HHVBP states since CMS launched the original HHVBP Model in 2016; in particular, average functional scores at the start of care (SOC) assessments have declined even though functional scores at the end of care have remained unchanged (Arbor Research, 2020; 2021). Insights from previous interviews with staff at HHAs in HHVBP states suggested that many agencies changed their approach to administering SOC OASIS assessments in response to HHVBP as well as other quality-related initiatives (Arbor Research, 2018).

Building on this work, we previously investigated whether the declines in reported functional status at SOC could be attributed to HHAs seeing a different/sicker case-mix of beneficiaries and concluded that changes in health status could not explain reported functional status declines (Arbor Research, 2021). Our current analysis focuses on an additional driver – whether changes in how care is delivered since HHVBP implementation have contributed to observed improvement on functional status assessments. We also assess whether any changes in care delivery have had differing impacts on selected OASIS measures across home health episodes in HHVBP and non-HHVBP states. If we observe that the delivery of care – in terms of the timing, intensity, or mix of visits – is not associated with improvements in functional status, then instrumentation (that is, how the OASIS assessment is administered) is a likely driver. This, in turn, could have potential implications for how the evaluation interprets OASIS measures and, ultimately, overall results.

4.4.1 Summary of Approach

As in prior analyses, to reduce the influence of confounding factors and improve comparability among beneficiaries, we focused on Medicare FFS home health users with a prior inpatient stay for one of three clinical "cohorts"—heart failure, pneumonia, or knee/hip replacement. The three cohorts are defined by the primary diagnosis associated with the inpatient admission stay that preceded the home health episode. These diagnoses are not only common in the Medicare population[19] and involve beneficiary

[19] In the period between 2013 and 2019, heart failure diagnosis was associated with 5.0 percent of all acute care discharges, pneumonia with 4.4 percent and knee/hip replacement with 6.2 percent (not shown).

populations with diverse characteristics, but they allow us to examine how case-mix factors could impact performance measures across different scenarios. We restricted our analytic sample to beneficiaries with a complete pair of SOC and discharge/end of care (EOC) OASIS assessments, and whose functional status in the SOC assessment is not in the highest category for the respective OASIS item (i.e., excluding patients that the agency deems as having no opportunity for improvement by the EOC assessment).

For each clinical cohort, we conducted multivariate regression analysis for three OASIS-based functional performance outcomes – Improvement in Dyspnea, Improvement in Ambulation, and Improvement in Grooming – to assess the trends in improvement over time, while accounting for beneficiary health at the start of care, length of care, and patterns of clinical care delivery (i.e., visit timing, intensity, and the type of visits delivered by the HHA). Using a stepwise regression strategy, we first estimated an unadjusted model to obtain the differences in measure performance over time (i.e., indicated by the year-group coefficients), representing the total amount of change in functional measures for HHVBP and non-HHVBP states. We then estimated three iterative regression models (M1-M3) that sequentially added sets of explanatory variables to understand their respective contributions in explaining the functional improvement trends (Exhibit 34). The estimated regression coefficients for the year-group indicators represent the extent of improvement between 2018/2019 and 2014/2015 remaining after including the control variables. To the extent that changes in clinical care delivery are responsible for the observed time trends in improvement, this would be reflected in the difference between the estimated coefficients for M2 and M3. The unadjusted time differences in performance allow us to account for how the control variables listed in Exhibit 34 are related to changes in three OASIS-based functional performance measures. Furthermore, we can also assess the contribution of the different factors to observed trends in improvement.

Exhibit 34. Variables Used to Assess Relationship between Clinical Care Delivery and Changes in Functional Status

Conceptual Domain	Variables	Models		
		M1	M2	M3
Outcome: Improvement in Functional Status	Documented improvement in three OASIS-based functional measures at EOC compared to SOC			
Variables Capturing Change Over Time Unexplained by the Control Variables				
Change over time/Time trends	Year-groups	√	√	√
Change over time in Intervention States	Interaction of year-group by HHVBP	√	√	√
Control Variables				
Intervention states	HHVBP	√	√	√
OASIS documentation of initial functional status	Documented functional status at SOC	√	√	√
Length of care	No. days between SOC and EOC assessment	√	√	√
Clinical complexity at start of care	Quartile groups based on HCC scores		√	√
Clinical care delivery	No. total visits over length of care			√
	% of visits during first 7 days			√
	Therapy visits as % of total			√

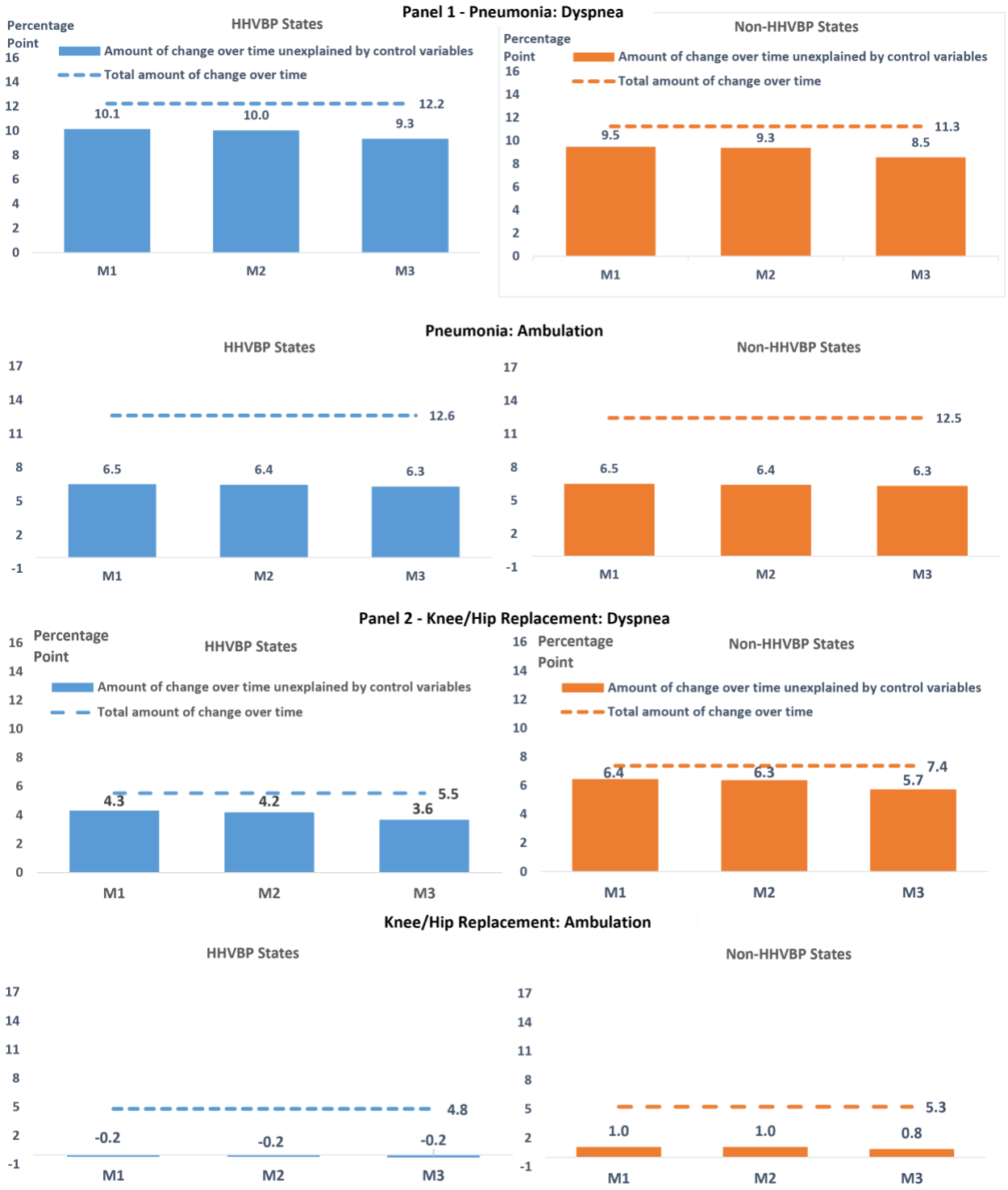
4.4.2 Changes in Clinical Care Delivery Explain Limited Portion of Trends in Reported Functional Improvement

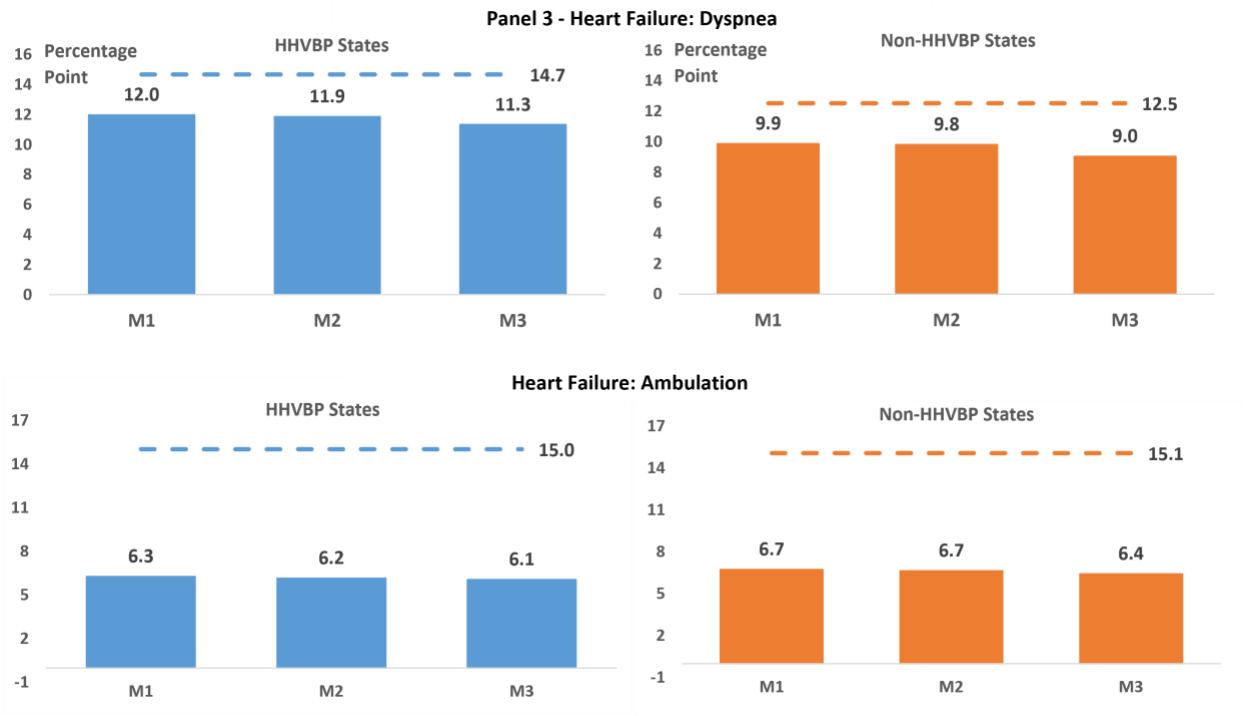
Broadly, we found that across the different models and three beneficiary cohorts, changes in health among Medicare FFS beneficiaries and patterns in clinical care delivery do not help explain the full extent of patients' functional improvement as reported by HHAs. Our evidence is based on the small magnitude change in the year-group coefficients when the measures of clinical care delivery (in terms of timing, intensity, and mix of visits) were added to the regression model M3. Instead, the data suggest that the overall time trends in improvement in the functional measures are independent of changes in care delivery and the other model covariates.

Exhibit 35 illustrates the magnitude of year-group coefficients for two of the measures (Improvement in Ambulation and Improvement in Dyspnea) for each of the three beneficiary clinical cohorts, separately for HHAs in HHVBP and non-HHVBP states (See Exhibit B-22 [Page 170] for the Improvement in Grooming findings and Exhibits B-23 to B-31 [Page 171] in the Technical Appendix for full modeling results). That the year-group coefficients remain largely unchanged across models (e.g., for Improvement in Ambulation among patients with heart failure in non-HHVBP states, the year-group coefficients stay at 6.7 or 6.4 across models [bottom of Panel 3 in Exhibit 35]) may reflect the effects of an increasing industry-wide emphasis on quality measure performance.

Among beneficiaries with pneumonia (top of Panel 1 in Exhibit 35), the total amount of change in dyspnea from 2014/15 to 2018/19 (represented by the dashed line) was 12.2 percentage points in HHVBP states and 11.3 percentage points in non-HHVBP states. The full model (M3) – which adds visit timing, intensity, and visit mix variables to account for changes in clinical care delivery – only reduced the unexplained portion to 9.3 percentage points in HHVBP states and to 8.5 percentage points in non-HHVBP states. This translates to a sizable amount of the change in dyspnea among beneficiaries with pneumonia remaining unexplained. A similar pattern of unexplained change is observed across the other clinical cohorts for dyspnea as well as for the ambulation measure with one exception: among beneficiaries with a knee/hip replacement, the model covariates decreased the unexplained portion of change to close to zero in both HHVBP and non-HHVBP states (bottom of Panel 2 in Exhibit 35). Other than this one exception, the general pattern of large unexplained change in the measures was observed in both HHVBP and non-HHVBP states and was of a similar magnitude regardless of HHVBP status.

Exhibit 35. Large Portion of Change in Improvement in Functional Status Remains Unexplained after Controlling for Changes in Clinical Care Delivery





We show the three patient subgroups (Pneumonia, Knee-Hip Replacement, and Heart Failure) for the change in two of the measures; See Exhibit B-22 (Page 170) in the Technical Appendix for results in change in the Improvement in Grooming measure. We examined the change in improvement over time for three periods – 2014/2015, 2016/2017, and 2018/2019 – but only show the first and last time period for ease of presentation. Full results are provided in Exhibits B-23-B-31 (Pages 171) in the Technical Appendix.

4.5 Chain-affiliated Agencies show Similar Performance across HHVBP and non-HHVBP States

Much of the evaluation analyses to date document changes in HHA quality across a range of measures, in both HHVBP and non-HHVBP states, suggesting the original HHVBP Model is enhancing or intensifying the incentives that already exist in the home health market. Interviews with HHAs this year (see Chapter 10) and in previous years corroborate these empirical trends, with HHAs in HHVBP states as well as HHAs in non-HHVBP states that were familiar with the model noting that HHVBP alone was not driving their quality approach; rather, the HHVBP Model was viewed as part of a broader array of quality-oriented, value-based, initiatives and market forces that shape their quality improvement activities (Arbor Research, 2019; 2021). Notably, interviews conducted in 2019 with corporate leaders at large home health chains highlighted how many of their quality improvement initiatives were formulated at the corporate level and rolled out to affiliated HHAs, whether the HHA was in an HHVBP state or not (Arbor Research, 2020). The particular case of chain-affiliated HHAs raises the possibility that there may be similar performance improvement initiatives in HHVBP and non-HHVBP states as a function of their chain status, whether prompted by the HHVBP Model or by other quality improvement initiatives. For these chains, we might expect that policies set at the corporate level would impact affiliated chains regardless of whether the HHA was in one of the nine original HHVBP states. Chain-affiliated HHAs responding to our 2022 survey (described in Chapter 10) corroborated that approaches to decision-making vary but that the corporate office generally plays a role: among chain-affiliated survey respondents, only one in 10 agencies reported that the local agency was the exclusive decision-maker,

and just under one-third indicated that decisions are largely made at the corporate level, with the remainder reporting more nuanced shared decision-making arrangements.

Given this potential chain behavior, we analyzed the association of chain ownership and selected HHVBP outcomes, comparing chains that operate HHAs in both HHVBP and non-HHVBP states with non-chain affiliated HHAs (independent HHAs) in HHVBP and non-HHVBP states. We hypothesized that chain affiliated HHAs would perform more similarly in HHVBP and non-HHVBP states than independent HHAs do in HHVBP and non-HHVBP states. We also hypothesize that independent HHAs in non-HHVBP states would show the least impact from the original HHVBP Model.

4.5.1 Summary of Approach

The home health industry has changed substantially over the time period studied, with extensive changes in ownership through merger and acquisition, making analysis of chain affiliation challenging. To study chain ownership, we selected agencies affiliated with chains operating in both HHVBP and non-HHVBP states across the full study period. We identified six chains which had at least 15 HHAs in HHVBP states and at least 15 HHAs in non-HHVBP states in 2014[20] and, importantly, continued operating in both groups of states through 2021 (or were acquired by one of the other six chains): Amedisys, Bayada Home Healthcare, Brookdale Senior Living, Care Tender Health, Gentiva Health Services and LHC Group.[21] HHAs that were affiliated with 1 of these six chains in 2014 were included in the sample if they had at least 100 HHA episodes in each study year (2014 to 2021). For comparison, we defined a sample of independent agencies comprising HHAs that were continuously independently owned and operated and had at least 100 episodes in each year of the study period.

We selected six performance measure outcomes to estimate the relationship between chain affiliation and performance, including: three OASIS-based measures (Improvement in Dyspnea, Improvement in Ambulation, and Improvement in Bathing); the two HHVBP claims-based measures (Unplanned Hospitalizations among First Home Health Episodes and ED use without Hospitalization among First Home Health Episodes); and the HHVBP HHCAHPS-based patient experience measure rating Overall Care. We ran regressions for each of the six performance measures using the combined sample of chain-affiliated and independent HHAs for the period 2014-2019. Our covariates included the number of home health episodes provided in each two-year period, an indicator for the regional grouping of states from which an HHVBP state was drawn, an indicator for the three, two-year periods (2014-2015; 2016-2017; and 2018-2019) for pre- and post-HHVBP, an indicator if in an HHVBP state, an indicator for chain affiliation, and interaction terms between the latter three indicator variables. For each of the performance measures, we used the coefficients from the regressions to estimate the adjusted changes in performance between the pre-HHVBP period (2014-2015) and two post-HHVBP periods – 2016-2017 and 2018-2019 – for chain-affiliated and independent HHAs in both HHVBP and non-HHVBP states.

4.5.2 How Chain Affiliation Affects Performance in HHVBP and non-HHVBP States

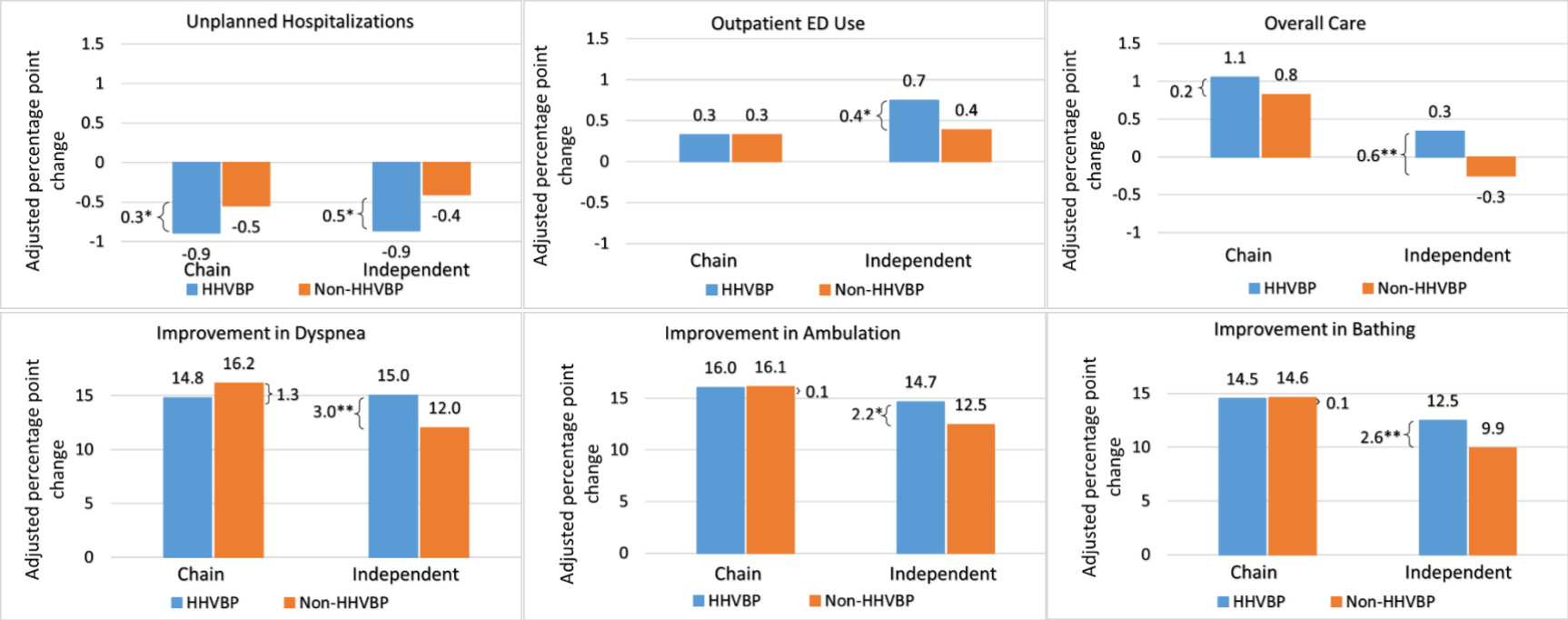
As hypothesized, the overall patterns in changes in performance among chain-affiliated HHAs remain largely similar, regardless of HHVBP status. While the relationships vary somewhat across measures, the performance changes in chain-affiliated HHAs were relatively similar regardless of whether the agency

[20] Only agencies with at least 100 episodes in 2014 were considered in the count.
[21] See Section A.2.1.3 (page 75) in the Technical Appendix for additional information on how the chain name variable was constructed.

was located in an HHVBP or non-HHVBP state for all performance measures except unplanned hospitalizations (Exhibit 36). Notably, these relationships hold most consistently for the OASIS measures, while the changes in performance for the unplanned hospitalization measure appear to be driven more by agency location in an HHVBP or non-HHVBP state rather than by chain affiliation.

For example, chain-affiliated agencies in HHVBP and non-HHVBP states experienced a 0.3 percentage point increase in ED use without hospitalization from the pre-HHVBP to post-HHVBP period (Exhibit 36). In contrast, among independent HHAs, the performance changes were significantly different between the HHVBP and non-HHVBP groups (e.g., Overall Care ratings among independent HHAs increased 0.3 percentage points in HHVBP states but decreased by the same magnitude in non-HHVBP states). For all measures, the performance changes among chain-affiliated HHAs differed from those in independent HHAs. Comparing changes in the three OASIS-based measures and the HHCAHPS-based measure in particular, we observe that independent agencies in non-HHVBP states have the lowest rate of change compared to the other three HHA groups. For example, for the Improvement in Ambulation measure, chain-affiliated agencies in HHVBP and non-HHVBP states achieved similar increases of 16.0 and 16.1 percentage points, respectively. Meanwhile, increases in performance for the measure were lower for independent agencies, and especially for those in non-HHVBP states (14.7 percentage points for HHVBP and 12.5 percentage points for non-HHVBP; Exhibit 36).

Exhibit 36. Adjusted Changes in Performance Similar for Chains Regardless of HHVBP Status Compared to Independent Agencies: Pre- and Post-HHVBP Implementation, 2014/2015 to 2018/2019



Note that some of the bracketed values are slightly different than the difference computed from the bar chart values due to rounding.

* *Difference is statistically significant at p < 0.10. Standard errors were clustered on the state level.*

** *Difference is statistically significant at p < 0.05. Standard errors were clustered on the state level.*

4.6 Discussion

Our results provide evidence of a few mechanisms by which the quality incentives in HHVBP may have prompted improvements in the delivery of care to home health patients and outcomes. Our analysis of HHA frontloading and changes in agency use of this practice in response to HHVBP is consistent with the hypothesis that HHAs respond to performance-based financial incentives by adjusting the number, timing, and types of visits to achieve better outcomes for some key measures. In particular, our analysis of the association between frontloading and key quality outcomes showed that shifting the distribution of skilled nurse or therapist visits more heavily to the first week was associated with better outcomes for unplanned hospitalizations. However, this agency practice was also associated with greater use of SNF visits. It is not immediately clear why frontloading has contrasting directions of association for unplanned hospitalizations and SNF visits. One possibility is that early intensive home health visits may serve to identify post-acute patients who would benefit from institutional post-acute care but who were initially referred to home health. If this were the case, frontloading may in a sense serve to correct suboptimal referrals to home health care.

Through our D-in-D analysis, we found statistically significant evidence that HHAs increased their use of frontloading in response to HHVBP by moderately increasing the share of both skilled nursing and therapy visits occurring during the first week relative to the second week of home health episodes. Considered collectively, the findings of these related analyses suggest that HHAs view frontloading as conducive to improving quality. Furthermore, the pattern of increasing magnitudes in the impacts of HHVBP for all six model years (2016-2021) for therapy frontloading and for the first five years (2016-2020) of the model for skilled nursing frontloading suggests possible agency responsiveness to increasing maximum payment adjustments.

We sought to characterize the size of the HHVBP effect on key claims-based utilization outcomes mediated by frontloading visit practices and found it is quite small relative to the size of the total impact of HHVBP on these outcomes. Thus, for the particular measure definition of frontloading that we have analyzed, we find that unspecified factors other than frontloading account for the great majority of the total impact of HHVBP on claims-based utilization. These other factors may include unobserved agency practices to improve care coordination, quality of visits (rather than timing and intensity), staffing changes, use of health information technology for monitoring, or other agency practices. It remains for future analyses to examine other potential mediators of the HHVBP effect on claims-based outcomes, including possible alternative measure definitions for frontloading.

The analysis of frontloaded visits across subgroups defined by risk of limited functional improvement revealed no significant differences between subgroups in the association of frontloading visits with reduced unplanned hospitalizations. Furthermore, we found no evidence of variation in the impact of HHVBP on use of frontloading skilled nursing visits by risk status for limited functional improvement. The significant variation that we found in the impact of HHVBP on use of frontloading therapy visits by risk status indicated a greater increase in frontloading therapy visits due to HHVBP in the at-risk subgroup. Considering these results as a whole, we found no evidence that HHVBP contributes to challenges among beneficiaries at-risk of limited functional improvement in receiving early intensive visits from HHA providers.

Furthermore, we investigated whether changes in clinical care delivery since HHVBP implementation were driving at least part of the improvements in functional status documented in OASIS assessments.

While we observed changes in the timing, intensity, and mix of visits delivered to home health users, these changes in clinical care delivery did not substantially account for increased rates of improvements in functional status reported in OASIS assessments. What remains unexplained about functional measure improvements over time may reflect influence from other drivers that the data are unable to assess. These drivers could include changes in clinical care unobservable in the data, changes in how HHAs train and instruct staff to complete OASIS assessments, and additional payer-incentivized or agency quality programs to improve care quality (e.g., improving care coordination, transitions of care, health risk management programs, and reducing missed service delivery) which, in turn, may explain the greater extent of improvement reported between SOC and EOC.

The finding that our model covariates – specifically the measures of clinical care delivery – were unable to substantially explain trends in improvement in functional status reinforces earlier results suggesting that changes in how HHAs complete the SOC OASIS assessment are an important driver of reported functional status improvements, with potential implications for the interpretation of measure performance. To the extent that increased emphasis on OASIS coding and documentation is not uniform across all types of agencies (e.g., more pronounced in large agencies or agencies that are chain-affiliated), but rather correlated with agency resources, then the system risks penalizing certain types of agencies that continue to conduct assessments without modifications, with implications for how payment systems may affect care delivery.

In addition to agency visit practices, we also examined how agency organizational structure in terms of chain affiliation may impact patterns of HHVBP effects on patient outcomes. Based on our interviews with HHA chains in 2019, we hypothesized that their common approach to quality improvement would lead to similar performance across chain-affiliated agencies regardless of whether the agencies operate in an HHVBP or non-HHVBP state. Our finding that this relationship holds most consistently for the OASIS-based measures is not surprising given interviewee reports that chains have implemented multiple strategies to improve documentation of functional assessments – including third-party and internal review of coding as well as extensive staff training – across their HHVBP and non-HHVBP agencies (Arbor Research, 2021; 2022). Whether the approaches used by chains were motivated in response to the original HHVBP Model or, more broadly, were implemented based on a number of payer initiatives emphasizing performance improvement cannot be determined by the data. Interviews with chains suggest that their activities were at least in part motivated by the HHVBP Model, but its incentives are just one of many factors prompting their focus on performance measurement and improvement. Given how similarly chain-affiliated HHAs perform and the growth in chain ownership and consolidation, the role of chains is a critical consideration in weighing the potential impact of HHVBP incentives on HHA behavior. Considerations of chain behavior may have implications for understanding the expansion of the HHVBP Model as well, with many of the impacts on performance for chain-affiliated agencies in the Model expansion states realized prior to expansion. Subsequent to model expansion, we would expect any impact in expansion states to be potentially larger for independent agencies, compared to those that are affiliated with a chain.

5. Results: Higher Agency Total Performance Scores in HHVBP States than Comparison States in Each of the Six Model Performance Years

5.1 Introduction

This section presents our analyses of the impact of the original HHVBP Model on the overall quality measure performance of home health agencies in the nine model states. As discussed above, the performance of eligible agencies under the original HHVBP Model is measured using Total Performance Scores (TPS), which serve as the basis for adjusting Medicare payments to agencies under the home health Prospective Payment System (PPS). For example, CMS first used the 2016 TPS to determine the payment adjustments applied to eligible HHAs in the nine original HHVBP states for CY 2018, and most recently used the 2019 TPS to determine payment adjustments for CY 2021. Under the original HHVBP Model, the TPS had growing financial implications for agencies in the nine HHVBP states. While the 2016 TPS determined payment adjustments of up to ±3 percent in CY 2018, the 2019 TPS determined payment adjustments of up to ±7 percent in CY 2021 (see Exhibit 1). More broadly, the TPS is of interest as an overall performance indicator of the original HHVBP Model as it allows comparison of agencies in the nine model states with those in the 41 non-model states where this metric did not affect Medicare payments.

As discussed in Section 1, the performance of agencies in the nine original model states during performance year 2020 would have determined payment adjustments of up to ±8 percent in CY 2022 in the original design of the HHVBP Model (CMS, 2016). However, in the CY 2022 final rule, CMS expanded the HHVBP Model nationally and identified CY 2022 as a pre-implementation year with no HHVBP payment adjustments (HHS, 2021). Furthermore, CMS changed the baseline year from 2019 to 2022 for the expanded model in the CY 2023 final rule (HHS, 2022). An agency's performance in CY 2023 – the first performance year of the expanded HHVBP Model – will be used to adjust its payment of up to ±5 percent in CY 2025.

In our analyses for this report, we examined agency performance data through 2021. Although agency performance in 2021 did not ultimately affect future payment rates to agencies since CMS ended the original HHVBP Model in December 2021, the decision to end the model early was not finalized until November of 2021 (HHS, 2021) meaning at the time, agencies expected their performance to result in payment adjustments in 2023. Using multivariate linear regression of agency-level data for 2016-2021, we found ***higher TPS values in each of the six years of the original HHVBP Model*** for agencies in the model states compared to those in the non-model states. Sustained impacts of HHVBP starting in the first year of implementation may reflect effects of the model's performance incentives as agencies were aware that starting in 2016, their performance would affect their future Medicare payments. Our analyses of agency TPS values for 2021, which was the third year that used larger weights for the claims-based measures, do not show a strong pattern of HHVBP agencies with a lower TPS being more likely than other agencies to care for beneficiaries with social risk factors.

5.2 Higher TPS among Agencies in HHVBP States Compared to Non-HHVBP States in the All Six Years of the Original Model

In 2021, we calculated a TPS for 76.9 percent of HHAs in the nine original HHVBP states[22] and 72.2 percent of HHAs in non-model states (Exhibit 37). For agencies in both HHVBP states and non-model states, those without a TPS tended to be small and were in operation for a relatively shorter period (see Exhibit B-33 [Page 181] in the Technical Appendix). Based on their smaller size, agencies that were ineligible to receive a TPS account for relatively few home health episodes in the U.S. Our analyses of TPS values for the most recent year (2021) demonstrate HHAs eligible to receive a TPS accounted for 99.0 percent of OASIS episodes in original HHVBP states and 98.7 percent of OASIS episodes in non-model states (Exhibit 37). We observed similar rates in 2020 (see Exhibit B-34 [Page 182] in the Technical Appendix). The TPS analyses in this report therefore reflects the quality performance of a very large proportion of the home health episodes for Medicare and Medicaid patients in the U.S.

Exhibit 37. HHAs that are Ineligible to Receive a TPS Account for Relatively Few Episodes, 2021

	Agencies in Original HHVBP States			Agencies in Non-HHVBP States		
	Eligible for TPS		Total	Eligible for TPS		Total
	Yes	No		Yes	No	
Total number of HHAs	1,502	450	1,952	6,045	2,330	8,375
% of HHAs	76.9%	23.1%	100.0%	72.2%	27.8%	100.0%
Number of OASIS episodes	1,670,144	17,239	1,687,383	5,426,638	69,301	5,495,939
% of OASIS episodes	99.0%	1.0%	100.0%	98.7%	1.3%	100.0%
Number of Medicare claims episodes	2,098,739	23,044	2,121,783	6,875,592	189,375	7,064,967
% of Medicare claims episodes	98.9%	1.1%	100.0%	97.3%	2.7%	100.0%

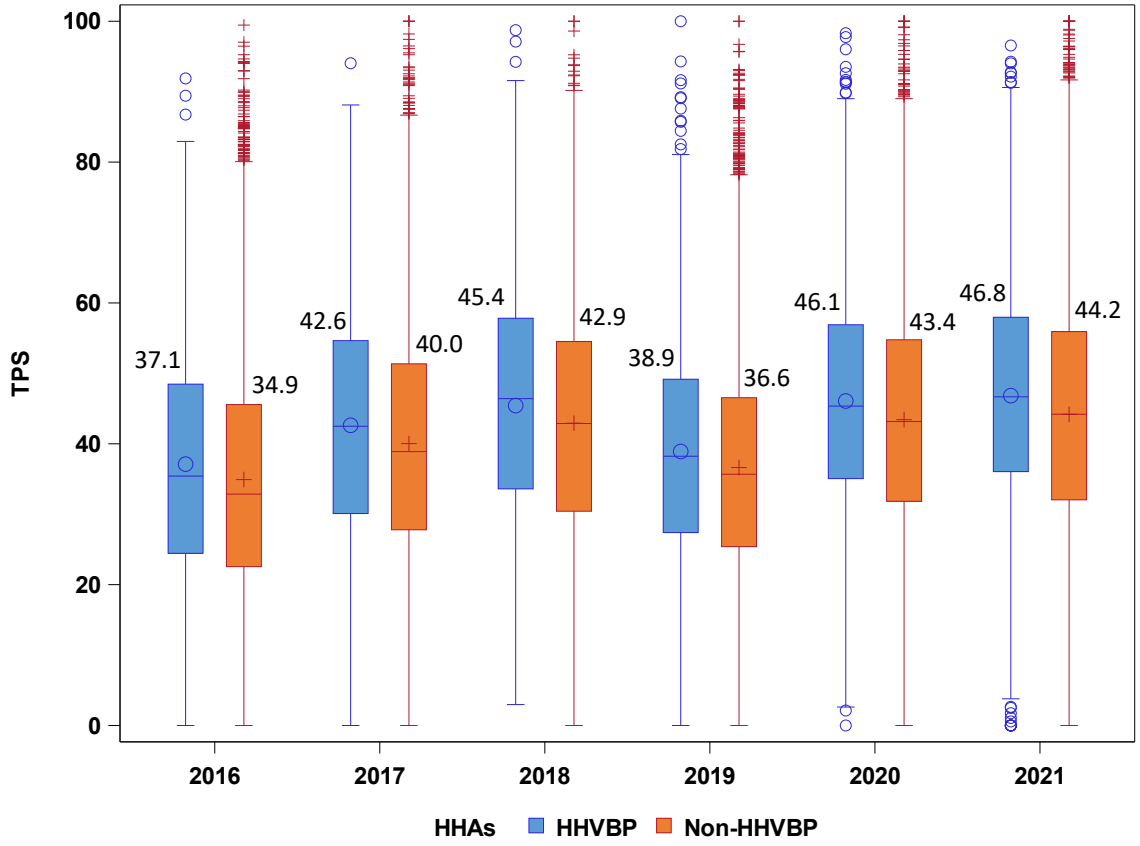
Agencies eligible to receive a TPS under the HHVBP Model include those having at least five HHVBP measures with sufficient data and a Medicare participation date prior to the CY used as a baseline period for measuring improvement.

In each of the six years of the original model, TPS values were slightly higher among HHAs in original HHVBP states relative to those in non-model states (Exhibit 38). We note that agency TPS values in the two groups of states are compared while accounting for the risk adjustment method being used for each of the individual HHVBP performance measures that comprise the TPS. Between 2016 and 2018, there was a shift upward in the agency TPS distribution each year for both groups of agencies. Since there were minimal changes in the TPS methodology during this period,[23] we can interpret these shifts as indicating ongoing improvement in agency performance in 2018 over 2017 (and in 2017 over 2016).

[22] The HHVBP Implementation Contractor did not calculate a 2021 TPS since CMS ended the original HHVBP Model a year early, so we were unable to compare how our values aligned with theirs.

[23] The same methodology was used to calculate each agency's TPS for 2016 and 2017, while one process measure was dropped from the TPS calculation for 2018 (Drug Education on Medications Provided to Patient/Caregiver).

Exhibit 38. Higher Agency TPS Values in HHVBP versus Non-HHVBP States, 2016 – 2021



*The box shows the interquartile range, with the median represented by the horizontal line and the mean represented by the circle or the "plus" sign for HHVBP and non-HHVBP groups, respectively. The lower line or "whisker" reflects the minimum observation, and the upper whisker reflects the maximum TPS that occurs within the 75th percentile and 1.5*IQR (the "fence"). The circles above the upper whisker reflect outliers (i.e., observations that are higher than the "fence").*

Between 2018 and 2019, there was a shift downward in the TPS distributions for both groups of agencies which likely reflects the major change in TPS methodology starting in 2019 (including an increased weighting of the two claims-based measures) rather than a decrease in overall agency performance (Exhibit 38).[24] Between 2019 and 2020, there was again a shift upward in the TPS distributions, with the two claims-based utilization measures and the two TNC change in functioning measures showing the largest increases in average measure scores (see Exhibit B-35 [Page 182] in the Technical Appendix).[25] TPS remained stable between 2020 and 2021 for both groups of agencies. As in the first five years of HHVBP, we found that the relatively higher TPS values among agencies in HHVBP

[24] Of note, agencies had lower scores on the unplanned ACH and outpatient ED utilization measures compared to most other measures included in the TPS (see Exhibit B-35 [Page 182] in the Technical Appendix for additional information).

[25] These trends may have been influenced by the COVID-19 PHE, which likely contributed to the observed declines in unplanned hospitalization and ED rates and higher average scores for these measures in 2020 (see Exhibit B-6 [Page 155] in the Technical Appendix).

states during 2021 continued to be almost entirely the result of higher scores for the OASIS-based outcome measures (see Exhibit B-35 [Page 182] in the Technical Appendix).

We also examined agency TPS values while accounting for the observed differences in agency characteristics and patient sociodemographic factors between the HHVBP and non-HHVBP groups.[26] For each of the six years of the original model, we found agency TPS values to be relatively higher in HHVBP states based on multivariate linear regression. Model estimates indicated TPS values that were 2.6 percentage points higher among agencies in HHVBP states in 2021 after ranging between 1.6 and 3.2 percentage points higher between 2016 and 2020 (Exhibit 39). This effect size indicates TPS values for HHVBP agencies that were 5.9 percent higher than those for non-HHVBP agencies in 2021 after ranging between 3.7 percent and 7.9 percent higher between 2016 and 2020.

Exhibit 39. Higher Agency TPS Values in HHVBP versus Non-HHVBP States When Also Adjusting for Patient Sociodemographic Factors and Agency Characteristics, 2016 – 2021

Year	Agencies in HHVBP States		Average TPS, Agencies in Non-HHVBP States	Percent Difference
	Coefficient	p-value		
2016	1.6	<0.001	34.9	4.6%
2017	2.0	<0.001	40.0	5.0%
2018	1.6	<0.001	42.9	3.7%
2019	2.9	<0.001	36.6	7.9%
2020	3.2	<0.001	43.4	7.4%
2021	2.6	<0.001	44.2	5.9%

We considered the results of these analyses of TPS through each of the six years of the model in the context of pre-existing levels of agency performance on the same measures. Using a similar methodology for calculating a TPS for each agency during 2013 – 2015,[27] we found that the agency scores were similar in HHVBP and non-HHVBP states in each year from 2013 – 2015 (see Exhibit B-36 [Page 184] in the Technical Appendix). These results suggest initial balance in the overall performance of agencies in these two groups prior to the implementation of the model.[28]

We also examined the impact of the original model in each of the HHVBP states since the effect of the model on the overall quality measure performance of agencies may vary across the individual states. In 2021, agency TPS values were higher for four HHVBP states relative to their respective regional comparison groups based on linear regression analyses: Arizona, Maryland, North Carolina, and

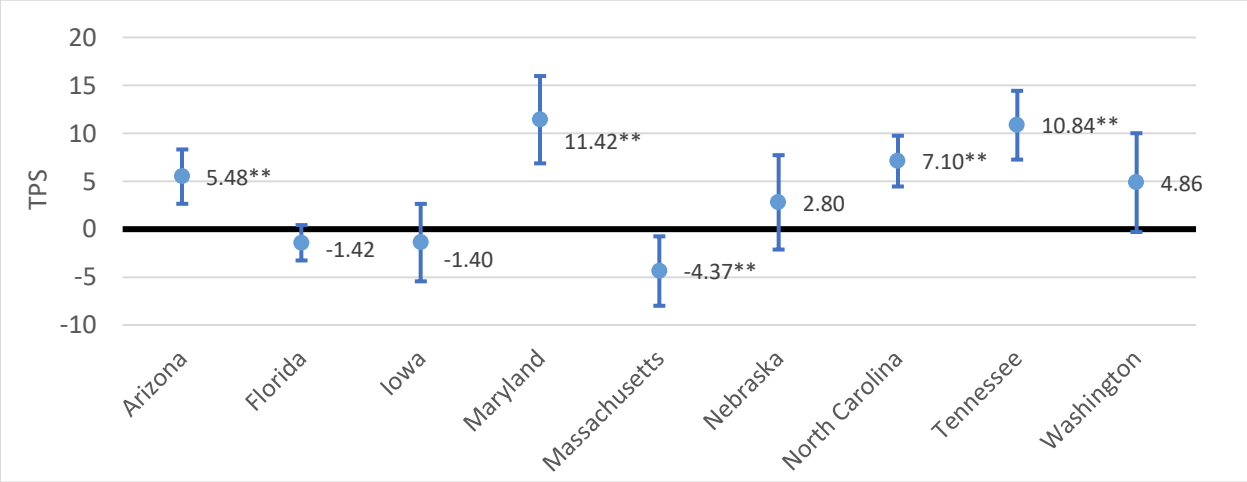
[26] As discussed above, we did not use a D-in-D approach for these analyses since the TPS already captures changes over time in performance. See Section A.1.7 (Page 54) in the Technical Appendix for additional detail.

[27] These simulated TPS values reflect agency performance in each year relative to the previous year, which is treated as the baseline period. For example, the simulated 2015 TPS reflects a combination of agency levels of quality achievement in 2015 relative to 2014 achievement thresholds and benchmarks and agency levels of quality improvement between 2014 and 2015.

[28] We do not compare TPS values during 2013-2015 with those observed during 2016 – 2021, since the TPS calculated for each year under the model will reflect the use of 2015 as a fixed baseline period and are therefore not directly comparable starting in 2017 (since the baseline period is no longer the previous year).

Tennessee (Exhibit 40). For all of these four states except North Carolina, agency TPS values were also higher relative to their regional comparison groups in each of the first five years of the model (see Exhibits B-37 through B-41 [Page 184] in the Technical Appendix). For North Carolina, agency TPS values were also higher relative to its regional comparison group in 2016, 2018, 2019, and 2020 (also shown in the Technical Appendix). In 2021, Massachusetts was the only HHVBP state with lower agency TPS values than its regional comparison group (Exhibit 40). The lower scores for agencies in Massachusetts relative to its regional comparison group continued a pattern also seen in 2018 through 2020 (see Exhibits B-39 through B-41 [Page 185] in the Technical Appendix).

