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

# Fourth Annual Report

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**NOTICE**
The statements contained in this report are solely those of the authors and do not necessarily reflect the views or policies of the Centers for Medicare & Medicaid Services. Arbor Research Collaborative for Health assumes responsibility for the accuracy and completeness of the information contained in this report.

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# Table of Exhibits

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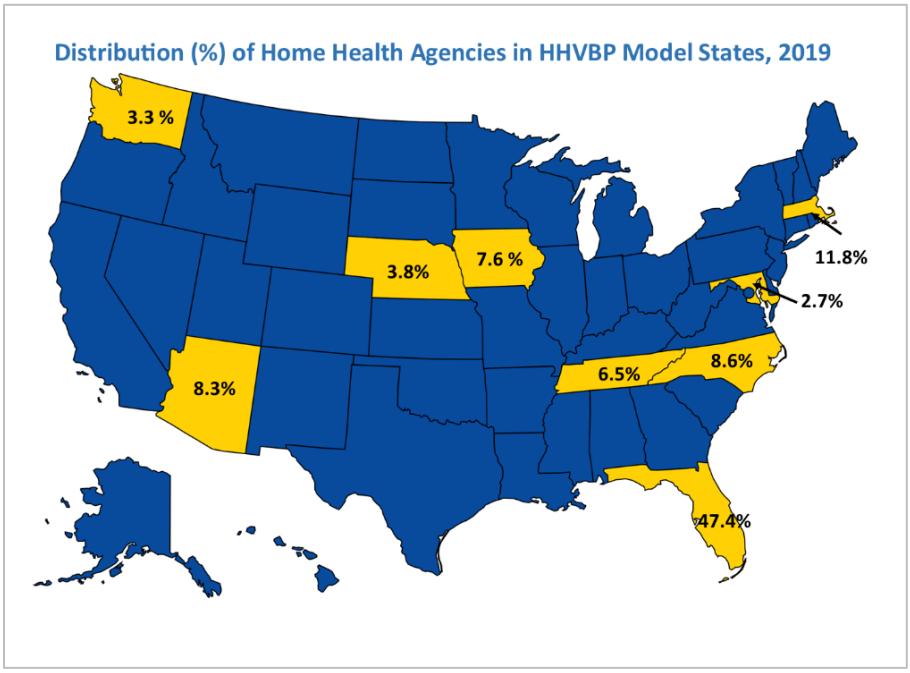
# Acronym List

| Acronym | Term |
|---|---|
| **ACH** | Acute Care Hospitalization |
| **ACO** | Accountable Care Organization |
| **AF** | Analytic File |
| **APM** | Alternative Payment Model |
| **BPCI** | Bundled Payments for Care Improvement |
| **CJR** | Comprehensive Care for Joint Replacement |
| **CMS** | Centers for Medicare and Medicaid Services |
| **CMMI** | The Center for Medicare and Medicaid Innovation |
| **COPs** | Conditions of Participation |
| **CY** | Calendar Year |
| **D-in-D** | Difference-in-Differences |
| **D-in-D-in-D** | Difference-in-Difference-in-Differences |
| **ED** | Emergency Department |
| **FFS** | Fee-for-Service |
| **FR** | Final Rule |
| **HH** | Home Health |
| **HH PPS** | Home Health Prospective Payment System |
| **HHA** | Home Health Agency |
| **HHC** | Home Health Compare |
| **HHCAHPS** | Home Health Care Consumer Assessment of Healthcare Providers and Systems |
| **HHGM** | Home Health Groupings Model |
| **HHRG** | Home Health Resource Groups |
| **HHS** | U.S. Department of Health and Human Services |
| **HHVBP** | Home Health Value-Based Purchasing |
| **IPR** | Interim Performance Report |
| **ICD-9** | International Classification of Diseases Version Ninth Revision |
| **ICD-10** | International Classification of Diseases Version Tenth Revision |
| **LUPA** | Low Utilization Payment Adjustment |
| **MDC** | Major Diagnostic Categories |
| **MedPAC** | Medicare Payment Advisory Committee |
| **MSSP** | Medicare Shared Savings Program |
| **MS-DRG** | Medicare Severity Diagnosis Related Group |
| **OASIS** | Outcome and Assessment Information Set |
| **OCM** | Oncology Care Model |
| **PAC** | Post-Acute Care |
| **PEP** | Partial Episode Payment |
| **RQ** | Research Question |
| **QAPI** | Quality Assurance and Performance Improvement |
| **SNF** | Skilled Nursing Facility |
| **SOC** | Start of Care |
| **TNC** | Total Normalized Composite |
| **TPS** | Total Performance Score |

# Executive Summary

## Background




In January 2016, the Center for Medicare & Medicaid Innovation (CMMI) of the Centers for Medicare & Medicaid Services (CMS) initiated the 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 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 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 interviews with HHA staff and our quantitative analyses to examine a range of outcomes of interest, including the performance measures used to calculate an agency's TPS in 2019 as well as measures of Medicare spending. We use multivariate linear regression within a difference-in-differences (D-in-D) framework to evaluate the effects of HHVBP, comparing the changes observed in the nine HHVBP states with those in the 41 comparison states based on data for the baseline period prior to HHVBP implementation (2013-2015) and cumulatively through the first four performance years of the model (2016-2019).

This Annual Report focuses on the experience of home health patients and agencies through 2019, the fourth performance year of the HHVBP Model, and the second year that eligible agencies in HHVBP states received an adjustment to their Medicare payment amounts under the Home Health Prospective Payment System (HH PPS). An agency's performance in 2017 is the basis for their payment adjustment of up to ±5 percent in 2019. The percentage of the HHVBP payment adjustment increases each year of the model, beginning with up to ± 3 percent in CY 2018 and up to ±8 percent planned for CY 2022. See the previous Annual Report for more information on the HHVBP Model and payment adjustments (Arbor Research, 2020).

## Key Findings

The figure below provides an overview of our key findings (Exhibit ES-1). We provide a summary of our evaluation findings below.

*Exhibit ES-1. Overview of Key Findings in the Fourth Annual Report*

| | | |
|---|---|---|
| **Total Performance Scores** | ↑ ▪ Overall agency performance continues to be higher in HHVBP states: 8% greater average scores than the comparison group in 2019 | |
| **Spending During and after Home Health Care** | ↓ ▪ Total Medicare spending<br>▪ Medicare spending on inpatient services and skilled nursing facility visits | ↑ ▪ Medicare spending on emergency department visits and observation stays |
| **Health Care Utilization** | ↓ ▪ Unplanned acute care hospitalizations<br>▪ Skilled nursing facility visits | ↑ ▪ Outpatient emergency department visits |
| **Quality/Patient Experience** | ↑ ▪ Patients discharged to community<br>▪ Improvement in functioning | ↓ ▪ Agency communication with patients<br>▪ Discussion of care with patients |
| **Agency Operations** | ↑ ▪ From interviews, agencies had more positive impressions of the model than in early years; the model prompted continued focus on quality improvement efforts already underway<br>⇄ ▪ No impact on use of home health services<br>▪ Descriptive analyses also suggest no effects on agency entries or closures or on access to home health care | |

***The HHVBP impacts on quality, utilization, and Medicare spending in the second payment year are similar to previous years.*** Overall, our findings for the second year of the HHVBP payment adjustments (2019) were similar to those for the three earlier years of the model, reflecting an overall reduction in Medicare spending, modest declines in some but not all aspects of utilization, and modest improvements in most quality measures. When comparing the impact of the HHVBP Model between the initial years (2016-2017) with the later years when HHAs received a payment adjustment (i.e., 2018-2019), we did not find consistent evidence across the quality, utilization, and spending measures of successively larger impacts of HHVBP due to the payment adjustments. Our finding of sustained impacts of HHVBP that began in the first year of 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 first four years of the model.*** The TPS values serve as broad indicators of HHA performance and are the basis for adjusting Medicare fee-for-service (FFS) payments to agencies in the nine model states. For each of the first four years of the model (2016-2019), the TPS for agencies in HHVBP states were higher overall relative to the TPS we calculated for agencies in the 41 non-model states. The 2019 TPS is not comparable to the TPS for earlier years due to changes in the TPS scoring methodology, but we found a continued positive impact of HHVBP on overall agency performance for 2019, when the second HHVBP payment adjustment was applied. We continued to find no patterns in

***HHVBP Model Snapshot, 2019***

- **1,931** home health agencies in operation
- **1,373,277** home health episodes provided
- **801,137** Medicare FFS beneficiaries covered

agency performance based on patient social risk factors that might indicate risks for some beneficiaries under the model.