Exhibit 40. Higher Agency TPS in Four HHVBP States Relative to their Regional Comparison Groups, 2021



*Graph shows 90% Confidence Intervals. ** p < 0.05*

5.2.1 Comparison of 2021 Agency TPS by Social Risk Factors

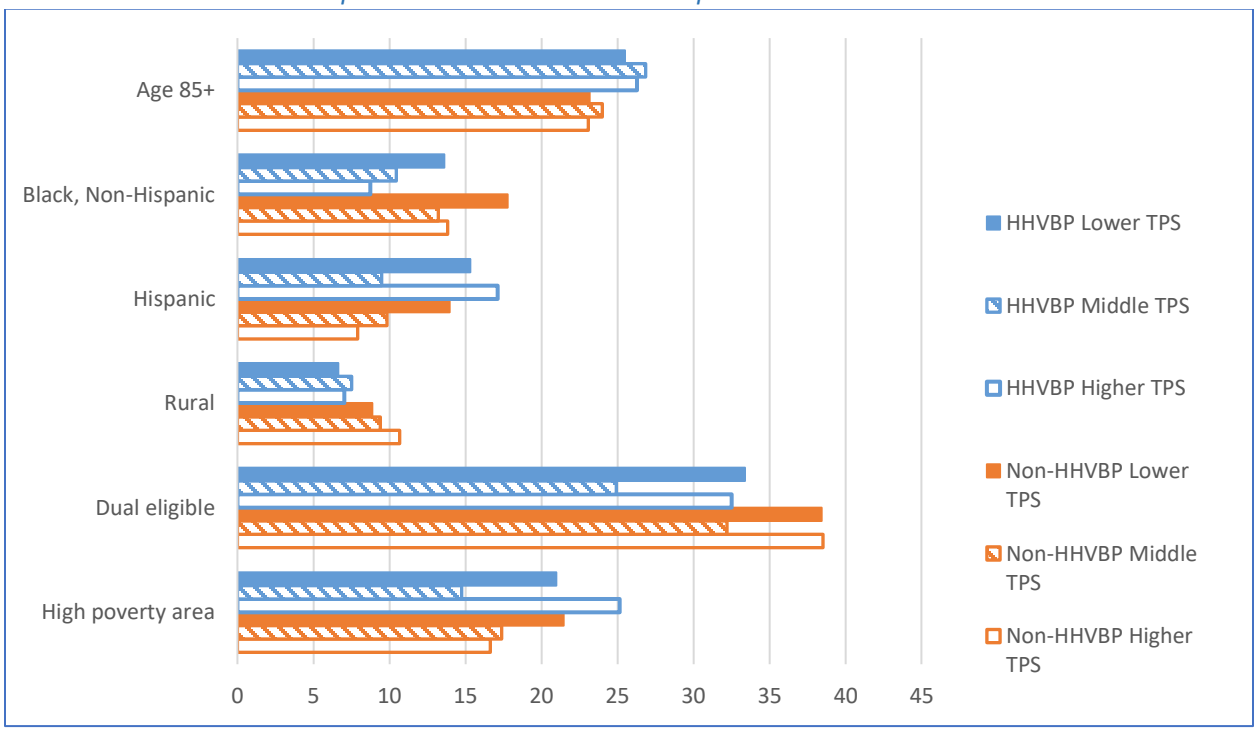
As with other value-based purchasing programs, there is potential under HHVBP for some providers to face greater challenges in responding to quality performance incentives. This may include providers caring for beneficiary populations with greater social risk factors. For example, if HHAs that care for disproportionately large populations of patients with social risk factors consistently have lower levels of performance and negative payment adjustments, and they perceive their poorer results as being influenced by factors beyond their control, the model may discourage agencies from caring for certain patient populations. In this way, there is a risk that the model could adversely affect access to care for some beneficiaries.

We again explored this risk during the sixth and final year of the original HHVBP model, which reflected the continued use of the larger weights for the claims-based measures in the TPS calculation. We considered the extent to which HHVBP agencies with a larger proportion of beneficiaries in certain demographic or social risk factor groups were more likely to have a lower TPS during 2021. For these analyses, we defined three groups of agencies: (1) Lower TPS, based on the lowest quartile of TPS values among agencies in the same state cohort in 2021; (2) Higher TPS, based on being in the highest quartile of TPS values among agencies in the same state cohort in 2021; and (3) Middle TPS, which includes all other agencies (i.e., the middle two quartiles in 2021).

Similar to previous years, we did not find that agencies in HHVBP states with a lower TPS in 2021 were systematically more likely than other agencies in HHVBP states to care for beneficiaries with certain

demographic characteristics or for those with social risk factors (Exhibit 41). For example, in HHVBP states, there were higher percentages of beneficiaries who were living in a high poverty area among agencies with a higher 2021 TPS (Exhibit 41). While agencies in HHVBP states with a lower TPS in 2021 cared for a higher percentage of Black non-Hispanic beneficiaries than other agencies in HHVBP states (Exhibit 41), we also found a similar pattern among agencies in non-HHVBP states. Broadly, these patterns based on demographic and social risk factors are similar to those we observed based on our analyses of agency TPS data for 2017 through 2020 that were presented in previous annual reports (Arbor Research, 2022).

Exhibit 41. Agencies in HHVBP States with a Lower 2021 TPS Do Not Care Disproportionately for Patients with Social Risk Factors Compared to Other 2021 TPS Groups



5.3 Discussion

Throughout the original HHVBP Model, we observed evidence of a consistent positive HHVBP impact on the overall performance of agencies on the quality measures included in the TPS. Evidence of sustained impacts of HHVBP that began in the first year of implementation (2016) suggests the importance of the model's performance incentives, which preceded the initial adjustments to agency payments under the Medicare home health PPS by two years (2018). With the initial TPS methodology published in the proposed rule for the HHVBP Model in July 2015 (HHS, 2015b), it was possible for agencies to anticipate that their performance starting in 2016 would affect their future Medicare payments, and plausibly may have influenced their response to the model well before the payment adjustments began.

In this report, we showed that the pattern in continued positive impacts of HHVBP now extends to 2021, the fourth and final year in which the original HHVBP Model adjusted Medicare home health PPS payments in nine HHVBP states. While the potential payment adjustments under the model have grown larger over time, the actual adjusted amounts remain small relative to the profit margins of many agencies. Nevertheless, we have continued to see higher TPS values among agencies in HHVBP states,

unlike the relatively comparable overall performance on quality measures that was observed prior to model implementation. While TPS values for 2019 through 2021 are not comparable to those for earlier years because of changes in the scoring methodology, our analysis of these three most recent years of data suggests a continued positive impact of HHVBP on overall agency performance. This change in scoring strengthened financial incentives for HHVBP agencies to improve their performance on the unplanned hospitalization measure in particular, as the weighting of this measure in the TPS calculation increased from 6.25 percent in 2018 to 26.25 percent starting in 2019 (HHS, 2018). In the three years since this scoring change was adopted, we have not observed a large increase in average scores for this measure among HHVBP agencies relative to non-HHVBP agencies in 2019-2021. Rather, as we observed prior to 2021, the higher TPS values among agencies in HHVBP states continue to largely reflect higher levels of performance on the OASIS-based outcome measures, which include measures of both discharge to community and functioning. This may be because the OASIS measures capture aspects of care that agencies have felt they can more readily influence, which is supported by our findings from previous interviews with agencies (Arbor Research, 2019; 2021) as well as this year's findings (see Section 10).

We are unable to rule out the possibility that agency TPS values for 2021 were affected by the COVID-19 PHE. During 2019-2021, we observed an increase in agency TPS values as well as in average scores for certain HHVBP measures which may have been relatively more sensitive to effects of the PHE, such as measures of unplanned hospitalization. However, these trends during 2019-2021 were observed among agencies in both original HHVBP and comparison states. Moreover, in other analyses we conducted for this report, we did not find a materially different effect of the PHE on agency performance in the nine original HHVBP states compared to the other 41 states (see Section 2.3). This includes relatively similar overall COVID-19 rates in HHVBP and comparison states during 2020-2021 and our overall finding that analyses of individual HHVBP performance measures were not highly sensitive to the inclusion of COVID-19 indicators in D-in-D analyses. Instead, the difference in TPS values among HHVBP and non-HHVBP agencies in 2021 is not markedly different from what we observed in earlier years of the model.

As the payment adjustments under the model continued to grow larger each year, we explored whether there were patterns in agency performance based on demographic factors or the presence of patient social risk factors that might indicate emerging risks for some beneficiaries under the model. Similar to previous years, this was also not the case in 2021. We did not find a pattern in 2021 of beneficiary social risk factors being more common among HHVBP agencies with a lower TPS compared to higher performing agencies. These results, which were consistent throughout the model implementation period, do not suggest that agencies caring disproportionately for patients with social risk factors were systematically achieving lower levels of performance on the quality measures included in the TPS. For VBP programs generally, it will be important to continue to consider both opportunities and challenges that may be specific to providers caring for historically disadvantaged populations, which can have implications for both their quality of care and access to care as well as for health equity.

6. Results: HHVBP Continues to Have Modest Impacts on Medicare Utilization Throughout the Six Years of the Model

6.1 Introduction

This section examines the impact of HHVBP on measures of health care utilization during the six years of the original HHVBP Model. We found that HHVBP continued to produce ***intended impacts on claims-based acute care hospitalizations, ED use followed by inpatient admission, and SNF use measures among FFS beneficiaries receiving home health services; it also had an offsetting unintended impact on ED utilization without hospitalization*** among FFS beneficiaries receiving home health services. Furthermore, in a supporting analysis, we examined select categories of diagnoses that were the most common causes of ED utilization to determine if some of them can explain the increasing outpatient ED use attributable to HHVBP. From this analysis we found that ED visits related to genitourinary conditions and a collection of less common diagnoses may be significant drivers of this pattern.

More specifically, the cumulative D-in-D results indicate relative declines under HHVBP in unplanned hospitalizations, among first and all home health episodes in a sequence, and use of SNFs, of approximately 0.19 to 0.40 percentage points (1 to 8 percent relative to baseline averages in HHVBP states). These findings provide evidence of the original HHVBP Model's continued achievement of intended impacts, since hospitalizations are an important indicator of health status and the largest driver of health care expenditures among FFS beneficiaries receiving home health services. Although we observe a relative increase in outpatient ED use among HHVBP states of 0.24 percentage points, there is also a relative decline in ED use followed by an inpatient admission of 0.21 percentage points, such that we do not observe a statistically significant increase in overall ED use. We note these findings reflect behavior of HHAs that occur during the first two years of the model prior to application of the initial payment adjustments (2016 – 2017) as well as the first four years of HHVBP payment adjustments (2018 – 2021). These changes in utilization are consistent with our findings for Medicare spending measures presented in the following section.

Two exogenous factors that started in 2020 – implementation of PDGM and onset of the COVID-19 PHE – continue to affect all home health episodes in 2021. Hence, we first present detailed findings about the impact of HHVBP on the six utilization measures followed by results of sensitivity analyses conducted to examine the potential implications of PDGM and COVID-19 PHE for the utilization measures. We also present descriptive trends of COVID-19-related hospitalizations between HHVBP and non-HHVBP states. Subsequently, we explore nuances related to these D-in-D findings by examining: (1) the potential effect of a substantial increase in the weight applied to claims-based quality measures in the TPS for 2019 – 2021 performance relative to 2018 performance; and (2) differences in the impact of HHVBP on outpatient ED use during home health episodes as a function of primary diagnoses associated with the ED visits.

New in this report, we examined if there was any impact of the original HHVBP Model on unplanned hospitalizations during or shortly after home health episodes among Medicare Advantage beneficiaries, a group that has grown in prevalence among all Medicare beneficiaries in recent years. We found that the HHVBP Model contributed to a slight reduction in unplanned hospitalizations occurring within 60 days of the start of a home health episode among this population that is similar in magnitude to the average annual impact among all home health episodes for the Medicare FFS population. This modest

improvement in the quality of home health care occurred despite the lack of model-based financial incentives to reduce unplanned hospitalizations among Medicare Advantage beneficiaries.

6.2 FFS Claims-Based Utilization Measure Rates, Pre- and Post-HHVBP Implementation

Before presenting our D-in-D findings, we present descriptive information on the FFS claims-based utilization measures that allow comparisons between HHVBP and non-HHVBP states to provide context for interpreting model estimates of the relative changes occurring under HHVBP. The unadjusted pre-HHVBP (2013-2015) values were relatively similar between the HHVBP states and non-HHVBP states for most of the utilization measures, particularly for the two HHVBP measures (listed in italics in Exhibit 42). The 15.7 percent rate of unplanned hospitalizations for first FFS episodes was slightly lower in HHVBP states relative to the 16.3 percent rate for non-HHVBP states during the pre-intervention years, and the two rates converged to closer average levels of 15.2 percent and 15.3 percent, respectively, during 2016-2021. In contrast, the baseline period measure of unplanned hospitalizations for all FFS episodes (17.0 percent) was somewhat greater in HHVBP states relative to non-HHVBP states (15.9 percent), maintaining a nearly constant difference on average during the post-HHVBP period when both HHVBP and non-HHVBP states decreased by 2.5 and 2.4 percentage points to rates of 14.5 percent and 13.5 percent, respectively.

During the three years preceding the start of HHVBP, outpatient ED utilization among HHVBP states was slightly lower at 11.7 percent of first home health episodes compared with non-HHVBP states (12.3 percent). The HHVBP average increased by 0.7 percentage points to a 12.4 percent rate similar to the 12.5 percent rate of non-HHVBP states post HHVBP (2016-2021). ED utilization followed by an inpatient admission, in contrast, was equal between HHVBP states and non-HHVBP states in the baseline period at a rate of 14.2 percent, and increased to a 14.3 percent rate in HHVBP states in the post-implementation period, while the rate in non-HHVBP states marginally decreased to 13.9 percent. Total ED use among first home health episodes was slightly lower in HHVBP states compared with non-HHVBP states from 2013 to 2015 (26.6 percent and 27.6 percent respectively); this rate increased post HHVBP to a rate of 27.3 percent in HHVBP states, while it decreased to 27.3 percent in non-HHVBP states. SNF use was somewhat higher among HHVBP states (4.9 percent) relative to non-HHVBP states (4.0 percent) during the baseline period, and though it declined for both groups, it still remained higher at an average of 4.1 percent for HHVBP relative to a 3.5 percent average for non-HHVBP states during the six years of the model.

In the recent two years (2020-2021), we observed continued decline in unadjusted rates of the two hospitalization measures and an uptick in outpatient ED use and total ED use in HHVBP states (Exhibit B-6 [Page 155] in the Technical Appendix). SNF use – which had the steepest decline in 2020 from 2019 (4.9 to 2.8 percent for HHVBP states and 4.2 to 2.4 percent for non-HHVBP states) – showed a marginal increase to 3.1 percent and 2.7 percent in 2021 for HHVBP and non-HHVBP states, respectively (see Exhibit B-6 [Page 155] in the Technical Appendix). Similar trends for both groups in 2020-2021 may be due to the continued impact of COVID-19 PHE or implementation of PDGM or a combination of both factors.

Exhibit 42. Baseline and Post-HHVBP Period Means for Unadjusted FFS Claims-Based Health Care Utilization Measures Show Small Changes in Rates of Acute Hospitalizations and SNF Use with Greater Increases in ED Use in HHVBP States versus Non-HHVBP States

Measure	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
Unplanned Acute Care Hospitalization/First FFS HH Episodes	15.7%	15.2%	16.3%	15.3%	-0.5	-1.0
Outpatient ED Use (no Hospitalization)/First FFS HH Episodes	11.7%	12.4%	12.3%	12.5%	0.7	0.2
ED Use followed by Inpatient Admission/First FFS HH Episodes	14.2%	14.3%	14.2%	13.9%	0.1	-0.3
Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes	26.6%	27.3%	27.6%	27.3%	0.7	-0.3
Unplanned Acute Care Hospitalization/All FFS HH Episodes	17.0%	14.5%	15.9%	13.5%	-2.5	-2.4
SNF Use /All FFS HH Episodes	4.9%	4.1%	4.0%	3.5%	-0.8	-0.5

Measures in the original HHVBP Model indicated by italic text.

In the context of our D-in-D approach, we also examined baseline trends in these claims-based measures to assess the validity of our assumption of parallel trends in HHVBP and non-HHVBP states. The risk adjusted plots of these utilization measures (see Exhibit A-22 [Page 44] in the Technical Appendix) for the two groups suggest that the trends were parallel prior to the implementation of HHVBP, such that the non-HHVBP population is a plausibly valid representation of what would have happened in HHVBP states if the model had not been implemented. Details are shown in Section A.1.5.2 and A.1.5.3 (Page 43) in the Technical Appendix.

6.3 HHVBP Continues to Reduce Acute Hospitalizations and SNF Use While Increasing Outpatient Emergency Department Use

We examined effects of the original HHVBP Model on several claims-based measures of utilization associated with or following home health episodes. Because home health care also entails monitoring patient status, facilitating early interventions, and promoting more rapid recovery of health and functional status, most of these measures can be interpreted as indicators of the quality of home health care in that higher quality care may result in fewer unplanned hospitalizations, ED visits, or subsequent admissions to SNFs. Given their importance as claims-based measures used in the calculation of the TPS, we focus first on the analysis of unplanned hospitalizations use and ED use without hospitalization among first home health episodes. We also report on our analysis of SNF use and other measures of hospitalization and ED use.

Overall, we found the average annual impact of the original HHVBP Model over 2016-2021 to involve relative decreases in utilization in HHVBP states compared with non-HHVBP states for most measures, but we also found relative increases in ED use not followed by hospitalization (Exhibit 43). HHVBP produced an average annual 0.19 percentage point decrease in unplanned hospitalizations use in first episodes among FFS home health beneficiaries in HHVBP states relative to non-HHVBP states during the six years of the model and an average annual impact of a 0.24 percentage point increase in outpatient ED utilization during first episodes (Exhibit 43). These effects translate to a 1.2 percent decrease per HHVBP Model year relative to the 15.7 percent average unplanned hospitalization rate for first home health episodes in HHVBP states during the baseline period and a 2.1 percent increase relative to the baseline average outpatient ED use of 11.7 percent. The D-in-D estimate for outpatient ED utilization reflects the HHVBP states' lower ED utilization rates in the baseline period converging to those of non-HHVBP states post-HHVBP.

In contrast to the outpatient ED utilization measure, we observed a 0.21 percentage point cumulative *decrease* in ED utilization followed by inpatient admission among first episodes in HHVBP states relative to non-HHVBP states. This corresponds to a 1.5 percent decrease relative to the baseline average of 14.2 percent and is consistent with the findings for impact on hospitalizations utilization. The total ED use measure, which combines outpatient ED utilization with ED visits that result in an inpatient admission, showed no cumulative (2016-2021) impact of HHVBP states compared with non-HHVBP states (Exhibit 43). This null finding for total ED use is consistent with the opposite directions of the estimated HHVBP impacts for the two constituent measures that make up the total ED use measure.

Because observation stays may in some circumstances serve as substitutes for an ED visit or inpatient stay, we examined the rate of combined ED visits and observation stays during first FFS home health episodes that did not result in hospitalizations for comparison with that of the HHVBP measure of outpatient ED use only. As expected, we found that the unadjusted rate of the combined ED visit/observation stay measure was slightly larger than for outpatient ED visits alone and observed a similar pattern of slightly increasing prevalence over time, followed by a decline in 2020 and a subsequent increase in 2021. For HHVBP states, the rate of outpatient ED use or observation stay without hospitalization rose from 13.8 percent in 2013 to 14.5 percent at the end of the baseline period in 2015; rose further to 15.5 percent by 2019, declining to 13.4 percent in 2020 and then again increasing to 14.1 percent in 2021 (see Exhibit B-6 [Page 155] in the Technical Appendix). Non-HHVBP states had very similar rates of use, rising from 13.7 percent in 2013 to 14.5 percent in 2015, 15.2 percent in 2019, declining to 13.3 percent in 2020, and rising again to 14.2 percent in 2021 (see Exhibit B-6 [Page 155] in the Technical Appendix). That is, the pattern of observation stays that do not result in an inpatient stay align closely with the ED visits that do not result in an inpatient stay.

Exhibit 43. HHVBP Leads to Continued Reduction in Unplanned Hospitalization, SNF Use, and ED Use Followed by an Inpatient Admission, but Increasing Outpatient ED Use

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
Unplanned Acute Care Hospitalization/First FFS HH Episodes						
2016	-0.23	<0.01	-0.36	-0.09	15.7%	-1.5%
2017	-0.03	0.75	-0.17	0.12		-0.2%
2018	-0.13	0.15	-0.28	0.02		-0.8%
2019	-0.25	<0.01	-0.41	-0.09		-1.6%
2020	-0.10	0.37	-0.27	0.08		-0.6%
2021	-0.45	<0.001	-0.64	-0.27		-2.9%
Cumulative	-0.19	0.01	-0.32	-0.07		-1.2%
Outpatient ED Use (No Hospitalization)/First FFS HH Episodes						
2016	0.25	<0.001	0.14	0.37	11.7%	2.1%
2017	0.22	<0.01	0.10	0.35		1.9%
2018	0.37	<0.001	0.24	0.49		3.2%
2019	0.35	<0.001	0.21	0.50		3.0%
2020	0.20	0.03	0.05	0.35		1.7%
2021	0.01	0.92	-0.15	0.17		0.1%
Cumulative	0.24	<0.001	0.13	0.35		2.1%
ED Use Followed by Inpatient Admission/First FFS HH Episodes						
2016	-0.19	0.02	-0.32	-0.06	14.2%	-1.3%
2017	-0.04	0.67	-0.17	0.10		-0.3%
2018	-0.11	0.24	-0.26	0.04		-0.8%
2019	-0.26	<0.01	-0.42	-0.10		-1.8%
2020	-0.20	0.06	-0.37	-0.02		-1.4%
2021	-0.49	<0.001	-0.68	-0.30		-3.5%
Cumulative	-0.21	<0.01	-0.33	-0.09		-1.5%
Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes						
2016	0.03	0.76	-0.13	0.19	26.6%	0.1%
2017	0.17	0.14	-0.02	0.36		0.6%
2018	0.25	0.03	0.06	0.44		0.9%
2019	0.13	0.29	-0.07	0.33		0.5%
2020	0.036	0.81	-0.19	0.26		0.1%
2021	-0.48	<0.001	-0.71	-0.26		-1.8%
Cumulative	0.03	0.72	-0.12	0.19		0.1%
Unplanned Acute Care Hospitalization/All FFS HH Episodes						
2016	-0.16	0.02	-0.27	-0.04	17.0%	-0.9%
2017	-0.10	0.22	-0.23	0.03		-0.6%
2018	-0.21	0.01	-0.35	-0.08		-1.2%
2019	-0.29	<0.01	-0.44	-0.14		-1.7%
2020	-0.50	<0.001	-0.66	-0.34		-2.9%
2021	-0.77	<0.001	-0.94	-0.61		-4.5%
Cumulative	-0.38	<0.001	-0.50	-0.26		-2.2%
SNF Use/All FFS HH Episodes						
2016	-0.19	<0.001	-0.24	-0.14	4.9%	-3.9%

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
2017	-0.20	<0.001	-0.26	-0.13		-4.1%
2018	-0.27	<0.001	-0.33	-0.20		-5.5%
2019	-0.29	<0.001	-0.36	-0.22		-5.9%
2020	-0.59	<0.001	-0.67	-0.51		-12.0%
2021	-0.67	<0.001	-0.74	-0.60		-13.7%
Cumulative	-0.40	<0.001	-0.46	-0.35		-8.2%

Measures in the original HHVBP Model indicated by italic text. CI= Confidence Interval. See Exhibit 43n (Page 241) in the Technical Appendix for each measure's sample size. [a] Values represent percentage point changes.

We also report results for the broader measure of unplanned hospitalizations among all FFS home health episodes to provide a more comprehensive view of the impacts of HHVBP on hospitalization. This approach allows us to analyze possible unintended consequences of the design of the HHVBP hospitalization measure (for example, if agencies are able to avoid certain hospitalizations in the near-term that instead occur later in a sequence of episodes, at which point they are not directly penalized by the model). As with the HHVBP measure that includes hospitalization only during first episodes, we estimated a similar reduction for unplanned hospitalizations among all home health episodes: cumulative estimate of -0.38 percentage points, corresponding to an average annual decrease of 2.2 percent in HHVBP states relative to the baseline period rate of 17.0 percent. We found a relative decline of 0.40 percentage points per year in SNF use among home health FFS beneficiaries in HHVBP states compared with those in non-HHVBP states, reflecting an 8.2 percent decline relative to the 4.9 percent baseline rate of SNF use.

For these claims-based utilization measures, the separate yearly D-in-D estimates for 2016-2021 showed some fluctuations from year to year. For unplanned hospitalization among first home health episodes, the yearly D-in-D estimates indicated reductions due to HHVBP in 2016 (-0.23 percentage points), 2019 (-0.25 percentage points), and 2021 (-0.45 percentage points) but no statistically significant impact in 2017, 2018, or 2020. Three of the six utilization measures (ED visits followed by inpatient hospitalization, unplanned hospitalizations among all home health FFS beneficiaries and SNF use among all home health FFS beneficiaries) had a statistically significant change in the average magnitude of impact estimates during the four years of payment adjustments (2018-2021) relative to the first two years (2016-2017) of the HHVBP Model (See Exhibit B-43 [Page 187] in the Technical Appendix).

All measures had a pattern of steadily increasing and statistically significant impacts in the intended direction of decreased use in most years since 2017 (Exhibit 43). Furthermore, we observed a sharp decline from 2019 to 2021 in the impact of unplanned hospitalizations among all episodes by 0.48 percentage points (-0.29 to -0.77 [166 percent]) and in SNF use by 0.38 percentage points (-0.29 to -0.67 [131 percent]). On the other hand, outpatient ED use had significantly greater impacts in an unintended (i.e. positive) direction since 2017, but then declined sharply from 0.35 in 2019 to 0.01 in 2021, a change of 0.34 percentage points (97 percent), and the first instance during this evaluation where there is a null effect of HHVBP on outpatient ED use (Exhibit 43). Additionally, the impact estimate in 2021 for ED use followed by a hospitalization among first home health episodes was negative and statistically significant

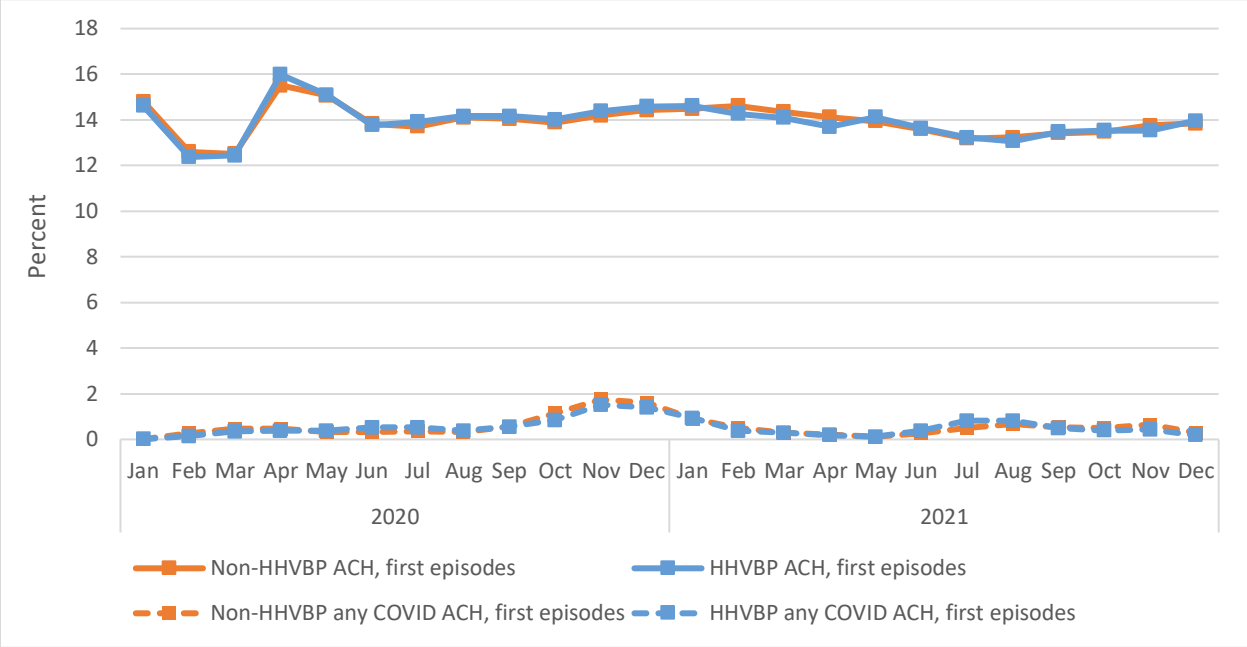
(-0.49), along with total ED use, which showed a significant impact for the first time in 2021 (-0.48 percentage points). For five of the utilization measures, we noted increased impacts in the intended direction in 2021 in HHVBP states relative to non-HHVBP states, translating to decline in unplanned hospitalizations (both measures), ED use followed by inpatient admission, total ED use, and SNF use.

As explained in Section 2.2.2, we conducted a sensitivity analysis to understand the impact of PDGM on the two utilization measures that include all (vs. only first) episodes. The 2021 impact estimates from the sensitivity analysis (Exhibit B-44 [Page 188] in Technical Appendix) were smaller in magnitude by 0.08 percentage points for unplanned hospitalizations among all home health episodes and by 0.12 percentage points for SNF utilization than the 2021 estimates from the primary analysis (Exhibit 43). This analysis shows that the elevated declines in 2021 attributed to the original HHVBP Model (as noted above) for both of these all-episode measures could partially be due to differential impact of PDGM in HHVBP states, in addition to the model impact.

6.3.1 Similar trends observed in acute care hospitalizations in HHVBP and non-HHVBP States during COVID-19 PHE

We also examined trends in COVID-19-specific unplanned hospitalizations among first FFS home health episodes in 2020, in relation to all unplanned ACHs among first FFS home health episodes (Exhibit A-54 [Page 85] in the Technical Appendix). This allowed us to explore if there were differential rates of COVID-19 hospitalizations between HHVBP and non-HHVBP states that contributed to the unplanned hospitalizations that is part of the HHVBP measure set. We observed that the trends in COVID-19 hospitalizations in HHVBP and non-HHVBP states were very similar over the two years. The rates ranged between 0.3 and 0.6 percent from March through September 2020 (Exhibit 44), increased in the last quarter of 2020 and then dropped in 2021, showing similar rates for HHVBP and non-HHVBP states (ranging between 0.1 and 0.8 percent from February 2021 through December 2021). The overall unplanned hospitalization rates among first home health episodes for both HHVBP and non-HHVBP states exhibited similar trends, with rates in HHVBP states being slightly lower than non-HHVBP states between February-April 2021 (14.0 percent vs. 14.4 percent), before merging back to 14 percent in Dec 2021 (Exhibit 44). We also found monthly trends in COVID-19-related hospitalizations corresponding to the all-episode unplanned hospitalization measure to be similar between HHVBP and non-HHVBP states (Exhibit B-42 [Page 187] in the Technical Appendix).

Exhibit 44. Similar Trends in Unplanned Acute Care Hospitalizations (ACHs) Among First FFS Home Health Episodes between HHVBP and non-HHVBP States, Overall and COVID-19 Specific, by Month, 2020-2021



For more details, please refer to Exhibit A-54 (Page 85) of the Technical Appendix.

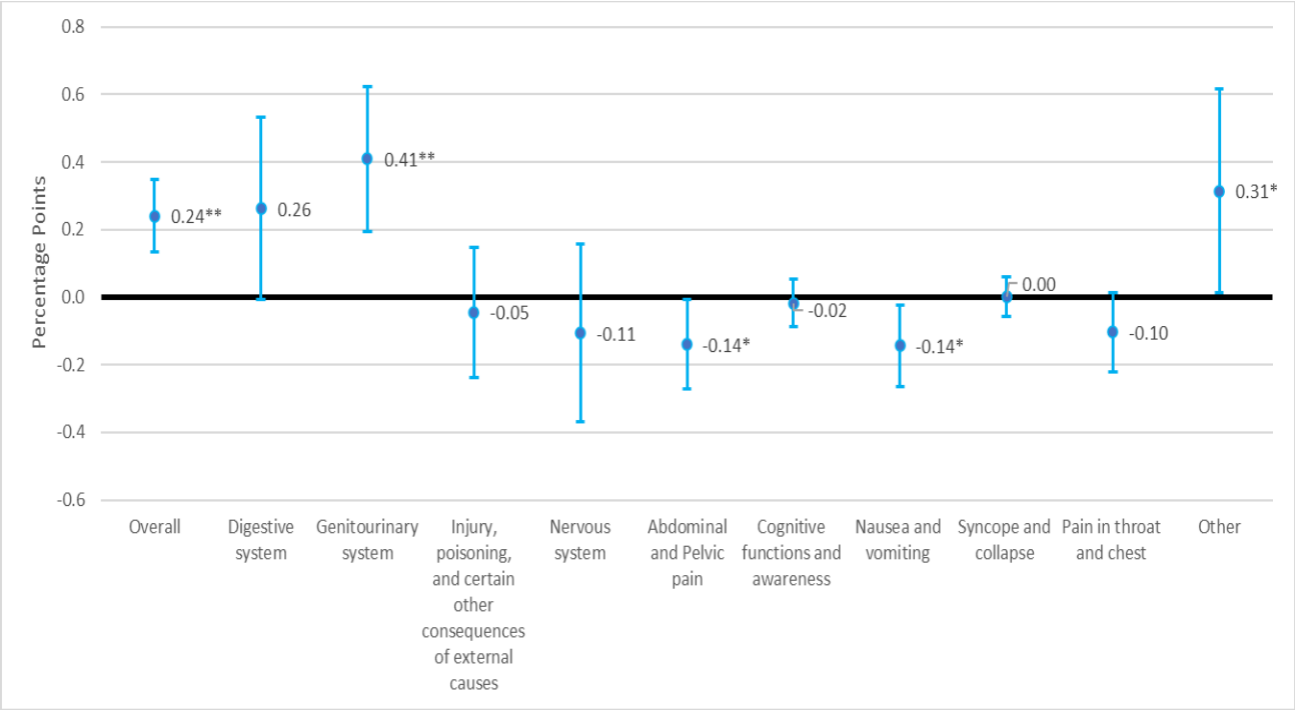
6.3.2 HHVBP Impacts on Increasing Outpatient ED Visits Are Driven by Primary Diagnoses of Genitourinary Conditions and a Collection of Less Common Diagnoses

Consistent with our findings in prior annual reports, we find evidence of offsetting increases to outpatient ED use and decreases in unplanned hospitalization, both attributable to HHVBP, indicating possible substitution of outpatient ED use for acute inpatient care even though agencies have incentives under HHVBP to reduce both types of service use (Arbor Research, 2021). To better understand factors contributing to higher outpatient ED utilization during first episodes in HHVBP states, we examined the most common causes for ED visits and classified them according to body system categories enumerated in Part C (Chapter-Specific Coding Guidelines) of the ICD-10-CM Official Guidelines for Coding and Reporting FY 2021 (details included in Section A.3.3 (Page 107) in the Technical Appendix) (CDC, 2021). Select common cause-specific ED visits[29] that we investigated were digestive system, genitourinary system, injury and poisoning, nervous system, abdominal and pelvic pain, cognitive functions and awareness, nausea and vomiting, syncope and collapse, throat and chest pain alongside a collection of less common causes pooled together as a separate "other" group.[30] Among HHVBP impacts on cause-specific outpatient ED visits, we found positive significant impacts on the probability of episodes with visits related to genitourinary conditions (0.41 percentage points), other conditions (0.31 percentage points) and negative significant impacts for abdominal and pelvic pain and nausea and vomiting, (both at -0.14 percentage points; Exhibit 45). Among ED visits that do not result in inpatient stays for home health users in HHVBP states during the intervention period, genitourinary conditions account for 7 percent, and other conditions, abdominal and pelvic pain, and nausea and vomiting account for

[29] Only conditions that satisfied parallel trends assumption in the baseline period are discussed here. For additional details, see Section A.3.3 in the Technical Appendix and Exhibit B-47 (Page 191) in the Supplemental Tables.
[30] Details on condition-specific ED use are provided in Exhibits A-50 and A-51 (Page 81) in the Technical Appendix.

approximately 8 percent, 3 percent, and 2 percent of such ED visits, respectively (not shown). Among impacts on cause-specific ED visits that resulted in inpatient stays, we found that the overall decline is driven by impacts on the probability of episodes with visits related to skin and subcutaneous issue (-0.08 percentage points) and all other causes pooled into a separate group (-0.23 percentage points; Exhibit B-47 [Page 191] in the Technical Appendix).

Exhibit 45. Cumulative D-in-D Estimates Indicate Higher Outpatient ED /First FFS HH Episodes Driven by ED Visits Related to Genitourinary Conditions and a Collection of Less Common Diagnoses

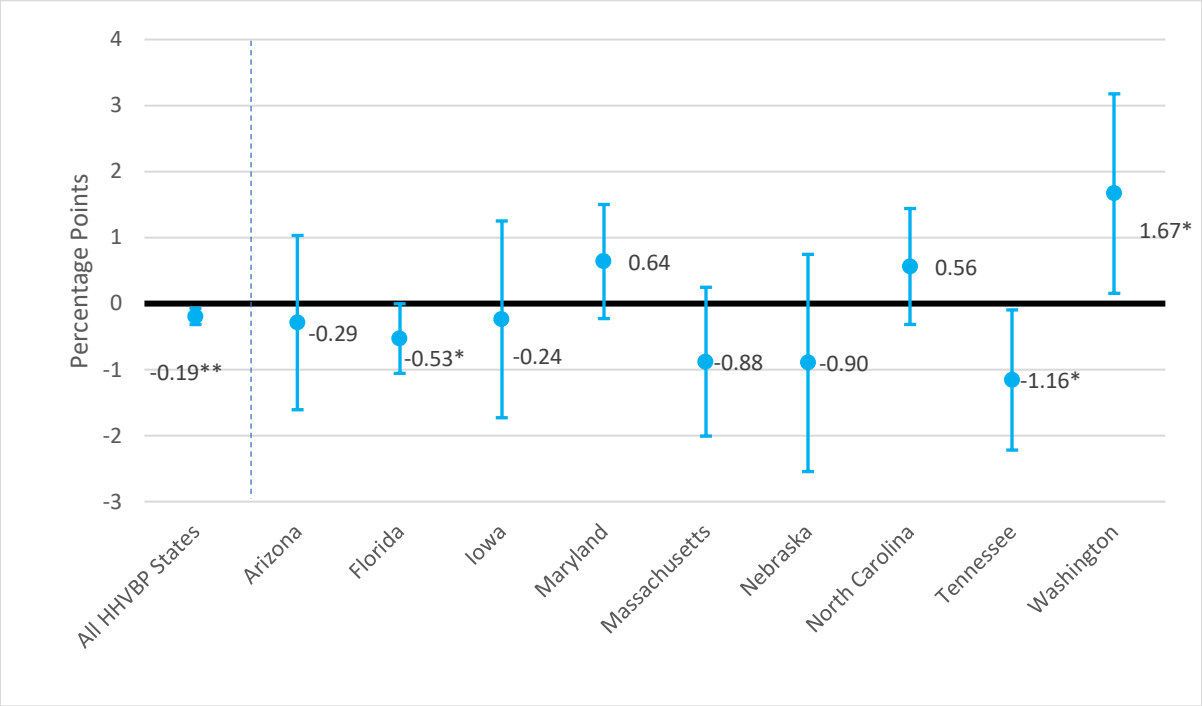


*Graph shows 90% Confidence Intervals; * p < 0.10, ** p < 0.05; Select cause-specific ED Use that satisfy parallel trends assumption in the baseline period are shown here. For details on all common causes of ED use that were examined see Exhibit A-50 (Page 81) in the Technical Appendix. All regression models adjust for beneficiary and agency characteristics and other covariates that are included in the D-in-D analyses of claims-based measures in this report (see Section A.1.4.2 [Page 10] in the Technical Appendix).*

6.3.3 HHVBP Intended Impacts on Acute Care Hospitalizations and Unintended Impacts on Outpatient ED Use Are Both Driven Primarily by Florida

In our analysis of state-specific impacts among HHVBP states, we found strong evidence of intended impacts in at least two HHVBP states relative to their regional comparison groups for three of the six claims-based utilization impact measures: unplanned hospitalizations among first home health episodes and all home health episodes and SNF use. For Florida, we found consistently strong evidence of intended impacts on unplanned hospitalizations among first and all home health episodes, ED use followed by an inpatient admission, and SNF use, with offsetting unintended impacts on ED use without hospitalization during first episodes (Exhibit 46, Exhibit 47, and Exhibit B-46 [Page 190] in the Technical Appendix). The decline in unplanned hospitalizations was driven by Florida and Tennessee with the average annual impact estimates being -0.53 and -1.16, respectively (Exhibit 46). On the other hand, we found some evidence of unintended impacts in Washington, with increasing unplanned hospitalizations among first home health episodes by 1.67 percentage points (Exhibit 46).

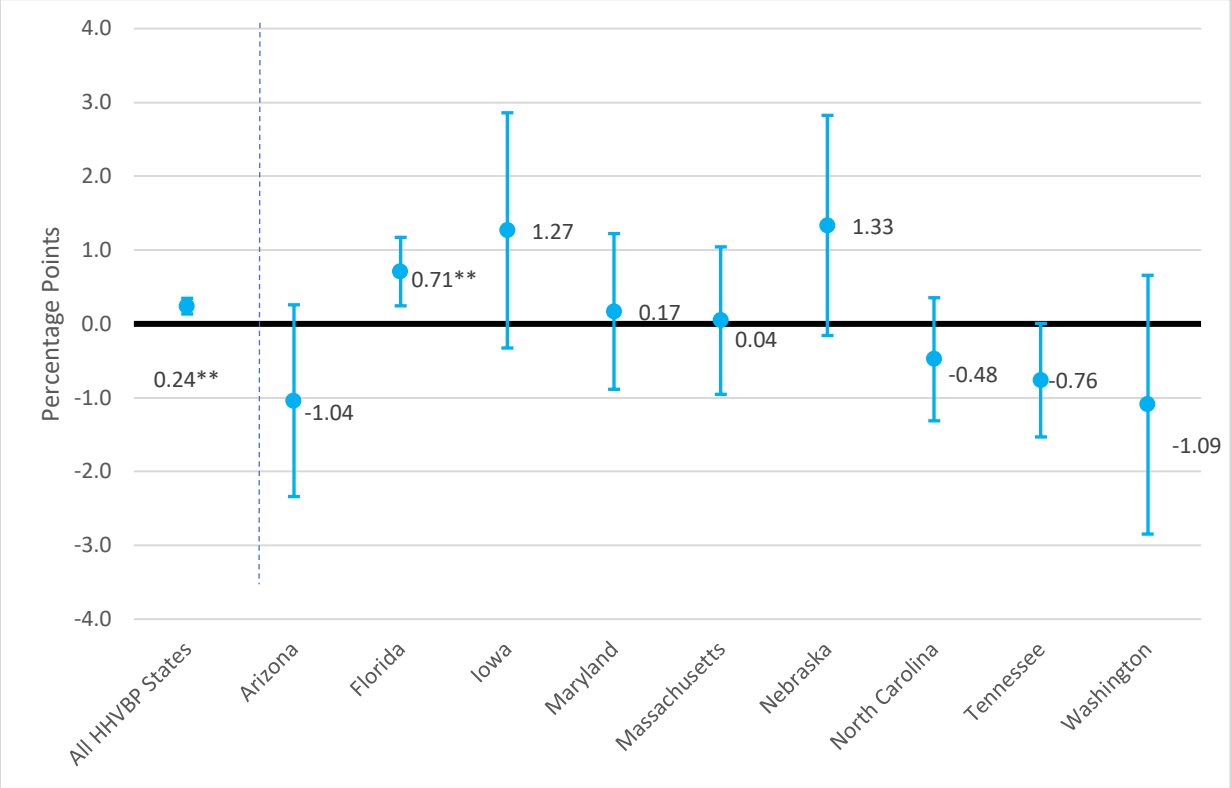
Exhibit 46. Cumulative D-in-D Estimates Indicate Reductions in Unplanned Acute Care Hospitalization/First FFS HH Episodes Overall are Driven Primarily by Florida and Tennessee



*Graph shows 90% Confidence Intervals; * p < .10; ** p < 0.05; State-level models include state-specific linear time trends. "All HHVBP States" model does not include state-specific linear time trends.*

Like Florida, Tennessee also contributed to the overall findings for unplanned hospitalizations among all home health episodes, SNF use, and for total ED utilization (see Exhibit B-46 [Page 190 in the Technical Appendix). We also observed a large decline in SNF use in Iowa with a cumulative impact estimate of -1.88 percentage points (-28.3 percent relative to its baseline level). Florida is also the only state for which we found strong evidence of unintended cumulative impacts increasing ED use during first episodes by 0.71 percentage points (+7.2 percent relative to its baseline level; see Exhibit 47).

Exhibit 47. Cumulative D-in-D Estimates Indicate Increases in Emergency Department Use (no Hospitalization)/First Home Health Episodes are Driven by Florida



*Graph shows 90% Confidence Intervals; ** p < 0.05; State-level models include state-specific linear time trends. "All HHVBP States" model does not include state-specific linear time trends.*

6.4 HHVBP Produces a Small Reduction in Unplanned Acute Care Hospitalizations Among Medicare Advantage Home Health Users During 2016 - 2020

Our findings in this and previous annual reports of slower growth in claims-based utilization in HHVBP states compared to non-HHVBP states that is attributable to the original HHVBP Model (see Section 6.2) suggest that HHAs respond to HHVBP incentives by making changes to their practices to prevent some unplanned hospitalizations. These results raise the question of whether relevant HHA responses to HHVBP incentives are narrowly targeted to their Medicare FFS patients or more general in nature, extending to patients covered by other payer types. To better understand whether HHVBP impacts on health care utilization by home health patients covered by Medicare FFS spill over to other patients, we conducted an analysis of home health utilization and unplanned hospitalizations for Medicare Advantage home health users. Throughout the period of the original HHVBP Model, the role of Medicare Advantage – the private plan alternative to traditional Medicare – has steadily grown. From 2016 to 2021, the share of all eligible Medicare beneficiaries enrolled in Medicare Advantage increased from 33 to 46 percent (KFF, 2022). We also found an increase in Medicare Advantage patients among OASIS episodes, from 24 percent in 2016 to 36 percent in 2021 (not shown). Given this growth in the prevalence of Medicare Advantage beneficiaries, assessing possible impacts of HHVBP on quality and costs of care in the Medicare Advantage population has also grown in importance over time for understanding the impact of HHVBP on the broader Medicare program.

6.4.1 Medicare Advantage Patient Mix

Prior to examining home health utilization and unplanned hospitalizations in the Medicare Advantage population, we reviewed the mix of characteristics of home health users in this population to see how it differed from the FFS population of home health users (Exhibit 48). In both HHVBP and non-HHVBP states, a higher percentage of Medicare Advantage home health users were Black and aged 65-84 years compared to the FFS beneficiaries. The share of dually eligible Medicare Advantage home health users is generally smaller than the share of dually eligible FFS home health users, with the exception of the post-HHVBP period in HHVBP states, during which the percentage of dually eligible Medicare Advantage home health users is higher than that of FFS beneficiaries (31.8 percent compared to 24.9 percent, Exhibit 48). Although the percentages of rural Medicare Advantage home health users increased slightly between the two time periods in both HHVBP and non-HHVBP states (3.1 to 3.6 percent and 5.1 to 5.5 percent, respectively, Exhibit 48), the percentages in the FFS group remained approximately constant at higher levels of 4 and 8 percent in HHVBP and non-HHVBP states, respectively. Throughout the time period and in both HHVBP and non-HHVBP states, a higher percentage of Medicare Advantage beneficiaries received care at HHAs that were non-profit, larger, and older compared to the FFS beneficiaries (Exhibit 48).

Exhibit 48. Baseline and Post-HHVBP Period Means of Medicare Beneficiary Characteristics Among Home Health Users in HHVBP and non-HHVBP States Show Some Differences in Patient and HHA Characteristics between the Medicare Advantage and FFS populations, 2013-2020

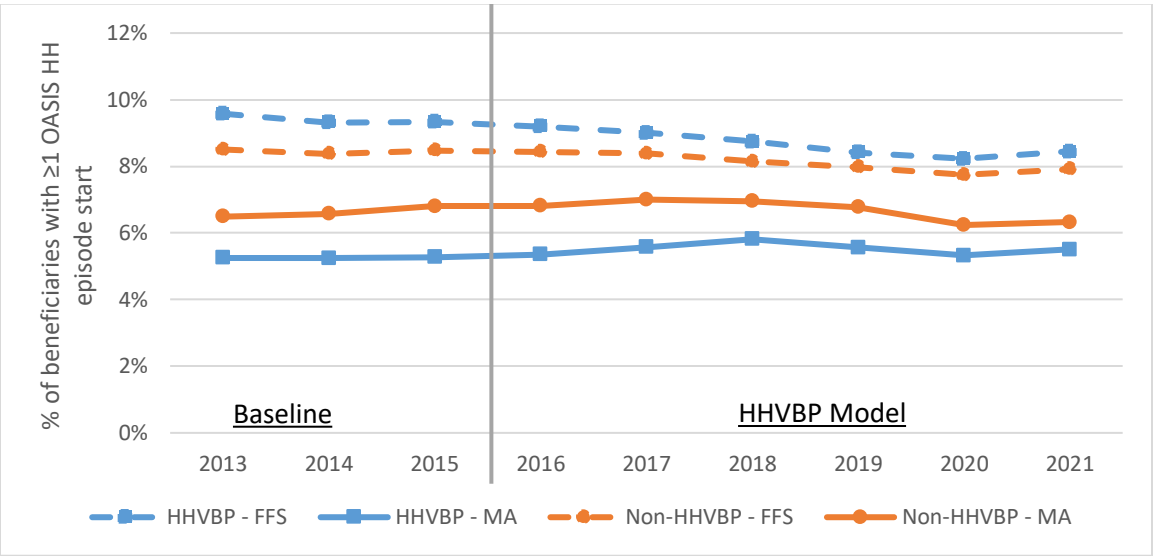
	HHVBP				Non-HHVBP			
	Baseline (2013-2015)		Post-HHVBP Period (2016-2020)		Baseline (2013-2015)		Post-HHVBP Period (2016-2020)	
	Medicare Advantage	FFS	Medicare Advantage	FFS	Medicare Advantage	FFS	Medicare Advantage	FFS
Patient Characteristics								
Age								
0-64 years	12.1%	13.3%	12.3%	11.3%	11.2%	15.5%	11.8%	13.7%
65-84 years	62.7%	57.0%	62.4%	57.9%	63.0%	57.1%	62.5%	58.6%
85 years and older	25.2%	29.8%	25.3%	30.8%	25.8%	27.4%	25.7%	27.7%
Female	61.9%	61.6%	61.5%	60.4%	61.7%	61.8%	61.3%	60.7%
Race/Ethnicity								
White, non-Hispanic	80.5%	79.6%	76.3%	82.7%	76.4%	76.7%	74.8%	78.4%
Black, non-Hispanic	11.7%	9.7%	13.4%	9.7%	14.3%	13.9%	15.6%	12.3%
Hispanic, regardless of race	6.3%	9.3%	8.6%	6.0%	7.1%	6.4%	7.2%	6.0%
Other, non-Hispanic	1.3%	1.2%	1.5%	1.4%	2.0%	2.8%	2.2%	3.1%
Multiracial, non-Hispanic	0.2%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%
Dually eligible	28.7%	30.0%	31.8%	24.9%	24.5%	31.1%	27.0%	29.4%
Rural location	3.1%	4.4%	3.6%	4.4%	5.1%	8.2%	5.5%	8.1%
HHA Characteristics								
Hospital-based setting	13.0%	9.3%	9.3%	8.6%	18.7%	14.2%	15.1%	11.9%
Ownership								
For-profit	54.6%	68.2%	62.3%	68.9%	48.1%	61.9%	54.5%	65.0%
Non-profit	41.6%	28.3%	35.0%	28.4%	49.5%	35.3%	43.7%	32.9%
Government-owned	3.9%	3.5%	2.7%	2.7%	2.3%	2.7%	1.8%	2.0%
HHA Size: Number of OASIS Episodes								
1-59	0.3%	0.8%	0.3%	0.6%	0.5%	1.6%	0.4%	1.2%

	HHVBP				Non-HHVBP			
	Baseline (2013-2015)		Post-HHVBP Period (2016-2020)		Baseline (2013-2015)		Post-HHVBP Period (2016-2020)	
	Medicare Advantage	FFS	Medicare Advantage	FFS	Medicare Advantage	FFS	Medicare Advantage	FFS
60-249	2.8%	6.7%	2.2%	4.6%	4.2%	10.8%	3.0%	8.8%
250-499	6.5%	10.8%	5.3%	7.8%	7.2%	13.0%	5.7%	10.8%
500-999	14.5%	17.0%	10.6%	14.4%	12.8%	16.7%	12.0%	15.8%
1000 and more	76.0%	64.7%	81.7%	72.7%	75.3%	57.8%	78.9%	63.4%
HHA Years in Operation								
0-3 years	2.6%	6.8%	1.5%	2.2%	2.2%	5.4%	1.5%	3.4%
4-10 years	15.6%	24.9%	11.6%	18.3%	12.3%	19.6%	9.1%	15.3%
11 or more years	81.8%	68.3%	86.9%	79.4%	85.5%	75.1%	89.5%	81.3%
Chain Affiliation								
Chain - Yes	45.6%	48.4%	51.1%	52.3%	37.1%	36.8%	42.0%	40.5%
Chain - No	45.3%	42.3%	39.8%	38.7%	49.4%	53.6%	47.3%	51.2%
Chain - Missing	1.9%	3.5%	0.8%	1.0%	3.4%	2.6%	1.2%	1.0%
Chain - Unknown	7.1%	5.8%	8.3%	8.0%	10.2%	6.9%	9.5%	7.2%

6.4.2 Medicare Advantage Beneficiary Home Health Utilization Remained Stable and Lower than Home Health Utilization Among Medicare FFS Beneficiaries During 2013 - 2021

Using an approach similar to our measurement of home health utilization among FFS beneficiaries based on at least one claims-based home health episode start in each year (Exhibit 11), we constructed a utilization measure among Medicare Advantage beneficiaries based on the percentage of all beneficiaries with at least one OASIS episode start in a given year (Exhibit A-61, [Page 91] Technical Appendix). Home health utilization remained relatively stable over the course of the reporting period (Exhibit 49). Home health utilization by Medicare Advantage beneficiaries in HHVBP states rose from 5.2 percent to a peak of 5.8 percent in 2018 before declining to 5.5 percent in 2021. In comparison, utilization rates in the non-HHVBP states remained consistently higher by 0.08 - 0.15 percentage points than that in HHVBP states over 2013-2021. In general, rates of home health use among Medicare Advantage beneficiaries were lower than FFS beneficiaries, for which utilization rates fell slightly from 8.5 to 7.9 percent between 2013 and 2021 in non-HHVBP states and from 9.6 to 8.4 percent during the same period in HHVBP states (Exhibit 49). The lowest rates of home health utilization among Medicare Advantage beneficiaries occurred in 2020 for both HHVBP and non-HHVBP states (8.2 and 7.7 percent, respectively).

Exhibit 49. Unadjusted home health utilization rates among Medicare Advantage beneficiaries remained stable and lower than that of FFS beneficiaries, 2013-2021

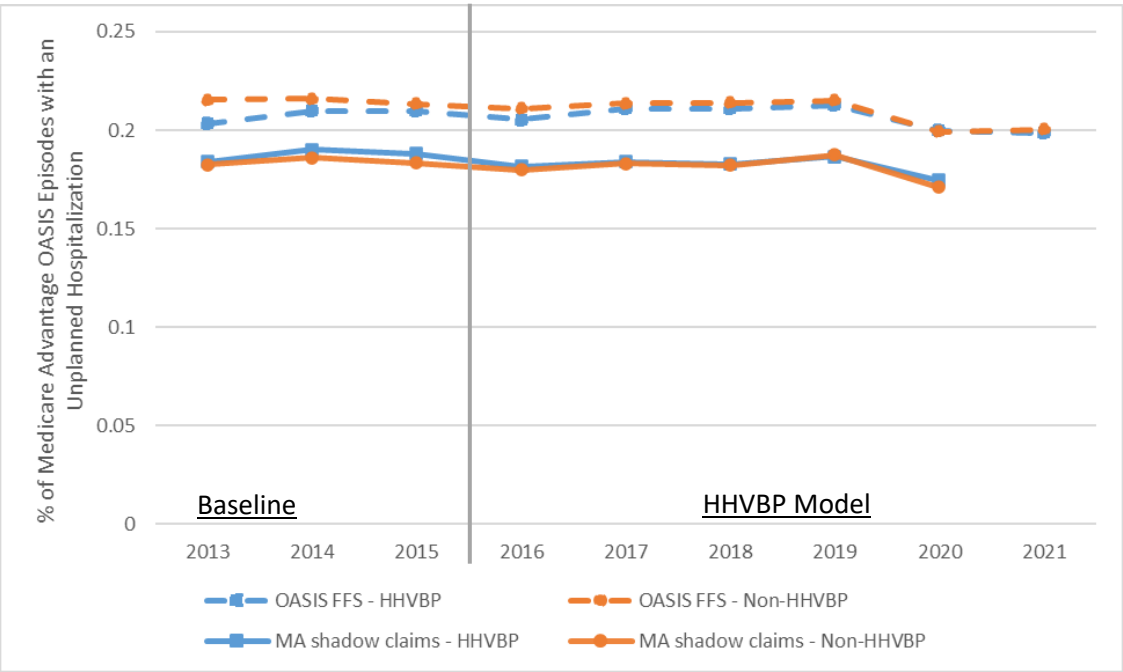


6.4.3 Unplanned Acute Care Hospitalizations Among Medicare Advantage Beneficiaries

Claims-based unplanned hospitalizations among FFS beneficiaries is a key performance measure in the calculation of the TPS (Section 5). While traditional FFS claims are not available for Medicare Advantage beneficiaries, we were able to construct a measure of unplanned hospitalization with zero-dollar "shadow claims," which are commonly submitted to CMS by inpatient providers to aid calculation of the share of inpatient days for low-income patients to determine disproportionate share hospital status and associated payment adjustments (CMS, 2022). We used the shadow claims as the numerator and OASIS episodes as the denominator for the purpose of constructing a measure of unplanned hospitalizations among Medicare Advantage home health beneficiaries (see Exhibit A-59 [Page 89] in the Technical

Appendix).[31] Exhibit 50 shows the unadjusted hospitalization rates from 2013 to 2020, the most recent year of data available. From 2013 to 2019, unplanned ACH rates among Medicare Advantage home health users in both HHVBP and non-HHVBP states were stable between 18 and 19 percent with a slight drop to about 17 percent occurring in 2020. We compared these utilization rates to an analogous measure of hospitalizations among FFS beneficiaries who use home health care, using a numerator based on FFS-claims for hospitalizations and a denominator based on OASIS episodes (Exhibit A-60 [Page 90] in the Technical Appendix). When looking out 60 days from an OASIS episode start, FFS beneficiaries had a slightly higher average unplanned ACH rate between 20 and 21 percent between 2013 and 2019, falling slightly from 21 percent in 2019 to 20 percent in 2020 in both HHVBP and non-HHVBP states. We note FFS ACH levels using OASIS episodes presented in Exhibit 50 are higher than the main result FFS ACH levels using home health claims episodes presented in Exhibit 42. We explored possible explanations for this difference in unadjusted rates across the two approaches to measuring FFS unplanned hospitalization rates. We observed a higher likeliness of a transfer to an inpatient facility among OASIS episodes that end within 60 days compared to those that extend beyond 60 days. This partially accounts for the higher rates of unplanned hospitalizations when using the first 60 days of OASIS episodes rather than FFS episodes as a denominator (see Section A.5.1.10 [Page 131] of Technical Appendix).

Exhibit 50. Unadjusted trends in unplanned acute care hospitalizations during the first 60 days of OASIS Home Health episodes for Medicare Advantage beneficiaries remained stable and lower than that of Medicare FFS beneficiaries, 2013-2020



Yearly D-in-D model estimates reflected an adjusted trend of decreasing unplanned hospitalization rates among HHVBP episodes relative to non-HHVBP episodes through 2020, the fifth year of the HHVBP model (Exhibit 51). However, only the 2019 estimate and the cumulative estimate were statistically significant at the 0.10 level. Through the first five years of the HHVBP Model, there was a 0.35

[31] Details on measure construction methodology included in Section A.5.1.10 (Page 131) of the Technical Appendix.

percentage point reduction in unplanned hospitalizations in HHVBP states relative to non-HHVBP states. This translated to a 1.9 percent reduction relative to the baseline average unplanned hospitalization rate of 18.8 percent. Recognizing that not all acute care hospitals submit shadow claims, we conducted a sensitivity analysis to exclude home health episodes that came from counties where more than 10 percent of all FFS claims came from hospitals that did not submit shadow claims (Exhibit B-49 [Page 193] in the Technical Appendix). The cumulative estimate in the sensitivity model was similar in magnitude to the main model (-0.30 percentage points), although these episode-level exclusions resulted in a slightly attenuated effect estimate. We explored potential adjustments for methodological differences between OASIS episodes and home health claim episodes and found adjustments attenuated the difference in levels but had no substantial effect on D-in-D estimates (see Section A.5.1.10 [Page 131] in the Technical Appendix).

Exhibit 51. Original HHVBP Model Associated with Modest Reduction in Unplanned ACH Hospitalizations among Medicare Advantage Beneficiaries over the First Five Years of the Model

	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
Unplanned Acute Care Hospitalization/All Medicare Advantage OASIS Episodes*						
2016	-0.23	0.18	-0.52	0.05	18.8%	-1.2%
2017	-0.33	0.12	-0.68	0.02		-1.8%
2018	-0.37	0.11	-0.76	0.01		-2.0%
2019	-0.53	0.04	-0.95	-0.11		-2.8%
2020	-0.23	0.43	-0.71	0.25		-1.2%
Cumulative	-0.35	0.09	-0.69	-0.01		-1.9%

*CI= Confidence Interval. [a] Values represent percentage point changes. *ACH events are identified if they occur the first 60 days of OASIS episodes. See Exhibit 51n (Page 241) in the Technical Appendix for sample size.*

An alternate unplanned hospitalization measure was constructed for Medicare Advantage beneficiaries using Medicare Advantage inpatient encounter data to identify unplanned hospitalizations among Medicare Advantage beneficiaries.[32] Medicare Advantage encounter data were only available during 2015-2020, which did not allow for a complete three-year baseline period that we use in most of our D-in-D analyses. A D-in-D analysis for this alternate version of the measure showed a significant cumulative estimate of -0.59 percentage points (with 90 percent confidence interval of [-0.26, -0.92]), translating to a 3 percent reduction in hospitalizations for Medicare Advantage beneficiaries in HHVBP states relative to non-HHVBP states (see Exhibit B-49 [Page 193] in the Technical Appendix).

6.5 No Clear Impact of Larger TPS Weight for the Unplanned Hospitalization Measure in 2019-2021

As discussed in Section 1, CMS designed the original HHVBP Model to evolve over time, with successively larger payment adjustments applied each year. In the fourth performance year (2019), CMS also made several changes to the HHVBP measure set and to the weights of the HHVBP measures when calculating each agency's TPS which affected the payment adjustments to agencies in 2021. In addition

[32] See Exhibit A-59 (Page 89) and Section A.5.1.10 (Page 131) of the Technical Appendix for additional detail.

to changes involving the HHVBP OASIS-based measures (discussed in detail in Section 8), larger TPS weights were applied starting in 2019 to both of the HHVBP claims-based measures. Starting in 2019, the weight used for the unplanned ACH measure increased from 6.25 percent to 26.25 percent, while the weight for the ED use without hospitalization measure increased from 6.25 percent to 8.75 percent. Together, the total weight for these two measures combined increased from 12.5 percent to 35 percent, such that performance on the claims-based measures had notably greater financial implications for agencies starting in 2019 (HHS, 2018).

Given the relatively large increase in the weight applied for the unplanned ACH measure, we evaluated whether the change in TPS weighting may have prompted a response from agencies in the original HHVBP states to improve their performance on this measure in particular. If so, such an effect would be incremental to impacts already observed through the first three years of the model.

We first classified agencies based on their previous performance on the unplanned ACH measure. Using quartiles of agency performance on this measure within each state during 2018, we defined three groups of agencies: (1) agencies in the lowest quartile for the percentage of adjusted unplanned ACH among first home health episodes in eligible agencies in the same state (i.e., having higher performance on this measure among agencies in their state); (2) agencies in the middle two quartiles for the measure; and (3) agencies in the highest quartile for the measure (i.e., having lower performance on this measure among agencies in their state). For each of these three groups, we compared the change in hospitalizations from 2018 to 2019, from 2019 to 2020, and from 2020 to 2021 between the original HHVBP states and comparison states. Additionally, we combined data over the three years (2019-2021) following the change in TPS weights to yield a more stable measure of agency performance on a single measure for evaluating effects of the change in weighting. This analysis includes adjustments for the same set of beneficiary and agency characteristics included in other analyses of claims-based impact measures in this report.

During 2018, the adjusted percentage of unplanned ACH during home health episodes among agencies in the high quartile (i.e., lower performers) was 18.8 percent in HHVBP states and 19.7 percent in non-HHVBP states (Exhibit 52). Among low quartile agencies for the same year, the average was 13.0 percent of episodes in HHVBP states and 12.0 percent in non-HHVBP states. Between 2018 and 2019 – where there was not yet an additional financial incentive to reduce hospitalizations – there was a decline in hospitalizations among the 2018 high quartile agencies in both groups of states, with a smaller decline in HHVBP states compared to non-HHVBP states (-1.8 percent vs. -2.3 percent; Exhibit 52). From 2019 to 2020, there was also a decline in unplanned ACHs among the high quartile agencies in 2018 in both groups of states, but the change did not differ between HHVBP and non-HHVBP states. Between 2020 and 2021, unplanned hospitalizations among agencies in the high quartile during 2018 remained stable in both groups of states.

Exhibit 52. Patterns in Unplanned Acute Care Hospitalization during 2018-2021 Do Not Indicate a Clear Impact of the Increased TPS Weight Assigned to the ACH Measure in 2019-2021

Agency Quartile for HHVBP Unplanned Acute Care Hospitalization Measure, 2018^	Adjusted Unplanned Acute Care Hospitalization/ First HH Episode, 2018	Estimated Change in Adjusted Unplanned Acute Care Hospitalization/ First HH Episode, 2018 to 2019	Estimated Change in Adjusted Unplanned Acute Care Hospitalization/ First HH Episode, 2019 to 2020	Estimated Change in Adjusted Unplanned Acute Care Hospitalization/ First HH Episode, 2020 to 2021	Estimated Change in Adjusted Unplanned Acute Care Hospitalization/ First HH Episode, 2018 to 2019-2021
Low Quartile (Higher Performers)					
HHVBP States	13.0%	1.5%**	-2.0%	-0.5%**	0.1%**
Non-HHVBP States	12.0%	2.1%**	-2.1%	0.0%**	0.8%**
Middle Quartiles					
HHVBP States	16.1%	-0.1%*	-2.4%*	-0.3%**	-1.7%*
Non-HHVBP States	15.9%	0.1%*	-2.6%*	0.1%**	-1.6%*
High Quartile (Lower Performers)					
HHVBP States	18.8%	-1.8%**	-2.8%	-0.1%	-3.6%**
Non-HHVBP States	19.7%	-2.3%**	-2.9%	0.0%	-4.1%**

^Defined based on agency quartiles within each state for the risk-adjusted measure of unplanned acute care hospitalization that is used in calculating each agency's TPS.
**p<0.10; **p<0.05 comparing estimated change in unplanned acute care hospitalization/first home health episode for HHVBP states relative to non-HHVBP states, with adjustments for beneficiary and agency characteristics and other covariates that are included in the D-in-D analyses of claims-based measures in this report.*

Among agencies that were in the low quartile (i.e., higher performers) for hospitalizations in 2018, hospitalizations increased during 2019 for both HHVBP and non-HHVBP states, but was smaller in HHVBP states than non-HHVBP states (1.5 vs. 2.1 percent; Exhibit 52). Hospitalizations decreased between 2019 and 2020 for both groups in the low quartile group, although like the high quartile group, the change did not differ between the two groups of states. Between 2020 and 2021, hospitalizations decreased by 0.5 percent in HHVBP states but remained stable in non-HHVBP states. For the middle quartiles of agencies, hospitalizations decreased slightly by 0.1 percent in HHVBP states but *increased* by the same amount in non-HHVBP states during 2019, and then decreased between 2019 and 2020 with a larger decrease among agencies in non-HHVBP states (-2.6 percent) relative to HHVBP states (-2.4 percent; Exhibit 52). During 2021, hospitalizations decreased by 0.3 percent in HHVBP states but increased by 0.1 percent in non-HHVBP states.

We also observed differences in average changes in measures scores between HHVBP and non-HHVBP states for all three quartile groups between 2018 and three years combined, 2019-2021 (last column of Exhibit 52). However, these differences were not consistent across lower and higher performing quartiles, and do not provide strong evidence of an impact of the increased TPS weighting of the hospitalization measure. For example, while the increase in unplanned hospitalizations was smaller among high performing HHAs (low quartile) in HHVBP states than those in non-HHVBP states (0.1 vs. 0.8 percent, respectively), average rates of unplanned hospitalizations decreased more among lower

performing (high quartile) HHAs in non-HHVBP states than in HHVBP states (-4.1 vs. -3.6 percent, respectively).

These results suggest year-to-year variation in agency performance on the HHVBP hospitalization measure, as agencies with lower performance in 2018 (high quartile) improved, on average, from 2019-2021 while agencies with higher performance in 2018 (low quartile) worsened, on average, in 2019 but then improved in 2020-2021. We therefore also considered whether agencies may have responded to the change in TPS weighting based on information that would have been available to them about their performance in an earlier year. As of the start of 2019, agencies may have been more aware of their performance on the measure for 2017 than their performance for 2018. We replicated the analysis presented in Exhibit 52, except that we used 2017 data to define quartiles of agency performance and examined changes in hospitalization between 2017 and 2019. The findings of this sensitivity analysis were similar to those presented above; in particular, there was no evidence that agencies in the high quartile in HHVBP states were more likely to improve than their counterparts in non-HHVBP states with this slightly different time frame (not shown).

6.6 Discussion

Our findings that the original HHVBP Model has decreased unplanned hospitalizations, ED use resulting in inpatient admission, and SNF use aligns with the intentions of policymakers to incentivize HHA activities that reduce unnecessary acute care use. However, we found evidence of offsetting increases to outpatient ED use attributable to HHVBP, indicating possible substitution of outpatient ED services for acute inpatient care, even though agencies have incentives under HHVBP to reduce both outpatient ED visits and inpatient hospitalizations. Related to these incentives, findings from our previous interviews with HHAs suggest that they use similar strategies to decrease both types of utilization (Arbor Research, 2020).

One potential explanation for our findings is that HHVBP reduced the severity of conditions for which home health patients received emergency services while having little impact on the likelihood of an ED visit, thereby reducing the frequency of inpatient hospital admissions initiated in the ED but in turn also leading to an increase in the frequency of outpatient ED visits. We explored this hypothesis by testing the impact of HHVBP on outpatient ED visits and ED visits that result in inpatient stays identified separately by the most common groups of diagnoses listed as causes of ED use in the study population. We found evidence that relative increases in ED visits related to the genitourinary system and a collection of less common diagnoses may explain the pattern of increasing outpatient ED use attributed to HHVBP. We also found that a relative reduction in ED visits for skin and subcutaneous tissue and other less common conditions grouped together among HHVBP episodes were significant drivers of reductions in ED visits that resulted in inpatient stays.

In an analysis of first episode unplanned hospitalizations associated with a COVID-19 diagnosis, we found relatively low proportions of COVID-19 related hospitalizations that peaked in the last quarter of 2020 and in the third quarter of 2021 and generally similar patterns across HHVBP and non-HHVBP states. In addition, we conducted sensitivity analyses of impacts on utilization that did not include adjustments for either COVID-19 diagnoses for individual home health patients or for county-level COVID-19 rates. The 2020-2021 D-in-D estimates from these models (Exhibit B-45 [Page 188] in the Technical Appendix) were similar to those in Exhibit 43 for all utilization measures. These results collectively add further evidence that impacts of COVID-19 were generally similar in HHVBP and non-

HHVBP states, suggesting the PHE had limited effect as a potential confounder of this evaluation's estimates of HHVBP Model impacts for 2020-2021.

Our analysis of changes in unplanned ACHs from 2018 to 2019 through 2021 among agencies categorized according to the high, middle, and low quartiles of adjusted unplanned ACH in 2018 shows evidence of differential response among HHVBP agencies to the substantial weighting increase for the measure (6.25 to 26.25 percent) in the TPS calculation that started in 2019. One possible explanation for the inconsistent patterns we observe across the three groups is that yearly changes in the performance of individual agencies on this measure may in part reflect the effects of regression to the mean. Aside from this finding of little or no change in average performance of HHVBP agencies on unplanned ACH rates during first episodes measured in later years of the model relative to early years, we did find evidence of an increasing intended impact reducing unplanned ACH and SNF utilization among all episodes to a greater degree in 2018-2021 relative to 2016-2017. However, this finding seems driven to a large extent by the increase in the HHVBP impact on these measures in 2020 and 2021 relative to all prior years of the model.

Given some uncertainty about potential confounding related to exogenous events in 2020 that included implementation of the PDGM and onset of the COVID-19 PHE, we urge caution with the interpretation of the larger than previous HHVBP impacts on these outcomes in recent years. Compared to 2020, in 2021 we observed increased declines in ACH, SNF use, ED use resulting in inpatient admission, and for the first time, a null effect in outpatient ED use for HHVBP states. Results from our sensitivity analyses exploring alternative approaches to controlling for PDGM and the COVID-19 PHE (Exhibit B-44 and Exhibit B-45, Technical Appendix), found similar impact estimates as those reported above, with some attenuation in the magnitudes of the 2020 -2021 estimates depending on how we accounted for the PDGM-related change in maximum episode lengths. Even though the magnitudes of the impact estimates were relatively smaller than those in Exhibit 43, the trends in the impact estimates in 2020-2021 were the same. Consistent with the findings in Exhibit 2, the sensitivity analyses (Exhibit B-44, Technical Appendix) also showed larger impacts in the intended direction in 2021 from 2020 implying that the increased financial incentives may be driving some perceptible changes in HHA activities contributing to these larger model impacts in HHVBP states relative to trends in comparison states. These increased impacts (declines in ACHs and SNF use in HHVBP states) have led to reduction in overall Medicare spending translating to annual savings as discussed in Section 7.

Consistent with our findings from previous years, Florida continued to drive the intended impacts on unplanned hospitalizations, ED use followed by inpatient admission and SNF use. We also found evidence of declines in unplanned hospitalizations and SNF use - two of the main drivers of Medicare savings (as discussed in the next section) - in Tennessee and Iowa.

In an analysis that is new with this report, we found some evidence of a modest impact of HHVP in decreasing unplanned hospitalizations among Medicare Advantage beneficiaries who use home health care in HHVBP states relative to Medicare Advantage home health users in non-HHVPB states. The average annual impact during 2016 through 2020 was similar to the average HHVBP impact among Medicare FFS beneficiaries in terms of magnitude and percentage change relative to the baseline level. These results are consistent with the hypothesis that HHAs respond to HHVBP incentives with efforts to reduce unplanned hospitalizations that extend across payer types rather than narrowly targeting the Medicare FFS population whose outcomes, as reflected in the HHVBP claims-based measures, weigh

heavily in determining HHA payment adjustments. As the prevalence of Medicare Advantage beneficiaries among all Medicare beneficiaries grows, continuing to monitor spillover impacts of the expanded HHVBP Model in this population will provide insight into HHVBP's impacts on the Medicare program as a whole.

7. Results: HHVBP Continued to Slow the Rate of Growth in Medicare Spending Largely Due to Impacts on Inpatient and Skilled Nursing Facility Spending

7.1 Introduction

Since its inception in 2016, the goal of the original HHVBP Model has been to provide incentives for better quality care with greater efficiency. This can be achieved through reduction in unplanned acute care hospitalizations, SNF stays, or other forms of health care utilization and thereby reducing Medicare spending. However, there may also be offsetting changes in utilization that lead to increased spending for other types of services, such as what we found for outpatient ED use (see Section 6). In this section, we examine the effects of HHVBP on both overall Medicare Part A and Part B spending and on individual components of Medicare spending from 2016 through 2021, the final year in which payment adjustments were applied under the original HHVBP Model.

We continued to find that HHVBP led to a ***decline in Medicare spending for FFS beneficiaries receiving home health services*** through the six years of the original model. This includes a reduction in Medicare spending due to HHVBP during 2020-2021, following the introduction of PDGM and the onset of the COVID-19 PHE.[33] During 2016-2021, we found that HHVBP led to a 1.9 percent decline in average Medicare expenditures per day for FFS beneficiaries during and within 30 days following home health episodes. This impact reflects a reduced rate of growth in total Medicare spending among beneficiaries receiving home health services in HHVBP states compared to non-HHVBP states, and reflects an average annual reduction in total Medicare spending of $230 million during 2016 – 2021. We continued to find that much of this overall decline reflects impacts on spending for inpatient and SNF services, and corresponds to an estimated annual savings of $134 million and $39 million, respectively. New for this report, we also observed a decline in spending on home health services, corresponding to an annual estimated savings of $47 million.

In contrast, we continue to find evidence of a small, positive effect of HHVBP on Medicare spending for outpatient ED visits and observation stays. However, the observed increase in spending associated with these services in the original HHVBP states represents a small offset to the savings due to the relatively small expenditures associated with ED visits and observation stays (approximately 2.3 percent of total spending in the baseline period).

Below, we first provide an overview of the measures of Medicare spending that we examined, which includes a change in measure calculations starting in 2020 due to implementation of PDGM. We then describe trends in Medicare spending among beneficiaries receiving home health care in HHVBP and non-HHVBP states, present the results of D-in-D analyses of the impact of the model on total Medicare spending, and examine impacts for both key components of spending and results for individual HHVBP states.

[33] As discussed above in Section 2 and briefly in the following section, we added risk adjusters in our multivariate regression model and used our modified analytic approach for 2020-2021 to help mitigate any bias in our impact estimates due to these exogenous factors.

7.2 Overview of Medicare Spending Measures

To assess average effects of HHVBP on Medicare spending for all of the original HHVBP states combined and for the nine individual HHVBP states, we continued to focus on three measures of total Medicare spending for FFS beneficiaries receiving home health care. Our analyses of 2020-2021 data indicated that it was necessary to revise our spending measure definitions to assess model impacts starting in 2020. We noted a differential change in the follow-up period for measuring spending during home health care between HHVBP and non-HHVBP states starting in 2020 that appeared to be a result of the introduction of PDGM. The change in our spending measure definitions was motivated by concern that D-in-D analyses might falsely attribute a change in average spending in HHVBP states relative to non-HHVBP states to the original HHVBP Model instead of attributing it to PDGM. To avoid this potential source of bias, we implemented alternative spending measure definitions for 2020-2021 (refer to Section 2.2.2 for details) while keeping the spending measure definitions for the pre-PDGM years (2016-2019) unchanged from our Fourth Annual Report.

The **Average Medicare Spending per Day <u>during</u> FFS Home Health Episodes of Care** reflects Medicare Part A and Part B expenditures occurring during or shortly after the time period in which Medicare FFS patients are under the active care of an HHA. While analyses of pre-PDGM model years (2016-2019) are based on a measure of spending from the home health claim start date through seven days following the last home health visit date reported on the claim, analyses of the post-PDGM model years (2020-2021) are based on a measure of spending during the 30 days after the home health claim start date.[34] For the 62 percent of pre-PDGM (2016-2019) home health episodes and 35 percent of post-PDGM (2020-2021) episodes that had no subsequent home health episode, we examined a second measure, **Average Medicare Spending per Day <u>following</u> FFS Home Health Episodes of Care**. This measure reflects "*downstream*" Medicare Part A and Part B expenditures for up to 30 days following the time period in which Medicare FFS patients were considered to be under the active care of an HHA.[35] The former measure captures expenditures for inpatient hospitalizations and other services that occurred concurrently with a home health episode of care, while the latter measure captures expenditures associated with any hospitalizations or other services that occurred within 30 days after a home health episode ends.[35] We combine these two measures to calculate a measure of **Average Medicare Spending per Day <u>during and following</u> FFS Home Health Episodes of Care**. For home health episodes followed within seven days by a subsequent home health episode (for pre-PDGM years) or within 30 days of

[34] We define "during home health episodes of care" as the time period from the home health claim start date through a) the last visit date reported on the FFS claim plus seven days for the pre-PDGM model years (2016-2019) and 30 days after home health claim start date for the post-PDGM years (2020-2021), or b) the start of the next home heath episode. To draw accurate inferences about model impacts during 2016-2019, spending measures for the baseline years (2013-2015) are defined using the pre-PDGM method, whereas spending measures for the baseline years are defined using the post-PDGM method to assess model impacts in 2020-2021. See Section A.2.2 (Page 75) in the Technical Appendix for more detail.

[35] We define "following home health episodes of care" as the time period between the day that the beneficiary is no longer under the active care of an HHA (after the 7th day following last visit date for pre-PDGM years and after the 29th day following home health claim start date for post-PDGM years) and over the subsequent 30 days or until the start of the next home health episode, death, or loss of FFS Part A eligibility, whichever comes earlier. See Section A.2.2 (Page 75) in the Technical Appendix for more detail.

home health claim start date (for the two post-PDGM years), the combined measure reflects spending only during the home health episode.

For each of the above three measures of total Medicare spending for FFS beneficiaries receiving home health care, we also defined measures for key components of Medicare spending. As explained further in the Technical Appendix (Section A.2.2 [Page 75]), we calculated measures of average Medicare spending per day for each of the following service categories: inpatient hospitalizations, home health care, Part B non-institutional services (i.e., carrier and durable medical equipment claims), outpatient institutional services (which include outpatient ED and observation stays), skilled nursing, and hospice services. We note that by definition, the home health component is not relevant to the *downstream total spending measure* as it includes expenditures within 30 days after a home health episode ends.

7.3 FFS Claims-Based Medicare Spending, Pre- and Post- HHVBP Implementation

As shown in Exhibit 53, average Medicare spending per day during home health episodes of care increased at a slower rate between the baseline and the 2016-2019 post-implementation period in the

Exhibit 53. Average Spending for FFS Home Health Beneficiaries Increased at a Slower Rate between Baseline and Post-Implementation Period in HHVBP States versus Non-HHVBP States

Measures (Pre-PDGM Approach)	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Intervention (2016-2019)	Baseline (2013-2015)	Intervention (2016-2019)	HHVBP States	Non-HHVBP States
Average Medicare Spending per Day during and following FFS HH Episodes of Care	$138.33	$148.86	$131.61	$144.41	$10.53	$12.80
Average Medicare Spending per Day during FFS HH Episodes of Care	$150.60	$161.70	$135.34	$150.38	$11.10	$15.04
Average Medicare Spending per Day following FFS HH Episodes of Care	$105.97	$114.93	$116.54	$123.52	$8.96	$6.98
Measures (Post-PDGM Approach)	**HHVBP States**		**Non-HHVBP States**		**Change in Mean**	
	Baseline (2013-2015)	**Post-PDGM Intervention (2020-2021)**	**Baseline (2013-2015)**	**Post-PDGM Intervention (2020-2021)**	**HHVBP States**	**Non-HHVBP States**
Average Medicare Spending per Day during and following FFS HH Episodes of Care	$130.85	$154.88	$127.69	$156.73	$24.03	$29.04
Average Medicare Spending per Day during FFS HH Episodes of Care	$144.25	$167.01	$135.79	$165.28	$22.76	$29.49
Average Medicare Spending per Day following FFS HH Episodes of Care	$82.25	$116.22	$89.38	$123.55	$33.97	$34.17

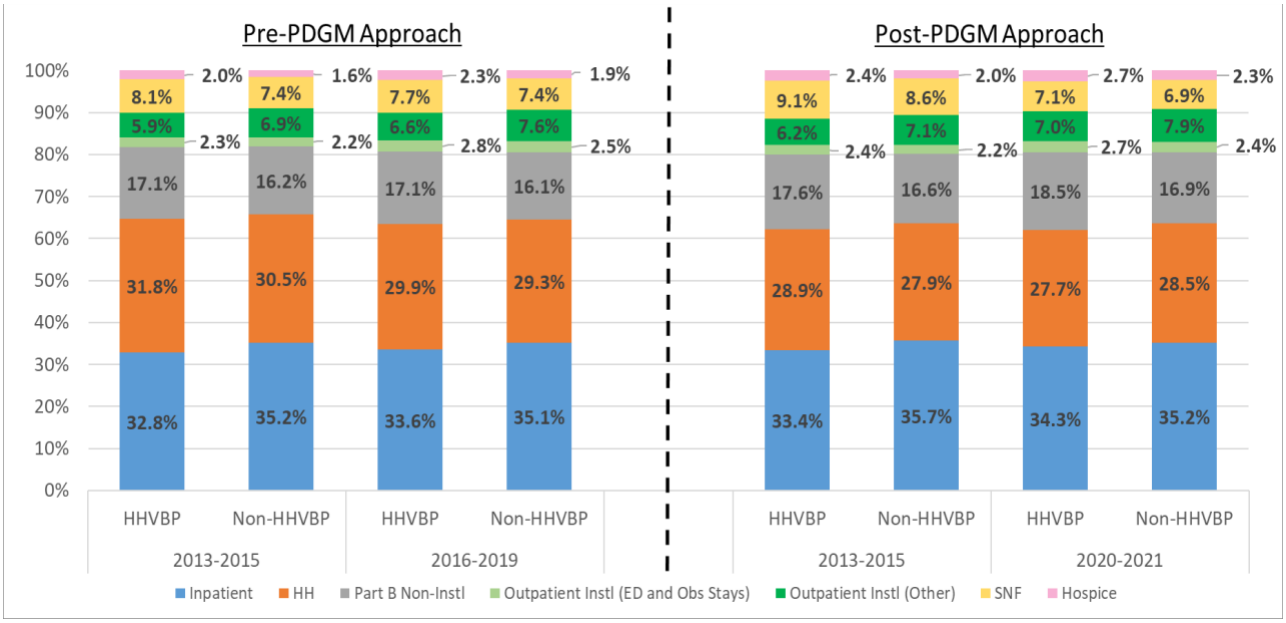
Average is based on capped expenditure measures. For more details on post-PDGM approach, please refer to Section A.1.4.2 (Page 10) in the Technical Appendix.

original HHVBP states than in non-HHVBP states (increasing by $11/day and $15/day which corresponds to increases of 7.4 percent and 11.1 percent, respectively).[36] Average spending continued to increase at a slower rate in HHVBP states than in non-HHVBP states between the baseline period (recalculated using the post-PDGM approach) and 2020-2021 (increasing by $23/day and $29/day which corresponds to increases of 15.8 percent and 21.7 percent, respectively). This measure of spending also increased at a somewhat lower rate during the baseline period in HHVBP states relative to non-HHVBP states when adjusting for model covariates (see Exhibit A-11 [Page 30] in the Technical Appendix for a comparison of trends in spending between the two groups, and Exhibit B-6 [Page 155] in the Technical Appendix for unadjusted annual means during 2013 – 2021 for the two groups).

The major components of total Medicare FFS spending during the baseline period were similar among beneficiaries receiving home health care in HHVBP and non-HHVBP states (Exhibit 54). For the two groups, approximately one-third of total Medicare expenditures during and following home health episodes in the baseline period were associated with inpatient services, followed by 31-32 percent for home health services, 16-17 percent for Part B non-institutional services, 8-9 percent for outpatient institutional services, 7-8 percent for SNF services, and 2 percent for hospice services. Medicare expenditures for outpatient ED visits and observation stays combined represent approximately one-fourth of total outpatient institutional expenditures and slightly more than two percent of total expenditures for both groups during the baseline period. Observation stays (not shown separately in Exhibit 54) account for slightly less than one-third of the combined outpatient ED and observation stay expenditures (32.0 percent for HHVBP; 28.2 percent for non-HHVBP). The distribution of spending among these major components during the baseline period was relatively similar when using the post-PDGM approach to defining spending measures (Exhibit 54).

[36] The average number of days corresponding to the measures of spending during and following home health episodes of care were similar between HHVBP and comparison states for both the baseline period and post-implementation periods, including both the pre-PDGM and post-PDGM periods (see Exhibit B-50 [Page 195] in the Technical Appendix).

Exhibit 54. Components of Total Medicare Spending for FFS Beneficiaries Were Similar Between Beneficiaries in HHVBP States and Non-HHVBP States During Baseline (2013 – 2015) and Pre-PDGM (2016-2019) and Post-PDGM Implementation (2020-2021) Periods



Percentages are based on uncapped total Medicare spending during and following FFS home health episodes of care. For more details on post-PDGM approach, please refer to Section A.1.4.2 (Page 10) in the Technical Appendix.