***Cumulative decline of $604.8 million in overall Medicare spending for FFS beneficiaries receiving home health services during 2016-2019, largely driven by reduced spending for inpatient and skilled nursing facility (SNF) services.*** Through the first four years of the model, we detected a 1.3 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 four-year, cumulative 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 $604.8 million (average annual reduction of $151.2 million). We can explain this overall decline by the observed slower rate of growth in HHVBP states relative to the non-HHVBP states in spending during home health episodes (rather than in the subsequent 30 days). We did not find evidence that the HHVBP payment adjustment to agencies in 2018 and 2019 resulted in larger reductions in Medicare spending than in previous years of the model prior to the payment adjustments (2016-2017).

The declines in overall Medicare spending due to HHVBP were largely because of reductions in spending for inpatient and SNF services among home health beneficiaries (Exhibit ES-2). Our D-in-D analyses point to a 2.4 percent decline in average Medicare spending per day for inpatient services and a 4.2 percent decline in average spending for SNF services, which translates to cumulative (2016-2019) savings of $381.4 million and $164.9 million, respectively. These savings due to HHVBP were partly offset by an estimated 6.1 percent increase in Medicare spending for outpatient emergency department (ED) visits and observation stays through 2019, which translates to a cumulative (2016-2019) increase in spending of $65.3 million for these services. We continue to find no HHVBP effect on Medicare spending for home health services, which—along with inpatient services—represents the two largest components of Medicare spending for FFS beneficiaries receiving home health care.

***Reductions in unplanned hospitalizations and use of skilled nursing facilities.*** Through the first four years of HHVBP, 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 0.19 percentage points in unplanned hospitalization rates among all home health episodes, which corresponds to a 1.1 percent decrease from average measure values pre-HHVBP implementation. We also found HHVBP to result in a 0.24 percentage point decline in the use of SNFs among home health beneficiaries, which corresponds to a 4.9 percent decrease in average measure values relative to pre-HHVBP implementation. Additionally, despite the larger TPS weights assigned to the unplanned hospitalization measure (from 6.25 percent in 2018 to 26.25 percent in 2019), we did not find the change in TPS weight to result in greater improvements in performance on this measure in 2019 beyond the gains that had already occurred under HHVBP.

***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 0.31 percentage point increase in outpatient ED use, which corresponds to a 2.6 percent increase relative to average measure values prior to HHVBP. However, we also found that HHVBP led to a 0.15 percentage point decrease in ED use resulting in an inpatient hospital stay, or a 1.1 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.

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

| Medicare Spending (in millions $) | Cumulative (2016-2019) D-in-D Impact (95% CI) | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| **Total Medicare Parts A and B Spending during and following FFS Episode of Care*** | | | | | |
| *Per day impact*** | -$1.76 (-$3.10, -$0.41) | -$1.12 (-$1.93, -$0.32) | -$2.03 (-$3.29, -$0.78) | -$1.93 (-$3.59, -$0.27) | -$2.00 (-$4.08, $0.08) |
| Aggregate Impact | -$604.8 (-$1,065.3, -$140.9) | -$100.1 (-$172.4, -$28.6) | -$178.1 (-$288.6, -$68.4) | -$167.8 (-$312.1, -$23.5) | -$159.3 (-$325.0, $6.4) |
| % Impact | -1.3% | -0.8% | -1.5% | -1.4% | -1.4% |
| **Inpatient Spending** | | | | | |
| Aggregate Impact | -$381.4 (-$687.3, -$75.6) | -$73.3 (-$125.1, -$22.3) | -$99.1 (-$172.8, -$25.4) | -$95.6 (-$189.5, -$1.7) | -$112.3 (-$221.4, -$3.2) |
| % Impact | -2.4% | -1.8% | -2.5% | -2.4% | -3.1% |
| **Outpatient ED and Observation Stays Spending** | | | | | |
| Aggregate Impact | $65.3 ($37.8, $96.2) | $11.6 ($6.3, $16.1) | $16.7 ($9.7, $22.8) | $19.1 ($9.6, $27.8) | $20.7 ($10.4, $30.3) |
| % Impact | 6.1% | 4.1% | 6.1% | 7.0% | 8.3% |
| **Skilled Nursing Facility Spending** | | | | | |
| Aggregate Impact | -$164.9 (-$264.6, -$65.3) | -$27.7 (-$43.8, -$10.7) | -$42.1 (-$66.7, -$18.4) | -$47.8 (-$79.1, -$16.5) | -$47.0 (-$81.2, -$12.7) |
| % Impact | -4.2% | -2.7% | -4.2% | -4.8% | -5.2% |
| **Home Health Spending** | | | | | |
| Aggregate Impact | $17.2 (-$151.2, $185.6) | $12.5 (-$9.8, $34.8) | -$19.3 (-$57.9, $20.2) | $8.7 (-$44.3, $61.7) | $15.1 (-$47.0, $78.1) |
| % Impact | 0.1% | 0.3% | -0.5% | 0.2% | 0.4% |
| Number of Agencies | 11,666 | 10,851 | 10,437 | 10,100 | 9,694 |
| Number of FFS Beneficiaries | 8,125,224 | 3,247,837 | 3,182,835 | 3,081,841 | 2,806,214 |

*CI= Confidence Interval. D-in-D = difference in differences. Cumulative estimate is calculated as the weighted average of the yearly D-in-D estimates, weighted by the proportion of total episode-days accounted by each year. 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 following the end of the home health episode.** Per day impact is not in millions.*

***Reductions in unplanned hospitalizations observed for a broad range of diagnostic conditions***. Through additional analyses to understand better the impact of HHVBP on hospitalization rates, we found that the HHVBP effect on lower unplanned hospitalization during home health episodes applied to a broad range of conditions, including digestive and infectious diseases. As expected, the HHVBP impact on reducing hospitalizations

almost exclusively reflect "medical" hospitalizations, which often involve complications of chronic health conditions, in contrast with a negligible impact on "surgical" hospitalizations, which are usually planned events for elective procedures. Furthermore, agencies respond to HHVBP incentives by improving quality through services tailored to address the reason for the hospitalization that preceded the home health episode, as evidenced by our finding of greater intended HHVBP impacts on medical rehospitalizations for the same condition as the primary diagnosis of the prior hospitalization. This also supports what we heard in interviews over the years, where agencies frequently mentioned reducing readmissions as one of their priorities.

***Modest increase in skilled nursing and therapy visits in early weeks of home health episode in HHVBP agencies.*** During our previous interviews with HHAs in HHVBP states, some agencies mentioned scheduling more skilled nursing visits early in an episode of care (commonly termed *frontloading* visits by home health practitioners) as a quality improvement strategy. Expanding on our previous descriptive analyses, we found a small but statistically significant effect of HHVBP on frontloading among post-acute care home health episodes, with agencies in HHVBP states increasing the number of skilled nursing and therapy visits during the first two weeks as well as shifting more of these visit types into the first week. These practice changes translate to about a two percent relative increase in the number of skilled nursing or therapy visits in the first two weeks of an episode from the baseline average of about four visits per visit type.

***Modest gains in quality of care include greater improvements in functional outcomes***. There continues to be a strong pattern through the first four years of the model of relatively small but positive effects of HHVBP on the Outcome and Assessment Information Set (OASIS)-based outcome measures used to calculate TPS. They include a measure of discharge to the community and several measures of improvement in functional status, including the two new 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 occurred in a context where average measure rates for many of the quality measures exceeded 51 percent prior to implementation of HHVBP. The improvements in functional outcomes during home health care occurred for home health patients with lower functional status reported at the start of care. During interviews with agencies in previous years, we heard that there have been changes in agency perspectives on administering OASIS assessments. Our analyses of the functional status reported on the OASIS start of care assessment suggest that in both HHVBP and non-HHVBP states, changes over time in the OASIS measures may in part reflect changes in factors other than beneficiary health status, such as a more intensive and focused approach to conducting and recording assessments.

***Modest, unintended impact on two of the five measures of patient experience with care***. Performance scores for the five patient experience measures derived from the Home Health Care Consumer Assessment of Healthcare Providers and Systems (HHCAHPS) survey remained stable and relatively high over time in both HHVBP states and non-HHVBP states. Based on D-in-D analyses, we found no impact of HHVBP on three of these five HHCAHPS-based performance measures through the first four years of the model, including whether a patient would recommend the agency and patient ratings of overall care. For measures of communication and discussion of care, we found that HHVBP was associated with a -0.3 percentage point relative decline. While unintended, this does not suggest a meaningful impact of

HHVBP on these two aspects of patient experience with care, given the high overall levels of performance on these measures (i.e., ranging from 82 percent to 86 percent).

***HHVBP has not led to changes in the overall use of home health services among FFS Medicare beneficiaries or materially affected the case-mix of home health patients.*** 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 HHVBP effect on the percentage of FFS beneficiaries receiving home health care nor on FFS home health episode rates through the fourth performance year of the model. While we found lower rates of home health utilization in rural areas compared to urban areas, trends were similar for HHVBP and non-HHVBP states.

Further, 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 three broad measures of case-mix, we saw modestly lower growth in severity among patients receiving care from HHVBP agencies relative to agencies in non-HHVBP states in the post-implementation period. It will be important to continue to examine whether HHVBP encourages agency practices of admitting patients based on their case-mix, especially as the payment adjustments grow larger over time.

***No evidence of an adverse impact of HHVBP on access to home health care.*** Using a combination of analytic approaches, we did not observe signals that HHVBP adversely affected access to home health care. Based on available data through the first six months of 2019, we did not observe an impact of HHVBP on agency entry/exit rates, which remained similar for agencies in HHVBP states relative to those in non-HHVBP states during the post-HHVBP period. The extent to which at least one or two HHAs served counties in HHVBP states remained high, even in rural areas. While we found rural counties to be more likely than urban counties to have both a low number of home health visits per episode and high ED use, which suggests a greater risk of potential access issues for rural home health beneficiaries, this pattern was similar in both HHVBP and non-HHVBP states. Further, there was no evidence of a growing number of counties in HHVBP states where access to care for home health beneficiaries may be impaired, based on trends in the number of counties with both a low number of home health visits per episode and high ED use.

Last, 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 observed a small increase in the share of discharges from acute inpatient settings admitted to home health care in HHVBP states. This finding is consistent with our other analyses that showed no signs of emerging access problems due to HHVBP.

***For vulnerable populations, a pattern of differential impacts based on Medicaid coverage, but not based on rural versus urban location.*** If HHVBP does not uniformly affect all patients in the same way, the model could have implications for health disparities. While there is potential for the quality incentives under HHVBP to encourage greater gains among populations who initially had worse outcomes and thereby reduce health disparities, there is also a risk of a worsening in health disparities if the benefits of quality improvement are not shared among more vulnerable populations. In examining

whether the impact of HHVBP through its first four years has differed for certain vulnerable populations who may be predisposed to having worse outcomes, we found a pattern of differential impacts based on Medicaid coverage. For example, while we observed a 2.4 percent decline in unplanned acute care hospitalizations and approximately a three percent gain in improvements in both self-care and in mobility due to HHVBP among non-Medicaid patients, we did not observe these impacts among Medicaid patients. These differential impacts on improvement in self-care and mobility were associated with modest growth in disparities in these outcomes for Medicaid patients under the model. In contrast, we found no evidence of a differential impact of HHVBP on patients in rural areas for any of the outcomes that we examined.

***Follow-up interviews with home health agencies suggest increasing familiarity and more positive impressions of the HHVBP Model than in earlier years. Agencies continue to integrate QI activities reinforced by the model into existing QI plans.*** Most agencies we spoke with in 2020 were less preoccupied with meeting model requirements and less concerned about the model's potential financial impact than in previous years, suggesting increased familiarity with the HHVBP Model. To address the model and other similar CMS national initiatives that focus on improving performance, agencies continued to employ a variety of strategies, including using data analytics to measure and improve quality and focusing on staff recruitment and training. These extensions to ongoing activities reduced the focus on HHVBP-specific activities over time, even before the COVID-19 Public Health Emergency that affected all aspects of care in 2020. As agencies across the country experience a multitude of internal and external pressures from national initiatives related to improving care delivery, we should expect these overlapping initiatives and some effects of the model in HHVBP states to be similar to changes occurring in non-HHVBP states. In addition, findings from this year's interviews continue to suggest a possible "spillover" effect of HHVBP in chain-affiliated agencies also operating in non-HHVBP states which may weaken the estimates of the model when comparing HHVBP to non-HHVBP states.

***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. For example, our findings regarding the overall impacts of the model were largely the same when excluding Florida and its regional comparison group. Five out of the nine HHVBP states—Arizona, Maryland, North Carolina, Tennessee, and Washington—continued to drive quality improvements in the HHVBP group through higher agency TPS values, relative to their regional comparison groups. For the claims-based utilization measures, there was consistently strong evidence of intended impacts on unplanned hospitalizations in Florida, and intended impacts on unplanned hospitalizations and SNF use in Tennessee. There was evidence of overall Medicare savings due to HHVBP in four states—Iowa, Massachusetts, Nebraska, and Tennessee. Although Florida's cumulative estimate for Medicare spending was not statistically significant, the yearly D-in-D analyses indicated savings in each year from 2016 – 2018. We found Arizona and Maryland to be the most consistent drivers for the positive impacts on OASIS outcome measures, which represent 6 of the 13 measures used to calculate agency TPS values in 2019, while Florida and Massachusetts drove the unintended impacts for the HHCAHPS measures.

*Exhibit ES-3. Summary of Primary D-in-D Findings in Fourth 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** | -0.18% | -1.1% |
| | Unplanned Hospitalization among All FFS HH Episodes | ↓ **Decrease** | -0.19% | -1.1% |
| | *ED Use (no Hospitalization) among First FFS HH Episodes* | ↑ **Increase** | 0.31% | 2.6% |
| | SNF Use among All FFS HH Episodes | ↓ **Decrease** | -0.24% | -4.9% |
| **Medicare Spending** | Average Medicare Spending per Day among FFS HH Beneficiaries during and following HH Episodes of Care | ↓ **Decrease** | -$1.76 | -1.3% |
| | Average Medicare Spending per Day among FFS HH Beneficiaries during HH Episodes of Care | ↓ **Decrease** | -$1.46 | -1.0% |
| | Average Medicare Spending per Day among FFS HH Beneficiaries following HH Episodes of Care | ⇄ **N.S.** | -$0.01 | -0.01% |
| **Quality Measures** | *Discharged to Community* | ↑ **Increase** | 0.78% | 1.1% |
| | *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 Pain Interfering with Activity* | ↑ **Increase** | 1.86% | 2.6% |
| | *Improvement in Dyspnea* | ⇄ **N.S.** | 0.32% | 0.5% |
| | *Improvement in Management of Oral Medications* | ↑ **Increase** | 2.77% | 5.4% |
| **Patient Experience** | *How often the HH team gave care in a professional way (Professional Care)* | ⇄ **N.S.** | -0.14% | -0.2% |
| | *How well did the HH team communicate with patients (Communication)* | ↓ **Decrease** | -0.24% | -0.3% |
| | *Did the HH team discuss medicines, pain, and home safety with patients (Discussion of Care)* | ↓ **Decrease** | -0.25% | -0.3% |
| | *How do patients rate the overall care from the HH agency (Overall Care)* | ⇄ **N.S.** | .002% | 0.002% |
| | *Would patients recommend the HH agency to friends and family (Likely to Recommend)* | ⇄ **N.S.** | 0.17% | 0.2% |

*Cumulative effect reflects 2016-2019. HHVBP measures for CY 2019 are in italics. N.S. = not significant. Statistical significance identified with p-values ≤ 0.10.*

## Conclusions

Through the first four years of the model (2016-2019), 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 HHVBP states relative to the 41 non-HHVBP states. These effects include declines in unplanned hospitalizations and SNF use that appear to be important drivers of the favorable impact on overall Medicare spending. Through the end of the second year in which CMS adjusted Medicare payments to HHAs based on their TPS (2018-2019), we did not find evidence that these payment adjustments led to more pronounced impacts compared to the initial years of the model (2016-2017).

Our findings of reductions in unplanned hospitalizations and in Medicare spending for inpatient services provide evidence of the 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 one of the potential mechanisms 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 $600 million during 2016-2019.

The effects of the quality-based HHVBP payment adjustments may be moderated by levels of overall agency profitability. Even though the payment adjustments in 2019 reached a maximum of ±5 percent, just over half (52 percent) of HHVBP agencies received adjustments exceeding ±1 percent. These adjustments were applied in an environment where agency median profit margins were nearly 20 percent. CMS designed the HHVBP payment adjustments to become progressively larger, reaching ±8 percent in 2022 and will continue to estimate both intended and unintended impacts of the model on beneficiaries.