There were similar changes over time in the major components of total spending in HHVBP and non-HHVBP states. For both groups, outpatient institutional services accounted for an increasing share of total spending over time while home health and Part B non-institutional services accounted for a decreasing share of total spending using the pre-PDGM approach for model years 2016-2019. Using the post-PDGM approach for 2020-2021, the share of total spending related to outpatient institutional services increased over time for both groups, while the share related to home health services decreased for HHVBP states (28.9 percent to 27.7 percent) and increased for non-HHVBP states (27.9 percent to 28.5 percent). For both HHVBP and comparison states, there was also a sharper decline in the share of total spending for SNF services in 2020-2021 that was not observed in earlier years of HHVBP (Exhibit 54).

These trends were also reflected in the average expenditure per day amounts for each period (see Exhibits B-53 and B-54 [Page 197] of the Technical Appendix). While the average dollar amounts for all components increased over time in both HHVBP and non-HHVBP states, we observed the largest increases for the inpatient and outpatient institutional categories for both the pre-PDGM and post-PDGM periods. Unadjusted means for other spending components, corresponding to spending during home health episodes of care and up to 30 days following home health episodes of care, are also included in the Technical Appendix (Exhibits B-53 and B-54 [Page 197]).

7.4 HHVBP Continues to Result in Overall Reductions in Medicare Spending

Based on data through the sixth and final year of the original model, we continued to find HHVBP to be associated with a decline in two of the three measures of total Medicare spending per day for Part A &

Part B services (Exhibit 55). The cumulative D-in-D estimate[37] of -$2.63 suggests that HHVBP led to a reduction in average daily Medicare spending during and following home health episodes among FFS beneficiaries, which corresponded to a 1.9 percent decrease compared to average HHVBP values observed for 2013 – 2015. This D-in-D estimate translated to an estimated average annual savings among FFS beneficiaries receiving home health services of $230 million during the six years of the model 2016 – 2021 (not shown). This estimate corresponded to savings to the Medicare program occurring from the beginning of the home health episode through up to 30 days after home health episodes of care.[34] Each of the yearly estimates indicated reduction in spending in HHVBP states relative to non-HHVBP states, with 2020 and 2021 D-in-D estimates being larger in magnitude than the prior years.

These overall savings reflect the measured impact of HHVBP on Medicare spending during, rather than in the 30 days following, home health episodes of care. In fact, the cumulative D-in-D estimate of -$2.63 for average daily Medicare spending during FFS home health episodes was the same magnitude as the combined spending measure, corresponding to a 1.8 percent decline relative to pre-HHVBP levels (Exhibit 55) and an estimated average annual savings among FFS beneficiaries receiving home health services of $165 million during 2016 – 2021. This estimate corresponded to savings occurring from the beginning of the home health episode through up to seven days after the last home health visit, or starting in 2020, 29 days following the start of home health care. Using data for the most recent two years of the model and applying the modified approach for calculating spending measures in the post-PDGM period, we continue to find evidence of an impact of HHVBP in reducing Medicare spending during home health episodes, with D-in-D estimates that were slightly larger in magnitude (-$4.27 for 2020 and -$5.30 for 2021) compared to prior years. Conversely, estimates for the third spending measure, average daily Medicare spending *following* home health episodes, were smaller and continued to be not statistically significant, cumulatively or for each of the six years.

Overall, the D-in-D estimates for the total spending measures suggest relatively slower growth in average spending per day in HHVBP states compared to non-HHVBP states, also depicted in risk-adjusted trend lines (see Section A.1.5.3 [Page 43] in the Technical Appendix, Exhibit A-23) over 2013-2021). These covariate-adjusted plots illustrate the larger increase in average spending occurring in non-HHVBP states relative to HHVBP states during the post-implementation period which is the source of savings under HHVBP.

Since financial incentives under HHVBP have become stronger with every year of the model (Exhibit 1), we tested whether the impact of the model on the Medicare spending measures differed between the first two years of the model before payment adjustments were applied (2016 – 2017) and the subsequent four years of the model (2018 – 2021). We found a larger impact of HHVBP in 2018 – 2021 compared to 2016 – 2017 for the overall measure of spending during and following home health episodes of care (see Exhibit B-52 [Page 196] in the Technical Appendix) which appears to be strongly influenced by the larger D-in-D estimates for 2020 and 2021 (Exhibit 55). As with our findings for agency TPS and forms of utilization, impacts of HHVBP on Medicare spending starting in the first year of model implementation may reflect effects of the model's performance incentives starting in 2016, when

[37] The cumulative estimate is a weighted average of the yearly D-in-D estimates with 2016-2019 HHVBP impacts estimated from one regression model and 2020-2021 impacts estimated from another regression model that incorporates the post-PDGM approach.

agencies may have been anticipating that their performance would affect their future Medicare payments.

Exhibit 55. HHVBP Leads to Reductions in Overall Medicare Part A and Part B Spending for FFS Home Health Beneficiaries in Each Year of the Original HHVBP Model

Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change*
	D-in-D	p-value	Lower 90% CI	Upper 90% CI		
Average Medicare Spending per Day during and following FFS HH Episodes of Care						
2016	-$1.12	<0.01	-$1.80	-$0.45	$138.33	-0.8%
2017	-$2.00	<0.01	-$3.06	-$0.95		-1.4%
2018	-$1.98	0.02	-$3.36	-$0.61		-1.4%
2019	-$2.68	0.01	-$4.39	-$0.97		-1.9%
2020	-$3.52	<0.01	-$5.57	-$1.47		-2.7%
2021	-$4.82	<0.001	-$7.16	-$2.49		-3.7%
Cumulative	-$2.63	<0.01	-$4.03	-$1.23		-1.9%
Average Medicare Spending per Day during FFS HH Episodes of Care						
2016	-$0.90	0.05	-$1.67	-$0.14	$150.60	-0.6%
2017	-$1.78	0.02	-$3.02	-$0.54		-1.2%
2018	-$1.80	0.07	-$3.46	-$0.15		-1.2%
2019	-$2.13	0.09	-$4.22	-$0.04		-1.4%
2020	-$4.27	<0.01	-$6.59	-$1.95		-3.0%
2021	-$5.30	<0.001	-$7.90	-$2.70		-3.7%
Cumulative	-$2.63	<0.01	-$4.22	-$1.04		-1.8%
Average Medicare Spending per Day following FFS HH Episodes of Care						
2016	-$0.41	0.56	-$1.56	$0.74	$105.97	-0.4%
2017	-$0.35	0.72	-$1.96	$1.26		-0.3%
2018	$0.74	0.54	-$1.25	$2.74		0.7%
2019	$0.19	0.90	-$2.26	$2.65		0.2%
2020	-$0.16	0.91	-$2.56	$2.23		-0.2%
2021	-$1.70	0.32	-$4.54	$1.14		-2.1%
Cumulative	-$0.25	0.82	-$2.05	$1.55		-0.3%

*CI= Confidence Interval. These models include state-specific linear time trends (See Section A.1.5.4 [Page 48] in the Technical Appendix for more details). See Exhibit 55n (Page 241) in the Technical Appendix for each measure's sample size. *Relative changes for 2016 – 2019 express the impact estimate as a percentage of the average spending per day during the baseline period in HHVBP states as reported in the table. Estimates of the relative change for 2020-2021 and the cumulative 2016-2021 period incorporate the post-PDGM approach to measuring average spending per day and were calculated using a slightly different average baseline value. For more details, please refer to Section A.1.4.2 (Page 10) and A.2.8 (Page 102) in the Technical Appendix.*

7.5 HHVBP Impact on Total Medicare Spending Continues to be Driven by Decreases for Inpatient and Skilled Nursing Facility Services

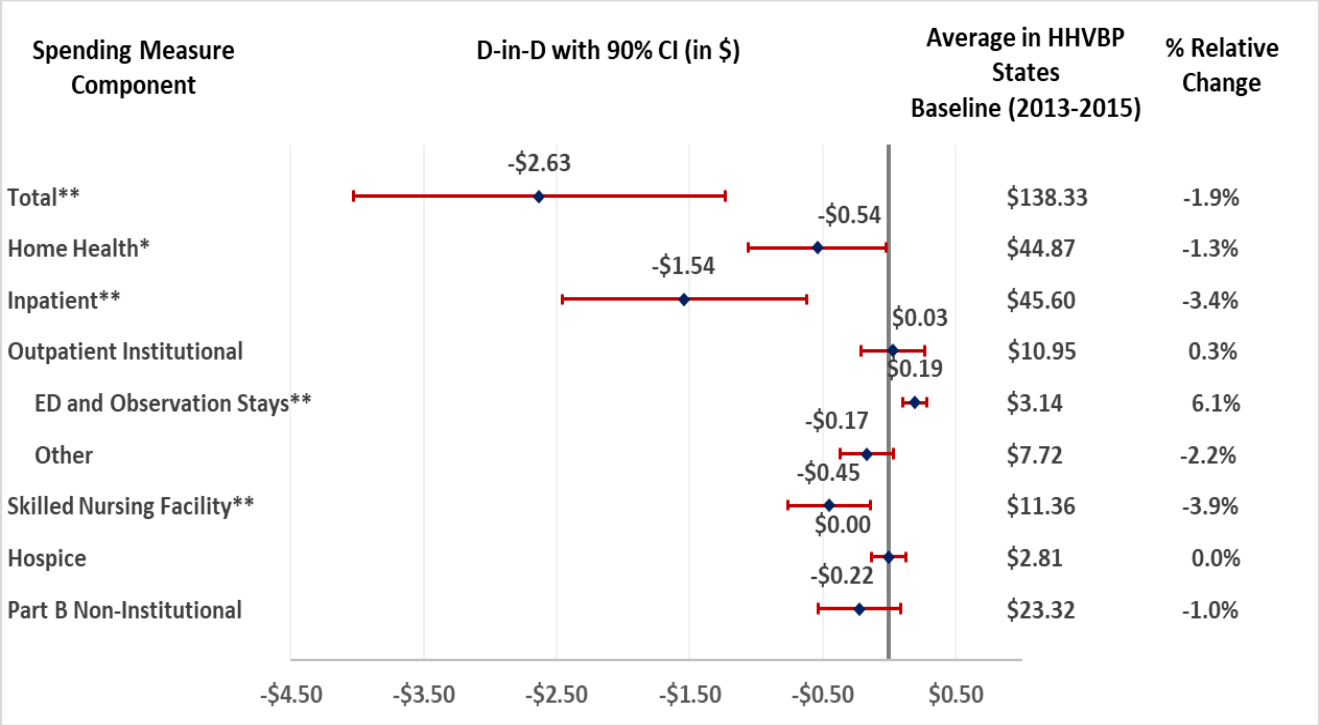
Consistent with what we reported in the Fifth Annual Report, (Arbor Research, 2020) inpatient and SNF services continue to contribute to the overall reduction in average Medicare spending *during and following* home health episodes of care due to HHVBP (Exhibit 56). The cumulative D-in-D estimates indicate that HHVBP led to a $1.54 and $0.45 reduction in average daily spending for inpatient and SNF services, respectively, which corresponds to a 3.4 and 3.9 percent decline relative to pre-HHVBP implementation average measure values, respectively. These reductions in inpatient and SNF

expenditures per day correspond to estimated annual savings to Medicare of $134 million and $39 million, respectively. New this year, we observed a reduction in home health expenditures per day, with a cumulative D-in-D estimate of $0.54 for home health services (p=0.09) and corresponds to a 1.3 percent decline relative to the average home health spending during the baseline period. This reduction corresponds to an estimated average annual savings of $47 million in Medicare spending for home health services. In contrast, we continued to see a small positive impact of the model on outpatient ED and observation stay expenditures ($0.19/day) during and following home health episodes of care, which corresponds to a 6.1 percent increase compared to pre-HHVBP levels and an estimated average annual cost to Medicare of $17 million.

The yearly D-in-D estimates for the spending components (see Exhibit B-56 [Page 202] in the Technical Appendix) were largely consistent with the cumulative results. In each year from 2016 – 2019, there were declines in spending due to HHVBP for both inpatient services and SNF services. While we continued to find an impact of HHVBP in reducing Medicare spending for inpatient services in 2020 and 2021, the impact estimate for SNF services was not statistically significant for 2020 (-$0.39, p=0.16) or 2021 (-$0.32, p=0.32). In contrast, the negative cumulative D-in-D estimate for home health services was driven by results for 2020 and 2021 which indicated 4.9 and 4.5 percent declines, respectively, relative to baseline averages (see Exhibit B-56 [Page 202] in the Technical Appendix). There was no evidence of declines in home health spending due to HHVBP prior to 2020.

We continued to find no impact of HHVBP on spending for the category of all outpatient institutional services in 2020 and 2021, as well as cumulatively through the six years of the model (Exhibit 56). Yearly D-in-D estimates for outpatient ED and observation stay expenditures per day, which account for approximately 25 to 30 percent of all outpatient institutional expenditures (Exhibit 54), remained consistently positive and over time relative to pre-HHVBP levels (increasing from $0.13 in 2016 to $0.23 in 2020 and then declining slightly to $0.16 in 2021; see Exhibit B-56 [Page 202] in the Technical Appendix). However, the cumulative impact estimate for the other outpatient institutional services category is negative and not statistically significant ($0.17, p=0.15, Exhibit B-56 [Page 202] in the Technical Appendix).

Exhibit 56. Reduction in Average Medicare Spending per Day during and following FFS HH Episodes of Care in HHVBP States versus Non-HHVBP States during 2016-2021 Driven by Declines in Inpatient, SNF, and Home Health Components

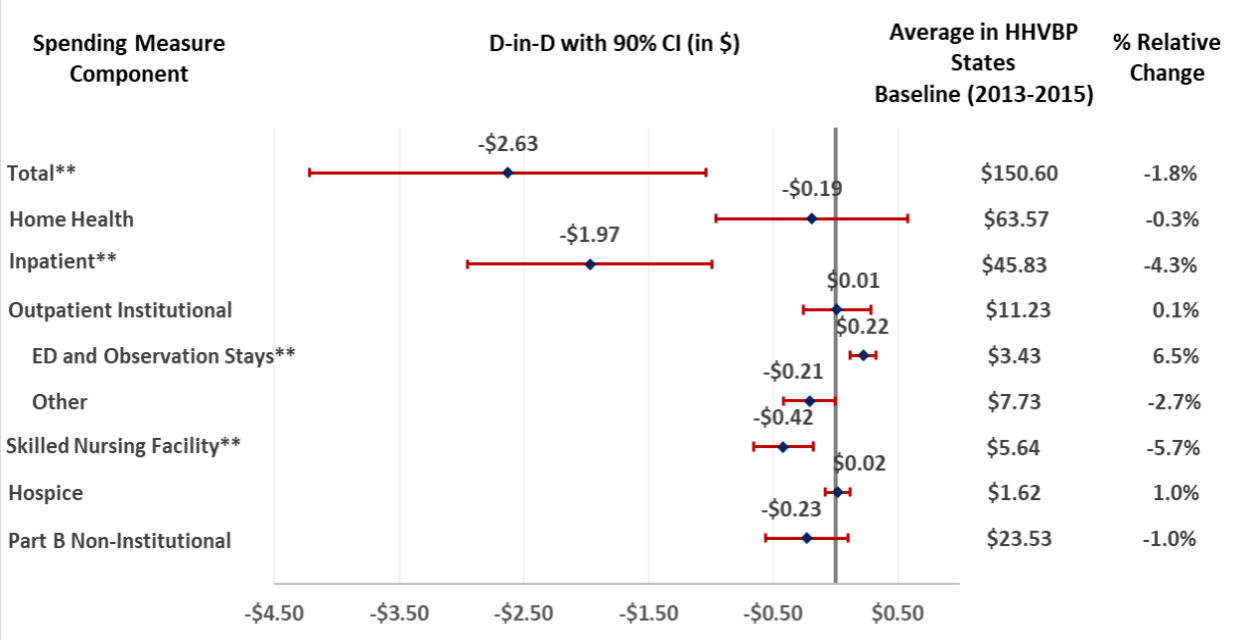


*Average is calculated based on the capped expenditure components. Estimates of the relative change for cumulative 2016-2021 period incorporate the post-PDGM approach to measuring average spending per day and were calculated using a slightly different average baseline value. For more details, please refer to Sections A.1.4.2 (Page 10) and A.2.8 (Page 102) of the Technical Appendix. * p < 0.10, ** p < 0.05.*

We noted similar cumulative impacts of HHVBP in reducing inpatient and SNF expenditures and increasing outpatient ED and observation stay expenditures *during* home health episodes (Exhibit 57). The total estimated savings due to HHVBP for this measure (cumulative D-in-D estimate of -$2.63; Exhibit 55) largely reflected the impact on spending for inpatient services (cumulative D-in-D estimate of -$1.97) and SNF use (cumulative D-in-D estimate of -$0.42; Exhibit 57). We found no overall effect of HHVBP on expenditures for home health services *during* home health episodes.

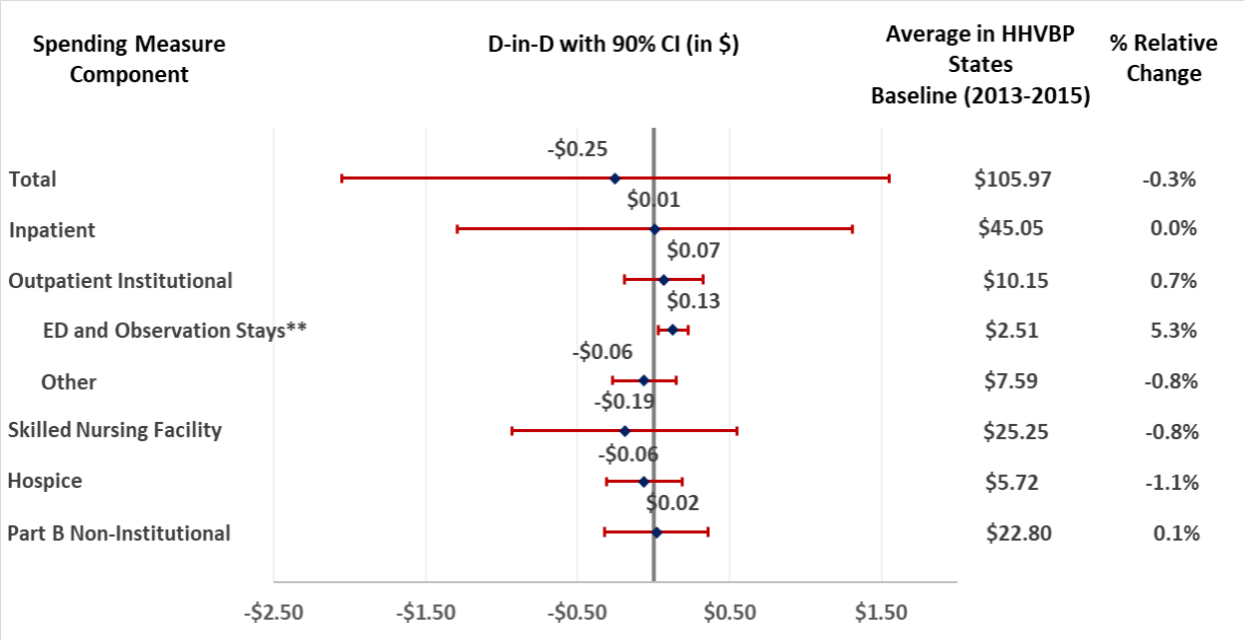
As with our findings for total Medicare spending *following* home health episodes, there was also generally no impact of HHVBP on the components of Medicare spending following home health episodes (Exhibit 58) with the exception of a small positive impact of the model on spending for outpatient ED visits and observation stays (cumulative D-in-D estimate of $0.13).

Exhibit 57. Reduction in Average Medicare Spending per Day during FFS Home Health Episodes of Care in HHVBP States versus Non-HHVBP States Driven by Declines in Inpatient and SNF Components



*Average is calculated based on the capped expenditure components. Estimates of the relative change for cumulative 2016-2021 period incorporate the post-PDGM approach to measuring average spending per day and were calculated using a slightly different average baseline value. For more details, please refer to Sections A.1.4.2 (Page 10) and A.2.8 (Page 102) of the Technical Appendix. * p < 0.10, ** p < 0.05.*

Exhibit 58. No Reduction in Average Medicare Spending per Day following FFS Home Health Episodes of Care in HHVBP States versus Non-HHVBP States



Average is calculated based on the capped expenditure components. Estimates of the relative change for cumulative 2016-2021 period incorporate the post-PDGM approach to measuring average spending per day and

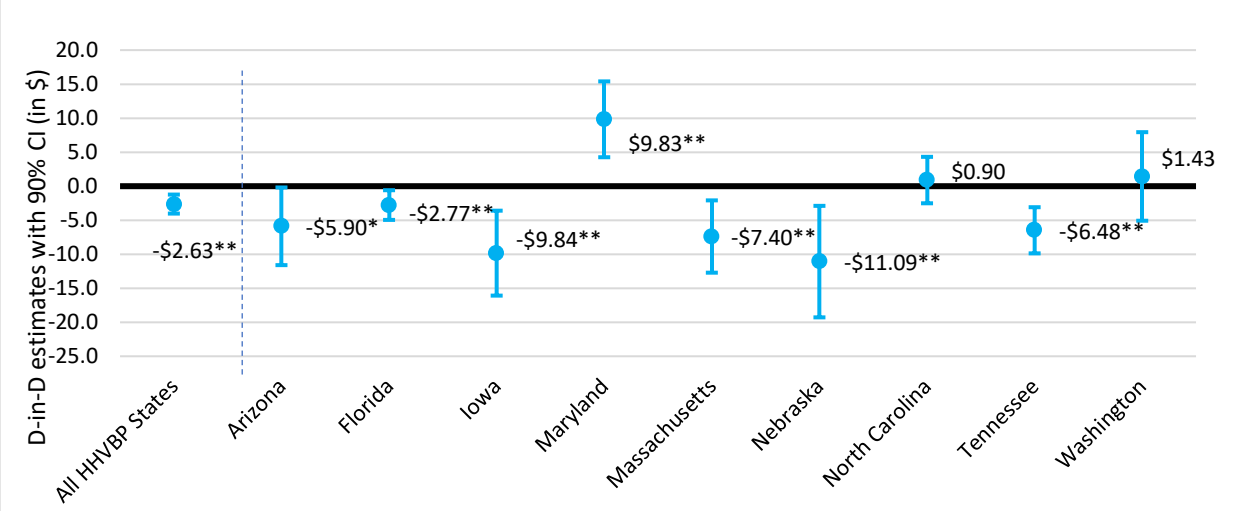
*were calculated using a slightly different average baseline value. For more details, please refer to Sections A.1.4.2 (Page 10) and A.2.8 (Page 102) of the Technical Appendix. * p < 0.10, ** p < 0.05.*

7.6 Cumulative Impact of HHVBP in Reducing Total Medicare Spending in Six HHVBP States

When examining impacts of the original HHVBP Model at the state level, we found evidence of overall savings due to HHVBP relative to regional comparison groups for six of the nine HHVBP states (Exhibit 59). The cumulative D-in-D estimates for average Medicare spending per day *during and following* home health episodes of care indicate reductions in spending for Arizona (-$5.90), Florida (-$2.77), Iowa (-$9.84), Massachusetts (-$7.40), Nebraska (-$11.09), and Tennessee (-$6.48). In contrast, there was a $9.83 positive cumulative D-in-D estimate for Maryland, which points to a relative increase in average spending per day during and following FFS home health episodes of care under HHVBP (Exhibit 59).

Our analysis of the two other spending measures sheds some light on the source of the overall spending impacts observed in the individual states. We found evidence of reductions in average Medicare spending per day *during h*ome health episodes of care in four of the six states mentioned above: Iowa, Massachusetts, Nebraska, and Tennessee (see Exhibit B-57 [Page 204] in the Technical Appendix). As we found above for all HHVBP states combined (Exhibit 55), there is no individual HHVBP state with an estimated reduction in average Medicare spending per day *following* home health episodes of care due to HHVBP. However, we found that the observed impact of HHVBP on total spending in Maryland appears to reflect a positive impact on spending both following home health episodes of care ($12.63, p<0.001) and during home health episodes of care ($6.81, p=0.09; see Exhibit B-57 [Page 204] in the Technical Appendix).

Exhibit 59. Declines in Average Medicare Spending per Day during and following FFS Home Health Episodes of Care during 2016-2021 Observed in Six of the Nine HHVBP States



*Graph shows 90% confidence intervals. * p < 0.10, ** p < 0.05. State-level models include state-specific linear time trends (See Section A.1.6 [Page 53] in the Technical Appendix for more details).*

Since the overall decline in Medicare spending due to HHVBP during and following home health episodes of care reflects impacts on spending for inpatient, SNF, and home health services, we examined these three components of spending for each of the nine HHVBP states (see Exhibit B-58 [Page 205] in the Technical Appendix). At the state level, we found evidence of cumulative declines in

spending for inpatient services due to HHVBP in Arizona (-$5.74), Florida (-$1.76), Iowa (-$5.68), Massachusetts (-$5.31), Nebraska (-$6.34) and Tennessee (-$2.49); cumulative declines in spending for SNF services in Iowa (-$4.07) and Tennessee (-$1.77) and cumulative declines in spending for home health services in Florida only (-$1.42). Consistent with our findings of the impact of HHVBP on total spending in Maryland, there was a positive cumulative D-in-D estimate for spending on inpatient services in Maryland ($8.40). When examining average spending per day *during* home health episodes of care, we noted reductions in spending associated with inpatient hospitalizations in five states: Florida, Iowa, Massachusetts, Nebraska, and Tennessee. Iowa and Tennessee continued to be the drivers of savings associated with SNF services for this measure (see Exhibit B-58 [Page 205] in the Technical Appendix).

7.7 Discussion

With the addition of 2021 data – the last year in which payment adjustments were applied under the original HHVBP Model – we find a sustained impact of HHVBP in reducing Medicare spending for FFS beneficiaries receiving home health care. There continues to be broad alignment between the overall findings of this evaluation regarding the impact of HHVBP on the utilization of services and the impact on Medicare spending. Similar to the sources of the cumulative reductions in spending due to HHVBP which have continued to reflect savings related to inpatient hospital and SNF services, we also observe declines in utilization in each of these areas due to HHVBP (Section 6). These findings are consistent with intended effects of the HHVBP Model to reduce unplanned hospitalizations and may indicate that HHVBP has successfully incentivized quality improvements that have reduced the need for more resource-intensive forms of care.

Our findings of increased expenditures associated with outpatient ED visits and observation stays are also consistent with observed increases in outpatient ED use. Together, our findings for inpatient hospital services and outpatient ED visits and observation stays could imply that outpatient ED services were increasingly substituting for inpatient hospitalizations. While the increase in spending for outpatient ED visits and observation stays offsets savings related to inpatient hospitalizations somewhat, it is a limited impact due to the relatively small share of overall spending for these services.

More so than in earlier years of the model, the analyses for this report suggest that the impact of HHVBP on spending may be growing larger over time. This is based on our findings of slightly larger D-in-D estimates for 2020 and 2021 compared to earlier years and evidence of larger impact estimates for the most recent four years of the model combined (2018-2021) compared to the initial two years (2016-2017). A possible alternative explanation is that there has been a differential impact of PDGM in HHVBP states which has contributed to a slightly larger impact estimate for 2020-2021. However, our modification to the spending measure definitions starting in 2020 was designed to limit any such effects of PDGM as a possible source of confounding, and our analyses of the change in follow-up between the baseline and post-PDGM periods based on these new measure definitions do not suggest a differential change in the duration of home health care between HHVBP and non-HHVBP states as a result of PDGM that would potentially represent a source of bias. Results for certain utilization measures (presented in Section 6) suggest the possibility that the most recent spending impacts could reflect growing improvements related to HHVBP. For example, larger declines in the most recent years for measures of unplanned hospitalizations could be an indication that the original HHVBP Model has led to larger gains in efficiency over time involving the use of inpatient hospitalization.

Another recent finding is that there is a decline in spending for home health services in HHVBP states compared to non-HHVBP states based on a combined measure of spending during and following home health episodes. This result, driven by changes occurring in 2020 and 2021, points to home health spending as another source of the larger recent savings observed under HHVBP. However, we also note that this finding was narrowly statistically significant at the $p<0.10$ level ($p=0.09$). The mechanism(s) by which HHVBP would generate efficiencies in home health spending in the post-PDGM period only are not clear and merit further consideration. Agencies are paid on a per-episode basis by Medicare under PDGM, with adjustments for patient case-mix, such that variation in home health payments per episode do not directly reflect variation in the utilization of services per episode.

If recent changes in home health spending were related to the introduction of PDGM, which was implemented nationally at the start of 2020, one might expect this to occur in somewhat of a pattern across states. This was not the case, however, as state-level analyses showed declines in home health spending since 2020 in just two of the nine HHVBP states (Arizona and Florida) relative to their regional comparison groups (results not shown). It could be that the impact of HHVBP shifted somewhat in a modified payment context. We see benefits in research exploring potential changes in agency practices and patient case-mix in the post-PDGM era that might help to explain the recent trends in home health spending observed in HHVBP and non-HHVBP states and whether these trends are sustained over time.

While the effect of the COVID-19 PHE continued in 2021, we did not find evidence that COVID-19 has had a markedly different impact on home health beneficiaries in HHVBP states relative to non-HHVBP states during the two years of the pandemic. As discussed in Section 2, trends in the incidence of COVID-19 were relatively similar between HHVBP states and non-HHVBP during both 2020 and 2021. In addition, we conducted sensitivity analyses of impacts on spending that did not include adjustments for either COVID-19 diagnoses for individual home health patients or for county-level COVID-19 rates. The 2020-2021 D-in-D estimates from these models (Exhibit B-59 [Page 207] in the Technical Appendix) were slightly larger in magnitude to those in Exhibit 55 for all three total spending measures, which suggests that even though the COVID-19 PHE does not represent a major source of confounding for the 2020-2021 impact estimates, adjusting for these factors may have helped to minimize any bias related to the COVID-19 PHE.

As we have found in previous years of the model, our finding at the national level of overall cost savings to Medicare due to HHVBP is not uniform across the HHVBP states. Based on data through 2021, there is evidence of a cumulative impact of HHVBP in reducing overall Medicare spending in six of the nine states included in the original HHVBP Model. As we observed at the national level, declines in spending related to inpatient hospitalization and SNF services continued to be drivers of savings at the state level. A recent decline in spending related to home health services also represented an additional source of savings in two states since 2020. In contrast to our findings for other HHVBP states, we also continued to find evidence of an increase in Medicare spending in one HHVBP state, Maryland. As discussed in previous reports, this finding may reflect the overlapping implementation of the Maryland All-Payer Model, a statewide initiative that was not adopted in other states and may have influenced changes occurring in the post-HHVBP period specific to Maryland.

8. Results: HHVBP Continued to Produce Modest Improvements in OASIS-Based Outcome Quality Measures

8.1 Introduction

This section presents findings on the impact of the original HHVBP Model on the five OASIS-based measures used to determine payment adjustments in 2021, the final year of the model. Using D-in-D analyses, we continued to find a ***modest, positive impact of HHVBP for most of the OASIS-based outcome measures*** after six years of the model, including the two Total Normalized Composite (TNC) measures of changes in mobility and self-care that were introduced in 2019. The significant relative gains we observed occurred where average rates for the original, non-TNC measures tended to be high (e.g., 52 to 73 percent) prior to 2016 in both HHVBP and non-HHVBP states. At the state level, Arizona continued to be a consistent driver of the overall HHVBP findings for most of the OASIS-based measures.

8.2 OASIS-Based Quality Measures, Pre- and Post-HHVBP Implementation

Trends for the five OASIS-based measures that were used in determining the HHVBP payment adjustments in 2021 showed a general trend toward improvements in outcomes over time in both HHVBP and non-HHVBP states (Exhibit 60); this trend began prior to HHVBP implementation (see Exhibit B-6 [Page 155] in the Technical Appendix). For example, rates for Improvement in Management of Oral Medications increased by 21.7 percentage points for HHVBP states (51.5 percent to 73.2 percent) and by 17.8 percentage points for non-HHVBP states (53.9 percent to 71.8 percent). We observed smaller increases in the percent of patients discharged to community (1.80 percentage points in non-HHVBP states; 0.40 percentage points in HHVBP states).

Performance scores also increased for the two normalized composite measures introduced in 2019.[38] In HHVBP states, the average score for the TNC Change in Self-Care measure increased from 1.37 in the baseline period to 1.93 post-intervention, while average measure scores in non-HHVBP states increased from 1.28 to 1.81. For the TNC Change in Mobility measure, average scores in HHVBP states increased by 0.26 between baseline and post-intervention (i.e., 0.43 to 0.69) and by 0.23 (0.41 to 0.64) in non-HHVBP states (Exhibit 60).

Exhibit 60. Improvements in Unadjusted OASIS-based Outcomes in Both HHVBP and Non-HHVBP States from Baseline to Post-HHVBP Period

Measure (Percentage or Mean Score)	HHVBP States		Non-HHVBP States		Change in Percentage or Mean Score	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
Discharged to Community (%)	72.8%	73.2%	70.1%	71.9%	0.40	1.8

[38] For each TNC measure, the change in a patient's status between start/resumption and end of care in each of the underlying areas of functioning is standardized to be worth up to ±1 point towards the total composite change score. As such, the range for each of the episode-level composite measures reflects the number of underlying OASIS items: the TNC Change in Mobility score ranges from -3 to +3 points, and the TNC Change in Self-Care score ranges from -6 to + 6 points. See Exhibits A-63 and A-64 (Page 92) of the Technical Appendix.

Measure (Percentage or Mean Score)	HHVBP States		Non-HHVBP States		Change in Percentage or Mean Score	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
TNC Change in Self-Care (score)	1.37	1.93	1.28	1.81	0.56	0.53
TNC Change in Mobility (score)	0.43	0.69	0.41	0.64	0.26	0.23
Improvement in Dyspnea (%)	66.7%	82.4%	66.1%	79.9%	15.7	13.8
Improvement in Management of Oral Medications (%)	51.5%	73.2%	53.9%	71.7%	21.7	17.8

Measures in the original HHVBP Model indicated by italic text.

8.3 Modest Improvements for Most OASIS-Based Outcome Impact Measures

We found a positive cumulative HHVBP effect for four of the five OASIS-based measures during the six years of the original HHVBP Model. For patients discharged to the community, we observed cumulative gains of 1.08 percentage points in HHVBP states relative to non-HHVBP states, translating to 1.5 percent change relative to its 72.8 percent baseline value (Exhibit 61). Our year specific D-in-D analysis indicate larger relative increases in HHVBP states relative to non-HHVBP states over the six years (e.g., 0.6 percentage points in 2016 up to 1.94 percentage points in 2021). The difference in impact between the early years of the HHVBP Model prior to agencies receiving a payment adjustment (i.e., 2016-2017) and the final four years of the original model in which payment adjustments were applied (i.e., 2018-2021) was statistically significant, suggesting a larger effect of where patients are discharged when HHAs received a payment adjustment (see Exhibit B-64 [Page 209] in the Technical Appendix).

The cumulative D-in-D estimates were also statistically significant and positive for the two TNC measures. HHVBP states had a relative increase of 0.04 in the TNC Change in Self-Care measure score from pre- to post-HHVBP implementation over non-HHVBP states, translating to a 2.9 percent increase from an average score of 1.37 in the baseline period (Exhibit 61). Although the cumulative D-in-D estimate for the TNC Change in Mobility measure was slightly smaller (0.01), it translated to a similar increase from its baseline (i.e., 2.3 percent increase from a baseline average score of 0.43), which is reflective of the different range in normalized change values for the two TNC measures (i.e., -3 to +3 for Mobility compared to -6 to +6 for Self-Care).[39] The relative change from baseline values in HHVBP states for 2019—the year they were introduced into the HHVBP Model—were higher than the cumulative results: 3.6 percent for TNC Change in Self-Care and 4.7 percent for TNC Change in Mobility measure (see last column of Exhibit 61). For 2021, impact estimates for both TNC measures were equivalent to 2019 values (i.e., slightly larger than the cumulative estimate), but were not statistically significant.

[39] See Section A.2.3 (Page 92) of the Technical Appendix for additional information on the specific OASIS items that comprise the TNC measures.

Exhibit 61. HHVBP Model Results in Greater Improvement for Five OASIS-Based Outcome Measures

Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	Percent Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
Discharged to Community						
2016	0.42	0.01	0.14	0.69	72.8%	0.6%
2017	0.55	0.04	0.11	0.98		0.8%
2018	0.97	0.01	0.40	1.55		1.3%
2019	1.20	0.01	0.47	1.93		1.6%
2020	1.37	0.01	0.47	2.27		1.9%
2021	1.94	<0.01	0.88	2.99		2.7%
Cumulative	1.08	0.01	0.44	1.71		1.5%
TNC Change in Self Care						
2016	0.02	0.01	0.01	0.04	1.37	1.5%
2017	0.03	0.01	0.01	0.06		2.2%
2018	0.05	0.01	0.02	0.08		3.6%
2019	0.05	0.03	0.01	0.09		3.6%
2020	0.05	0.11	-0.001	0.10		3.6%
2021	0.05	0.20	-0.01	0.10		3.6%
Cumulative	0.04	0.04	0.01	0.08		2.9%
TNC Change in Mobility						
2016	0.01	<0.01	0.004	0.02	0.43	2.3%
2017	0.01	0.01	0.005	0.02		2.3%
2018	0.02	0.01	0.01	0.03		4.7%
2019	0.02	0.05	0.002	0.03		4.7%
2020	0.01	0.16	-0.002	0.03		2.3%
2021	0.02	0.19	-0.004	0.04		4.7%
Cumulative	0.01	0.04	0.003	0.03		2.3%
Improvement in Dyspnea						
2016	0.80	0.05	0.13	1.48	66.7%	1.2%
2017	0.74	0.25	-0.33	1.82		1.1%
2018	0.05	0.95	-1.37	1.47		0.1%
2019	-0.44	0.69	-2.20	1.33		-0.7%
2020	-1.55	0.23	-3.68	0.58		-2.3%
2021	-1.58	0.29	-4.03	0.87		-2.4%
Cumulative	-0.38	0.69	-1.94	1.19		-0.6%
Improvement in Management of Oral Medications						
2016	1.89	<0.001	1.02	2.77	51.5%	3.7%
2017	3.00	<0.001	1.68	4.33		5.8%
2018	3.13	<0.01	1.48	4.79		6.1%
2019	2.56	0.05	0.42	4.71		5.0%
2020	1.57	0.32	-1.00	4.14		3.0%
2021	1.38	0.44	-1.59	4.35		2.7%
Cumulative	2.26	0.05	0.38	4.13		4.4%

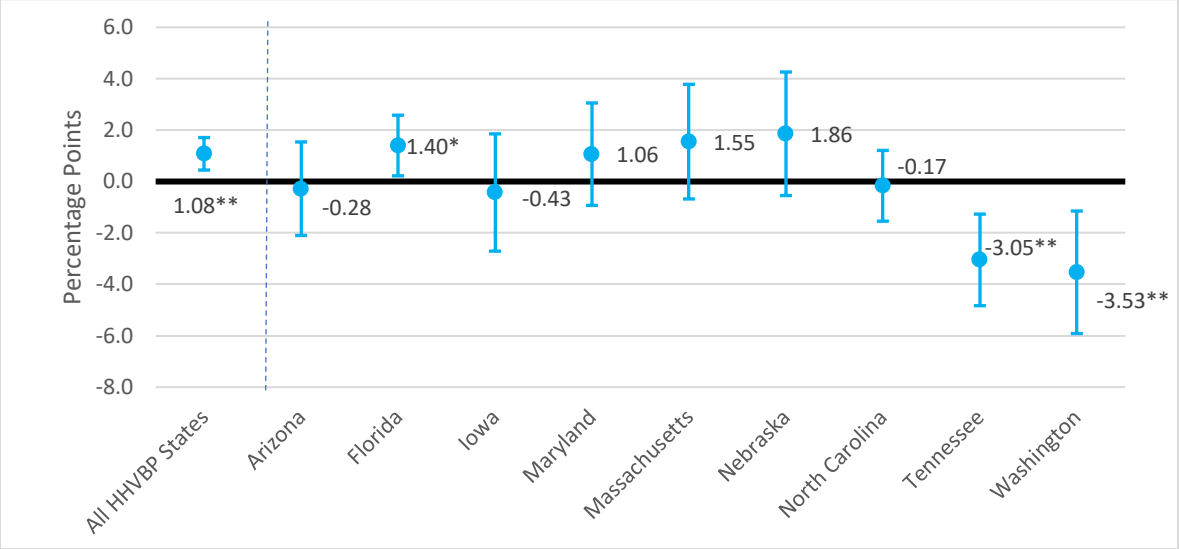
[a] Values represent percentage point changes with the exception of the TNC measures. | Measures in the original HHVBP Model indicated by italic text. | CI= Confidence Interval. | These models include state-specific linear time trends (See Section A.1.5.4 [Page 48] in the Technical Appendix for more details). See Exhibit 61n (Page 241) in the Technical Appendix for each measure's sample size.

We also found cumulative D-in-D effects to be statistically significant and positive for Improvement in Management of Oral Medications (Exhibit 61). Relative to the comparison group, the magnitude of the increase in the percentage of patients showing improvement in HHVBP states was 2.26 percentage points for Management of Oral Medications, or a 4.4 percentage point increase from 51.5 percent at baseline. In addition, the relative increases observed in HHVBP states occurred where there continued to be relatively large increases in measure rates over time for both groups. For example, the percentage of patients reported to be improving in Management of Oral Medications in HHVBP states increased by 21.7 percentage points between the baseline period and post-HHVBP implementation (i.e., from 51.5 percent to 73.2 percent of patients; (Exhibit 60). Similar to the two TNC measures, the impact estimate for Improvement in Management of Oral Medications for 2021 was not statistically significant.

In our analysis of state-specific impacts among HHVBP states relative to their respective regional comparison groups, we continued to find positive, statistically significant D-in-D cumulative results for Florida with regard to discharge to community (Exhibit 62). This implies that there was an increase in the rate of beneficiaries discharged to the community in Florida relative to the other states in its regional grouping through six years of the original HHVBP Model. Conversely, there were significantly lower rates of beneficiaries discharged to the community in Tennessee and Washington relative to the states in each of their respective regional groupings (Exhibit 62).

For the other OASIS-based quality measures, we found Arizona to be a consistent driver of the overall HHVBP findings, with positive, significant D-in-D cumulative results for all but Improvement in Dyspnea (see Exhibit B-65 [Page 210] in the Technical Appendix for the state-level D-in-D cumulative results for the OASIS-based measures). Across these four measures, the cumulative D-in-D estimate was considerably larger for Arizona than for all HHVBP states combined. For example, the cumulative estimate for the Improvement in Management of Oral Medications measure in Arizona was 11.74 percentage points compared to 2.26 for all HHVBP states (Exhibit 61). In turn, this translates to a much larger relative change from baseline (e.g., Arizona had a 23.4 percent increase from its baseline average of 50.2 percent; see Exhibit B-65 [Page 210] in the Technical Appendix). For the two TNC measures, both Arizona and Maryland had larger improvements than their regional groupings. For example, for the TNC Change in Mobility measure, Arizona had a 15.0 percent increase from its baseline average of 0.40, while Maryland increased 17.4 percent from its baseline average of 0.46.

Exhibit 62. Increase in Home Health Beneficiaries Discharged to Community in All HHVBP States Combined and Florida, but Decrease in Tennessee and Washington



*Graph shows 90% confidence intervals; * p,<0.10, ** p < 0.05.*

8.4 Slightly Steeper Declines in Mortality Rates among FFS Beneficiaries Receiving Home Health in HHVBP States

We also examined whether HHVBP may have had implications for mortality rates among home health patients, which could have occurred as a result of changes in the quality or intensity of their care. While the previous analyses presented in this section utilize OASIS assessment data, we relied on Medicare FFS claims to examine mortality, since date of death is more reliably reported on these administrative data (especially for deaths occurring after the patient is discharged from home health). To align this measure with other claims-based impact measures (e.g., see Sections 6 and 7), we evaluated the percentage of home health episodes in which the Medicare FFS beneficiary died within 60 days of the start of the episode (see Exhibit A-56 [Page 87] in the Technical Appendix for additional detail).

The average unadjusted mortality rate during home health episodes in HHVBP states was 3.5 percent in the baseline period (2013-2015) and decreased slightly to 3.4 percent over the six years of the original HHVBP Model (Exhibit 63). For non-HHVBP states, the average unadjusted mortality rate was slightly lower and declined slightly from 3.3 percent in the baseline period to 3.1 percent in the post-HHVBP period.

Exhibit 63. HHVBP States have Slightly Higher Unadjusted Patient Mortality Rates among FFS Beneficiaries than Non-HHVBP States

Measure	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
Mortality Rate/All FFS Episodes	3.5%	3.4%	3.3%	3.1%	-0.1%	-0.2%

After adjusting for the core set of beneficiary and agency covariates (see Exhibit A-3 [Page 16] in the Technical Appendix) including state fixed effects, our D-in-D model suggests a 0.15 percentage point decrease in the mortality rate among FFS home health beneficiaries in HHVBP states relative to non-HHVBP states over the six year period of the original HHVBP Model (Exhibit 64). This cumulative effect translates to a 4.3 percent decrease relative to the 3.5 percent average mortality rate in HHVBP states during the baseline period.[40] The separate yearly D-in-D estimates are all negative and statistically significant.

Exhibit 64. Small Decrease in Patient Mortality Rates among FFS Beneficiaries in HHVBP States Relative to Non-HHVBP States

Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
2016	-0.12	<0.001	-0.16	-0.08	3.5%	-3.4%
2017	-0.09	<0.001	-0.14	-0.05		-2.6%
2018	-0.09	<0.01	-0.13	-0.04		-2.6%
2019	-0.11	<0.001	-0.17	-0.06		-3.1%
2020	-0.20	<0.001	-0.26	-0.15		-5.7%
2021	-0.24	<0.001	-0.30	-0.18		-6.9%
Cumulative	-0.15	<0.001	-0.19	-0.11		-4.3%

[a] Values represent percentage point changes| CI=Confidence Interval. | See Exhibit 61n (Page 241) in the Technical Appendix for measure's sample size.

8.5 Discussion

Our findings for all but one of the OASIS-based outcome measures show a modest, positive impact of HHVBP, reflecting a relative increase in discharges to the community and improvement in functional status measures in HHVBP states compared to non-HHVBP states. Cumulative impacts for the two statistically significant single-item OASIS measures ranged from 1.1 to 2.3 percentage points (discharged to community and improvement in management of oral medications, respectively) and where average measure achievement rates were already high (e.g., 73 percent and 52 percent, respectively) prior to implementation of HHVBP. In particular, for the two improvement measures examined (as well as the two composite measures), these relative gains occurred in the context of increases in measure rates that were already occurring in both HHVBP and non-HHVBP states prior to the launch of HHVBP and may in part reflect the response of agencies to other public reporting initiatives. This aligns with findings from our qualitative work this year (see Section 10) and previous years that found quality improvement efforts for OASIS assessment to be a central focus of agencies (Arbor Research, 2018; 2019; 2020; 2021).

Although we continued to find statistically significant cumulative impacts of HHVBP when averaging effects over the entire six years of the original model for improvement in managing oral medications and the composite measures, a pattern emerged in 2020 and continued in 2021, where the impact estimates for these measures were not statistically significant, in contrast to what we found for each of the first four years of the model (i.e., 2016-2019). One possible explanation for this pattern in the results for the

[40] We note that after accounting for the beneficiary characteristics, agency characteristics, and other risk-factors that comprise our covariate list, the risk-adjusted mortality rate for HHVBP states is *lower* than that of the non-HHVBP states. See Exhibits B-66 – B-68 (Page 211) in the Technical Appendix.

two most recent years is the COVID-19 PHE, especially given our inability to control for COVID-19 diagnoses among all home health patients with OASIS data (see Section 2 for additional detail on changes to our evaluation approach due to the COVID-19 PHE). To better understand the influence of COVID-19 as a potential confounder for the 2020 and 2021 impact estimates, we conducted a sensitivity analysis of the TNC measures that was restricted to Medicare FFS beneficiaries only, for whom we could adjust for claims-based COVID-19 diagnoses in addition to county-level COVID-19 rates. For both TNC measures, estimates for 2020 and 2021 that were based on a model including both types of COVID-19 adjustments were statistically significant for both years for the TNC Change in Self-Care measure and for 2021 for TNC Change in Mobility (not shown). In a related analysis, we did not find these results to be sensitive to the inclusion of adjustments for individual patient COVID-19 diagnoses. While this analysis that only included Medicare FFS beneficiaries did not yield impact estimates for the TNC measures that were substantially different from our primary analyses that also included patients enrolled in Medicare Advantage plans or Medicaid, we would not rule out the possibility that impact estimates for these measures could reflect a small degree of confounding related to the COVID-19 PHE.

We continue to observe variation at the state level on the impact of the model on the OASIS-based measures. State-level D-in-D analyses show Arizona to be the only state that was a consistent driver of the overall HHVBP impact estimates for most of the OASIS-based measures.

9. Results: HHVBP Continued to Have Modest Unintended Impact on Three of Five Measures of Patient Experience with Care

9.1 Introduction

In this section, we examine the impact of the original HHVBP Model on the five measures of home health patients' experience with their care that were derived from the HHCAHPS survey and used to calculate an agency's TPS. These measures continued to remain relatively stable during the post-implementation period in both HHVBP and non-HHVBP states. Based on our D-in-D analyses, we found no impact of HHVBP on the two global HHCAHPS-based performance measures through the six years of the model, including patients' ratings of overall care from the agency and likelihood of recommending the agency. For the remaining three measures, we found ***HHVBP was associated with a -0.3 to -0.5 percent relative decline in patient experience with care***. We provide more detail below.

9.2 Patient Experience Measures, Pre- and Post-HHVBP Implementation

Performance scores for the five HHCAHPS-based measures have remained high in magnitude over time (Exhibit 65) with average unadjusted measure scores of all but one measure (Discussion of Care) being higher in the HHVBP states than in the non-HHVBP states, for both the baseline and post-implementation periods. The unadjusted values for all five measures slightly declined between the baseline and post-HHVBP periods, with slightly larger declines of 0.2 to 1.2 percentage points in HHVBP states compared to declines of 0 to 0.8 percentage points in non-HHVBP states (Exhibit 65). The largest declines between the baseline and post-HHVBP implementation periods occurred with the Discussion of Care measure (1.2 percentage point decline in HHVBP states and 0.7 percentage points in non-HHVBP states) and the Likely to Recommend global measure (1.1 percentage points and 0.8 percentage points, respectively). Values for the other global measure – Overall Care – remained similar post-implementation in both HHVBP and non-HHVBP states.

The unadjusted values for the Professional Care and Communication measures became more similar between the HHVBP states and non-HHVBP states post-implementation compared with the baseline period. However, we observed an opposite trend for the Discussion of Care measure, where the difference between HHVBP states and non-HHVBP states increased slightly from the baseline period (1.0 percentage point) to post-implementation (1.5 percentage points). As noted above, Discussion of Care is also the only HHCAHPS measure where unadjusted measure values in the HHVBP states were slightly lower than those of non-HHVBP states in both the baseline and post-HHVBP periods.

Exhibit 65. HHCAHPS-Based Patient Experience Measures Remained Stable Over Time in Both HHVBP and Non-HHVBP States

HHCAHPS-Based Patient Experience Impact Measures	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
How often the home health team gave care in a professional way (Professional Care)	88.8%	88.3%	88.2%	88.0%	-0.5%	-0.2%

HHCAHPS-Based Patient Experience Impact Measures	HHVBP States		Non-HHVBP States		Change in Mean	
	Baseline (2013-2015)	Post-HHVBP (2016-2021)	Baseline (2013-2015)	Post-HHVBP (2016-2021)	HHVBP States	Non-HHVBP States
How well did the home health team communicate with patients (Communication)	85.9%	85.3%	85.3%	85.2%	-0.6%	-0.1%
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)	82.8%	81.6%	83.8%	83.1%	-1.2%	-0.7%
How do patients rate the overall care from the home health agency (Overall Care)	84.4%	84.2%	83.7%	83.7%	-0.2%	0.0%
Would patients recommend the home health agency to friends and family (Likely to Recommend)	79.6%	78.5%	78.4%	77.6%	-1.1%	-0.8%

Measures in the original HHVBP Model indicated by italic text.

9.3 Modest Negative or No Impact on Measures of Patient Experience with Care

Our cumulative D-in-D findings through the sixth year of the model found no cumulative impact of HHVBP on the two global HHCAHPS-based measures that are derived from single HHCAHPS questions: Overall Care and Likely to Recommend (Exhibit 66). Results for the most recent year of the model also indicate no HHVBP effect for both of these measures.

For the three composite patient experience of care measures, we found a cumulative negative effect of the model. Relative to non-HHVBP states, HHVBP led to a cumulative impact of a 0.27 percentage point decrease in the Professional Care measure, a 0.31 percentage point decrease in the Communication measure, and a 0.41 percentage point decrease in the Discussion of Care measure in HHVBP states (Exhibit 66). These cumulative effects translate to a 0.3 percent, 0.4 percent, and 0.5 percent decrease relative to the baseline averages of 88.8 percent, 85.9 percent, and 82.8 percent, respectively, in HHVBP states. Results for the most recent year of the model also indicate a negative HHVBP effect for all three measures. For all three measures, the estimated impacts for 2021 were larger than the cumulative impacts (e.g., for Discussion of Care, we found an impact of -0.95 percentage points in 2021 vs. a cumulative impact of -0.41 percentage points; Exhibit 66), translating to a larger decrease for 2021 relative to baseline values (e.g., in 2021, we observed a 1.1 percent decrease for Discussion of Care relative to its baseline average of 82.8 percent).[41]

[41] We found a small, negative HHVBP effect on the Likely to Recommend measure in 2020 (p=0.06), but was not statistically significant in 2021 (p=0.18).

Exhibit 66. The Original HHVBP Model Results in Modest Decrease in Three HHCAHPS-Based Measures

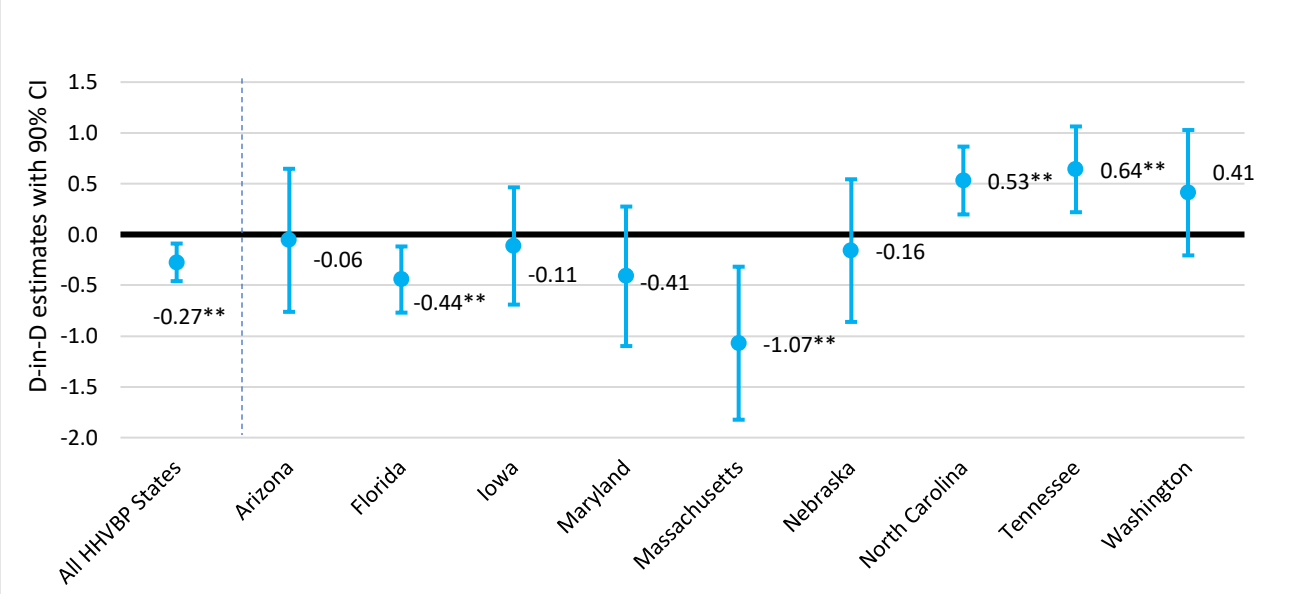
Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	Percent Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
How often the home health team gave care in a professional way (Professional Care)						
2016	-0.11	0.42	-0.34	0.12	88.8%	-0.1%
2017	0.02	0.91	-0.24	0.28		0.02%
2018	-0.08	0.62	-0.33	0.18		-0.1%
2019	-0.40	0.02	-0.68	-0.13		-0.5%
2020	-0.47	0.01	-0.77	-0.16		-0.5%
2021	-0.62	<0.01	-0.95	-0.29		-0.7%
Cumulative	-0.27	0.01	-0.46	-0.09		-0.3%
How well did the home health team communicate with patients (Communication)						
2016	-0.23	0.16	-0.49	0.04	85.9%	-0.3%
2017	-0.05	0.78	-0.34	0.24		-0.1%
2018	-0.30	0.10	-0.59	0.002		-0.3%
2019	-0.40	0.03	-0.72	-0.09		-0.5%
2020	-0.18	0.38	-0.52	0.16		-0.2%
2021	-0.70	<0.01	-1.06	-0.34		-0.8%
Cumulative	-0.31	0.02	-0.52	-0.10		-0.4%
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)						
2016	-0.35	0.06	-0.66	-0.04	82.8%	-0.4%
2017	0.22	0.26	-0.10	0.54		0.3%
2018	-0.22	0.29	-0.57	0.12		-0.3%
2019	-0.60	<0.01	-0.97	-0.23		-0.7%
2020	-0.57	0.02	-0.97	-0.17		-0.7%
2021	-0.95	<0.001	-1.38	-0.52		-1.1%
Cumulative	-0.41	<0.01	-0.65	-0.17		-0.5%
How do patients rate the overall care from the home health agency (Overall Care)						
2016	-0.10	0.68	-0.48	0.29	84.4%	-0.1%
2017	0.04	0.88	-0.36	0.43		0.05%
2018	0.26	0.30	-0.15	0.66		0.3%
2019	-0.17	0.52	-0.60	0.26		-0.2%
2020	-0.15	0.60	-0.61	0.32		-0.2%
2021	-0.45	0.16	-0.97	0.07		-0.5%
Cumulative	-0.09	0.59	-0.38	0.19		-0.1%
Would patients recommend the home health agency to friends and family (Likely to Recommend)						
2016	0.01	0.97	-0.44	0.46	79.6%	0.01%
2017	0.30	0.29	-0.17	0.76		0.4%
2018	0.40	0.18	-0.09	0.90		0.5%
2019	-0.02	0.95	-0.52	0.49		-0.03%
2020	-0.64	0.06	-1.21	-0.08		-0.8%
2021	-0.49	0.18	-1.09	0.11		-0.6%
Cumulative	-0.07	0.73	-0.42	0.27		-0.1%

[a] Values represent percentage point changes. | Measures in the original HHVBP Model indicated by italic text. | CI=Confidence Interval, D-in-D=Difference in Differences. See Exhibit 66n (Page 241) in the Technical Appendix for each measure's sample size.

Additionally, we found a statistically significant decline between the early years of the original HHVBP Model (i.e., 2016 – 2017) and the four most recent years where HHAs received a payment adjustment (i.e., 2018 – 2021) for these three measures. Compared to non-HHVBP states, HHVBP states had a 0.34 percentage point decrease for the Professional Care measure, a 0.26 percentage point decrease for the Communication measure, and a 0.52 percentage point decrease for the Discussion of Care measure between the early years and later years of the model (see Exhibit B-70 [Page 213] in the Technical Appendix).

In our analysis of state-specific impacts, we found that Florida and Massachusetts continued to be the drivers of the overall results for the Professional Care, Communication, and Discussion of Care measures, with negative, statistically significant cumulative D-in-D estimates relative to their respective regional comparison groups (see Exhibit B-71 [Page 213] in the Technical Appendix for the state-level D-in-D cumulative results for the HHCAHPS-based measures). Conversely, we found *positive,* statistically significant cumulative D-in-D estimates in Tennessee for all five measures of patient experience. This year, we also found a positive, statistically significant cumulative impact in North Carolina for three of the measures (Professional Care, Overall Care, and Likely to Recommend) (see Exhibit B-71 [Page 213] in the Technical Appendix). For most of the measures, the magnitude of the D-in-D estimates for these four states was larger than the overall estimate for all HHVBP states combined (e.g., see Exhibit 67 for the Professional Care measure).

Exhibit 67. Decrease in HHCAHPS-based Professional Care Measure for All HHVBP States Combined, Florida, and Massachusetts, but Increase in North Carolina and Tennessee



*Graph shows 90% confidence intervals; * p < 0.10, ** p < 0.05.*

9.4 Discussion

As part of the ongoing development of quality measurement and quality incentive programs, there have been growing efforts to incorporate patient perspectives on their care. The design of the original HHVBP Model reflects this initiative, as five of the original 17 performance measures (and 13 of the performance measures identified for 2021) included in the agency TPS calculation reflected measures of

patient experience with care based on the HHCAHPS survey. As part of our evaluation of HHVBP, we used these five HHCAHPS-based measures to examine possible effects on patient experience with care.

Measure rates were relatively high for all five HHCAHPS-based measures during the baseline period, ranging from 78 percent to 89 percent, and have remained relatively stable over time. For all five measures, the change in measure rates between the baseline period and the post-implementation period was within 1.2 percentage points in both HHVBP and non-HHVBP states.

While we continued to find no effect of HHVBP for the two global measures of patient experience with care (Overall Care and Likely to Recommend), our D-in-D analyses suggest a small negative impact of HHVBP on the Professional Care, Communication, and Discussion of Care measures through the six years of the original HHVBP Model. These cumulative findings appear to be driven largely by results from 2019 through 2021, the three most recent years of the model in which there was up to a ±5, ±6, and ±7 percent annual payment adjustment, respectively, to HHAs in the HHVBP states. However, the cumulative impact estimates for these measures correspond to only a 0.3 to 0.5 percent relative decrease in the baseline measure rates, which does not suggest a meaningful impact of HHVBP on these aspects of patient experience with care. Furthermore, we would not expect a meaningful negative impact of HHVBP on patient experience with care based on our interviews with representatives of HHAs in HHVBP states where we heard that many agencies were identifying strategies to help staff improve agency response rates and scores on the HHCAHPS survey to improve their performance on these measures or from the HHA survey we fielded this year that also found similar patterns between HHVBP and comparison states in approaches to quality improvement for the HHCAHPS-based measures (see Section 10).

It is also important to view these findings within the broader context of the model as well as the HH PPS. For example, in 2019, CMS made several changes to the HHVBP measure set, including adding new OASIS composite measures, dropping OASIS process measures, increasing the weights applied to the two claims-based measures included in the TPS calculation and decreasing the weight for the HHCAHPS-based measures slightly (31.25 percent to 30 percent; See Table 50 in (HHS, 2018). These non-trivial changes to the HHVBP Model in 2019 may have prompted agencies to focus more of their efforts on the claims-based and new OASIS measures, which may have resulted in a small, unintended impact on certain aspects of patient experience.

More recently, the onset of the COVID-19 PHE may have had implications for measurement of patient experience. In particular, CMS did not require HHCAHPS surveys to be completed for 2019 Q4, 2020 Q1, or 2020 Q2 (October 2019 through June 2020) (CMS, 2020a) so that providers could instead allocate resources to patient care during the COVID-19 PHE. Additionally, there was concern that the COVID-19 PHE would have a considerable impact such that these data should not be included in CMS' quality reporting program (CMS, 2020b). Since these HHCAHPS measures are used in the TPS calculation, their inclusion during these unprecedented times could have had a further unintended impact on the HHVBP payment adjustments for HHAs. As expected, we observed a decrease in the number of HHCAHPS surveys in 2020 and 2021 compared to earlier years, from an average of 148 surveys per HHA in 2013-2019 to just 124 per HHA in 2020, followed by a slight increase to an average of 136 per HHA in 2021 (not shown). However, there was not a noticeable change in the unadjusted HHCAHPS-based measure values over time (see Exhibit B-6 [Page 155] in the Technical Appendix). Three of the five measures had negative significant D-in-D estimates for 2020 – the beginning of the COVID-19 PHE – including Likely to

Recommend, which showed a negative impact of HHVBP for the first time. However, this impact did not continue into 2021, and there was no impact at the cumulative level (Exhibit 66). Together, our results do not point to a clear, sustained change in the effects of HHVBP on patient experience during the COVID-19 PHE.

10. Results: Agency Operational Changes

10.1 Introduction

This chapter presents analyses based on two primary data collection efforts that examine how agencies responded to the original HHVBP Model. We first discuss findings from 75 interviews we conducted with staff from HHAs, followed by results from a survey fielded to 4,700 HHAs. Both efforts were conducted across HHVBP and non-HHVBP states during 2022.

10.2 Agency Interviews Suggest HHVBP Model Is an Intensifier for Existing Performance Improvement Activities Rather than Being a Key Driving Force

This section presents findings from qualitative analyses of 75 telephone interviews conducted with key informants from HHAs. The goals were to understand: 1) how HHA performance improvement activities and operations have changed since the original HHVBP Model began; and 2) how these activities differ between HHAs in HHVBP and comparison states. From the interviews, we found that while agencies in both groups of states noted their increased emphasis on quality and performance improvement over the past decade, they did not cite HHVBP as a key driving force. However, some agency administrators in HHVBP states and at national chains indicated that the original HHVBP Model intensified an existing focus on performance improvement. Additionally, we found that performance improvement approaches reported by agency personnel in the original HHVBP Model states did not vary substantially from those reported by personnel in comparison states. The following sections present more detailed findings from these interviews.

10.2.1 Data Collection and Analysis

Between April and September of 2022, the evaluation team conducted 38 telephone interviews with key informants from HHAs in the nine original HHVBP states and 37 telephone interviews with key informants from HHAs in comparison states. Informants typically included agency administrators, clinical directors, and/or their corporate counterparts for larger regional and national organizations. We selected agencies that represented a mix of the following key characteristics: ownership (for-profit or not-for-profit), size (less or more than 450 episodes), and chain status (part of a chain or not). To minimize respondent burden, HHAs from comparison states that were selected to complete the HHA survey (see Section 10.3) were excluded from the interview sample. For both HHVBP and comparison states, we started with a target of 37 to 40 agencies and replaced agencies who declined an interview or did not respond to outreach with agencies that had similar characteristics from the sample of 120 agencies.

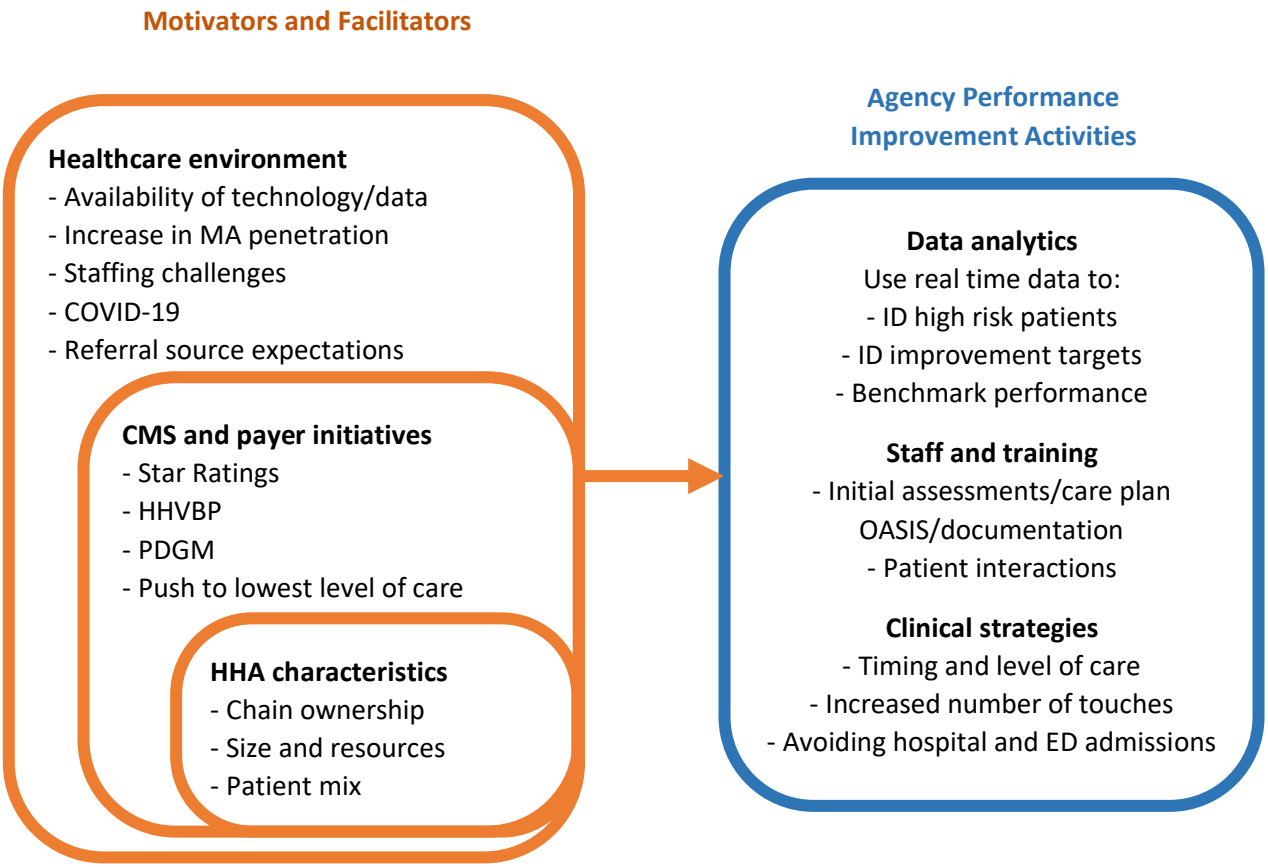
As in previous years, the evaluation team conducted the semi-structured interviews using an interview guide developed for and approved by CMS. The guide was designed to solicit information on the motivations and activities of HHAs – what was driving their behavior both in terms of the model and the broader context in which they operate – and how agency operations have changed over the past six years. We asked interviewees to focus on the time period when the original HHVBP model was active (i.e., 2016-2021). Many interviewees had changed positions and/or agencies during that time period, sometimes moving between agencies in intervention and comparison states. In addition, many agencies in the sample changed ownership (in some instances multiple times) over the past six years. In these cases, we asked interviewees to focus on the agency where they had the longest tenure during the time period, and, when possible, compare their experience there to their experience at other agencies where they had worked.

After conducting each set of interviews (first with comparison agencies, and thereafter with the HHVBP agencies), we summarized findings for the core research topics and identified common themes across interviews. We provide a more detailed description of these methods, including the composition of our sample population, in Section A.3.15 (Page 116) of the Technical Appendix.

10.2.2 Results

While the type and frequency of performance improvement activities varied among agencies of different sizes and affiliations, the activities described did not differ substantially between HHVBP and comparison agencies. Agencies described a number of market and industry factors motivating their operational decisions and their efforts to demonstrate performance and maintain referral sources. Exhibit 68 depicts key factors agencies said impacted their performance improvement efforts, as well as the main activities agencies described undertaking to improve performance and quality. The environmental factors influencing agency behavior and improvement activities in both HHVBP and comparison states were generally consistent with those described in agency interviews conducted for prior years' annual reports (Arbor Research, 2018; 2020; 2021).

Exhibit 68. Motivators and Facilitators Shaping HHA Performance Improvement Activities



The remainder of this section discusses our findings related to agency performance improvement activities during the HHVBP implementation period. We first discuss agency awareness of HHVBP amid other pressures to demonstrate performance and then describe the performance improvement activities agencies reported engaging in since 2016.

HHVBP was one of many factors influencing HHA performance improvement efforts

As Exhibit 68 shows, the original HHVBP Model was one of many factors shaping agency performance improvement activities. The model was implemented during a period of increasing pressure from payers, providers, and patients to demonstrate performance, minimize hospital and ED admissions, and provide care in the home when possible. Agencies in both HHVBP and comparison states spoke more frequently about a focus on Star Ratings and the need to demonstrate high quality scores for purposes of sustaining referral sources and participation in preferred networks or other payer contracts. Some smaller agencies in the comparison states were entirely unaware of the HHVBP Model.

Challenges related to training and retaining staff also heightened since 2016, as did expectations to be judicious about the total number of home health visits with the increasing prevalence of Medicare Advantage and CMS' introduction of PDGM in January 2020. Pressures to avoid unnecessary hospitalizations and admissions to SNFs and to treat patients in the home were further exacerbated by the introduction of COVID-19.

Agency characteristics also appeared to influence performance improvement strategies. Agencies that were affiliated with a chain, for example, often reported implementing practices that their corporate office established and rolled out to all agencies, often across state lines. Additionally, chains and large non-chain agencies were more likely than small, independent agencies to describe structured improvement strategies. These strategies generally involved full-time staff dedicated to quality improvement and ongoing staff training, and the use of real-time data and analytic software to monitor agency and individual staff-level performance.

Agencies primarily serving Medicaid patients expressed special challenges in achieving improved performance scores given the higher proportion of patients they serve with long-term chronic conditions. These oftentimes include multiple medical and behavioral health diagnoses where the goal of care is to stabilize or slow a decline rather than show improvement.[42] They noted that the nature of their patient population puts them at a disadvantage in achieving higher TPS scores as compared to agencies serving patients with fewer long-term conditions. Other agencies, often those affiliated with or providing hospice services directly, also indicated they were at a disadvantage since they care for a larger portion of patients nearing the end of life and experiencing frequent ED visits but not yet willing to consider enrolling in hospice.

Given the multitude of factors shaping performance improvement activities, many of which were active before, during, and after the HHVBP implementation period, there was little indication that HHVBP alone motivated changes, but rather aligned with other motivators to impact HHA behavior. One agency administrator who worked with several large agencies since 2016, most recently with one affiliated with a large national chain, said:

[42] The challenges described by agencies primarily serving Medicaid patients were attributable to several factors in addition to the complexity of patients' comorbidities and the inability to achieve improvement, including lower Medicaid reimbursement rates and oftentimes troublesome Medicaid managed care requirements. Those agencies serving larger shares of Medicaid patients reported that, as a result of these challenges, other agencies in their markets are accepting fewer Medicaid patients over time and that their agency's Medicaid share has accordingly increased.

"A lot of it you already are working on. Trying to manage and look good. But when there's a potential dollar figure that's attached to it, all of a sudden it just raises the bar."

HHVBP heightened awareness to key performance metrics for some agencies

In both HHVBP and comparison states, larger and chain-affiliated agencies were more likely than smaller agencies to cite HHVBP as bringing heightened awareness to key performance metrics which are also part of agency Star Ratings, such as OASIS measures, hospitalization rates, and the HHCAHPS survey. Agencies reported a number of activities addressing these metrics, including focusing on initial assessments, teaching staff about how to use the OASIS tool and effectively document improvement, engaging patients in setting goals and developing care plans, and working with staff, patients, and providers to reduce or avoid hospitalizations.

Many interviewees from agencies in HHVBP states noted that while HHVBP increased attention to OASIS documentation of the care delivered, it did not result in significant changes to patient care itself. Furthermore, most agencies in the comparison states did not have plans to significantly change their quality and performance improvement activities to perform well following the HHVBP expansion, anticipating that their current efforts and attention to Star Ratings would be sufficient. Some, however, noted that they may increase their focus on OASIS documentation and certain quality metrics in response to HHVBP.

Performance improvement efforts tended to focus on three areas: data analytics and monitoring, staffing and training, and clinical strategies

The following sections discuss key performance improvement activities agencies engaged in during the HHVBP implementation period and the many factors influencing their strategies.

Agencies increasingly relied on real-time data and analytics to identify and track performance improvement

Agencies increased their reliance on data analytics as real-time data became more available through the adoption of electronic health records (EHRs) and due to the increasingly sophisticated predictive and analytic software available in EHRs and from other vendors. Much of this software has been tailored to identify high risk patients, predict Star Ratings and HHVBP rankings, and facilitate improved OASIS documentation and coding. Most agencies reported relying on analytic software to support improvement work and benchmarking activities. For example, they frequently reported using software to monitor how their performance compared to other agencies in their area, in their larger organization (if they were part of a chain), in their state, and across the nation. One agency administrator that was part of a large health system noted:

"We do far more use of data than we did before, prior to five years ago, because data is so much more fluent, and we have so much more of it, that it's much easier to use."

Agencies described using data analytics to identify performance metrics where they did not fare as well, particularly for metrics that feed into Star Ratings, and modifying their improvement efforts to tackle those metrics. To address these gaps, most described implementing targeted staff training and

education, and many used clinical scorecards to tailor training to individual staff. However, though these efforts could produce improvements in performance in the short-term, many noted that when they shifted their attention away from a specific metric to focus on another metric, they observed declines in performance in that area.

Larger, well-resourced and chain-affiliated agencies were more likely to report use of more systematic data analytic efforts using industry software and benchmarking services along with internally developed reports to guide areas of focus. Smaller and non-chain affiliated agencies reported less frequent use of supporting software. Many smaller agencies also reported focusing more broadly on areas included in Star Ratings that tend to align with HHVBP measures (see Exhibit 2 for overlap of measures).

Most agencies have structured training and education programs for staff geared towards improving scores on quality measures

Many agencies in HHVBP states reported that the introduction of the model highlighted the importance of staff training (see text box), particularly around OASIS measures, and the importance of accurate initial assessments and plans of care. This education took various forms, including extensive training during the onboarding period and ongoing training throughout a clinician's tenure with the agency.

Larger and chain-affiliated agencies reported having more robust and systematic training programs compared to smaller and non-chain affiliated agencies and hiring staff dedicated to training, OASIS documentation, and quality improvement. Most agencies also cited unstable staffing and staff turnover as a challenge to ensuring consistent and accurate documentation, and indicated that staffing challenges were exacerbated by COVID-19. Many agencies operating in the original nine HHVBP Model states reported that while HHVBP may have motivated their increased focus on documentation efforts to ensure that the quality of care they provide is documented, these efforts did not change the quality of the care they delivered.

Intensified OASIS training

A number of administrators at larger agencies described comprehensive training related to OASIS provided by OASIS-certified trainers. One performance improvement supervisor for a large national chain with agencies in both HHVBP and comparison states reported:

"Many, many hours on OASIS training…When new home staff are hired, the training they receive on OASIS is extensive. We also do annual testing and training for staff who don't pass the assessment with the required percentage of correct answers, and [corporate] has an entire department dedicated to OASIS, so they're involved not only in initial training, but retraining and ongoing for both our management staff and our field staff on the guidance from CMS, and evaluation of what they're seeing with our own documentation… I think it's a combination of the overall performance quality improvement activities of the company, but HHVBP certainly plays a factor, especially this year with the [expansion], not just the states that were initially involved in HHVBP."

Another aspect of staff training relates to increasing patient education and improving patient experience and satisfaction. Many agencies reported identifying strategies to help staff improve response rates and scores on the HHCAHPS survey. Agencies trained staff to notify patients that they would receive a survey and what it would look like, regularly encouraged patients to fill it out, and modified the language they

used with patients to align with the language in the survey. An agency executive director within a nationwide health system described this process as follows:

> *"We have a copy of what the survey looks like, the HHCAHPS survey, in the start of care package. We are asking nurses that do the start of care [assessment] to show the patient and family care giver that this is a survey that's going to be mailed to you and kind of review with them a little bit to let them know what it looks like and to please send it in."*

For both OASIS-based and patient experience measures, agencies tended to focus on staffing and training to optimize their scores.

Agencies frequently implemented clinical strategies to improve timing and level of care and avoid hospital and ED admissions

Over the course of the evaluation, agency administrators reported paying extra attention to the timing of care. In interviews this year, they again mentioned starting care early and having nurses do assessments to identify the level of care needed and areas where they anticipate being able to improve outcomes. In addition, they use these early assessments to identify patients at risk for hospitalization or requiring extra attention given their condition or level of acuity. As in previous years, agencies also reported patients being discharged from the hospital earlier and with higher acuity or sent directly home after complex surgeries rather than receiving inpatient care first, making it especially important to start care early (Arbor Research, 2020; 2021).

Similar to prior years' interviews (Arbor Research, 2018; 2019; 2020; 2021), agencies reported implementing a variety of strategies to address unnecessary hospitalizations. These strategies included focusing on the start of care and care planning, encouraging patients to call the agency rather than immediately going to the emergency room, increasing the number of "touches" and calls to patients, and checking in with patients in advance of weekends to identify and mitigate scenarios that might lead to avoidable admissions. Agencies also reported working with other post-acute care providers to offer more services in the home, such as physician home visits, urgent after-hours care, and specialty wound care services. Several chain-affiliated agencies reported receiving central office support to contact and monitor high-risk and more complex patients after hours. HHAs reported using similar strategies across all states, though many in HHVBP states noted that the model invigorated their long-standing focus on reducing hospitalizations:

> *"I think that the emphasis on [hospitalization rates] isn't necessarily new, but definitely with the advent of the new VBP metrics, it takes on an even higher significance, because you can be at or just below national average and not really get points for that anymore."*

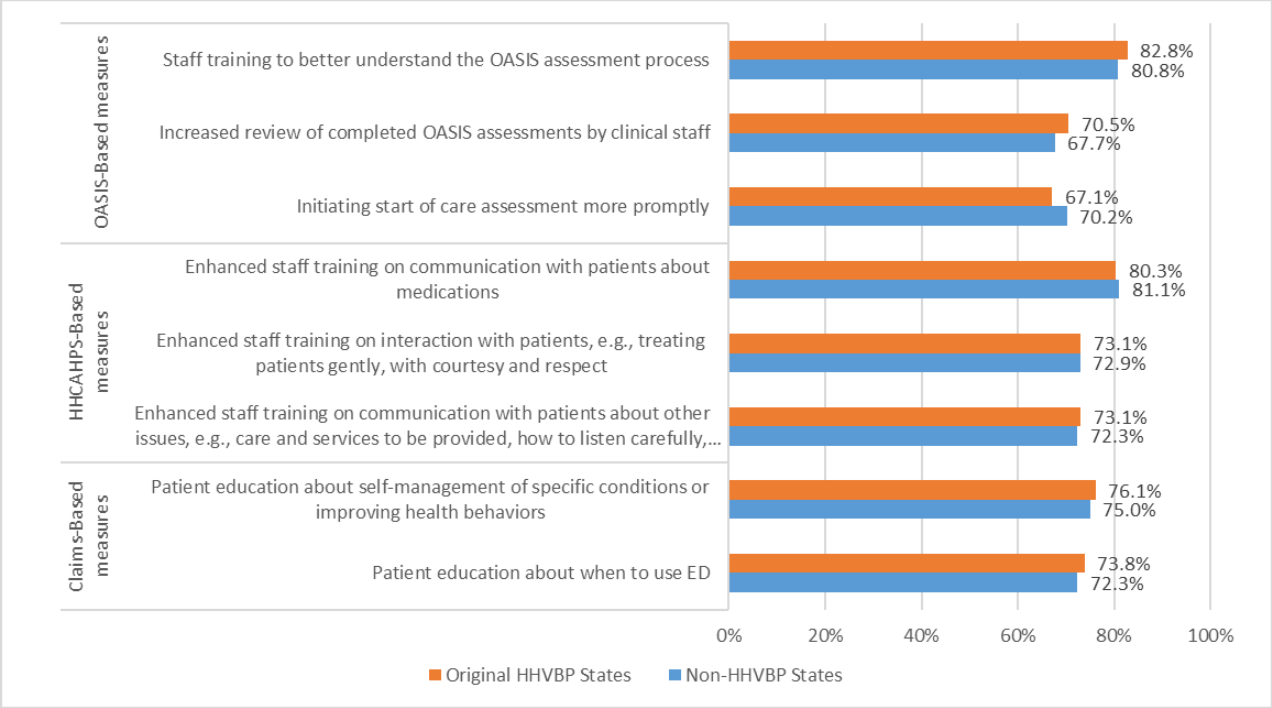
10.3 HHA Survey Finds Few Differences between Original HHVBP and Comparison Agencies

As described above, we conducted a survey of original HHVBP and comparison agencies in 2022 to explore how agency behavior may have changed subsequent to model implementation. Overall, we found few differences between the original and non-HHVBP agencies in their quality improvement approaches. The vast majority of agencies reported the use of multiple activities targeting quality indicators based on OASIS, HHCAHPS, and Medicare claims data, with few differences in types of quality improvement activities between HHVBP and non-HHVBP states. Similar to findings from the 2018 survey we conducted as part of this evaluation, the incentive structure of the original HHVBP Model was reported to be of lesser importance than those of other quality programs in incentivizing agency attention and activities even in HHVBP states. Over half of agency respondents indicated that the HHVBP Model was a "very important" driver of their quality improvement activities. In contrast, Star Ratings, Quality Assurance and Performance Improvement (QAPI) requirements in Conditions of Participation (COPs), and HHCAHPS ratings were identified as being very important drivers of quality improvement activities by over 70 percent of HHAs in both HHVBP and non-HHVBP states. Only 31 percent of agencies across the board indicated that participation in ACO or MA contracts was "very important" in their quality improvement efforts. Agency perceptions of broader home health industry challenges, such as obtaining high HHCAHPS and Quality of Patient Care Star Ratings and improving the accuracy of OASIS assessments were also relatively similar between HHVBP and non-HHVBP states. Across original and comparison agencies, recruiting and retaining staff was reported as a 'big' challenge by the highest proportion of agencies. We provide more detail on these findings below.

10.3.1 Agencies Use Multiple Approaches to Quality Improvement across Different Measure Types

In general, we found similar patterns in approaches to quality improvement on claims-based, OASIS, and HHCAHPS measures for HHAs in HHVBP and non-HHVBP states, with no statistically significant differences between the two groups. Similar to 2018 survey results, a large majority of agencies reported that many different strategies were "very important," suggesting that agencies simultaneously use multiple, complementary strategies to achieve their quality goals. The top strategies cited by agencies for each of the measure groups are reported in Exhibit 69 (See Exhibit B-74 (Page 216) in the Technical Appendix for the full results.)

Exhibit 69. Agencies in HHVBP and Non-HHVBP States Use Multiple, Complementary Approaches to Improve Scores on Claims-Based, OASIS, and HHCAHPS Measures



Data source: 2022 HHA Survey. This exhibit presents the subset of approaches that were rated as "very important" by the largest proportion of agencies for each type of measure. There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting a particular approach as "very important."

For each type of performance measure, we asked agencies to what extent the performance scores reflected their quality improvement (QI) efforts (Exhibit 70). The proportion of agencies in HHVBP states reporting that their efforts were largely reflected in the scores was highest for OASIS measures (59.8 percent) followed by HHCAHPS (54.1 percent). In non-HHVBP states, a similar proportion of agencies indicated that their efforts were largely reflected in OASIS and HHCAHPS results (61.9 percent and 60.1 percent, respectively). Across all states, agencies were least likely to say their efforts were largely reflected in claims-based measure results (51.1 percent in HHVBP states and 47.9 percent in non-HHVBP states compared to 54 – 62 percent for OASIS-based or HHCAHPS-based measures). Across all measures, only a small proportion (between 7 and 15 percent of agencies) said their efforts were "not at all" reflected in performance scores. There were no statistically significant differences between agency responses in HHVBP and non-HHVBP states.

Meanwhile, among agencies reporting that their efforts were "reflected to a small extent" or that they were "unable to observe a connection" between their agency's QI efforts and performance results, the top reasons indicated were: disruptions due to COVID-19, staff turnover and, among non-HHVBP agencies, that results did not reflect their performance (not shown). The limited size of payment incentives was the least frequently checked reason.

Exhibit 70. Agencies in Both HHVBP and Comparison States Reported that their Efforts were Reflected to 'a Large Extent' Most Often for OASIS-based Measures

Extent to which agency efforts reflected in performance scores	Original HHVBP States			Non-HHVBP States		
	Claims-based measures	OASIS-based measures	HHCAHPS-based measures	Claims-based measures	OASIS-based measures	HHCAHPS-based measures
A large extent	51.1%	59.8%	54.1%	47.9%	61.9%	60.1%
A small extent	38.6%	32.1%	35.1%	37.1%	31.1%	30.8%
Not reflecting HHA efforts	10.0%	8%	10.8%	15%	7%	9%

Data source: 2022 HHA Survey. There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting the extent to which efforts were reflected in performance scores.