Our analyses suggest no substantial unintended impacts of HHVBP during the initial four years of implementation. For example, we found no evidence of an overall HHVBP effect on Medicare spending for home health care (the second largest component of Medicare spending for home health beneficiaries), home health utilization, or access to home health care. We did find differential impacts of HHVBP based on Medicaid coverage, where we did not observe the favorable impacts of the model on unplanned hospitalizations and improvements in functional outcomes among Medicaid patients. We will continue to consider the implications of the model for vulnerable populations in future years. While we observed declines in two of the five measures of patient experience with care, they represented small impacts (e.g., -0.3 percentage points) on measures with high performance (e.g., 82 percent to 86 percent), and there was no effect on measures of willingness to recommend the agency and ratings of overall care. With the larger planned payment adjustments in 2020-2022, it will be important to determine whether additional intended or unintended effects of HHVBP emerge, both overall and for specific subgroups of agencies and beneficiaries.

# 1. Introduction

The Centers for Medicare & Medicaid Services (CMS) designed the 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 HHVBP Model aims to give HHAs a financial incentive for quality achievement and improvement through adjustments to Medicare payments for home health services. The HHVBP payment adjustments are determined based on an agency's quality performance measures relative to peers in its state.

From calendar year (CY) 2016 through CY 2022, HHAs in Arizona, Florida, Iowa, Massachusetts, Maryland, Nebraska, North Carolina, Tennessee, and Washington are required to participate in the HHVBP Model. These states were selected at random from nine state regional groupings that contained five to six states each. These groups were defined based on geographic location, utilization, demographics, and clinical characteristics (HHS, 2015a).

The model began in 2016, with the first two years used as reporting years to set the rates used later in the model. Starting in January of 2018, each eligible HHA in the HHVBP states had its Medicare payments adjusted upward or downward by up to 3 percent based on the relative Total Performance Score (TPS) it achieved in 2016. In CY 2019 – the most recent year of data included in this report – the payment adjustments had a maximum range between -5 percent and 5 percent based on HHA quality performance levels achieved during CY 2017. As shown below in Exhibit 1, the maximum adjustment range to an agency's Medicare payment amount will increase each year between CY 2018 and CY 2022 (CMS, 2016). These adjustments modify the otherwise applicable payment rates for HHAs under the Medicare home health prospective payment system (HH PPS).

*Exhibit 1. HHVBP Model Payment Adjustment Amounts, by CY*

| 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 | Yes, based on 2020 TPS | ±8% |

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 HHVBP Model may influence HHA behavior and impact quality of care, Medicare expenditures, beneficiary experience, and the utilization of Medicare services. This is our fourth 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 the HHVBP Model modifies the existing payment approach under Medicare and corresponding financial incentives. We then discuss the 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 2018, Medicare served approximately 3.4 million beneficiaries and paid a total of $17.9 billion for home health care under the HH PPS, reflecting a slight increase from the previous year's spending of $17.7 billion and a nearly 90 percent increase in spending since 2002 (MedPAC, 2020). 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 (34 percent of initial home health episodes) or as a referral from the community (66 percent of initial home health episodes) (MedPAC, 2020). That is, unlike skilled nursing facility (SNF) services, Medicare does not require a preceding hospitalization for home health coverage, 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.[1] On January 1, 2020, CMS implemented the Patient-Driven Groupings Model (PDGM), a new method for determining the per fee-for-service (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

[1] For example, the HH PPS has 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).

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.[2] HHAs are required to complete and submit OASIS assessments for all of 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 in the HHVBP Model.

## 1.2 HHVBP Performance Measures and Scores

### 1.2.1 HHVBP Performance Measures and Data Sources

As noted earlier, an agency's TPS determines the payment adjustments for eligible HHAs in the nine 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). 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). CMS also 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. In addition to dropping the two OASIS-based process measures, the 2019 HHVBP measure set 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) Change in Self-Care and Total Normalized Composite (TNC) Change in Mobility (HHS, 2018). The HHVBP Implementation contractor calculates these two composite measures from OASIS data for HHAs in the HHVBP states.

With the exception of three HHA self-reported measures, the measures included in the 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 HHC and were included in the CMS Star Ratings prior to the start of the model (Exhibit 2).

### 1.2.2 Agency Total Performance Scores

While Medicare HH PPS payments were not adjusted in the first two performance years of HHVBP (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. The fourth performance year (2019) is the second year in which agencies: 1) were incentivized to achieve a high TPS

[2] Agencies do not have to complete OASIS for patients under 18 years of age or those receiving services for pre- or post-natal conditions.

through adjustments to future payments under the Medicare HH PPS (i.e., their 2019 performance affects payment rates in CY 2021); and 2) received payment adjustments that were determined by previous performance years (i.e., payment adjustments of up to ±5 percent were based on their CY 2017 performance). To determine the payment adjustments for each HHA, the HHVBP Implementation contractor calculates a TPS for each HHA based on its scores for each of the performance measures achieved two years prior to that year. For the 13 HHVBP performance measures used in CY 2019 and used to calculate the HHA's TPS for payment year 2021,[3] HHAs receive points based either on their achievement level relative to baseline threshold values or improvement relative to their baseline performance; these points are calculated separately for each measure in each model state.[4] For HHAs that were in operation prior to the start of 2015, their baseline period for measuring improvement is 2015. For HHAs that opened during 2015 or later, their baseline period for measuring improvement is determined based on their first full CY in operation. For the three HHA self-reported measures, HHAs receive points for reporting these measures; the agency's performance on these measures does not affect the TPS.

For the TPS calculation, HHAs receive 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 2017 (which determines the payment adjustment in 2019), agencies must have a Medicare participation date prior to 2016. In addition, to be eligible for a payment adjustment, agencies must be in operation for the entire performance year.[5]

[3] See Exhibit 2 below for HHVBP performance measures used for other years.
[4] 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.
[5] However, 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.

*Exhibit 2. HHVBP Performance Measures for Performance Years 1-5 (CY 2016-2020)*

| 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.*
*[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 will be required to submit data for this measure through CY 2020, but it will be dropped from public reporting in April 2020 (HHS, 2019).*
*[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).*

## 1.3 Scope of this Annual Report

This Fourth Annual Report examines the HHVBP Model after the first four years of implementation. This includes data and supporting analyses for CY 2019, the second year that HHAs in the nine HHVBP states are subject to positive and negative payment adjustments up to 5 percent. We use data available from CYs 2013-2019, which includes a baseline period (2013-2015) and the first four performance years of the HHVBP Model (2016-2019).

In addition to addressing the impact of HHVBP on cost, quality utilization, and patient experience, this report expands upon our analyses from previous reports. We conducted several new analyses to address changes made to the HHVBP Model in 2019, including the two new OASIS-based composite measures and the impact on unplanned hospitalizations, in light of weighting the two claims-based measures more heavily in the TPS calculation. We examined new measures of utilization, including emergency department (ED) visits that lead to an inpatient admission, as well as rehospitalizations among HH patients with different medical conditions. Also new this year, we examined potential substitutes to home health services among post-acute care beneficiaries in addition to whether the financial incentives under the model affect access to care or the mortality rate of home health patients. Additionally, we expanded several of our ancillary analyses to explore potential unintended consequences of the model, including the impact of HHVBP on frontloading, case-mix of beneficiaries receiving home health care, and vulnerable populations. We also sought perspective from key informants from HHAs across the nine HHVBP states previously interviewed in 2017 to provide a longitudinal perspective on the impact of the model on HHA operations. We conclude with a summary of our plans for future analyses.

# 2. Evaluation Approach

This section summarizes our approach for the evaluation. We provide an overview of our evaluation design for the HHVBP Model, including quantitative analyses of claims and OASIS data, selection of a comparison group for individual and aggregated HHVBP states, analysis of agency TPS, and analysis of surveys about patient experience. We also review our approach to collecting and analyzing interview data from home health chain organizations and agencies. We provide additional details regarding our analytic approach in the Technical Appendix.

## 2.1 Overview of the HHVBP Evaluation Design

Evaluation of the model will span an eight-year timeframe that covers the model's entire period of operation. 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 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? (RQ1)
- 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? (RQ2)
- How does HHVBP impact HHA operations, characteristics of HHAs in operation, and fiscal solvency? (RQ3)
- Are there unintended consequences of HHVBP? (RQ4)
- Do other CMS initiatives, external initiatives, or other policies have implications for the effects of HHVBP? (RQ5)
- What is the impact of HHVBP on Medicare more broadly? (RQ6)
- What is the feasibility of expansion of the HHVBP Model beyond the nine model states and its anticipated effect on supporting CMS's goals of providing better care, lower costs, and improved health? (RQ7)

This evaluation analyzes secondary data (e.g., Medicare FFS claims and OASIS data) and collects primary data to provide information about the behavior of providers under the model and the potential impact on beneficiaries. We conducted and analyzed interviews with agencies in HHVBP states to understand how different aspects of agency operations may have changed since earlier in the model implementation. Analysis of these qualitative data highlight issues for further investigation and provide context for interpreting our quantitative analytic results.