To better understand the impact on agencies of payer emphasis on quality measurement, we asked about two specific aspects: (i) the impact of broad emphasis on quality measurement in the Medicare program (including MA plans), and also, for agencies in the original model states, (ii) the impact of the Medicare payment adjustments in the HHVBP Model. Exhibit 71 shows agency responses, in terms of the changes within their own agencies from these initiatives. For agencies in the original HHVBP states, the influence of the HHVBP payment adjustments was less than that of broader Medicare/MA initiatives for three of the four items; the exception was for "increased focus on certain measures rather than across the board improvement in care," where a similar percentage of respondents reported that changes were the result of Medicare/MA impacts as for the HHVBP Model. For all four items, the influence of Medicare/MA was relatively similar across HHVBP and non-HHVBP states. The most commonly noted change within own agencies by respondents in both HHVBP and non-HHVBP states was an increased focus on documentation or coding of OASIS data, with just under two-thirds of agencies in HHVBP and non-HHVBP states associating this change with the broader Medicare/MA influence (e.g., 64.4 percent and 65.4 percent, respectively; Exhibit 71). In comparison, about half (49.9 percent) of agencies in HHVBP states reported this increased focus on documentation or OASIS coding as a definite impact of the original HHVBP Model.

Exhibit 71. Broad Medicare Emphasis on Performance Driving Changes within own Agencies Similarly across HHVBP and Non-HHVBP States, with Largest Change in OASIS Coding & Documentation

	HHVBP States		Non-HHVBP States
	Due to HHVBP Model	Due to Medicare/MA	Due to Medicare/MA
Increased focus on documentation or coding of OASIS data			
Yes, definitely	49.9%	64.4%	65.4%
Yes, somewhat	40.7%	28.5%	28.9%
More resources allocated to QI			
Yes, definitely	34.8%	41.0%	38.2%

	HHVBP States		Non-HHVBP States
	Due to HHVBP Model	Due to Medicare/MA	Due to Medicare/MA
Yes, somewhat	31.4%	33.6%	37.2%
Increased focus on certain measures rather than across the board improvement in care			
Yes, definitely	32.3%	32.1%	32.5%
Yes, somewhat	43.1%	41.6%	42.8%
Increased willingness to share best practices			
Yes, definitely	23.1%	31.4%	34.6%
Yes, somewhat	40.6%	43.6%	42.1%

Data source: 2022 HHA Survey. There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting each response.

The survey also asked about agencies' perceptions of the impact of these initiatives on other agencies to allow agencies to report more openly regarding any perceived industry-wide impacts or unintended consequences. When asked about changes in other agencies, while the list of items differed from those shown in Exhibit 71, "an increased focus on documentation or coding of OASIS data to attain a higher score" again topped the list as the most frequently selected item by agencies across HHVBP and non-HHVBP states (Exhibit 72).Within HHVBP states, a greater proportion of agencies responded that the HHVBP payment adjustments "definitely" had an impact compared to Medicare/MA emphasis on performance measurement for several behaviors including, "increased focus on documentation or coding of OASIS data to attain a higher score" (36.3 percent vs 30.7 percent), "focus on patients more likely to show improvement on OASIS measures" (34.7 percent vs 22.6 percent), and "avoiding sicker or more challenging patients" (30.7 percent vs 23.3 percent), although differences were not statistically significant. Responses for the other items were relatively similar across agencies in HHVBP and non-HHVBP states as well as responses by agencies within HHVBP states in response to the HHVBP payment adjustments vs. broader Medicare incentives.

Exhibit 72. Perceived Changes in OASIS Coding & Documentation due to Emphasis on Quality Measurement also Noted for Other Agencies

	HHVBP States		Non-HHVBP States
	Due to HHVBP	Due to Medicare/MA	Due to Medicare/MA
Increased focus on documentation or coding of OASIS data to attain a higher score			
Yes, definitely	36.3%	30.7%	37.0%
Yes, somewhat	42.8%	40.4%	39.2%
Focus on patients more likely to show improvement on OASIS measures			
Yes, definitely	34.7%	22.6%	28.8%
Yes, somewhat	30.3%	27.4%	24.3%
Avoiding sicker or more challenging patients			
Yes, definitely	30.7%	23.3%	24.9%
Yes, somewhat	28.9%	27.6%	23.0%
Increased willingness to share best practices			
Yes, definitely	18.5%	20.1%	20.4%
Yes, somewhat	32.2%	37.7%	42.4%
Potential overtreatment of patients to meet a measure performance goal			
Yes, definitely	11.9%	11.3%	13.6%
Yes, somewhat	30.4%	27.2%	30.6%
Decreased willingness to share best practices			
Yes, definitely	9.5%	12.0%	12.5%
Yes, somewhat	26.0%	22.9%	24.8%

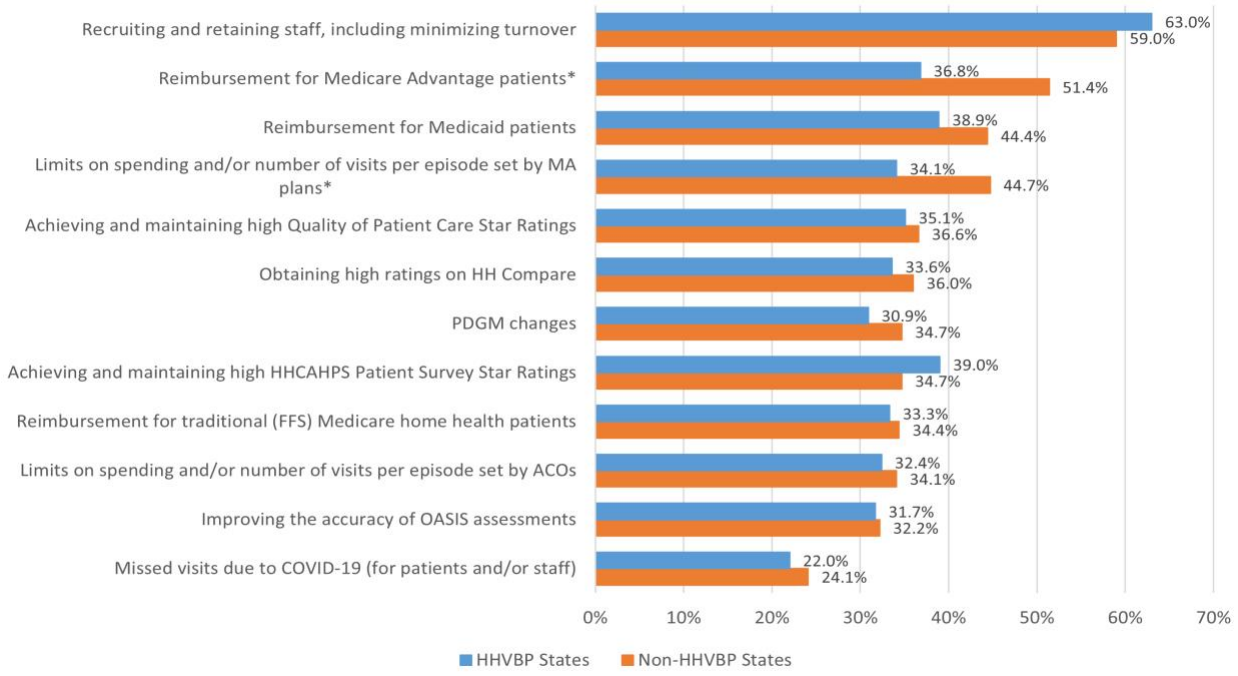
Data source: 2022 HHA Survey. There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting each response.

10.3.2 Other Changes to Operations

In addition to exploring performance improvement strategies, we asked agencies about the operational challenges they encountered. Of the 14 items[43] asked about in the survey (Exhibit 73), the only item noted by more than half of respondents in both HHVBP and non-HHVBP states as "a big challenge" was "Recruiting and retaining staff, including minimizing turnover" (63 percent and 59 percent, respectively). Slightly more than half of agency respondents in non-HHVBP states also reported reimbursement by Medicare Advantage plans as posing "a big challenge," compared to only about one-third of agencies in HHVBP states (51.4 percent vs. 36.8 percent; $p<0.05$). Similarly, agencies in non-HHVBP states were more likely to report limits on spending and/or number of visits per episode set by MA plans as big challenges compared to agencies in HHVBP states (44.7 percent vs. 34.1 percent; $p<0.05$).

[43] Two of the 14 items listed under challenges on the survey are discussed in the following section.

Exhibit 73. Recruiting and Retaining Staff rated as Top Operational Challenge by Agencies in HHVBP and Non-HHVBP States



Data source: *2022 HHA Survey. *Results statistically different between HHVBP and non-HHVBP states at* p < *0.05.*

10.3.3 Readiness for Equity Improvements

Given the increased emphasis by CMS on promoting health equity across the health care system, we included several questions in the survey that explored HHA awareness and understanding of the importance of meeting the cultural and language needs of the populations they serve. We approached this in terms of the possible challenges to operations presented by patient diversity as well as potential strategies agencies might employ to achieve readiness for efforts to reduce disparities, including staff training, reliance on data to guide key operational decisions, and increasing diversity of their workforce.

Based on the survey responses, agencies appear to understand the importance of meeting the needs of diverse communities and have at least some necessary elements in place that will allow them to be responsive to their patients. For the majority of agencies, “providing services that meet the needs of patients from different cultures or backgrounds” was not viewed as a challenge (top panel of Exhibit 74), and only a small proportion of agencies in both groups indicated that this was a big challenge. A similarly small proportion noted “meeting the language needs of patients with limited English proficiency” as a big challenge, with a slightly lower percentage in HHVBP states compared to non-HHVBP states (9.1 percent and 12.9 percent, respectively; bottom panel of Exhibit 74). The distribution of responses to the item of perceived level of challenge in meeting the language needs of patients with limited English proficiency was statistically different between agencies in HHVBP and non-HHVBP states.

Exhibit 74. Only a Small Proportion of Agencies Rated Meeting Needs of Patients from Different Cultures or with Limited English Proficiency as a "Big Challenge"

Data source: 2022 HHA Survey. Survey respondents were asked to rate items on a 7-point scale with 7 representing a "big challenge" and 1 defined as "not much of a challenge" (ratings 2 – 6 had no definitional label). From left to right, bars represent a rating of 1, 2-3, 4, 5-6, and 7.
** Results statistically different between HHVBP and non-HHVBP states at $p < 0.05$.*

Relatedly, over 90 percent of all agencies reported having mandatory staff trainings to ensure care is culturally responsive already in place for their staff, with the vast majority requiring the training for all staff (76.8 percent for HHAs in HHVBP states and 74.3 percent in non-HHVBP states; Exhibit 75).

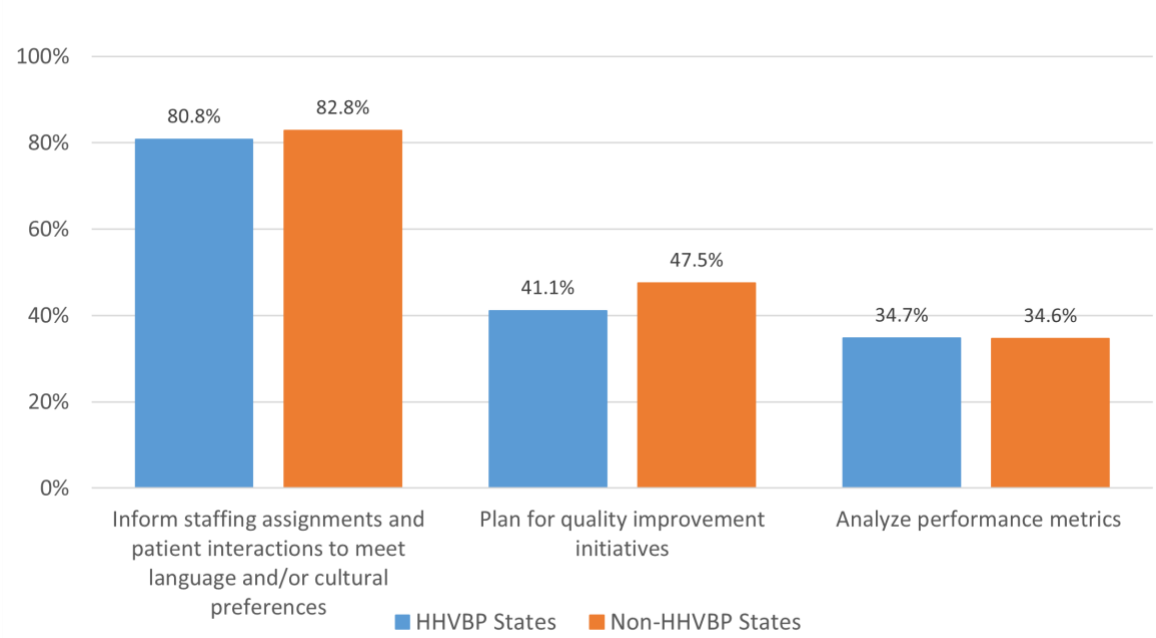
Exhibit 75. Vast Majority of Agencies Reported Having Mandatory Staff Trainings Related to Cultural Responsiveness, Regardless of HHVBP Status

Types of training		HHVBP States	Non-HHVBP States
Ensure care delivery is responsive to the beliefs and attitudes of people across different cultures	Mandatory for all staff	76.8%	74.3%
	Mandatory for patient care staff	16.2%	15.8%
	Training available but not required	4.4%	6.6%
	Training not available	2.6%	3.4%

There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting each response.

Across agencies in HHVBP and non-HHVBP states, over 80 percent of agencies reported using patient race and ethnicity or language data to inform staffing assignments and patient interactions (Exhibit 76). However, less than half of agencies indicated using these data to plan for QI activities and about a third indicated using the data to analyze performance metrics.

Exhibit 76. Patient Race, Ethnicity, and Language Data widely used by Agencies to Inform Staffing Assignments, Less Widely used to Analyze Performance Metrics



There were no statistically significant differences between the percentage of agencies in HHVBP and non-HHVBP states reporting each response.

An additional aspect of HHAs' ability to meet the cultural and linguistic needs of their patient populations is having agency staff that reflect the racial and ethnic makeup of the patients as well as staff that are able to communicate with patients with limited English proficiency. Exhibit 77 shows the percentage of Medicare home health users and agency staff reported to be members of racial and ethnic minority groups. In general, agencies in both HHVBP and non-HHVBP states appear to have staff that at least partially reflect their patient populations. Across all agencies, the percentage of home health patients is greater than the percentage of staff in the first three race/ethnicity categories in

Exhibit 77 (with the exception of Hispanics in HHVBP states, where the percentages are approximately the same)[44] with the gaps between patients and staff generally larger in non-HHVBP states. For Asian/Pacific Islanders, staff proportions are greater than patient proportions in both HHVBP and non-HHVBP states. Similarly, the percentage of staff able to communicate with patients in a language other than English was greater than the share of patients with limited English proficiency in both groups (Exhibit 77).

Exhibit 77. HHA Staff Race and Ethnicity at least Partially Reflects Patients Served with gaps Somewhat Larger in Non-HHVBP Compared to HHVBP States

Percent	HHVBP States		Non-HHVBP States	
	HH Patients	HH Staff	HH Patients	HH Staff
Hispanic	21.4*	22.4*	16.3	11.6
Black	17.4*	14.1	22.6	16.5
American Indian & Alaska Native	3.2*	1.9	3.7	1.8
Asian/Pacific Islander	4.8*	6.6*	7.1	14.2
Non-English speaking[a]	22.8*	26.9	17.1	24.7

Percentages are averaged across all agencies, counting each agency equally regardless of agency size.
**Results statistically different between HHVBP and non-HHVBP States at $p < 0.05$, shown in the respective HHVBP column only. [a] For patients, this refers to those for whom English is not their primary language; for staff, this refers to those who are able to communicate with patients in a language other than English.*

We also compared the percentage of patients and staff in each race/ethnicity category for each agency (rather than in the aggregate as in Exhibit 77). Exhibit 78 shows the difference between those two proportions – we consider proportions within 10 percentage points as "similar" for the larger groups (i.e., Hispanic, Black, and non-English speaking) and within 5 percentage points as "similar" for the smaller race/ethnicity groups (i.e., Asian/Pacific Islander and American Indian & Alaska Native). For example, in 75.9 percent of agencies in HHVBP states, the proportion of Hispanic patients differed from the proportion of Hispanic staff by less than 10 percentage points (i.e., were "similar"); in 9.5 percent of HHVBP agencies, the percentage of Hispanic patients was less than the percentage of Hispanic staff by more than 10 percentage points and in 14.6 percent of HHVBP agencies, the reverse was true (Exhibit 78).

Across agencies, concordance of race/ethnicity between patients and staff is relatively high –in HHVBP states, more than three-quarters of agencies reported having similar proportions of Hispanic patients and staff and approximately two-thirds of agencies indicated they have similar proportions of Black patients and staff. Approximately two-thirds of agencies also reported similar proportions of patients and staff who prefer to or are able to communicate in a language other than English. With the exception of Hispanics, there are no significant differences in patient-staff race/ethnicity and language concordance between HHVBP and non-HHVBP agencies (Exhibit 78).

[44] The concordance in Hispanic ethnicity in HHVBP states may be due to the influence of Florida which has a greater than average Hispanic population.

Exhibit 78. Race/Ethnicity and Language Concordance among Patients and Staff Relatively High in HHBVBP and Non-HHVBP States

Difference between Patient and Staff Proportion	HHVBP States			Non-HHVBP States		
	Patient % < Staff %	Similar[a]	Patient % > Staff %	Patient % < Staff %	Similar[a]	Patient % > Staff %
Hispanic*	9.5%	75.9%	14.6%	3.1%	80.1%	16.8%
Black	7.7%	69.3%	22.9%	6.6%	64.9%	28.5%
Asian/Pacific Islander	12.5%	48.3%	39.2%	11.1%	45.5%	43.4%
American Indian & Alaska Native	2.5%	89.5%	8.0%	2.3%	90.6%	7.1%
Non-English speaking[b]	24.8%	66.1%	9.1%	27.0%	65.6%	7.4%

**Results statistically different between HHVBP and non-HHVBP states at $p < 0.05$.*
[a] Similar is defined as within 10 percentage points for Hispanics, Blacks, and Non-English speaking and within 5 percentage points for Asian/Pacific Islanders and American Indian & Alaska Natives to account for low percentages.
[b] For patients, this refers to those for whom English is not their primary language; for staff, this refers to those who are able to communicate with patients in a language other than English.

10.4 Discussion

Towards the end of the original HHVBP Model, agencies continued to view HHVBP as just one of many factors that influence their focus on performance improvement. Findings from the agency interviews and survey reinforce the importance other payer initiatives have in motivating agencies to engage in performance improvement. For the most part, these motivators aligned with HHVBP incentives, as seen in the similarity of performance improvement activities reported by both HHVBP and comparison agencies. In both data collection efforts, emphasis on staff training and review of OASIS documentation was a common theme.

Of interest, through the survey, more agencies reported that changes with respect to OASIS were being motivated by the broad emphasis on performance improvement in the Medicare program and from MA plans compared to the HHVBP Model. In addition, through our discussions with a diverse group of agencies, it appeared that agency characteristics facilitated the types and robustness of activities implemented. Size and chain affiliation seemed to have a stronger relationship to the agency's activities related to data analytics, staff training, OASIS documentation, and clinical strategies than their presence in an HHVBP or comparison state. During interviews, many agencies in both HHVBP and comparison states frequently stated that they already focused on providing quality patient care and engaged in performance improvement activities prior to the implementation of the original HHVBP Model or that they would be conducting similar efforts regardless of the model.

These direct reports from HHAs, through surveys and in-depth interviews, provide further evidence to support prior years' findings that HHAs are responding to various pressures that generally emphasize greater focus on performance and quality improvement within home health care. The absence of major differences in findings between performance improvement efforts in the original HHVBP and comparison states suggests that HHVBP is not the driving force determining agency operations but sometimes acts as further motivation for improvement.

11. Results: Inequities in Home Health Quality Both Before and After Implementation of HHVBP

11.1 Introduction

As with other VBP programs, it is important to consider whether the HHVBP Model has implications for health equity. While we find evidence of overall improvements in quality under the original HHVBP Model, these gains may not necessarily be occurring uniformly among different beneficiary subgroups. It is possible for the quality incentives under HHVBP to either positively or negatively influence health equity. For example, if quality incentives encourage greater gains among beneficiary subgroups with historically worse outcomes and greater opportunities for quality improvements, there is potential for the HHVBP Model to promote greater health equity. However, as with other VBP programs, HHVBP could contribute to inequities in quality of care. For example, any factors that may have limited quality improvements or access to high quality home health care prior to HHVBP could also represent barriers during model implementation in ways that result in worsening inequities among home health patients.

In this section, we first explore whether effects of the original HHVBP Model differ among home health patients based on (1) enrollment in Medicaid (i.e., whether dually eligible for Medicare and Medicaid, or Medicaid only), or (2) patient race and ethnicity. Our findings indicate that HHVBP was associated with differential changes in home health patient outcomes based on both Medicaid coverage and patient race and ethnicity. The overall impacts of the model in leading to fewer unplanned hospitalizations and greater improvements in functioning were not observed among Medicaid patients, resulting in a pattern of ***modest growth in disparities for Medicaid patients***. We did not find consistent patterns in the implications of the model for racial and ethnic minority groups; relative to outcomes for White non-Hispanic patients, HHVBP is associated with larger gains among Black non-Hispanic patients and smaller gains among Hispanic patients.

We explored whether these results might reflect measurable changes in home health process quality that differed across patient subgroups under HHVBP. In Section 4, we reported findings that increases in HHA use of frontloading skilled nurse and therapist visits can be attributed to the HHVBP Model alongside evidence that these practices are associated with reductions in unplanned hospitalizations. In light of these findings, we tested for possible variation in impacts of HHVBP based on dual eligibility as well as patient race and ethnicity. We found ***no evidence that HHVBP led to differential changes in agency frontloading of home health visits based on dual eligibility status nor patient race and ethnicity***.

Since patient outcomes may depend on the quality of home health care that is available, we also examined inequities in the use of lower quality HHAs. We observed ***overall inequities by race and ethnicity in the use of lower quality agencies that persisted under HHVBP***. In addition, analysis of county-level changes in HHA quality documents that agency quality is unevenly distributed across the U.S., and that inequities in use of lower quality agencies widened or persisted over time for most racial and ethnic minorities. We also considered whether agencies providing care to higher shares of Medicaid patients face greater challenges in improving performance on quality measures, which could reflect greater resource constraints in these agencies and perhaps help to explain our findings involving disparities in outcomes for Medicaid patients. However, our analysis does not point to a strong

relationship between an agency's Medicaid share and the magnitude of their performance improvements over time.

11.2 Motivation: Potential Unintended Consequences of Value-Based Purchasing

The goal of VBP programs to promote overall quality improvement has potential to benefit historically disadvantaged populations through gains in quality of care and patient outcomes. However, a potential unintended consequence of VBP programs is that they may systematically penalize providers who care for patients for whom it is more difficult to achieve quality performance levels that are tied to payment. Previous research involving other care settings indicates potential for unintended consequences of VBP programs for health disparities (Joynt, 2013; Ryan, 2013; Damberg, 2015; Gilman, 2015; Qi, 2020; Aggarwal, 2021). One risk is that VBP programs may redistribute resources away from providers who care for historically underserved populations, which could limit investments in quality improvement and lead to worsening disparities in care and outcomes. This risk is important to evaluate in the context of HHVBP, especially as the payment adjustments grew larger over time relative to other VBP programs.

As we describe in Section 5 of this report, we continued to find no evidence that HHVBP systematically penalizes agencies that care disproportionately for patients with social risk factors, even as the payment adjustments under the model have grown larger over time. This is consistent with our findings for earlier years of the model (Arbor Research, 2020; 2021; 2022). However, these findings do not preclude the possibility that gains in quality under HHVBP are not shared equally among different patient populations. This would be the case if there are greater challenges in improving outcomes for some patients, such as those who face greater social or economic disadvantages that adversely affect their health. If so, there is potential for a widening gap in outcomes over time among patient groups despite the overall quality performance incentives. Alternatively, we should not rule out the possibility that these incentives would motivate disproportionate gains among patient groups for whom there are greater opportunities for improvement.

In the remainder of this section, we first assess whether there were disparities in key home health patient outcomes prior to the implementation of HHVBP based on Medicaid enrollment and race or ethnicity. We then evaluate whether there is a widening gap in home health patient outcomes emerging under the model based on these patient characteristics, or whether there are disproportionate gains under the model for certain patient subgroups that have potentially reduced any existing disparities.

To assess whether the implications of the model are different for patients with Medicaid coverage or certain racial or ethnic minority groups, we examined impact measures that together represent a range of outcomes that are highly relevant to the goals and the design of the model. These impact measures include measures of unplanned ACH and outpatient ED use (without hospitalization), which correspond to the two claims-based HHVBP utilization measures; and composite measures of improvement in mobility and improvement in self-care, which correspond to two of the OASIS-based HHVBP performance measures.

11.3 Modest Growth in Disparities for Patients with Medicaid Coverage

In previous Annual Reports, we reported evidence of differential impacts of HHVBP on home health patients with Medicaid coverage (Arbor Research, 2021; 2022). In particular, the effects of HHVBP in reducing overall unplanned hospitalizations and improving levels of functioning among home health patients were not observed among those with Medicaid coverage and resulted in modest growth in

disparities for this population. In this report, we extend these prior analyses to determine whether these patterns in the effects of the model continued through 2021, the final year of payment adjustments under the original HHVBP Model.

FFS beneficiaries who are dually eligible for Medicare and Medicaid account for between 25 and 35 percent of all FFS home health episodes and have several distinguishing characteristics (Exhibit 79). Relative to other beneficiaries, dually eligible beneficiaries tend to be younger, are more likely to be Hispanic or Black, have a higher average HCC risk score (as an indicator of higher expected costs to Medicare), and were less likely to be discharged from an inpatient facility shortly before the start of home health care (Exhibit 79). Dually eligible beneficiaries are also predisposed to receive care from for-profit agencies and agencies that are not affiliated with a home health chain (Exhibit 79). These patterns remain similar between the baseline period and the post-HHVBP period. There are similar patterns by Medicaid status for the broader population of Medicare and Medicaid home health patients with OASIS data (see Exhibit B-75 [Page 218] in the Technical Appendix).

Exhibit 79. Dual Eligibility Status is Associated with Many Differences in the Characteristics of FFS Home Health Beneficiaries, 2013-2021

	Baseline (2013-2015)		Post Period (2016-2021)	
	Dually Eligible	Non-Dually Eligible FFS	Dually Eligible	Non-Dually Eligible FFS
FFS Episodes (N)				
HHVBP	1,340,689	3,082,241	2,420,664	7,419,040
Non-HHVBP	5,322,666	10,094,882	10,774,716	22,704,281
Average Age (Years)				
HHVBP	70.9	79.7	70.8	80.0
Non-HHVBP	70.2	78.8	70.8	79.1
Female (%)				
HHVBP	66.4	60.2	64.5	58.8
Non-HHVBP	66.9	60.6	64.4	59.1
Race/Ethnicity (Mutually Exclusive) (%)				
Hispanic				
HHVBP	25.5	2.5	17.6	2.2
Non-HHVBP	17.4	3.8	15.6	3.5
Black Non-Hispanic				
HHVBP	17.8	6.7	18.7	6.9
Non-HHVBP	27.3	10.8	22.7	8.7
White Non-Hispanic				
HHVBP	54.4	89.8	60.9	89.8
Non-HHVBP	49.3	83.7	54.4	85.7
Non-Hispanic Other Race				
HHVBP	2.0	0.9	2.6	1.1
Non-HHVBP	5.8	1.6	7.0	2.0
Non-Hispanic Multiracial				
HHVBP	0.2	0.1	0.2	0.1

	Baseline (2013-2015)		Post Period (2016-2021)	
	Dually Eligible	Non-Dually Eligible FFS	Dually Eligible	Non-Dually Eligible FFS
Non-HHVBP	0.2	0.2	0.2	0.1
Average HCC Score (1st Episode)				
HHVBP	2.8	2.6	3.3	2.9
Non-HHVBP	2.7	2.6	3.0	2.9
ESRD Flag				
HHVBP	4.4	2.2	5.8	2.4
Non-HHVBP	5.7	2.6	6.3	2.8
Discharge from Inpatient Facility within 14 Days (%)				
HHVBP	53.3	64.9	57.5	63.2
Non-HHVBP	54.1	65.8	52.2	65.0
Rural (%)				
HHVBP	6.0	4.5	6.3	4.6
Non-HHVBP	10.4	8.9	9.8	8.9
HHA Ownership (%)				
For-Profit				
HHVBP	76.8	68.5	76.3	71.7
Non-HHVBP	77.2	65.5	79.5	69.7
Non-Profit				
HHVBP	20.4	28.3	21.5	25.9
Non-HHVBP	20.5	31.9	19.1	28.6
Government-Owned				
HHVBP	2.8	3.3	2.2	2.5
Non-HHVBP	2.2	2.6	1.5	1.7
HHA Chain Affiliation (%)				
Chain-Affiliated				
HHVBP	39.4	53.0	46.8	56.7
Non-HHVBP	28.1	37.7	31.0	43.5
No Chain Affiliation				
HHVBP	49.9	39.0	44.6	33.7
Non-HHVBP	65.7	53.6	63.4	48.5
Chain Affiliation Unknown/Missing (%)				
HHVBP	10.7	8.0	8.6	9.6
Non-HHVBP	6.1	8.7	5.5	8.0

When not adjusting for differences in patient case-mix, there were mixed patterns in key measures of utilization when comparing dually eligible beneficiaries to other beneficiaries. In both HHVBP and comparison states, there were higher rates of unplanned ACH among dually eligible beneficiaries than other beneficiaries, both in the baseline period and in the post-HHVBP period. Dually eligible beneficiaries were also more likely to have an outpatient ED visit in both groups of states and in both time periods (Exhibit 80).

Exhibit 80. Higher Unadjusted Unplanned ACH and Outpatient ED Use among Dually Eligible FFS Beneficiaries in Both HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)		Post Period (2016-2021)	
	Dually Eligible	Non-Dually Eligible FFS	Dually Eligible	Non-Dually Eligible FFS
Unplanned Acute Care Hospitalization/First HH Episodes (%)				
HHVBP	16.1	15.8	17.2	14.7
Non-HHVBP	16.9	16.0	15.9	15.1
ED Use (No Hospitalization)/First FFS HH Episodes (%)				
HHVBP	13.5	11.5	14.5	11.8
Non-HHVBP	14.6	11.7	14.1	12.0

For a broader population of home health patients with OASIS data, we examined changes over time in composite measures of both self-care and mobility that were not adjusted for patient case-mix. There is a pattern of Medicaid patients having smaller improvements in functioning during home health episodes, in both HHVBP and non-HHVBP states and in both time periods (Exhibit 81).

Exhibit 81. Smaller Unadjusted Total Normalized Composite Change in Self Care and Mobility among Medicaid Patients Compared to Non-Medicaid Patients in Both HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)		Post Period (2016-2021)	
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid
Total Normalized Composite (TNC) Change in Self-Care				
HHVBP	1.3	1.5	1.7	2.0
Non-HHVBP	1.2	1.4	1.6	1.9
Total Normalized Composite (TNC) Change in Mobility				
HHVBP	0.4	0.5	0.6	0.7
Non-HHVBP	0.4	0.5	0.6	0.7

Multivariate analyses also indicated a pattern of worse outcomes for patients with Medicaid before HHVBP was implemented. Medicaid coverage was associated with more frequent outpatient ED visits and with less improvement in self-care and mobility (Exhibit 82). These differences represent disparities in key outcomes for patients with Medicaid prior to implementation of the HHVBP Model, while accounting for demographic, clinical, socioeconomic, and geographic characteristics of beneficiaries, other CMMI models, and agency characteristics (see Section A.5.1.6 [Page 126] in the Technical Appendix for details). Among FFS beneficiaries, dually eligible patients had lower unplanned ACH (Exhibit 82).

Exhibit 82. Medicaid Coverage Associated with Higher Adjusted Outpatient ED Use and Lower Adjusted Total Normalized Composite Change in Self-Care and Mobility Prior to HHVBP Implementation, 2013-2015

Measure	Subgroup Comparison	Difference Estimate	p-value
Unplanned Acute Care Hospitalization/First FFS HH Episodes (%)** [a]	Dually Eligible vs. Non-Dually Eligible	-0.19	<0.001

Measure	Subgroup Comparison	Difference Estimate	p-value
ED Use (No Hospitalization)/First FFS HH Episodes (%)** [a]	Dually Eligible vs. Non-Dually Eligible	2.02	<0.001
Total Normalized Composite (TNC) Change in Self-Care*	Medicaid vs. Non-Medicaid	-0.10	<0.001
Total Normalized Composite (TNC) Change in Mobility*	Medicaid vs. Non-Medicaid	-0.03	<0.001

*See Section A.5.1.7 (Page 127) in the Technical Appendix for details regarding model specifications. * Results obtained from linear regression with state fixed effects. ** Results obtained from linear regression with state fixed effects and HCC risk score. [a] Difference estimates represent percentage point changes.*

To test whether the impact of HHVBP varied among patient subgroups defined based on dual eligibility or Medicaid status, and whether the measured disparities for Medicaid patients during the baseline period worsened or improved under HHVBP, we conducted D-in-D-in-D analyses. These analyses allow for differences in the D-in-D estimates for patient subgroups. In specifying these tests, we supplemented the interactions of treatment group and post-HHVBP indicators in our standard D-in-D models with a third interaction involving the patient subgroup of interest. For details regarding our methods, see Section A.5.1.7 [Page 127] in the Technical Appendix.

The results of our analyses through the final year of payment adjustments under the original HHVBP Model continue to suggest that the improvements occurring under HHVBP are largely occurring among patients without Medicaid coverage (Exhibit 83). For example, the D-in-D estimates by subgroup indicate lower unplanned ACH due to HHVBP among beneficiaries who are not dually eligible (-0.50 percentage points, $p<0.01$), while there was no statistically significant impact of HHVBP for dually eligible beneficiaries (-0.15 percentage points, $p=0.44$). A comparison of these D-in-D estimates points to a differential impact of HHVBP on beneficiaries based on whether they were dually eligible, with HHVBP leading to an increase in unplanned hospitalizations for dually eligible beneficiaries relative to those who are non-dually eligible (D-in-D-in-D estimate of 0.34 percentage points, $p<0.001$).

There is a similar pattern in the findings for the two composite measures of changes in functioning (Exhibit 83). As with other impact measures that are based on OASIS data, these measures are not limited to Medicare FFS beneficiaries, and also include data for both beneficiaries enrolled in Medicare Advantage as well as patients with Medicaid coverage who are not also covered by Medicare. Based on D-in-D estimates for each patient subgroup, there is evidence of improvements in self-care and in mobility due to HHVBP for patients without Medicaid coverage, but not for patients with Medicaid ($p>0.10$ for both measures). The negative D-in-D-in-D estimates indicate that Medicaid patients are falling behind other patients under HHVBP with regard to their improvements in functioning while receiving home health services ($p<0.01$ for both measures in Exhibit 83).

Exhibit 83. No Evidence of Improvements in Utilization or Composite Measures of Change in Functioning due to HHVBP among Home Health Patients with Medicaid Coverage, 2013-2021

Measure	Dually Eligible (Medicaid)			Non-Dually Eligible (Non-Medicaid)			Dually Eligible (Medicaid) minus Non-Dually Eligible (Non-Medicaid)		
	D-in-D	p-value	% Relative Change [b]	D-in-D	p-value	% Relative Change [c]	D-in-D-in-D	p-value	% Relative Change [b]
Unplanned Acute Care Hospitalization/First FFS HH Episodes ††[a]	-0.15	0.44	-0.9%	-0.50	<0.01	-3.2%	0.34	<0.001	2.1%
ED Use (No Hospitalization)/First FFS HH Episodes ††[a]	0.44	0.02	3.3%	0.16	0.37	1.4%	0.29	<0.01	2.1%
Total Normalized Composite (TNC) Change in Self-Care †	0.005	0.80	0.4%	0.05	<0.01	3.4%	-0.05	<0.001	-3.9%
Total Normalized Composite (TNC) Change in Mobility †	0.009	0.19	2.2%	0.02	<0.01	4.2%	-0.01	<0.01	-2.5%

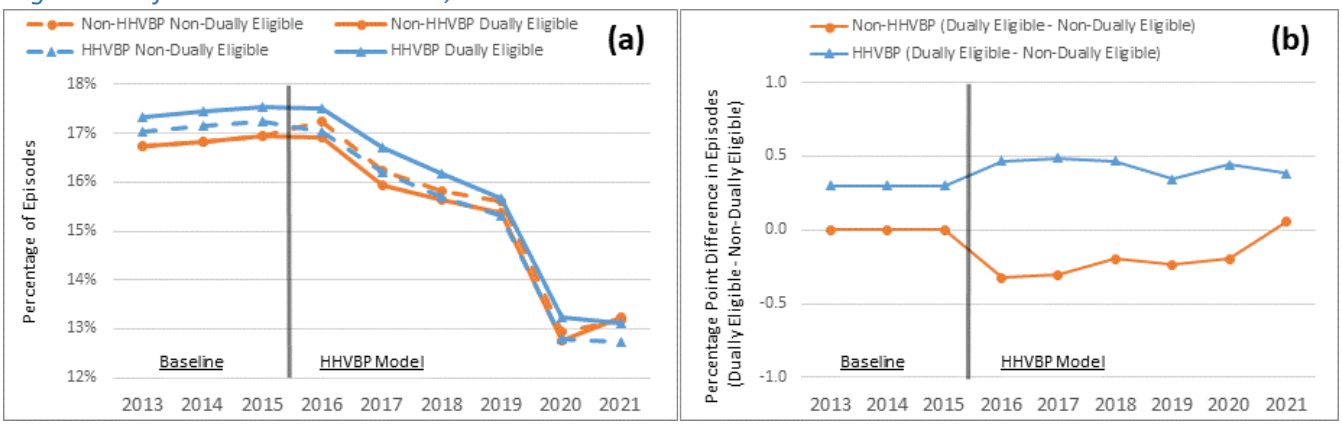
See Section A.5.1.7 (Page 127) in the Technical Appendix for details regarding model specifications. † Results obtained from linear regression with state linear trends. †† Results obtained from linear regression with state linear trends and HCC risk score. [a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for dually eligible or Medicaid patients in HHVBP states (shown in Exhibit 80 and Exhibit 81). [c] Calculated by dividing the model estimate by the baseline mean for non-dually eligible or non-Medicaid patients in HHVBP states (shown in Exhibit 80 and Exhibit 81).

To further understand the implications of HHVBP for patients with and without Medicaid coverage, we plotted adjusted measure rates using estimates from the D-in-D-in-D analyses (see Exhibit 84 and Exhibit 85 below). In the *first panel* of each figure, we show trends during 2013-2021 by HHVBP status and dually eligible status (panel a of each Exhibit). In the *second panel* of each figure, we then show trends in the difference in outcomes between patients with and without Medicaid coverage, separately for those in HHVBP states and non-HHVBP states (panel b of each Exhibit). The second panel shows more directly whether there is a pattern of either worsening or improving disparities over time in HHVBP states relative to the comparison states.

Trends in adjusted annual unplanned ACH rates reflect declines during 2016-2021 for both dually eligible beneficiaries and other beneficiaries, in both HHVBP and comparison states (Exhibit 84 panel a). For all four groups, there was a steeper decline during 2019-2020, which then leveled off from 2020-2021. The difference in hospitalization by dual eligibility status among beneficiaries in HHVBP states remained positive during most of the 2013-2021 period, reflecting higher hospitalizations among dually eligible beneficiaries (Exhibit 84 panel b). In contrast, the difference in the percentage of beneficiaries hospitalized became negative for most of the post-implementation period in non-HHVBP states, indicating a trend towards lower hospitalizations among dually eligible beneficiaries relative to other

beneficiaries. Therefore, the positive D-in-D-in-D estimate for the hospitalization measure in Exhibit 83 does not reflect a worsening disparity in hospitalization among dually eligible beneficiaries in HHVBP states. Instead, the differential impact of HHVBP reflects an overall gain occurring among dually eligible beneficiaries relative to other beneficiaries during the post-implementation period in non-HHVBP states that is not also observed in HHVBP states. We find the observed differences by dual eligibility status to be relatively stable in HHVBP states from 2013-2021 with no evidence of a growing disparity. However, hospitalization rates among dually eligible beneficiaries became more comparable to that of other beneficiaries in non-HHVBP states by 2021.

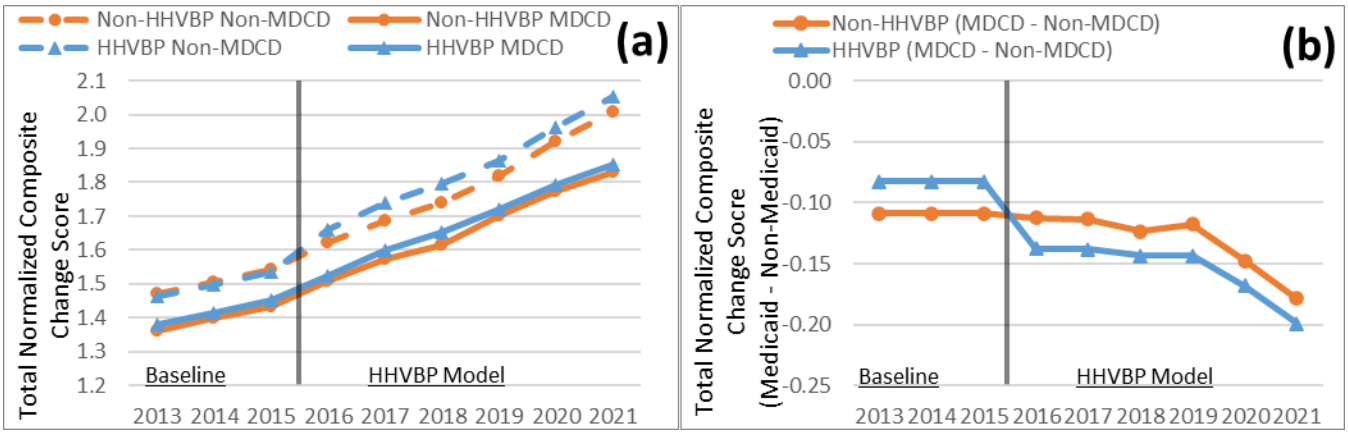
Exhibit 84. (a) Decline in Adjusted Unplanned ACH among Both Dually Eligible and Non-Dually Eligible Beneficiaries and (b) No Evidence of a Growing Disparity in Adjusted Unplanned ACH among Dually Eligible Beneficiaries in HHVBP States, 2013-2021



See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models.

Unlike trends in unplanned ACH, trends in composite measures of change in functioning indicate widening disparities over time which occurred to a greater degree in HHVBP states. For example, there were larger improvements in self-care over time among patients without Medicaid coverage compared to those with Medicaid coverage (Exhibit 85 panel a). Since a larger gap between these two groups emerged over time in HHVBP states compared with non-HHVBP states (Exhibit 85 panel a), there was a slightly larger widening in the disparity over time in HHVBP states (Exhibit 85 panel b). The most recent trends from 2019-2021 show a widening in this disparity in both HHVBP and non-HHVBP states.

Exhibit 85. (a) Slower Increase in Adjusted TNC Change in Self-Care among Medicaid Patients Compared to Non-Medicaid Patients and (b) Slightly Widening Disparity in Adjusted TNC Change in Self-Care for Medicaid Patients in HHVBP States Relative to Non-HHVBP States, 2013-2021



See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models. MDCD=Medicaid.

11.4 HHVBP Impacts Vary by Patient Race and Ethnicity

We used a similar approach to examine whether the impact of HHVBP varied based on the race and Hispanic ethnicity of home health patients and whether there are implications for racial or ethnic disparities in the quality of home health care.[45] In the baseline period, Hispanic beneficiaries accounted for a slightly higher percentage of home health episodes among FFS beneficiaries in HHVBP states than in the comparison states (9.5 percent and 8.5 percent, respectively), while Black beneficiaries accounted for a lower percentage of home health episodes in HHVBP states than in the comparison states (10.1 percent and 16.5 percent, respectively; Exhibit 86). These percentages declined in the post-HHVBP period in both groups of states. Beneficiaries who were identified as other race continued to account for approximately 1 to 3 percent of episodes in both groups of states, while beneficiaries identified as multi-race continued to account for 0.1 to 0.2 percent of episodes in both groups.

Black and Hispanic beneficiaries receiving home health services have several distinguishing characteristics relative to White non-Hispanic beneficiaries. In both HHVBP and non-HHVBP states, Black beneficiaries tend to be younger, are more than twice as likely to be dually eligible for Medicare and Medicaid and are over four times as likely to have ESRD than White non-Hispanic beneficiaries (Exhibit 86). Hispanic beneficiaries also tend to be younger, are more than three times as likely to have dual eligibility, are more likely to have ESRD, are less likely to reside in rural areas, were less likely to have been recently discharged from an inpatient facility prior to the start of home health care, are more likely to receive care from for-profit agencies, and are less likely to receive care from chain-affiliated agencies

[45] For all analyses, race and ethnicity were obtained from OASIS assessments and supplemented with data from the Master Beneficiary Summary File (MBSF) when OASIS data were missing. For further details see Section A.2.1.1 (Page 58) in the Technical Appendix.