## 2.2 Quantitative Analytic Approach

We designed our quantitative analysis to address the question: What was the impact of the HHVBP Model on the quality of health care, health care utilization, health outcomes, and health care costs? Our analyses examine whether the HHVBP Model is achieving its overarching goal—to 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)* (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 Episodes per 1,000 FFS Beneficiaries | County-Year |
| **FFS Claims-Based and OASIS-Based Case-Mix Measures (Section 3)** | |
| HCC Score at the Start of Care | FFS 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 Claims-Based Measures Examining Post-Acute Care (Section 3)** | |
| Home Health Care | FFS Hospital Discharge-Level |
| Skilled Nursing Facility | FFS Hospital Discharge-Level |
| Inpatient Rehabilitation Facility | FFS Hospital Discharge-Level |
| Hospital Outpatient Therapy | FFS Hospital Discharge-Level |
| None (i.e., Self-Care) | FFS Hospital Discharge-Level |
| **FFS Claims-Based HHA Operations Measures (Section 4)** | |
| Number of Skilled Nurse Visits During First 2 Weeks | FFS Episode-Level |
| Number of Therapy Visits During First 2 Weeks | FFS Episode-Level |
| Frontloading Skilled Nurse Visits | FFS Episode-Level |
| Frontloading Therapy Visits | FFS Episode-Level |
| **FFS Claims-Based Utilization Measures* (Section 6)** | |
| *Unplanned Acute Care Hospitalization/First FFS HH Episodes* | FFS Episode-Level |
| *Outpatient ED Use (No Hospitalization)/First FFS HH Episodes* | FFS Episode-Level |
| ED Use Followed by Inpatient Admission/First FFS HH Episodes | 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 |
| **Causes of FFS Claims-Based Hospitalization Measures (Section 6)** | |
| Rehospitalization (Overall) | FFS Episode-Level |
| Medical Rehospitalization for Same MDC as Index Hospitalization | FFS Episode-Level |
| Medical Rehospitalization for Different MDC as Index Hospitalization | FFS Episode-Level |
| **FFS Claims-Based Spending Measures‡ (Section 7)** | |
| Average Medicare Spending per Day during/following FFS HH Episodes of Care | FFS Episode-Level |
| Average Medicare Spending per Day during FFS HH Episodes of Care | FFS Episode-Level |
| Average Medicare Spending per Day following FFS HH Episodes of Care | FFS Episode-Level |
| **OASIS-Based Outcome Quality Measures (Section 8)** | |
| *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 |
| *Improvement in Pain Interfering with Activity* | OASIS Episode-Level |

| Measure | Unit of Analysis |
|---|---|
| Improvement in Status of Surgical Wounds | 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 summary report. HHVBP Measures indicated by italic text. |As discussed in Section 1.2, in 2019, CMS removed all OASIS process measures and replaced three of the OASIS outcome measures with the two composite measures (see Exhibit 2). | We do not include the three measures that are self-reported by HHAs since these are only available for HHAs in the HHVBP states. |All measures have a baseline period of 2013-2015 except for HHA Total Performance Score which has a baseline period of 2015 | *As discussed in Section 2.2.2, a D-in-D approach is not used for analysis of agency TPS. ‖We also analyzed hospitalization measure stratified by eight MDC categories and by surgical versus medical types.| ‡For each of the three spending measures, we analyze their components: Medicare Part B carrier/DME combined, HH, Hospice, Inpatient, Outpatient ED and Observation Stays, other Outpatient/Outpatient types combined, and SNF. Abbreviation: HCC, Hierarchical Condition Categories.*

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 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 nine 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 C.1 [Page 111] 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 8] and A.1.5 [Page 20] in the Technical Appendix for more details).

Beginning in January 2019, the OASIS assessment form was updated from version C2 to D, which included removal of four indicators of clinical status of patients at the start of home health care (without replacement) that the HHVBP Evaluation used as covariates in our D-in-D analyses in the Third Annual Report. Due to these changes in OASIS data collection, for the Fourth Annual Report, we are unable to continue using the same D-in-D model specification that was used in the Third Annual Report. For this evaluation, our analyses of the impact of removing these four OASIS-based covariates indicated a lack of parallel trends during the baseline period for key claims-based utilization measures of interest. In contrast, we found that the omission of these four OASIS-based covariates did not materially affect our findings for the OASIS-based outcome measures.

For the claims-based measures, we examined several potential covariates with a goal of finding conceptually similar substitutes for the four unavailable OASIS covariates and improving the performance of the D-in-D models. We identified three clinical factors as additional covariates: oxygen indicator, PDGM home health admission source, and PDGM defined clinical grouping (see Exhibit A-4 [Page 16] and Section A.1.4.2 [Page 9] in the Technical Appendix for details). These covariates, along with existing beneficiary, agency characteristics, and other core clinical factors, helped to achieve balance in the baseline period between the HHVBP and non-HHVBP states. Our analyses indicated that the addition of these covariates improved the model's ability to satisfy the parallel trends assumption for key impact measures of interest and establish valid inferences about the impact of HHVBP. Despite adding these new covariates, 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.

In general, our D-in-D estimates based on the revised covariate list are very similar and yield findings regarding the effects of HHVBP on utilization and spending that are similar to those presented in the Third Annual Report. However, due to changes in the covariate list, there are some impact measures in which D-in-D estimates for the first three years of the evaluation period (2016-2018) have resulted in estimates that differ in magnitude from what was reported in the Third Annual Report. 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 9), Section A.1.5.2 (Page 22), and Section A.1.5.3 (Page 36) of the Technical Appendix.

A potential confounder for our evaluation of the 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-5 [Page 19] 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. Consequent upon the revised covariate list and addition of new APM indicators in the D-in-D model for the entire evaluation period, model estimates for prior years (2013-2018) may be slightly different from what was reported in the Third Annual Report. However, the overall findings are consistent with what was presented before.

We are unable to use a D-in-D approach for the three self-reported HHVBP performance measures (Influenza Vaccination Coverage for Home Health Care Personnel, Herpes Zoster [Shingles] Vaccination for Patient, Advance Care Plan) for which data are only available for HHAs in the HHVBP states. We focus on reporting rates among HHAs in the nine HHVBP states for these measures (see Section 11.4). Finally, we use an alternative analytic approach for examining agency TPS values, as described in Section 2.2.2 of this report. 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 20) in the Technical Appendix.

Given the phase-in structure of 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 (2018-2019) of the post-implementation period. In particular, we compared the average estimated HHVBP impacts on the measures in 2018-2019, 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 20) in the Technical Appendix.

### 2.2.1 Comparison Groups for State-Level Analyses

In addition to analyzing measures at the national level, we evaluated the impact of HHVBP among individual states included in the 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 4). 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. 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 4), 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 4. 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 noted in the Third Annual Report, we had 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. The tests concluded that using a regional group (Exhibit 4) 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 measures, FFS claims-based Medicare spending measures, and the OASIS-based measures. Further details are included in Sections A.1.6 (Page 41) of the Technical Appendix.

### 2.2.2 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 HHVBP Model on overall agency performance, we compared 2016-2019 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).[6] 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.[7] For these reasons, we employed a cross-sectional regression analysis, as opposed to a D-in-D approach, for examining agency TPS values. Section A.1.7 (Page 42) in the Technical Appendix contains further details regarding our rationale for using this analytic approach.

### 2.2.3 Interpreting the Findings

Adhering to best practices for evaluation research (Wasserstein, 2019), the HHVBP evaluation team 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 qualitative findings to draw conclusions about impacts of the HHVBP Model. We expect this strategy to facilitate policymakers' subsequent use of the findings for decision-making purposes.

## 2.3 Qualitative Approach

This annual report presents findings from 63 interviews with home health agencies from across the nine HHVBP states, conducted from July 2020 through September 2020. These interviews comprise the primary source of information on how the HHVBP Model influences agency operations over time. Because there is no uniform data available from agencies about their operations, these interviews offer the only explicit opportunity to assess how the model's financial incentives shape agency operations and care delivery activities. The interviews provide real-world context to interpret trends in the quality, spending, and utilization outcomes examined in our quantitative analyses. Further, we use the qualitative information to generate hypotheses for additional primary data collection activities and quantitative analyses.