Exhibit 86. Characteristics of FFS Home Health Beneficiaries Differ by Race and Hispanic Ethnicity, 2013-2021

	Baseline (2013-2015)					Post Period (2016-2021)				
	Hispanic	Non-Hispanic				Hispanic	Non-Hispanic			
		Black	Other	Multi-	White		Black	Other	Multi-	White
FFS Episodes (N)										
HHVBP	418,777	446,519	53,845	5,764	3,497,092	589,052	964,570	141,687	10,435	8,131,820
Non-HHVBP	1,312,063	2,539,258	467,431	29,149	11,065,725	2,477,641	4,418,097	1,203,997	57,748	25,310,878
Average Age (Years)										
HHVBP	75.1	71.0	75.5	74.5	78.0	76.8	72.0	76.4	74.5	78.5
Non-HHVBP	73.5	70.6	77.0	73.3	77.3	74.0	71.4	77.7	73.9	77.5
Female										
HHVBP	64.1%	62.8%	61.5%	63.6%	61.7%	64.4%	60.7%	60.4%	62.1%	59.9%
Non-HHVBP	61.7%	63.7%	62.1%	62.1%	62.7%	60.2%	62.3%	61.3%	61.3%	60.6%
Medicare and Medicaid Dual Eligibility										
HHVBP	81.7%	53.5%	50.8%	36.2%	20.9%	72.5%	46.9%	44.3%	34.9%	18.1%
Non-HHVBP	70.6%	57.2%	66.0%	43.6%	23.7%	67.8%	55.4%	62.9%	43.1%	23.1%
Average HCC Score (1st Episode)										
HHVBP	2.3	2.9	2.7	2.8	2.7	2.9	3.3	3.0	3.0	3.0
Non-HHVBP	2.5	2.6	2.4	2.6	2.6	2.8	3.0	2.6	2.9	2.9
ESRD										
HHVBP	3.4%	10.1%	6.4%	4.9%	1.9%	5.6%	11.6%	7.4%	5.2%	2.0%
Non-HHVBP	8.8%	8.1%	5.7%	4.5%	2.0%	10.2%	9.8%	6.2%	4.4%	2.2%
Discharge from Inpatient Facility within 14 Days										
HHVBP	32.6%	65.4%	65.7%	64.9%	64.2%	46.5%	66.2%	64.7%	62.0%	62.3%
Non-HHVBP	50.8%	50.9%	51.0%	57.3%	66.0%	52.2%	54.8%	51.0%	57.0%	63.2%
Rural										
HHVBP	0.2%	4.6%	2.3%	4.9%	5.6%	0.4%	4.8%	2.2%	4.4%	5.4%
Non-HHVBP	3.2%	7.1%	5.1%	11.7%	10.9%	3.1%	7.4%	4.6%	13.0%	10.4%
HHA Ownership:										
For-Profit										
HHVBP	91.2%	70.9%	64.4%	67.3%	68.7%	86.8%	73.9%	68.6%	67.2%	71.8%
Non-HHVBP	86.5%	81.2%	80.7%	73.4%	64.4%	86.5%	81.4%	83.0%	70.7%	69.5%
Non-Profit										
HHVBP	8.1%	25.5%	31.0%	29.4%	28.0%	12.5%	23.8%	27.9%	30.4%	25.7%
Non-HHVBP	12.5%	17.1%	17.9%	24.4%	32.8%	12.4%	17.3%	16.2%	27.6%	28.7%
Government-Owned										

	Baseline (2013-2015)					Post Period (2016-2021)				
	Hispanic	Non-Hispanic				Hispanic	Non-Hispanic			
		Black	Other	Multi-	White		Black	Other	Multi-	White
HHVBP	0.8%	3.6%	4.6%	3.4%	3.3%	0.7%	2.3%	3.5%	2.4%	2.5%
Non-HHVBP	1.0%	1.6%	1.4%	2.2%	2.9%	1.0%	1.3%	0.8%	1.7%	1.8%
HHA Chain Affiliation:										
Chain-Affiliated										
HHVBP	12.5%	51.1%	45.6%	46.9%	53.0%	23.8%	58.3%	51.4%	49.3%	56.1%
Non-HHVBP	14.6%	28.5%	19.1%	31.1%	38.7%	19.4%	37.1%	21.6%	31.0%	42.7%
No Chain Affiliation										
HHVBP	71.2%	39.1%	45.7%	43.2%	39.2%	69.6%	32.4%	38.0%	40.5%	34.4%
Non-HHVBP	81.6%	64.7%	76.9%	61.5%	52.6%	76.6%	56.6%	74.6%	61.4%	49.4%
Chain Affiliation Unknown/Missing										
HHVBP	16.3%	9.8%	8.7%	9.8%	7.8%	6.5%	9.2%	10.5%	10.2%	9.5%
Non-HHVBP	3.8%	6.7%	4.0%	7.4%	8.7%	3.9%	6.2%	3.7%	7.5%	7.9%

(Exhibit 86). These patterns by Black race and Hispanic ethnicity persisted in both the baseline and post-HHVBP periods. We found similar patterns when comparing the characteristics of a broader population of home health patients based on race and ethnicity (for details, see Exhibit B-76 [Page 221] in the Technical Appendix).

To evaluate whether the effects of HHVBP vary based on the race and ethnicity of home health patients, we examined the same set of impact measures used above for analyses of Medicaid patients: unplanned ACH, outpatient ED use, and composite measures of changes in mobility and self-care. Based on unadjusted analyses, Hispanic patients are less likely to have an unplanned ACH and an outpatient ED visit than White non-Hispanic patients, especially in HHVBP states (Exhibit 87). Hispanic patients tend to show somewhat less improvement in self-care and mobility than White non-Hispanic patients.

Comparisons involving Black patients reveal different patterns. In both HHVBP and comparison states, frequencies of unplanned ACH and outpatient ED use are higher in the baseline and post-HHVBP periods for Black patients relative to White non-Hispanic patients, while changes in self-care and mobility are relatively similar between the two groups (Exhibit 87). These overall patterns by race and ethnicity persist across the baseline and post-HHVBP periods.

Exhibit 87. Unadjusted Unplanned Acute Care Hospitalization and Outpatient ED Use Highest among Black Non-Hispanic Patients while Unadjusted Total Normalized Composite Change in Self-Care and Mobility Highest among White Non-Hispanic Patients in Both HHVBP States and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)					Post Period (2016-2021)				
	Hispanic	Non-Hispanic				Hispanic	Non-Hispanic			
		Black	Other	Multi-	White		Black	Other	Multi-	White
Unplanned Acute Care Hospitalization/First HH Episodes (%)										
HHVBP	9.6	18.9	16.4	17.2	16.2	12.9	18.2	15.2	15.3	15.1
Non-HHVBP	14.9	16.6	13.8	16.2	16.4	14.7	16.7	13.2	14.8	15.3
ED Use (No Hospitalization)/First FFS HH Episodes (%)										
HHVBP	8.3	14.8	11.5	12.8	12.0	10.3	14.7	11.8	13.2	12.3
Non-HHVBP	12.5	14.1	9.3	13.1	12.4	12.8	14.0	9.3	13.3	12.4
Total Normalized Composite (TNC) Change in Self-Care										
HHVBP	1.4	1.3	1.3	1.3	1.4	1.7	1.9	1.8	1.8	2.0
Non-HHVBP	1.1	1.2	1.2	1.2	1.4	1.6	1.7	1.6	1.7	1.9
Total Normalized Composite (TNC) Change in Mobility										
HHVBP	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.7	0.7	0.7
Non-HHVBP	0.3	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.7

We conducted regression analyses to examine whether these differences in outcomes by race and ethnicity are also observed when adjusting for differences in beneficiary case-mix and other factors (see Section A.5.1.6 [Page 126] in the Technical Appendix for details). Results from these analyses indicate that outpatient ED use was 0.9 percentage points higher among Black beneficiaries compared with White non-Hispanic beneficiaries during the baseline period (Exhibit 88). Black patients also showed smaller improvements in self-care and mobility based on analysis of composite change in functioning scores. These differences represent disparities for Black beneficiaries prior to implementation of the model while accounting for demographic, clinical, socioeconomic, and geographic characteristics of beneficiaries, other CMMI models, and agency characteristics. Similar comparisons involving Other race

and White non-Hispanic patients do not show a strong pattern of disparities in outcomes for Other race patients prior to HHVBP (see Exhibit B-77 [Page 224] in the Technical Appendix for details).

Exhibit 88. Higher Adjusted Outpatient ED Use and Lower Adjusted Total Normalized Composite Change in Self-Care and Mobility among Black versus White Non-Hispanic Beneficiaries Prior to HHVBP Implementation, 2013-2015

Measure	Subgroup Comparison	Difference Estimate	P-value
Unplanned Acute Care Hospitalization/First FFS HH Episodes (%)** [a]	Black vs. White Non-Hispanic	-0.13	0.05
ED Use (No Hospitalization)/First FFS HH Episodes (%)** [a]	Black vs. White Non-Hispanic	0.90	<0.001
Total Normalized Composite (TNC) Change in Self-Care*	Black vs. White Non-Hispanic	-0.03	<0.001
Total Normalized Composite (TNC) Change in Mobility*	Black vs. White Non-Hispanic	-0.01	<0.001

*See Section A.5.1.6 (Page 126) of the Technical Appendix for details regarding model specifications. * Results obtained from linear regression with state fixed effects. ** Results obtained from linear regression with state fixed effects and HCC risk score. [a] Difference estimates represent percentage point changes.*

As with the analyses in the previous section that examined the impact of HHVBP on patients with Medicaid, we used D-in-D-in-D analyses to test whether the impact of HHVBP varied based on patient race and ethnicity. Across the four impact measures, D-in-D-in-D models provide evidence of more favorable impacts of HHVBP for Black patients compared to White non-Hispanic patients. In particular, we find that the reductions in unplanned ACH and increases in composite self-care and mobility change scores due to HHVBP were larger for Black non-Hispanic patients than for White non-Hispanic patients (Exhibit 89). In contrast, we find no difference by race in the impact of HHVBP on outpatient ED use.

Exhibit 89. HHVBP Associated with Larger Improvements in Outcomes for Black versus White Non-Hispanic Beneficiaries 2013-2021

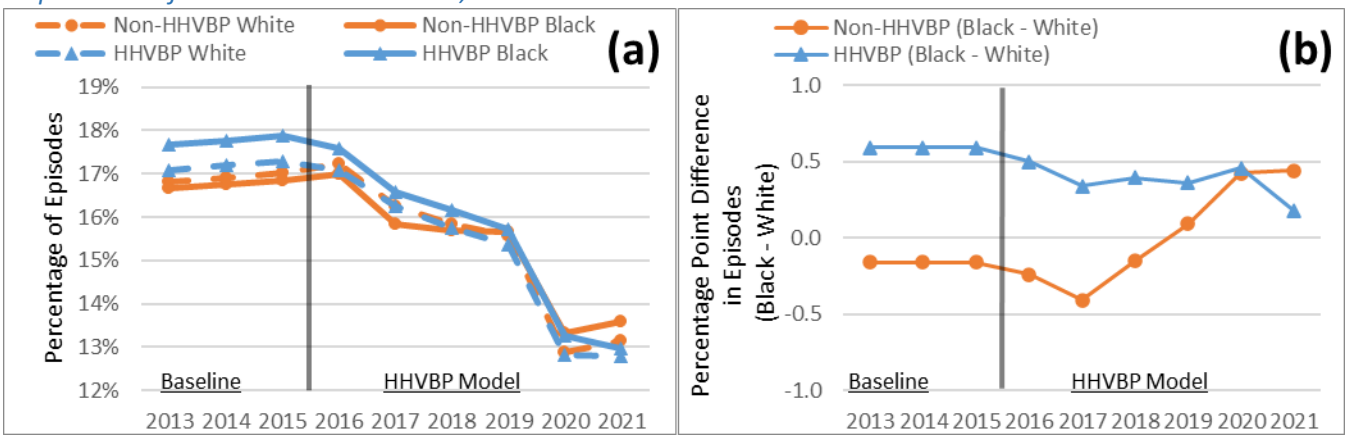
Measure	Black Non-Hispanic			White Non-Hispanic			Black Non-Hispanic – White Non-Hispanic		
	D-in-D	P-value	% Relative Change [b]	D-in-D	P-value	% Relative Change [c]	D-in-D-in-D	P-value	% Relative Change [b]
Unplanned Acute Care Hospitalization/First FFS HH Episodes ††[a]	-0.77	<0.001	-4.1%	-0.41	0.03	-2.5%	-0.36	0.01	-1.9%
ED Use (No Hospitalization)/First FFS HH Episodes ††[a]	0.26	0.22	1.8%	0.26	0.14	2.2%	0.001	0.99	0.01%
Total Normalized Composite (TNC) Change in Self-Care†	0.07	<0.01	5.2%	0.05	0.02	3.5%	0.02	0.05	1.5%

Measure	Black Non-Hispanic			White Non-Hispanic			Black Non-Hispanic – White Non-Hispanic		
	D-in-D	P-value	% Relative Change [b]	D-in-D	P-value	% Relative Change [c]	D-in-D-in-D	P-value	% Relative Change[b]
Total Normalized Composite (TNC) Change in Mobility [†]	0.03	<0.001	6.9%	0.02	0.02	4.3%	0.01	0.03	2.3%

See Section A.5.1.7 (Page 127) of the Technical Appendix for details regarding model specifications. [†] Results obtained from linear regression with state linear trends. [††] Results obtained from linear regression with state linear trends and HCC risk score. [a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for Black non-Hispanic patients in HHVBP states (shown in Exhibit 87). [c] Calculated by dividing the model estimate by the baseline mean for White non-Hispanic patients in HHVBP states (shown in Exhibit 87).

We also used plots of adjusted measure rates to further understand the relative trends for patients in specific race and ethnicity groups. As with the trends seen by dual eligibility status in the previous section, the frequency of unplanned ACH declined during much of the 2016-2021 period, for both Black and White non-Hispanic beneficiaries in both HHVBP and comparison states (Exhibit 90 panel a). In HHVBP states, hospitalization rates remained higher for Black compared to White non-Hispanic beneficiaries and declined at similar rates during the post-HHVBP period. In the comparison states, there was a slightly steeper decline in hospitalization rates among White compared to Black non-Hispanic beneficiaries during the post-HHVBP period.

Exhibit 90. (a) Decline in Adjusted Unplanned ACH among Both Black and White Non-Hispanic Beneficiaries and (b) No Evidence of a Growing Disparity in Adjusted Unplanned ACH among Black Non-Hispanic Beneficiaries in HHVBP States, 2013-2021



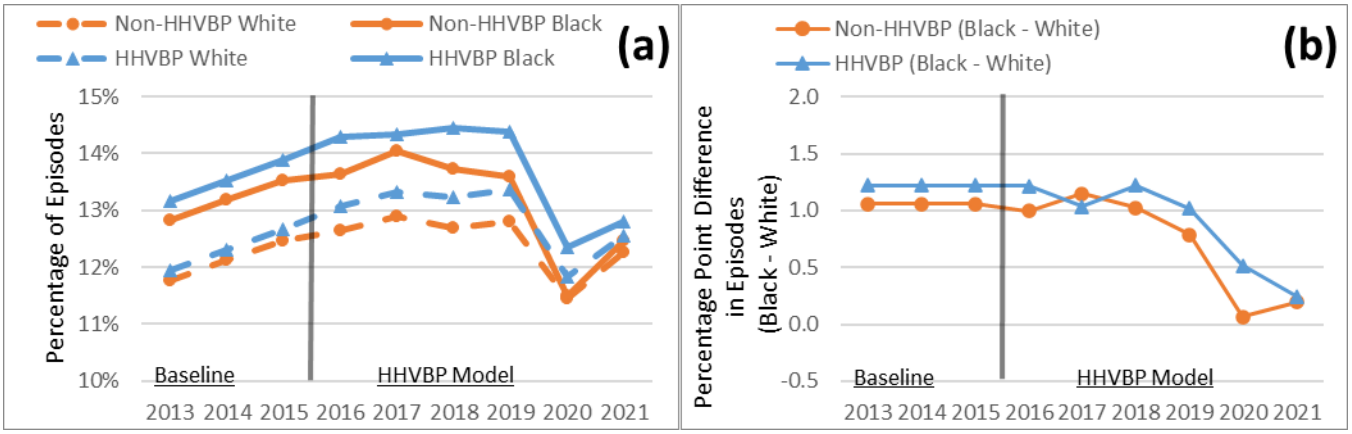
See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models

The result of these trends is a relatively stable racial disparity in hospitalization rates in HHVBP states of approximately 0.5 percentage points and a trend towards an emerging racial disparity in non-HHVBP states (Exhibit 90 panel b). Hence, the more favorable impact of HHVBP on hospitalization rates among Black compared to White non-Hispanic beneficiaries indicated by the D-in-D-in-D model above reflects the fact that while there have been similar declines in hospitalization among Black compared to White

non-Hispanic beneficiaries in HHVBP states in the post-implementation period, there were somewhat smaller declines for Black compared to White non-Hispanic beneficiaries in non-HHVBP states.

Trends in outpatient ED use are similar for beneficiaries in both race groups for much of the observation period, for both HHVBP and comparison states (Exhibit 91). For all four groups (panel a), ED use trended upward through 2019, declined sharply in 2020, and then bounced back up slightly in 2021. In both HHVBP and comparison states, there was a racial disparity in ED use of approximately one percentage point that persisted until 2020, when there was a narrowing of the disparity due to steeper declines in ED use among Black compared to White non-Hispanic beneficiaries. Together with the results of the D-in-D-in-D model, we conclude that HHVBP has had no impact on racial disparities in ED use.

Exhibit 91.(a) Increasing Adjusted ED Use (No Hospitalization) followed by a Recent Decline among both Black and White Non-Hispanic Beneficiaries and (b) Relatively Similar Racial Disparities in Adjusted ED Use in HHVBP and Non-HHVBP States, 2013-2021



See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models.

We used similar analytic approaches to assess the implications of the HHVBP Model for Hispanic beneficiaries. When using multivariate regression to compare outcomes during the baseline period, we find lower rates of both unplanned ACH and outpatient ED use for Hispanic beneficiaries compared to White non-Hispanic beneficiaries (Exhibit 92). The percentage of home health episodes with a hospitalization was 0.83 percentage points lower for Hispanic beneficiaries, while the percentage of home health episodes with an outpatient ED visit was 0.64 percentage points lower for Hispanic beneficiaries. A comparison of composite change in functioning scores did not reveal consistent differences between Hispanic and White non-Hispanic patients, with lower change scores for self-care among Hispanic patients and no difference between the two groups in change scores for mobility (Exhibit 92).

Exhibit 92. Lower Adjusted Unplanned Hospitalizations and Outpatient ED Use and Lower Adjusted Total Normalized Composite Changes in Self-Care among Hispanic versus White Non-Hispanic Patients Prior to HHVBP Implementation, 2013-2015

Measure	Subgroup Comparison	Difference Estimate	P-value
Unplanned Acute Care Hospitalization/First FFS HH Episodes (%)** [a]	Hispanic vs. White Non-Hispanic	-0.83	<0.001

Measure	Subgroup Comparison	Difference Estimate	P-value
ED Use (No Hospitalization)/First FFS HH Episodes (%)** [a]	Hispanic vs. White Non-Hispanic	-0.64	<0.001
Total Normalized Composite (TNC) Change in Self-Care*	Hispanic vs. White Non-Hispanic	-0.02	0.02
Total Normalized Composite (TNC) Change in Mobility*	Hispanic vs. White Non-Hispanic	-0.003	0.34

See Section A.5.1.6 (Page 126) of the Technical Appendix for details regarding model specifications. Results obtained from linear regression with state fixed effects. ** Results obtained from linear regression with state fixed effects and HCC risk score. [a] Difference estimates represent percentage point changes.*

When using D-in-D-in-D models to examine impacts of HHVBP, we find evidence of unfavorable changes under HHVBP for Hispanic patients relative to White non-Hispanic patients. Unlike the 0.41 percentage point reduction in hospitalizations due to HHVBP observed among White non-Hispanic beneficiaries, we find HHVBP to be associated with a 0.73 percentage point *increase* in hospitalizations for Hispanic beneficiaries (Exhibit 93). Similarly, unlike the positive impact of HHVBP on composite change scores for both self-care and mobility that is observed among White non-Hispanic patients, HHVBP is associated with a reduction in composite change scores for Hispanic patients.

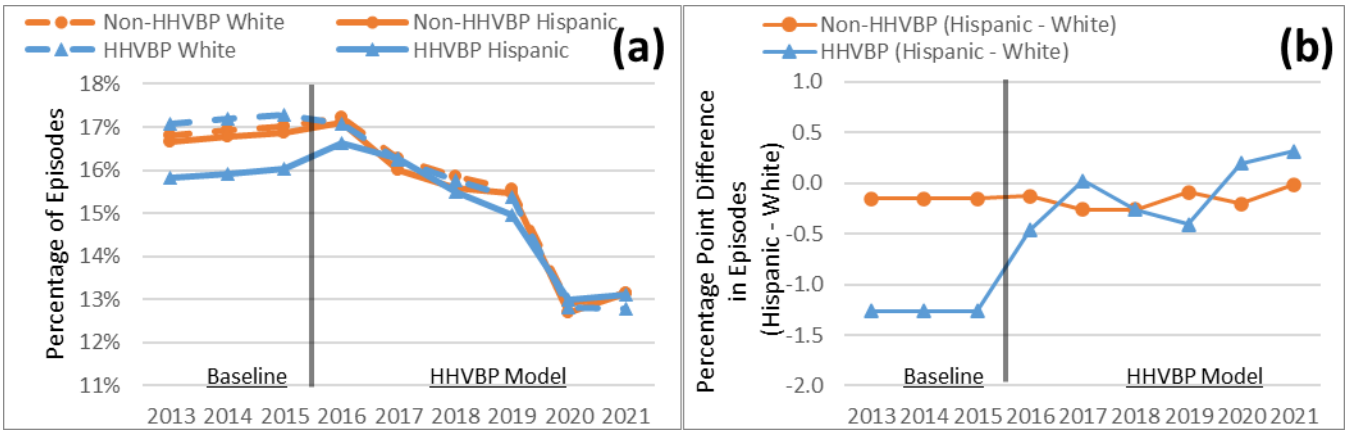
Exhibit 93. HHVBP Not Associated with Improvements in Outcomes for Hispanic Patients, 2013-2021

Measure	Hispanic			White Non-Hispanic			Hispanic – White Non-Hispanic		
	D-in-D	p-value	% Relative Change [b]	D-in-D	p-value	% Relative Change [c]	D-in-D-in-D	p-value	% Relative Change [b]
Unplanned Acute Care Hospitalization/First FFS HH Episodes [††] [a]	0.73	<0.01	7.6%	-0.41	0.03	-2.5%	1.14	<0.001	11.9%
ED Use (No Hospitalization)/First FFS HH Episodes [††] [a]	0.23	0.31	2.8%	0.26	0.14	2.2%	-0.02	0.88	-0.2%
Total Normalized Composite (TNC) Change in Self-Care [†]	-0.13	<0.001	-9.3%	0.05	0.02	3.5%	-0.17	<0.001	-12.1%
Total Normalized Composite (TNC) Change in Mobility [†]	-0.03	<0.01	-7.0%	0.02	0.02	4.3%	-0.05	<0.001	-11.7%

See Section A.5.1.7 (Page 127) in the Technical Appendix for details regarding model specifications. [†] Results obtained from linear regression with state linear trends. [††] Results obtained from linear regression with state linear trends and HCC risk score. [a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for Hispanic patients in HHVBP states (shown in Exhibit 80 and Exhibit 81).[c] Calculated by dividing the model estimate by the baseline mean for White Non-Hispanic patients in HHVBP states (shown in Exhibit 80 and Exhibit 81).

Plots of adjusted ACH rates show that the unfavorable relative trend under HHVBP for Hispanic beneficiaries appears to result specifically from changes between 2015 and 2016, the first year of the model. In non-HHVBP states, trends in hospitalization are similar for Hispanic and White non-Hispanic beneficiaries throughout the 2013-2021 period (Exhibit 94 panel a). In contrast, there is a convergence in hospitalization rates between the two groups in HHVBP states that primarily occurs between 2015 and 2016, with hospitalization rates among Hispanic beneficiaries rising towards rates observed among White non-Hispanic beneficiaries. Starting in 2016, the difference in hospitalization rates between the two groups in HHVBP states is smaller (within 0.5 percentage points), and is generally similar to the difference observed in non-HHVBP states (Exhibit 94 panel b). Evidence of an unfavorable impact of HHVBP on hospitalizations for Hispanic beneficiaries in Exhibit 93 above therefore corresponds to a lessening of the initial advantage for Hispanic beneficiaries compared to White non-Hispanic beneficiaries in HHVBP states that appears largely driven by trends during 2015-2016.

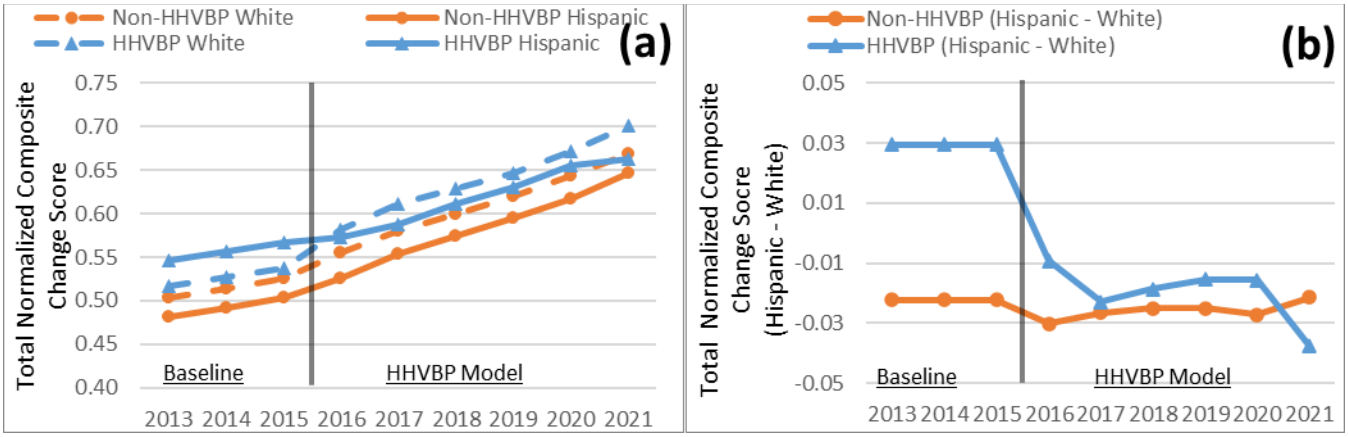
Exhibit 94. (a) Decline in Adjusted Unplanned ACH among Both Hispanic and White Non-Hispanic Beneficiaries and (b) Narrowing of the Difference in Adjusted Unplanned ACH by Hispanic Ethnicity in HHVBP States, 2013-2021



See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models.

Comparisons of trends in composite change scores for mobility reveal patterns among Hispanic and White non-Hispanic patients that are similar to those observed above for hospitalization. In non-HHVBP states, there are relatively similar upward trends among patients in both race/ethnicity groups during 2013-2021 (Exhibit 95 panel a). In HHVBP states, however, there is a smaller increase for Hispanic patients than for White non-Hispanic patients, such that the initial advantage for Hispanic patients during the baseline period becomes a disparity in the post-HHVBP period (Exhibit 95 panel b). As with hospitalizations, there is a notable shift in the difference between Hispanic and White non-Hispanic patients in HHVBP states during 2015-2016, and thereafter the difference between the two groups is relatively similar in HHVBP and non-HHVBP states.

Exhibit 95. (a) Smaller Increase in Adjusted Total Normalized Composite (TNC) Change in Mobility among Hispanic versus White Non-Hispanic Patients in HHVBP States and (b) Emerging Disparity in Adjusted TNC Change in Mobility for Hispanic Patients in HHVBP States, 2013-2021



See Section A.1.5.3 (Page 43) in the Technical Appendix for additional details regarding the techniques used to generate risk-adjusted values of the measures from the multivariable linear regression models.

11.5 No Evidence that HHVBP Impacts on the HHA Practice of Frontloading Visits Varies by Medicaid Coverage or Race and Ethnicity of Patients

In the two preceding sections, we report evidence of disparities in certain quality outcome measures based on both Medicaid status and race and ethnicity. We also report that the effects of HHVBP on these outcomes have not been uniform across all patient subgroups, and in some instances result in somewhat widening disparities under HHVBP. These findings are based on analyses of a range of outcomes that include unplanned hospitalizations, outpatient ED visits, and measures of changes in functioning. The sources of these disparities and differential changes occurring for underserved populations under HHVBP are not known.

One possible explanation for these findings is that there are differences across patient subgroups in how home health care is being delivered, both prior to HHVBP and potentially also in response to HHVBP. For example, this could be the case if the degree to which home health visits are frontloaded during episodes (with a goal of improving patient outcomes) is different and perhaps also changed differently under HHVBP for underserved populations. As discussed in Section 4, we found evidence that HHVBP led to an increase in frontloading of skilled nursing and therapy visits during the first week of care, but such changes may not have occurred uniformly across all patient groups.

To evaluate whether the effects of HHVBP on the use of frontloading varies based on dual eligibility status, we examined frontloading of skilled nursing and therapy visit types in claims-based visit-level data from home health episodes and focused on first episodes in sequences that followed within 14 days from an institutional discharge due to the greater risk such episodes have for subsequent unplanned hospitalizations. As for the analyses in Section 4, episodes are characterized as having frontloaded visits when there are more skilled nursing or therapy visits during the first week relative to the second week of the episode.

Based on unadjusted analyses for frontloading of skilled nursing visits, dually eligible patients have a similar percentage of post-institutional first home health episodes frontloaded as non-dually eligible home health episodes in HHVBP states during both the baseline period (between 58 and 59 percent)

and post-HHVBP period (54 percent; Exhibit 96). In non-HHVBP states, dually eligible patients have slightly higher levels of skilled nurse frontloading relative to non-dually eligible home health episodes. In both HHVBP and non-HHVBP groups, the percentages of first episodes frontloaded with skilled nurse visits declined slightly between the baseline and post-HHVBP periods (Exhibit 96). Dually eligible FFS beneficiaries have smaller percentages of post-institutional home health episode frontloaded with therapy visits in both HHVBP and non-HHVBP states during the baseline and post-institutional periods (Exhibit 96).

Exhibit 96. Relatively Similar Levels of Unadjusted Skilled Nursing Visit Frontloading and Lower Levels of Therapy Visit Frontloading Between Dually Eligible and Non-Dually Eligible FFS Beneficiaries in Both HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)		Post Period (2016-2021)	
	Dually Eligible	Non-Dually Eligible	Dually Eligible	Non-Dually Eligible
Frontloading Skilled Nursing Visits[a], Post-institutional First HH Episodes (%)				
HHVBP	58.3%	58.8%	54.2%	54.3%
Non-HHVBP	59.6%	58.8%	56.1%	54.7%
Frontloading Therapy Visits[a], Post-institutional First HH Episodes (%)				
HHVBP	26.6%	31.6%	29.4%	33.9%
Non-HHVBP	23.9%	29.5%	26.1%	31.1%

[a] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

Multivariate analyses indicated a mixed pattern of greater frontloading of skilled nurse visits and less frontloading of therapist visits for dually eligible patients relative to non-dually eligible Medicare FFS patients. In particular, our adjusted analyses found that the percentage of episodes frontloaded with skilled nurse visits was 0.5 percentage points higher for dually eligible FFS patients than for non-dually eligible FFS patients during the baseline period before HHVBP was implemented. But in the same period, the percentage of episodes frontloaded with therapist visits was 2.65 percentage points lower for dually eligible patients than for non-dually eligible patients (Exhibit 97; see Section A.5.1.2 [Page 122] in the Technical Appendix for details).

Exhibit 97. Dual Eligibility Status Associated with Higher Adjusted Skilled Nursing Frontloading and Lower Adjusted Therapy Frontloading Prior to HHVBP Implementation, 2013-2015

Measure	Subgroup Comparison	Difference Estimate	P-value
Frontloading Skilled Nursing Visits[a] (Visit Distribution), Post-institutional Episodes	Dually Eligible vs. Non-Dually Eligible	0.50	<0.001
Frontloading Therapy Visits[a] (Visit Distribution), Post-institutional Episodes	Dually Eligible vs. Non-Dually Eligible	-2.65	<0.001

[a] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

To test whether the impact of HHVBP on visit frontloading varied by dual eligibility status, we conducted D-in-D-in-D analyses. For details regarding our methods, see Section A.5.1.2 (Page 122) in the Technical Appendix. The results of our analyses suggest that the HHVBP effects on skilled nursing and therapy frontloading were similar among dually eligible and non-dually eligible Medicare FFS patients. The D-in-

D estimates in each subgroup indicate higher percentages of episodes with skilled nursing and therapy visits frontloaded for dually eligible patients (1.27 percentage points and 2.53 percentage points, respectively; Exhibit 98), and for non-dually eligible patients (1.42 percentage points and 2.71 percentage points, respectively). A comparison of these D-in-D estimates finds no evidence of a differential impact of HHVBP on frontloading of skilled nursing or therapy visits based on dual eligibility status.

Exhibit 98. HHVBP Associated with Similar Increase in Frontloading for Dually Eligible Patients and Non-Dually Eligible Patients, for Both Skilled Nursing and Therapy Visits, 2013 – 2021

Measure	Dually Eligible			Non-Dually Eligible			Dually Eligible minus Non-Dually Eligible		
	D-in-D[a]	p-value	% Relative Change[b]	D-in-D[a]	p-value	% Relative Change[c]	D-in-D-in-D[a]	p-value	% Relative Change[b]
Frontloading Skilled Nursing Visits[d] (Visit Distribution), Post-institutional Episodes[a]	1.27	0.07	2.2%	1.42	0.04	2.4%	-0.15	0.62	-0.3%
Frontloading Therapy Visits[d] (Visit Distribution), Post-institutional Episodes[a]	2.53	<0.001	9.5%	2.71	<0.001	8.6%	-0.18	0.48	-0.7%

[a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for dually eligible patients in HHVBP states (shown in Exhibit 80).[c] Calculated by dividing the model estimate by the baseline mean for non-dually eligible patients in HHVBP states (shown in Exhibit 80).[d] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

We used a similar approach to examine whether the impact of HHVBP on visit frontloading varies based on the race and ethnicity of Medicare FFS home health patients. In both HHVBP and non-HHVBP groups and both the baseline and post-HHVBP periods, Black non-Hispanic beneficiaries had the lowest skilled nursing frontloading rate among the three groups and were in between the levels of therapy frontloading for Hispanic and White non-Hispanic beneficiaries in both HHVBP states and non-HHVBP states. Also, in both HHVBP and non-HHVBP states and across both time periods, Hispanic patients had the highest percentage of episodes frontloaded with skilled nursing visits, but lowest percentage frontloaded with therapy visits (Exhibit 99).

Exhibit 99. Unadjusted Skilled Nursing Visit Frontloading Lowest among Black Patients and Highest among Hispanic Patients, while Unadjusted Therapy Visit Frontloading Lowest among Hispanic Patients, in Both HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)			Post Period (2016-2021)		
	Black Non-Hispanic	White Non-Hispanic	Hispanic	Black Non-Hispanic	White Non-Hispanic	Hispanic
Frontloading Skilled Nursing Visits[a] (Visit Distribution), Post-institutional Episodes						

Measure	Baseline (2013-2015)			Post Period (2016-2021)		
	Black Non-Hispanic	White Non-Hispanic	Hispanic	Black Non-Hispanic	White Non-Hispanic	Hispanic
HHVBP	54.0%	59.1%	63.0%	49.5%	54.8%	58.4%
Non-HHVBP	58.3%	59.0%	60.3%	54.6%	54.9%	56.5%
Frontloading Therapy Visits[a] (Visit Distribution), Post-institutional Episodes						
HHVBP	27.7%	31.2%	24.7%	29.7%	33.7%	28.9%
Non-HHVBP	24.4%	29.3%	22.5%	27.0%	31.0%	24.6%

[a] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

Multivariate analyses indicated a consistent pattern of significantly less use of frontloading both skilled nursing (-1.14 percentage points) and therapy visits (-2.72) during post-institutional episodes among Black patients relative to White non-Hispanic patients in the baseline period. The analyses revealed a mixed pattern for Hispanic patients, with significantly higher use of frontloading skilled nursing visits (1.29 percentage points) and significantly lower use of frontloading therapy visits (-3.92 percentage points) relative to White non-Hispanic patients (Exhibit 100).

Exhibit 100. Racial and Ethnic Differences in Adjusted Skilled Nursing and Therapy Frontloading Prior to HHVBP Implementation, 2013-2015

Measure	Black vs. White Non-Hispanic		Hispanic vs. White Non-Hispanic	
	Difference Estimate	P-value	Difference Estimate	P-value
Frontloading Skilled Nursing Visits[a] (Visit Distribution), Post-institutional Episodes	-1.14	<0.001	1.29	0.06
Frontloading Therapy Visits[a] (Visit Distribution), Post-institutional Episodes	-2.72	<0.001	-3.92	<0.001

[a] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

As with the earlier analyses that examined the impacts of HHVBP on frontloading home health visits based on patient dual eligibility status, we used D-in-D-in-D analyses to test whether the impact of HHVBP on frontloading of skilled nursing and therapy visits varied based on patient race and ethnicity. Across the two measures of frontloading, we found no evidence from the D-in-D-in-D models of significant differential impacts of HHVBP on the use of frontloading by race and ethnicity (Exhibit 101 and Exhibit 102). We find that HHVBP was associated with an increase in the percentage of episodes with skilled nursing and therapy visit frontloading among all three race and ethnicity groups examined, with one exception (frontloading of skilled nursing visits among Black non-Hispanic beneficiaries in Exhibit 101).

Exhibit 101. No Statistically Significant Difference in HHVBP Impact on Skilled Nursing and Therapy Frontloading between Black and White Non-Hispanic Patients, 2013-2021

Measure	Black Non-Hispanic			White Non-Hispanic			Black Non-Hispanic minus White Non-Hispanic		
	D-in-D	p-value	% Relative Change[b]	D-in-D	p-value	% Relative Change[c]	D-in-D-in-D	p-value	% Relative Change[b]
Frontloading Skilled Nursing Visits[d] (Visit Distribution), Post-institutional Episodes	0.86	0.27	1.6%	1.48	0.04	2.5%	-0.61	0.16	-1.1%
Frontloading Therapy Visits[d] (Visit Distribution), Post-institutional Episodes	2.47	<0.001	8.9%	2.59	<0.001	8.3%	-0.12	0.75	-0.4%

[a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for Black patients in HHVBP states (shown in Exhibit 80).[c] Calculated by dividing the model estimate by the baseline mean for White Non-Hispanic patients in HHVBP states (shown in Exhibit 80).[d] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

Exhibit 102. Similar HHVBP effect on Skilled Nursing Frontloading and Therapy Frontloading for Both Medicaid Patients and Non-Medicaid Patients. No Statistically Significant Difference in HHVBP Impact on Skilled Nursing and Therapy Frontloading between Hispanic and White Non-Hispanic Patients, 2013-2021

Measure	Hispanic			White Non-Hispanic			Hispanic minus White Non-Hispanic		
	D-in-D	p-value	% Relative Change[b]	D-in-D	p-value	% Relative Change[c]	D-in-D-in-D	p-value	% Relative Change[b]
Frontloading Skilled Nursing Visits[d] (Visit Distribution), Post-institutional Episodes	1.81	0.05	2.90%	1.58	0.03	2.70%	0.23	0.73	0.40%
Frontloading Therapy Visits[d] (Visit Distribution), Post-institutional Episodes	3.11	<0.001	12.60%	2.67	<0.001	8.60%	0.45	0.47	1.80%

[a] D-in-D values represent percentage point changes. [b] Calculated by dividing the model estimate by the baseline mean for Hispanic patients in HHVBP states (shown in Exhibit 80).[c] Calculated by dividing the model estimate by the baseline mean for White Non-Hispanic eligible patients in HHVBP states (shown in Exhibit 80).[d] Frontloading is defined as a binary variable where 1 indicates more visits by the profession type occurred during the first week than the second week of the episode; 0 otherwise.

11.6 Racial and Ethnic Inequities in the Use of Lower Quality HHAs

The HHVBP Model was designed to improve home health quality overall, not to address health disparities. Recently we examined whether the model played a role in bringing higher quality home health services to racial and ethnic minorities. Specifically, we examined who is being served by higher quality HHAs and who is being served by lower quality HHAs and whether these patterns differed between HHAs in HHVBP versus non-HHVBP demonstration states. These analyses can help assess HHVBP from an equity standpoint: gaps between racial and ethnic minorities and White beneficiaries in the use of lower quality HHAs may be a pathway to addressing disparities in health outcomes. Racial and ethnic minority beneficiaries are more likely to live in areas served by lower quality HHAs. However, we found that this overall pattern could vary slightly across different race/ethnicity subpopulations. Broadly, we found no evidence of a change in pre-existing inequities in use of lower quality HHAs in HHVBP states. Our detailed results are presented below.

11.6.1 Methods Overview

To investigate the trends in utilization of lower quality HHAs, we focused on four outcome measures of HHA performance: the two HHVBP claims-based measures; the HHVBP HHCAHPS-based Overall Care measure, and CMS' Star rating. Exhibit 103 shows how lower quality of care was defined for each of the four measures.

Exhibit 103. Definition of Lower Quality Home Health Agencies

Outcome Measure	Indicator of Lower Quality
Unplanned Acute Care Hospitalization (ACH), risk adjusted	Agencies in top tercile of ACH rate for a particular calendar year (highest ACH rates)
Outpatient Emergency Department (ED) Use with no Hospitalization, risk adjusted	Agencies in top tercile of measure rate for a particular calendar year (highest ED rates)
HHCAHPS Overall Care Rating	Agencies in the bottom tercile of HHCAHPS Overall Care Rating for particular calendar year (lowest rating)
CMS Star Rating	Agencies with CMS Star Rating of 3 or below (lowest rating)

All outcomes used in the analysis reflect the performance of the HHAs in the year during which the respective analyzed episode of care occurred.