As in previous years, we interviewed HHA key informants to assess qualitatively how model incentives are shaping agency operations and beneficiary care experiences. Due to the ongoing COVID-19 Public Health Emergency (PHE), CMS limited the number of interviews and the inclusion of new interview topics to minimize burden on providers during this difficult time. The research team therefore explored many of the same topics as in the first two years of the model (2017 and 2018). Using a semi-structured

[6] See Section 1.2.1 above for more detail on the HHVBP measure set.
[7] See Section A.2.7 (Page 78) in the Technical Appendix for more information on the TPS calculation.

interview guide, we asked interviewees to focus on how the following may have changed since early model implementation: (1) perceptions of HHVBP's impact on patients and agencies; 2) agency operations and care delivery; and (3) the intersection of HHVBP with other efforts and external factors.

To provide a strengthened longitudinal perspective, we targeted the 67 agencies originally interviewed in 2017, recognizing that not all may be available to be interviewed again. These agencies reflect a deliberative sample of agencies across several key characteristics, designed to capture the experiences of a variety of agencies: agency type (freestanding vs. hospital-based agencies); ownership (for profit or not); chain affiliation (affiliated with a large HHA chain or not); geographical area served (rural or urban); 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 B.1 (Pages 108) in the Technical Appendix.

## 2.4 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 during the first four performance years of the HHVBP Model. Section 3 examines changes in home health utilization, agency entry and exit, case-mix of beneficiaries receiving care, and potential impacts of the HHVBP Model on changes in 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 the impact of HHVBP on frequency of visits early in home health episodes. 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-model states, and includes further analyses of agency TPS and payment adjustments. We examine HHVBP impacts on Medicare utilization and 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. We analyze the impact of the HHVBP Model on vulnerable populations in Section 1010. In Section 11, we present findings from the interviews we conducted with representatives of HHVBP HHAs, followed by findings on HHVBP HHAs' use of the HHVBP Connect website and reporting rates for the three self-reported HHVBP measures. We conclude with a discussion of future activities in Section 12.

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

## 3.1 Introduction

This section presents an overview of characteristics of the home health industry in HHVBP and non-HHVBP states, followed by analyses of home health utilization and patient case-mix between the two groups. Both the number of HHAs and episodes declined in HHVBP and non-HHVBP states, and this decline predated the HHVBP Model. We did not find evidence of lower utilization emerging among Medicare FFS beneficiaries in HHVBP states compared with non-HHVBP states as a potential unintended consequence of HHVBP. Using a combination of other approaches, we also did not observe signals that HHVBP adversely affected access to home health care. The extent to which counties in HHVBP states were served by at least one or two HHAs remained high, even in rural areas. Further, there was no evidence of a growing number of counties in HHVBP states where access to care for home health beneficiaries may be impaired, based on trends in the number of counties with both a low average number of home health visits per episode and high ED use among home health beneficiaries.

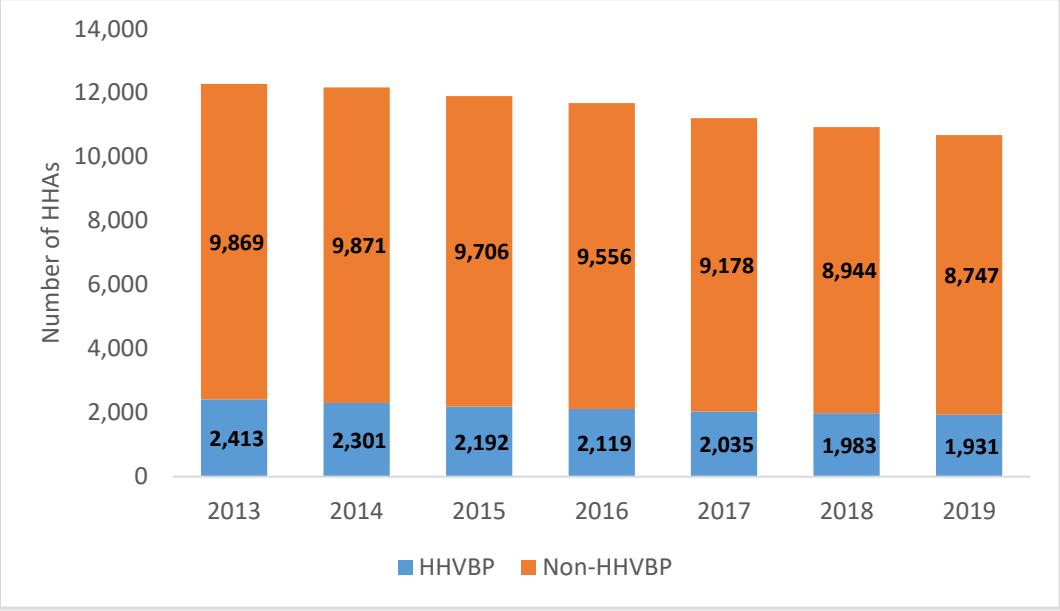
Further, while we observed a pattern of increasing clinical severity over time among home health patients for three case-mix measures, these trends were generally similar in HHVBP and non-HHVBP states. For two measures of functional status at the start of care, 1) a composite measure of patient mobility and 2) a composite measure of self-care, we found no evidence of HHVBP impacts. For the Hierarchical Condition Category (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 in all years of the post-implementation period. 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 do not conclude there is strong evidence of a significant agency response to HHVBP to select beneficiaries based on case-mix. This finding is consistent with our findings in our previous Annual Report (Arbor Research, 2020) based on a slightly different set of case-mix measures. It will be important to continue to examine whether HHVBP encourages agency practices of admitting patients based on their case-mix, especially as the payment adjustments grow larger over time.

In a hospital discharge-level analysis, we found evidence that HHVBP contributed to a slightly greater likelihood in 2018 and 2019 of beneficiaries transitioning to home health care within 14 days relative to other forms of post-acute care (PAC). This finding is consistent with other analyses reported in this section that showed no signs of emerging access problems due to HHVBP.

## 3.2 Continued Decline in the Number of Home Health Agencies

Overall, the number of HHAs has declined from 2013-2019 in the HHVBP and non-HHVBP states, which began prior to the HHVBP Model implementation (Exhibit 5). The rate of decline in HHAs was almost twice as high among the nine HHVBP states compared with the non-HHVBP states over the seven-year period (20.0 percent decrease vs. 11.4 percent decrease, respectively). The decreasing number of HHAs among HHVBP states was almost entirely driven by Florida, which experienced a 35 percent decline in the number of agencies over the seven-year period (from 1,399 to 915; not shown); this decline reflects the effect of the CMS moratorium on new Medicare HHAs in Florida. In 2019, Florida accounted for 47 percent of HHAs in HHVBP states, a decrease from 58 percent in 2013. See Exhibit C-8 (Page 125) in the Technical Appendix for additional information.

*Exhibit 5. Steeper Rate of Decline in the Number of Home Health Agencies in HHVBP States versus Non-HHVBP States, 2013-2019*

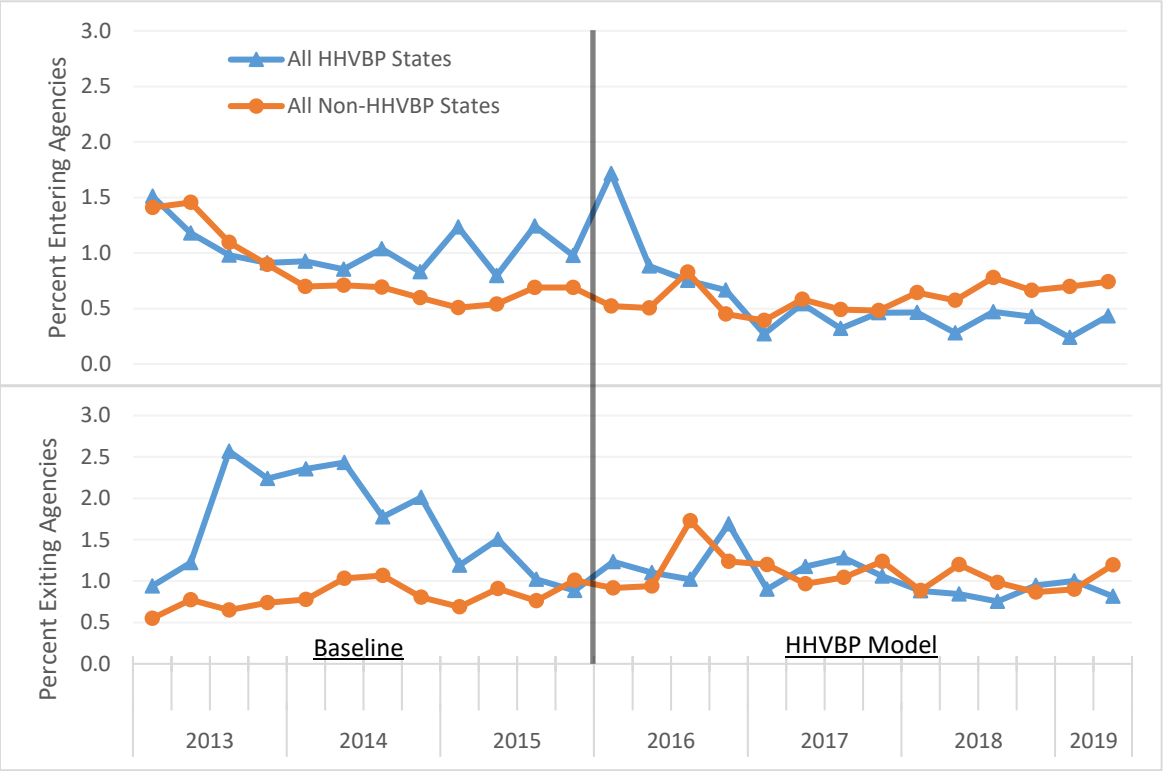



In the context of these preexisting declines in the number of HHAs in HHVBP and non-HHVBP states, we examined whether the model may have affected the overall rate at which new agencies appeared or the overall rate at which they terminated. The HHVBP Model could affect the delivery of home health services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

Similar to the findings we reported in our previous report (Arbor Research, 2020), we found that the decreases in the number of agencies in operation through Quarter 2 of 2019 (Exhibit 6) were due to the total number of agencies exiting the market exceeding the number of new agencies entering the market. 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 6). However, since the implementation of HHVBP, agency entry and exit rates have been relatively similar in HHVBP and non-HHVBP states.

Approximately 1.5 percent of all open agencies in HHVBP and non-HHVBP states were new in 2013 Q1 and decreased over time, with a larger decline in non-HHVBP states through 2014 (Exhibit 6). We observed a spike in the number of new agencies in HHVBP states in 2016 Q1 (largely due to new agencies in Massachusetts), but agency entry rates were similar in HHVBP and non-HHVBP states for the remainder of the post-implementation period.

*Exhibit 6. Quarterly Percentages of New and Terminating HHAs in HHVBP States Decreased to Similar Rates as Non-HHVBP States Following the Implementation of HHVBP, 2013 Q1-2019 Q2*

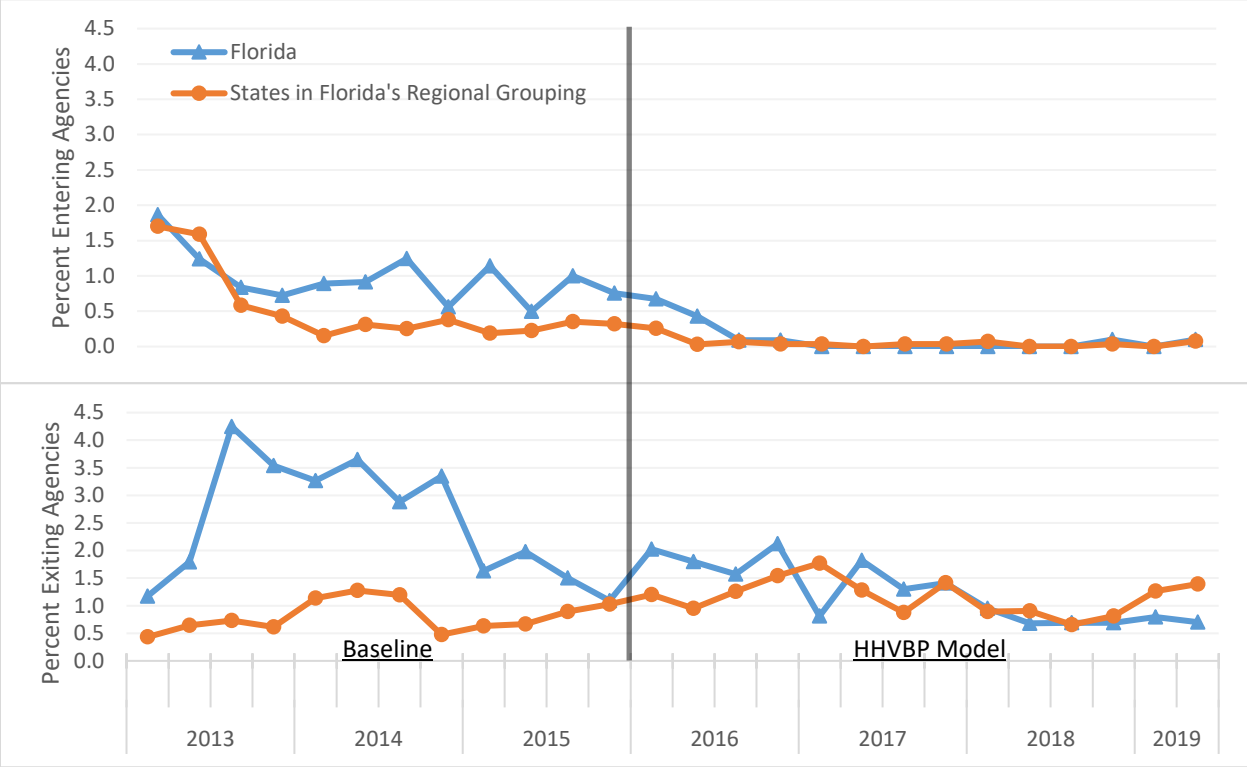



Unlike entry rates, quarterly agency exit rates were sometimes twice as high in HHVBP states compared with non-HHVBP states prior to HHVBP implementation (Exhibit 6). For example, exit rates of open HHAs in HHVBP states ranged from 0.9 percent to 2.6 percent from 2013 through 2015, whereas exit rates in non-HHVBP states ranged from 0.5 percent to 1.1 percent. As with agency entry rates, quarterly agency exit rates were similar in HHVBP and non-HHVBP states in the post-implementation period.

A number of HHVBP states—specifically, Florida, Massachusetts, and Arizona—strongly influenced the differences between HHVBP and non-HHVBP states during the pre-implementation period, with the majority of new agencies in HHVBP states located in these three states. In particular, the number of agencies opening in Florida decreased after implementation of the HHVBP Model and eventually stopped completely (Exhibit 7), reflecting the effect of the CMS moratorium on new Medicare HHAs in Florida. Meanwhile, agencies continued to open in other HHVBP states (Exhibit 8)—primarily in Massachusetts, Arizona, and Iowa.