The four outcomes of interest are indicators of whether the care in a particular home health episode was delivered by a lower quality HHA based on the respective outcome measures. The analysis uses home health episodes in two pre-HHVBP years (2014-2015) and two post-HHVBP years (2018-2019) for beneficiaries continuously enrolled in FFS for 12 months prior to the start of their home health episode.[46]

To compare the racial and ethnic inequities in the utilization of lower quality HHAs across time and HHVBP state participation status, we used logistic regressions for each of the four outcomes and for each of the four pre-/post- and model status combinations (pre-HHVBP period for HHVBP states; pre-HHVBP period for non-HHVBP states; post-HHVBP period for HHVBP states; post-HHVBP period for non-HHVBP states) and estimated odds ratios of utilizing lower quality HHAs among racial and ethnic minority beneficiaries, relative to their White counterparts. The first model controls for dual eligibility

[46] Episodes in HHAs with a missing outcome measure in both years of a particular two-year period were dropped from the analysis for that period and outcome measure.

status, age, sex, rurality, HCC score and the Health and Human Services (HHS) region[47] from which a non-HHVBP or HHVBP state was drawn, as well as the Centers for Disease Control and Prevention (CDC) Social Vulnerability Index (CDC, 2020) and the Racial Dissimilarity Index (US Census Bureau, 2022)[48] associated with the county in which the care was delivered (Model 1). To understand whether results are driven by the fact that minority racial and ethnic groups disproportionally reside in areas where higher quality HHAs are scarce, we ran a second model that accounts for whether higher quality HHAs deliver episodes in areas with lower quality HHAs (Model 2; see also Exhibit 104).[49]

Exhibit 104. Variables used to assess relationship between beneficiary race/ethnicity and use of lower quality HHAs

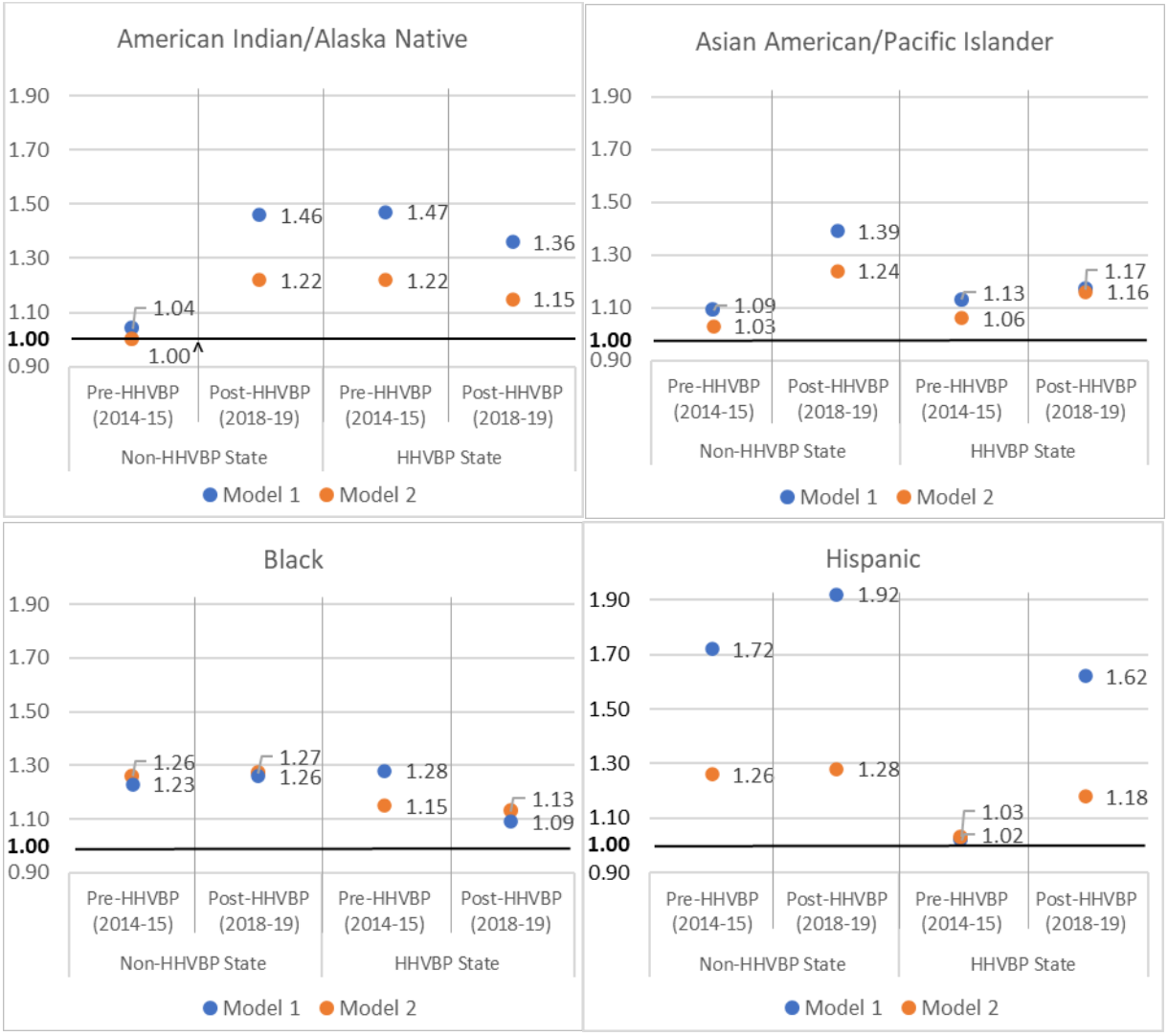
Variables	Models	
	M1	M2
Dependent/Outcome Variables		
Beneficiaries use of lower quality HHAs, based on: • Quality metric 1: ACH rates • Quality metric 2: ED rates • Quality metric 3: HHCAHPS Overall Rating • Quality metric 4: Star rating In each of four pre-/post- and HHVBP Model status combinations: pre-HHVBP era (2014-15) in HHVBP states; pre-HHVBP era (2014-15) in non-HHVBP states; post-HHVBP era (2018-19) in HHVBP states; and post-HHVBP era (2018-19) in non-HHVBP states.	√	√
Independent Variable		
Beneficiary race/ethnicity	√	√
Control Variables		
Age	√	√
Sex	√	√
Dual eligibility status	√	√
Urbanicity/rurality status	√	√
HCC score	√	√
HHS region	√	√
Neighborhood Social Disadvantage: CDC Social Vulnerability Index quartile (least to most vulnerable)	√	√
Neighborhood Segregation: Racial Dissimilarity Index quartile (least to most segregated)	√	√
Whether higher quality HHAs deliver episodes in a county with lower quality HHAs		√

[47] There are 10 HHS regions that directly serve select states for that region to better address the needs of communities served through HHS programs, including HHVBP.
[48] The Racial Dissimilarity Index measures the percentage of the non-Hispanic White population in a county which would have to change census tracts to equalize the racial distribution between white and non-white population groups across a county.
[49] The concept of supply in home health is more complex to operationalize, given the geographically decentralized nature of home health care delivery and difficulty in assessing an agency's capacity (compared to a hospital that has a fixed location and bed size counts). In Model 2 we used the share of episodes delivered by higher quality HHAs in a county as a proxy of higher-quality HHA care availability.

11.6.2 No Evidence of Overall Change in Existing Racial and Ethnic Inequities in the Use of Lower Quality Agencies under the HHVBP Model

With White beneficiaries as the reference group, the results show the odds ratios of using a lower quality HHA as defined by the particular quality measure. Despite some exceptions, racial and ethnic inequities in the use of lower quality HHAs persisted across the HHVBP Model, with racial and ethnic minority beneficiaries generally 'worse off' and having higher odds of using lower quality HHAs than White beneficiaries, in both non-HHVBP and HHVBP states. For example, compared to White beneficiaries, Black beneficiaries had higher odds of using lower quality agencies, as defined by Star ratings, in both non-HHVBP and HHVBP states (23-27 percent higher odds in non-HHVBP states and 9-28 percent higher odds in HHVBP states; Exhibit 105). Key exceptions—wherein racial and ethnic minorities were 'better off' with lower odds than Whites of using lower quality HHAs—occurred among Hispanic (the two HHVBP claims-based quality measures; and HHCAHPS-based quality, though only in HHVBP states) and Asian American/Pacific Islander (AAPI) (ED use with no hospitalization-based quality) beneficiaries (see Exhibits B-79 – B-85 [Page 225] in the Technical Appendix for the results for the other three performance metrics). Notably, for ACH- and ED-based quality HHA use, this favorable effect for minorities occurred for all racial and ethnic minorities in non-HHVBP states in the pre- but not post-HHVBP era, while half or more of racial and ethnic subpopulations in HHVBP states moved in an unfavorable direction over time—suggesting a negative HHVBP impact. Conversely, for HHCAHPS-based quality, racial and ethnic minority populations in HHVBP states decreased use of lower quality HHAs (moved in a favorable direction over time) compared to racial and ethnic minority groups in non-HHVBP states—this change suggests some positive association of HHVBP on the use of low HHCAHPS quality HHAs.

Exhibit 105. Odds ratios of using lower quality HHAs (as measured by Star ratings) were higher among racial and ethnic minority beneficiaries, relative to White beneficiaries; these patterns were attenuated but mostly unchanged after adjusting for the presence of higher quality HHAs serving the county



^ Value is not statistically significant at 5%. (The absence of this symbol indicates that the value is statistically significant.)

These racial and ethnic patterns were mostly unchanged, albeit attenuated (i.e., odds among racial and ethnic minorities more resembled that of Whites, with ORs closer to 1.00), after adjusting for whether higher quality HHAs also served beneficiaries in that county. However, the exceptions were notable, increasing or even reversing direction unfavorably for racial and ethnic minorities. This occurred, for example, among American Indian/Alaskan Native (AI/AN) and Hispanic beneficiaries in HHCAHPS-based quality HHA use—thus 'erasing' the prior observed positive HHVBP impact (see Exhibits B-83 and B-84 [Page 229] in the Technical Appendix for more details on HHCAHPS-related results). This also occurred in non-HHVBP states, for example, among Hispanic (for ACH and ED-based quality HHA use, see Exhibits B-79 – B-82 [Page 225] in the Technical Appendix) and Black (for ED-based quality HHA use, Exhibits B-81 and B-82 [Page 227] in the Technical Appendix) beneficiaries—suggesting that racial and ethnic

differences in lower quality HHA use among these subpopulations is influenced by the presence of higher-quality HHAs serving the county.

11.7 Racial and Ethnic Inequities in the Use of Lower Quality HHAs: Subgroup Analyses of County-level Trends

The above analyses show that historically underserved communities are more likely to receive care from lower quality HHAs, largely due to the fact that higher quality HHAs are not serving all areas. Thus, not only are there inequities in who is receiving higher quality care, there are inequities in where that care is being delivered. Taking a closer look at the geographic quality footprint of HHAs can highlight whether these inequities have widened or narrowed since the original HHVBP Model began and whether it is associated with these patterns. Specifically, we examined county-level trends in the use of lower quality HHAs among racial and ethnic minority beneficiaries relative to White beneficiaries and whether particular county-level characteristics were associated with these trends. Overall, we found evidence of existing racial and ethnic inequities in many counties in both HHVBP and non-HHVBP states, with no change in the pattern of inequities between the two groups during HHVBP. These results primarily reflect counties where there is a significant presence of racial and ethnic minorities to produce reliable estimates.

11.7.1 Methods Overview

To compare inequity trends in utilization of lower quality HHAs, we created separate county-level measures for American Indian/Alaska Natives, Asian American/Pacific Islanders, Blacks, and Hispanics which capture whether, in the years after the implementation of HHVBP, beneficiaries from the respective minority subpopulation are more likely to use lower quality home health care than their White counterparts. We first calculated county-level rates of utilization of lower quality HHAs for each racial and ethnic group based on the four indicators shown in Exhibit 103 above. County-level estimates were obtained for two separate periods – 2014-2015 (pre-HHVBP) and 2018-2019 (post-HHVBP).

Given the relatively small population sizes of some racial and ethnic groups at the county-level, compared to White beneficiaries, these analyses are limited to counties where there are at least 100 episodes associated with that racial and ethnic group and non-missing HHA outcome measures. Thus, analyses for each racial and ethnic minority group include differing subsets of counties and results.

Using the rates for each county, period, and minority racial and ethnic group, we created four indicators showing whether the minority group is less or as likely as Whites to use lower quality HHAs.[50] The sum of those lower quality disparity indicators thus vary between 0 and 4, where 0 shows an unfavorable situation for the minority group where there is no indicator of lower quality according to which beneficiaries from the minority group are either doing better or at least as well as Whites, and 4 represents a favorable situation for the minority group in which they are not doing worse than Whites on any of the four indicators of lower quality. In the middle, a 2 represents a 'neutral' situation in which a minority group is doing better or at least as well as Whites on half the quality metrics, but doing worse than Whites on the other half – and this situation has remained stagnant (same or unchanging) over

[50] Per our definition, a racial and ethnic minority group is less or as likely as Whites to use lower quality HHAs in a given county if the difference in the utilization rates of lower quality HHAs between that racial and ethnic minority group and Whites is less than 0.01.

time. We then compared the sums of those county-level indicators specific to each minority group for the two periods to create our final measures of changes in inequities as shown in Exhibit 106.

Exhibit 106. Definition of County-level Measure of Change in Inequities for a Given Minority Group Relative to Whites

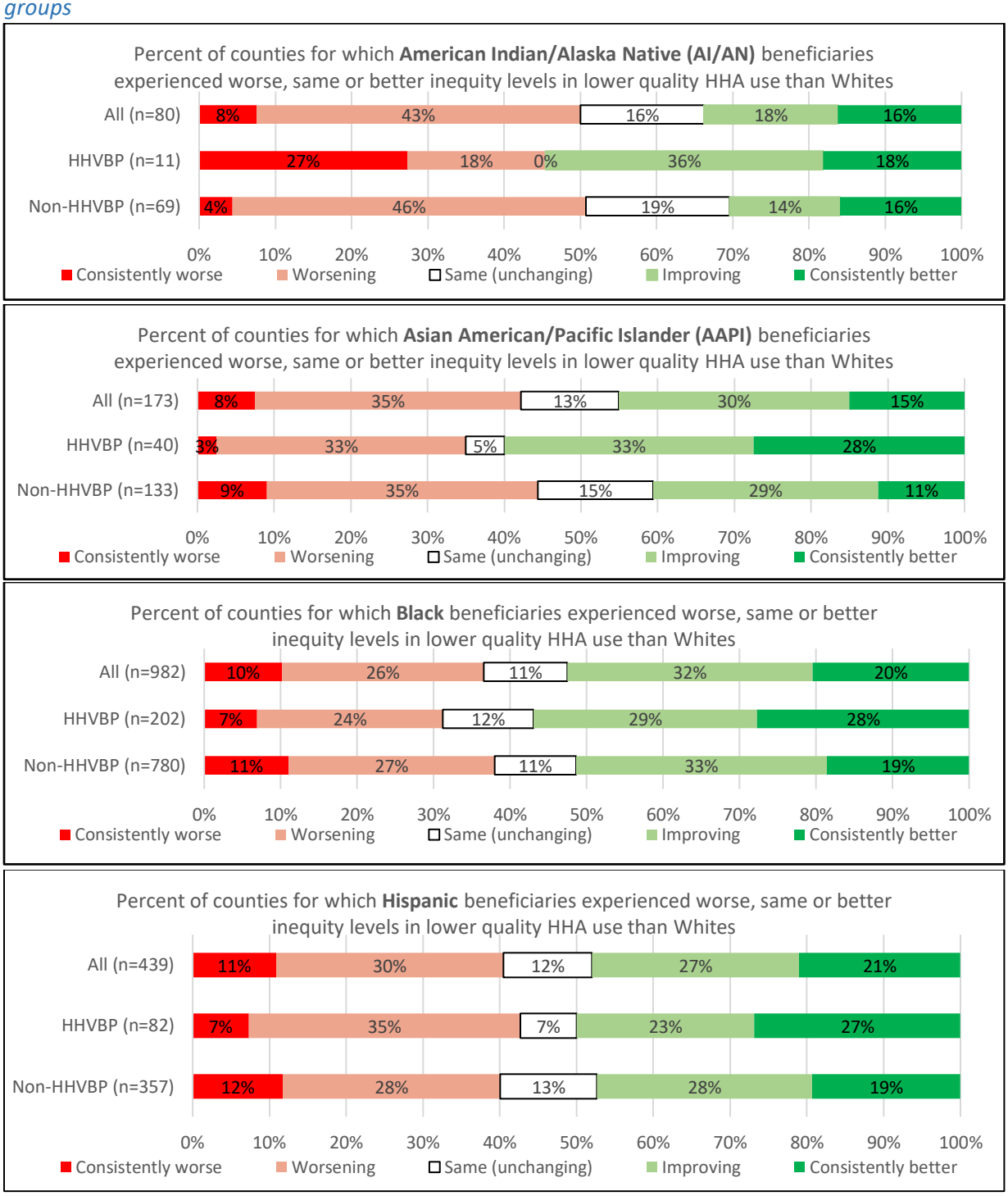
Sum of Lower Quality Inequity Indicators 2014-2015 (pre-HHVBP)		Sum of Lower Quality Inequity Indicators 2018-2019 (post-HHVBP)				
		0	1	2	3	4
		Unfavorable to Minority Group		Neutral	Favorable to Minority Group	
0	Unfavorable to Minority Group	Consistently Worse		Improving	Improving	
1						
2	Neutral	Worsening		Same (Unchanging)	Improving	
3	Favorable to Minority Group	Worsening		Worsening	Consistently better	
4						

Note: The sum of lower quality inequity indicators is determined by assessing whether a given racial or ethnic minority beneficiary subpopulation has a higher county-level rate of use of lower quality HHAs compared to White beneficiaries, based on four different quality metrics. A racial or ethnic minority subpopulation may have higher rates of lower quality HHA use than Whites based on 0 (none) of the metrics and up to all 4 of the metrics.

11.7.2 Ongoing Racial and Ethnic Inequalities in the Use of Lower Quality Agencies in Both HHVBP and non-HHVBP Counties

Across counties in HHVBP and non-HHVBP states, inequity trends in the use of lower quality HHAs before and after the original HHVBP Model began persisted for racial and ethnic minorities. The four racial and ethnic minority groups experienced consistently worse or worsening inequities over time relative to White beneficiaries in one third to one half of counties (Exhibit 107). For example, Hispanic beneficiaries experienced consistently worse (11 percent) or worsening (30 percent) levels of inequity in lower quality HHA use, relative to White beneficiaries, over time (Exhibit 107; bottom panel). However, there were notable exceptions where HHVBP appeared to narrow county-level inequities in use of lower quality HHAs – e.g., among Black beneficiaries, inequities in the use of lower quality HHAs moved in a favorable direction, or remained favorable, in just over half (52 percent) of counties (third panel). In the subset of counties where racial and ethnic minority groups were less likely than White beneficiaries to use lower quality HHAs, favorable patterns were more prevalent in HHVBP states (e.g., among AI/AN beneficiaries, inequities moved in a favorable direction, or remained favorable, in just over half (54 percent) of counties (first panel) in HHVBP states, but in only about one-third (30 percent) of counties in non-HHVBP states), suggesting a potential positive effect of the original HHVBP Model for this subgroup.

Exhibit 107. Inequities in lower quality HHA use among racial and ethnic minority beneficiaries compared to White beneficiaries from the pre-HHVBP (2014-15) to post-HHVBP (2018-19) eras in many counties in both HHVBP and non-HHVBP states, with no change in the pattern of inequities over time for the two groups



Note: Per our definition, lower quality HHAs are defined as being in the worst-performing tercile in a given year based on three metrics (ACH rates, ED rates, HHCAHPS overall ratings), or having three stars or less on a fourth metric (Star Ratings).

Because area-level factors, such as the level of social vulnerability or degree of racial and ethnic segregation, may also shape which areas HHAs serve, we also examined whether these characteristics were associated with improving or worsening inequities. For almost all racial and ethnic minority groups, there were few notable differences in characteristics between counties that 'defied expectations' favorably and counties that did not.

Despite general trends in any given state, the extent of these inequities varied widely across counties. Within some states, there were counties in which a given racial or ethnic minority group experienced persistently worse or worsening equity levels, **as well as** counties where they experienced persistently better or improving equity levels, in lower quality HHA use (see Exhibits B-86 – B-89 [Page 232] in the Technical Appendix for more detail). For all racial and ethnic minorities, there were some states in which all county-level changes moved towards (or were maintained in) a favorable direction for minorities, but also states where changes were all in a worsening direction or were unchanging/'neutral' (neither worse nor better than White beneficiaries) over time.

11.8 No Consistent Relationship of HHA Medicaid Share with Changes over Time in Performance Measures

As discussed in Chapter 10, interviewees from HHAs reported challenges serving Medicaid patients attributable to several factors, including lower Medicaid reimbursement rates, Medicaid managed care requirements, and greater clinical complexity among Medicaid beneficiaries. Those agencies serving larger shares of Medicaid patients reported that, as a result of these challenges, other agencies in their markets are accepting fewer Medicaid patients over time and that their agency's Medicaid share has accordingly increased. Relatedly, they suggested that they face greater challenges improving performance, as reflected in individual metrics and in the TPS. These changes in Medicaid share and performance improvement may be observed in both original and comparison HHVBP states, but stronger effects might be seen in the former due to the increased focus on payment adjustments. If the performance improvement incentives in the HHVBP Model affect agencies' likelihood of serving Medicaid patients, this may have implications for care, potentially through sorting vulnerable patients into agencies facing greater resource constraints. Further, payment adjustments tied to performance may potentially penalize agencies serving these patients.

The purpose of this analysis is twofold – first, to examine whether the agency-level share of Medicaid beneficiaries changed following HHVBP implementation in HHVBP and comparison HHAs and, second, to assess whether there is a relationship between Medicaid share and performance.

11.8.1 Summary of the Approach

To examine trends in Medicaid share before and after HHVBP implementation, the analysis relied on home health episodes found in OASIS data, which provide information on payer source needed to calculate each agency's Medicaid share. Specifically, we included episodes from calendar years 2014-2019 within the 50 US states, excluding episodes lacking a start-of-care OASIS assessment. To facilitate analysis over time, episodes were aggregated at the HHA level, and HHAs with fewer than 20 episodes annually were dropped. Throughout the analysis, we separately examined agencies in the original and comparison HHVBP states.

Medicaid share was defined as the percentage of episodes for which Medicaid was the primary payer, for each agency and year-pair (i.e., 2014-2015, 2016-2017, and 2018-2019). This definition excluded

episodes for dually eligible beneficiaries, where Medicare was the primary payer. Because we are examining Medicare-certified HHAs, there is a wide and skewed distribution of Medicaid share, with many agencies serving no Medicaid beneficiaries and a very small number of agencies serving a substantial proportion. Exhibit 108 shows the skewness of the distribution for 2014-2015, with the Medicaid share at the 50th percentile less than 1 percent in HHVBP states and less than 2 percent in non-HHVBP states, and the Medicaid share at the 90th percentile less than 14 percent for both groups.

Exhibit 108. Distribution of Medicaid Share in HHAs in Original HHVBP and Non-HHVBP States, 2014-2015

Percentile	HHVBP States	Non-HHVBP States
25th	0.0%	0.0%
50th	0.13%	1.2%
75th	4.9%	6.1%
90th	11.7%	13.5%
99th	46.4%	44.2%

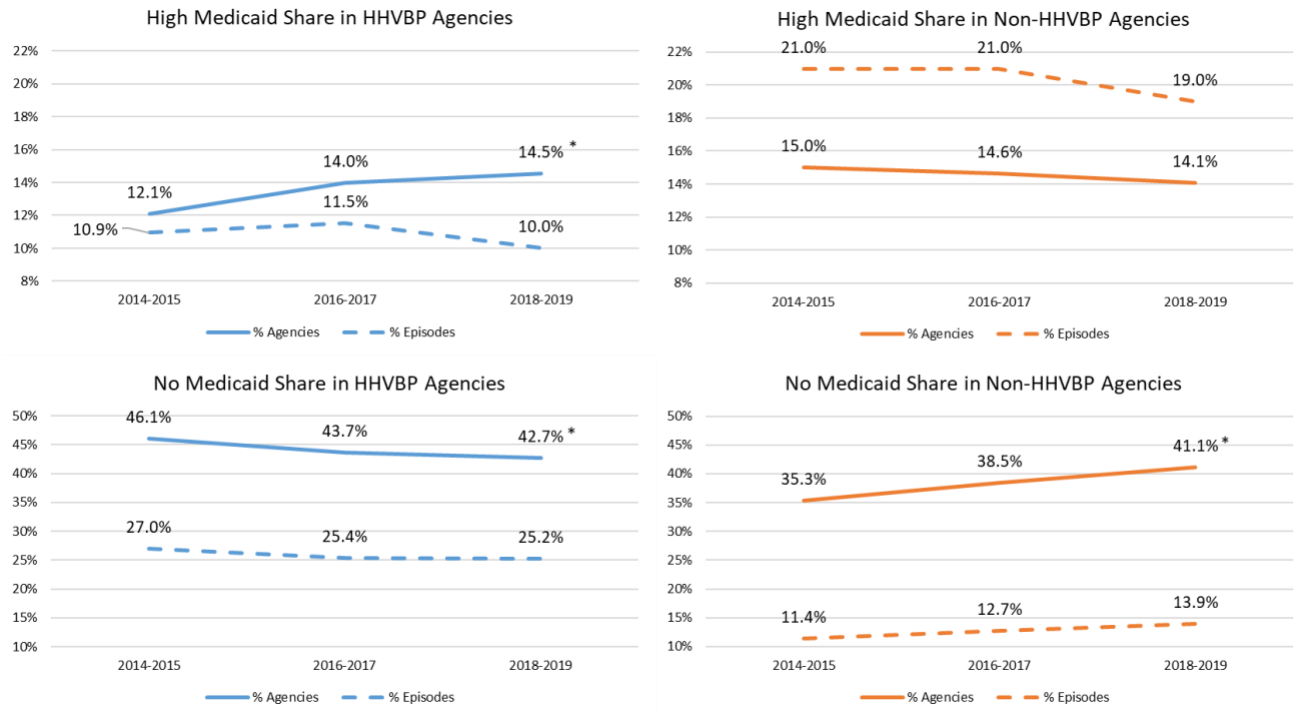
After examining the distribution, we focused our analysis on two groups of agencies: 1) those with no Medicaid share, and 2) those with 10 percent or more Medicaid patients (which we refer to as "high Medicaid share" agencies). These two groups included 4,039 HHAs with no Medicaid share (978 in HHVBP and 3,061 in non-HHVBP states) and 1,557 HHAs with a high Medicaid share (257 in HHVBP and 1,300 in non-HHVBP states) in 2014-2015. In addition to analyzing the number of agencies with no versus high Medicaid share, we also calculated the number of episodes associated with those agencies to better account for the variation in size of agencies.

To explore the relationship between Medicaid share and performance, we selected six performance metrics: two OASIS measures (Improvement in Dyspnea and Improvement in Ambulation); two HHVBP claims-based measures (Unplanned Acute Care Hospitalization and Outpatient ED Use with no Hospitalization); the HHVBP HHCAHPS-based patient experience measure rating Overall Care; and CMS's Quality of Patient Care Star Rating. Because the ACH and ED measures are claims-based, they do not include events for Medicaid beneficiaries. This may result in under-representation of the relationship between high Medicaid share and performance; in other words, we will not see the full effect of high Medicaid share on these performance measures.

11.8.2 Increasing Number of Home Health Agencies with High Medicaid Share in HHVBP States; Declining in Non-HHVBP States

In the original HHVBP Model states, the percentage of agencies with a high Medicaid share increased slightly from 2014-2015 to 2018-2019 (12.1 percent to 14.5 percent, respectively), while the percentage of agencies with no Medicaid share fell over that same period (46.1 percent to 42.7 percent respectively; Exhibit 109). The pattern for 2014-2015 to 2018-2019 was reversed in the comparison states, with the percentage of agencies with a high Medicaid share falling slightly over time (15.0 percent to 14.1 percent, respectively) and the percentage of agencies with no Medicaid share rising (35.3 percent to 41.1 percent, respectively).

Exhibit 109. Percentage of Agencies with High and No Medicaid Shares and Episodes Associated with those Agencies, 2014-2015 to 2018-2019

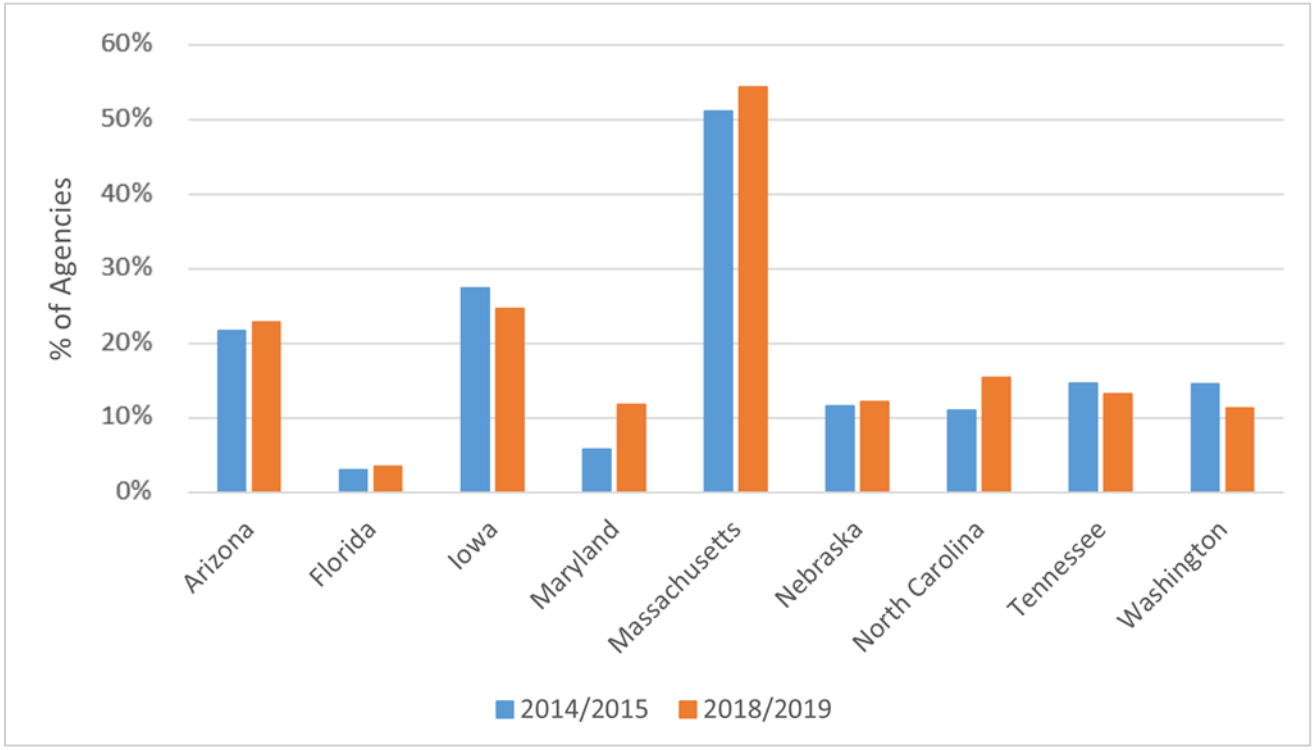


*Note: * indicates that the change in share of agencies from 2014-2015 to 2018-2019 is significant at p<0.05. High Medicaid share agencies defined as those with 10% or more Medicaid patients in each year-pair.*

Because Medicaid program requirements vary across states, we explored the extent of variation in Medicaid share across the nine original HHVBP Model states, as well as changes in share coinciding with HHVBP implementation. Exhibit 110 shows the wide variation in the percentage of HHVBP agencies with a high Medicaid share, which comprised just over 12 percent of HHVBP agencies in 2014-2015 (as shown above in the first panel of Exhibit 109). Comparing the relative distribution of high Medicaid agencies across states, Florida and Maryland had the lowest percentages of high Medicaid share agencies in 2014-2015 at 3 percent and 5.8 percent, respectively. Massachusetts, Iowa, and Arizona, in contrast, had the highest proportions of agencies with high Medicaid shares (51.1 percent, 27.5 percent, and 21.7 percent, respectively).

By 2018-2019, the proportion of all HHVBP agencies with high Medicaid shares rose to 14.5 percent. This growth is reflected in an increased percentage of agencies with a high Medicaid share in six of the nine original HHVBP states (Arizona, Florida, Massachusetts, Maryland, North Carolina, Nebraska). Conversely, the share of high Medicaid HHAs in Iowa, Tennessee, and Washington decreased over the same period (Exhibit 110).

Exhibit 110. Share of HHAs with High Medicaid Share in Original HHVBP States



Note: High Medicaid share agencies defined as those with 10% or more Medicaid patients in each year-pair.

11.8.3 Mixed Performance Improvements Observed in Agencies with High versus No Medicaid Shares in HHVBP and Non-HHVBP States

If agencies with higher Medicaid shares face greater challenges in improving performance, then we might expect that the changes in performance in response to emphasis on performance measurement would be smaller for high Medicaid share agencies compared to no Medicaid share agencies, regardless of whether the agencies are in HHVBP or non-HHVBP states. Based on the measures analyzed, our findings are mixed, with some limited evidence of lower performance improvement among agencies with a high Medicaid share, particularly for the OASIS- and survey-based measures, which may be more amenable to agency control (Exhibit 111).

The hypothesized relationship between Medicaid share and performance improvement can be seen most clearly for Improvement in Dyspnea where, among high Medicaid share agencies, we see changes of 8.8 and 10.7 percentage points, respectively, in HHVBP and non-HHVBP agencies from 2014-2015 to 2018-2019. Among agencies with no Medicaid share, though, the changes over time were larger with 18.3 and 14.2 percentage points in HHVBP and non-HHVBP states, respectively. The difference in the change between high and no Medicaid share agencies is larger in HHVBP states– 9.5 percentage points, compared to 3.5 percentage points in non-HHVBP states – and is statistically significant in both groups of states. Somewhat similarly, the average HHCAHPS Overall Care Rating for high Medicaid share agencies in 2014-2015 changed by -0.6 percentage points among HHVBP and +1.5 percentage points among non-HHVBP agencies by 2018-2019.[51] In contrast, the change was 1.7 percentage points for

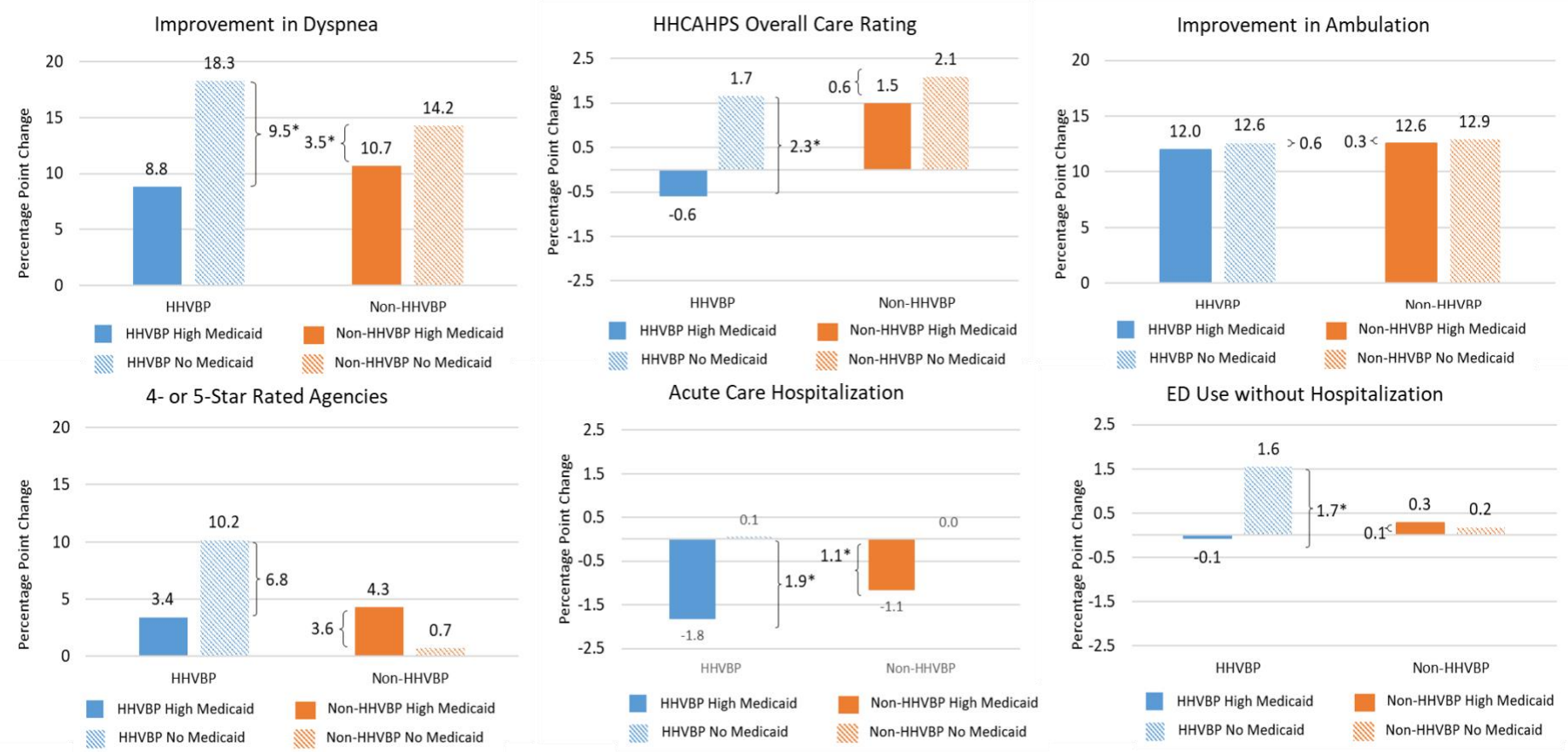
[51] In 2014-2015, 9.8 percent of HHVBP agencies with high Medicaid share and 12.3 percent of non-HHVBP agencies with high Medicaid share were “high-quality”, with high-quality defined as a composite Star Rating of 4 or 5 out of

agencies with no Medicaid share in HHVBP states and 2.1 percentage points in non-HHVBP states (Exhibit 111), again showing a greater difference between high and no Medicaid share agencies' change in HHVBP states (2.3 vs 0.6 percentage points).

Results for the other measures were mixed or did not provide strong evidence that performance improvements differed based on the agency Medicaid share. For both Improvement in Ambulation and the share of agencies with a 4- or 5- Quality of Patient Care Star Rating, changes over time in performance were not statistically different for high Medicaid share agencies relative to no Medicaid share agencies, in either HHVBP or non-HHVBP states. For ACH, high Medicaid share agencies showed larger improvements over time than no Medicaid share agencies in both HHVBP and non-HHVBP states. Change in performance as measured by ED Use w/o Hospitalization was mixed, with no consistent association between Medicaid share and changes in this outcome over time across HHVBP and non-HHVBP states.

5 stars. On average, a Star Rating was not available for approximately 16 percent of agencies with either a high or no Medicaid share in 2014-2015, decreasing to 12 percent by 2018-2019; these HHAs were excluded from this part of the analysis.

Exhibit 111. Mixed Findings on Changes in Performance Measures by Medicaid Share and HHVBP Status, 2014-2015 to 2018-2019



*Note: * indicates that the difference between the change in average value of the measure from 2014-2015 to 2018-2019 in high Medicaid and no Medicaid agencies is significant at p<0.05. High Medicaid share agencies defined as those with 10% or more Medicaid patients in each year-pair.*

11.9 Discussion

While VBP programs are designed to promote quality of care, they may not necessarily achieve this goal equally for all populations. If VBP programs do not succeed in encouraging improvements in quality of care for populations who were already predisposed to having worse outcomes, there is a risk that they could lead to wider gaps in quality of care. Alternatively, if VBP programs have the effect of encouraging greater gains among populations for whom there is the most need for improvement, they could result in a narrowing of gaps in quality of care. As a result, VBP programs could have either positive or negative implications for health equity among Medicare beneficiaries.

Taken together, our analyses of home health patient outcomes and use of lower quality HHAs do not point to consistent findings across all historically underserved populations regarding the implications of HHVBP for health equity. It should be noted that the HHVBP Model was not designed explicitly to address health inequities. It was also implemented in a context where there were existing disparities in outcomes such as unplanned hospitalizations, ED use, and changes in functioning based both on Medicaid status and/or race and ethnicity. Similarly, there were also preexisting inequities in the use of lower quality HHAs prior to HHVBP that disadvantaged multiple racial and ethnic minority groups. These initial gaps in quality at baseline often persisted in the post-HHVBP period, but we also find examples of both widening and narrowing gaps in quality among certain populations.

Evidence of somewhat widening disparities in health outcomes under the model based on Medicaid status may reflect greater challenges with quality improvement among home health patients covered by Medicaid. Patients with Medicaid coverage had somewhat worse outcomes across a range of key outcomes before model implementation, and then lagged slightly further behind other patients in those same outcomes under the model. This is in spite of the fact that we found HHVBP to be positively associated with frontloading of home health visits among post-institutional dually eligible patients in a manner that was similar to those who were non-dually eligible. However, we should not rule out the possibility of other differences across patients in the delivery or effectiveness of home health care. We also found evidence that home health patients with Medicaid have higher levels of acuity, and they may face greater barriers in access to care across care settings. These factors may pose additional challenges for agencies seeking to improve outcomes for this population, whether in response to HHVBP, public reporting of quality measures, or other quality initiatives.

Such challenges may be more pronounced for agencies serving a larger proportion of patients covered by Medicaid, due to the collective needs of their patient populations and resource constraints. We found that the share of agencies serving a substantial proportion of Medicaid patients increased slightly in the original HHVBP states, subsequent to model implementation. This trend varies considerably by agency characteristics and across states, but it was most pronounced for smaller and mid-sized agencies, while the percentage of agencies with no Medicaid share rose for larger agencies. Altogether, our results suggest that the burden of serving high-needs Medicaid patients may be very unevenly distributed. We do not find, however, a clear pattern of smaller improvements in performance measures over time among agencies with a higher share of Medicaid patients. This finding is in line with our observation in Section 5 that agency TPS do not appear to vary systematically with their share of dually eligible beneficiaries. The inequities we observe for Medicaid patients in both patient outcomes and in the changes occurring under HHVBP may reflect what is occurring broadly across agencies and not limited to the experience of agencies serving larger shares of Medicaid patients.

We also identified racial and ethnic inequities in home health patient outcomes and in the use of lower quality HHAs that largely persisted under HHVBP. The implications of HHVBP for these preexisting inequities appears to vary among specific racial and ethnic minority groups and across geographic areas. While we observe a narrowing in certain inequities in outcomes for Black patients under HHVBP, we also observe a widening in certain inequities in outcomes for Hispanic patients under HHVBP. Similarly, while inequities in the use of lower quality HHAs among racial and ethnic minority groups often persisted or worsened in many counties, we also find that they either remained favorable or improved for these groups in other counties. Together, evidence of persisting quality gaps based on both Medicaid status and race and ethnicity suggests a need for more targeted initiatives to reduce these inequities among home health patients.

The different trends we see across counties provide a possible learning opportunity to help guide future efforts. Charting which counties, particularly those in HHVBP states or serving more higher-risk (e.g., Medicaid patients, are narrowing home health quality inequities creates a roadmap for more purposeful inquiry and the opportunity to uncover what local conditions underlie these positive trends. This kind of geographic 'hot spotting' also identifies areas facing deteriorating trends, where focused efforts to improve quality could have a greater effect. While the HHVBP Model was not designed explicitly to address inequities, there is also evidence that HHAs are increasingly well positioned to understand them in a meaningful (and thereby more actionable way.

The most recent HHA survey results indicate that some HHAs have been documenting race, ethnicity and social risk needs of their patient populations and deploying this information in various efforts – for example, ensuring concordance in patient-provider race and ethnicity (see Section 10 for further detail on survey results. The continued collection and deployment of this information undergirds efforts to target inequities and understand effective strategies for addressing them. Future analyses could also explore geographic 'hot spots' where trends in inequities shifted notably in either a favorable or unfavorable direction for racial and ethnic minorities and communities at higher social risk levels and explore underlying mechanisms and drivers of change. The lessons learned from areas in which inequity gaps have closed may better inform decisions about other potential levers that could be incentivized under HHVBP and what type of support could be applied to areas still facing major shortfalls.

12. Future Activities

This Sixth Annual Report presents findings of our evaluation of the HHVBP Model through 2021. With CMS' decision to expand the model nationally on January 1, 2023, the original model ended a year early (i.e., 2021) and 2022 was designated as the pre-implementation year; HHAs in the 9 original HHVBP states did not receive payment adjustments during 2022. As such, our future activities will focus on assembling a summative report that highlights the most relevant evaluation findings over the entire six years of the original HHVBP Model, from 2016 through 2021. While this endeavor will largely rely on extant data and analyses, we will also conduct a small number of case studies in 2023 that will expand our equity-focused analyses. We provide more detail below.

Conduct case studies to better understand inequities by racial and ethnic minority groups in the use of lower quality agencies that persisted under HHVBP. Our analyses in Section 11 identified racial and ethnic inequities in home health patient outcomes and examined potential factors underlying these trends. Notably, we found inequities by race and ethnicity in the use of lower quality HHAs that persisted under HHVBP as well as inequities in who is served by higher quality HHAs; that is, we observed fewer examples of inequities when higher quality HHAs are in a county. However, higher quality HHAs are not distributed evenly across counties, and when beneficiaries use lower quality HHAs, it is generally because higher quality HHAs may not be serving the areas where they live. The reasons underlying these trends are not easily observed on a broad scale with available data. Therefore, to better understand these trends, we plan to conduct several case studies of communities that have lessening or lower levels of home health quality inequities to offer a fuller picture of post-acute care provided during the original HHVBP Model which will, in turn, help contextualize patterns of differential access/selection of higher quality HHAs in these communities. Within these communities, we will also aim to talk with some lower quality HHAs to enable us to compare activities across home health providers with different performance levels (while acknowledging that recruitment of lower performers can be challenging).

Through interviews with HHA staff and other key players (e.g., hospital discharge planners, skilled nursing facilities) in the community, we will explore how care provided by HHAs has changed before and after the original HHVBP Model was implemented and how the process differs in historically marginalized communities compared to what we have learned across all communities. These analyses will allow us to characterize and better understand HHAs that perform better-than-expected – given their patient social risk mix – as well as examine what agency-level and contextual factors facilitate high performance/improvement in communities facing greater social risks. The case studies will also allow us to identify whether these factors can offer promising practices for other HHAs and the communities they serve in lessening inequities when providing home health care.

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