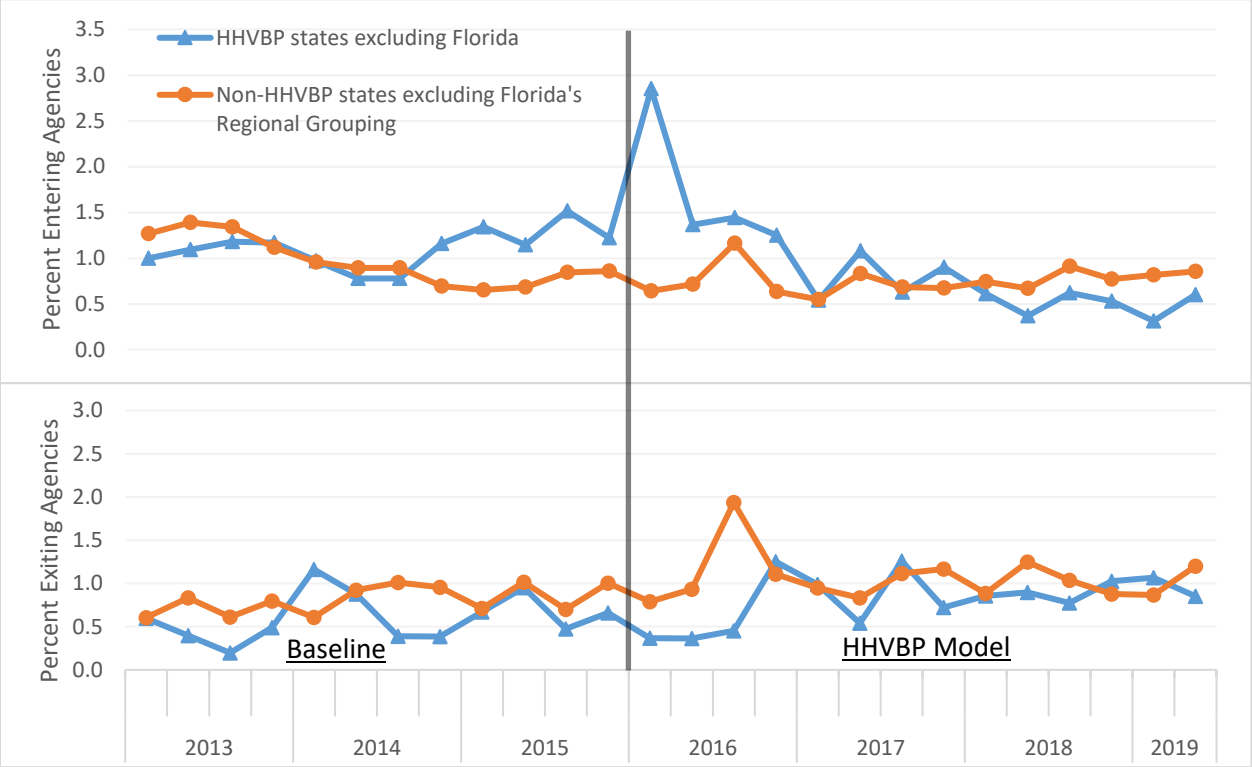
Florida also influenced the relatively high exit rates among HHVBP states, although the difference from states in its regional grouping became smaller in 2015 (Exhibit 7). As with the overall rates at which new agencies entered (Exhibit 6), agency exit rates between Florida and its regional grouping were relatively similar overall for the two groups in the post-implementation period. However, there is a slight uptick in exits in Florida's regional grouping compared with Florida in the two most recent quarters (2019 Q1-Q2).

*Exhibit 7. Quarterly Percentages of New and Terminating HHAs in Florida Decreased to Similar Rates as its Regional Grouping Following the Implementation of HHVBP, 2013 Q1-2019 Q2*




*For Regional Grouping definitions, see Exhibit 4.*

*Exhibit 8. Quarterly Percentages of New and Terminating HHAs Generally Remained Similar in HHVBP and Non-HHVBP States When Excluding Florida and its Regional Grouping, 2013 Q1-2019 Q2*




*For Regional Grouping definitions, see Exhibit 4.*

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

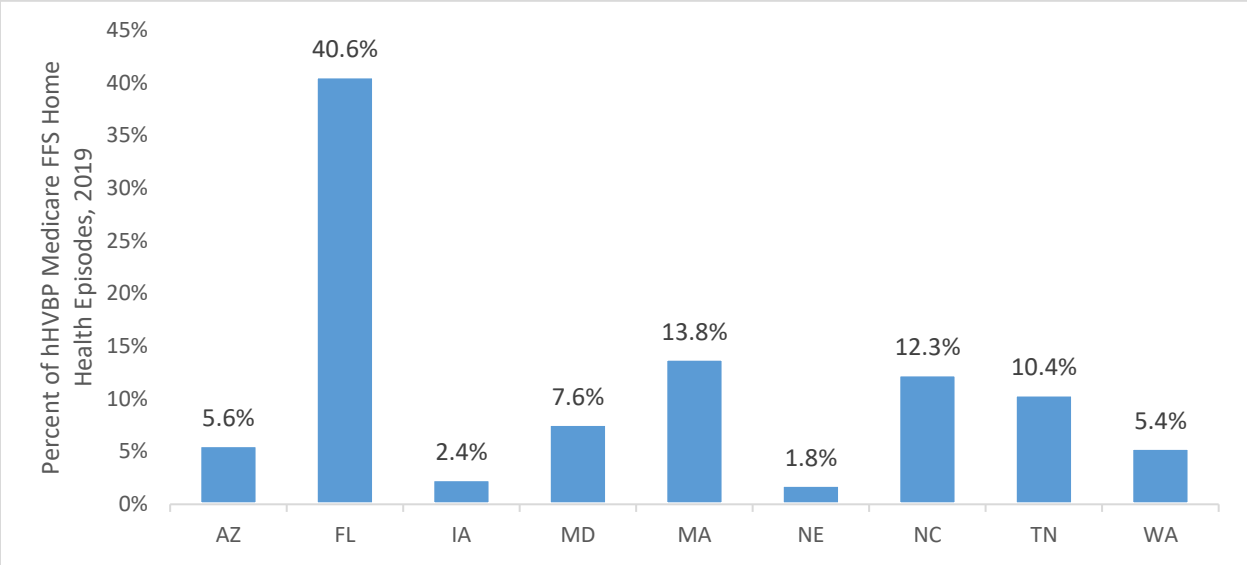
As demonstrated in the previous section, CMS implemented HHVBP in a market where the number of agencies in operation nationally had been declining over time. While there has been no apparent overall impact of HHVBP on the number of agencies in operation, including any wide-ranging effects on the market 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 have an understanding of how the characteristics of the home health populations in the HHVBP and non-HHVBP states compared to each other before model implementation. As we discuss below, we found differences among the nine HHVBP states in the underlying levels of home health utilization, among many factors we considered in defining comparison groups for the individual HHVBP states.

Overall, the 9 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 C.1 [Page 111] 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 for details).

In the most recent year of the model, the 1,931 HHAs operating in HHVBP states (Exhibit 5) provided nearly 1.4 million home health episodes to 801,137 Medicare FFS beneficiaries; the 8,747 HHAs in the 41 non-HHVBP states provided nearly 4.6 million home health episodes to 2.5 million Medicare FFS

beneficiaries (see Exhibit C-4 [Page 117] in the Technical Appendix). The states that comprise the HHVBP group differ substantially in the size of their home health populations. As Exhibit 9 shows, Florida alone accounted for 40.6 percent of all FFS home health episodes in the HHVBP states in 2019. At the other extreme, Nebraska and Iowa accounted for just 1.8 percent and 2.4 percent of episodes in the HHVBP states, respectively.

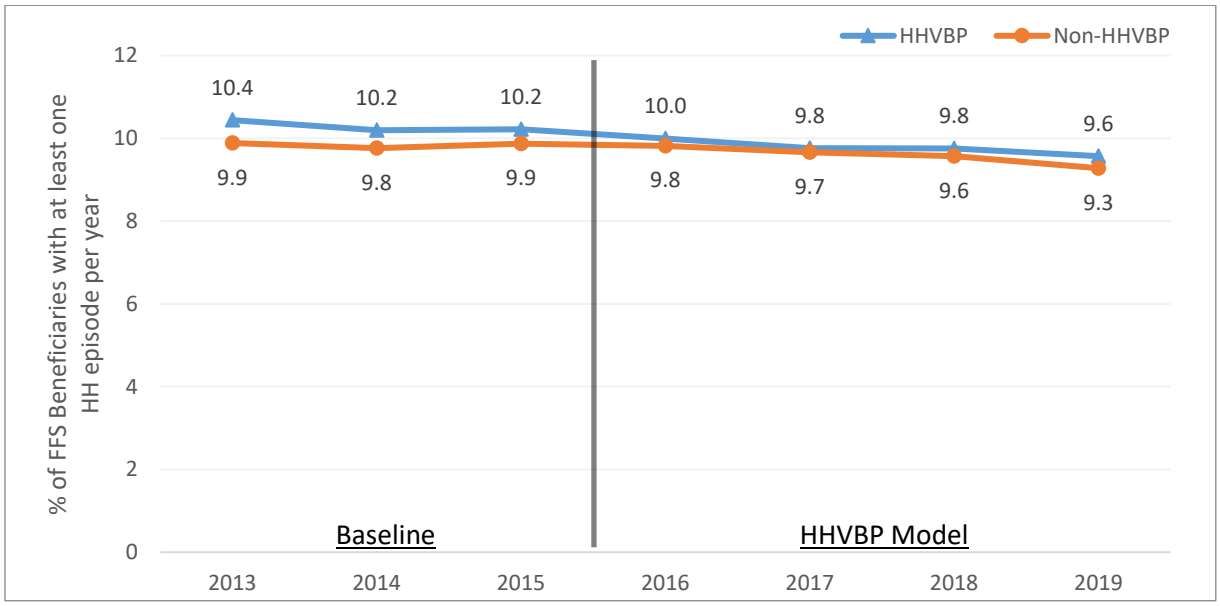
*Exhibit 9. Florida Accounts for Largest Percent of HHVBP Medicare FFS Home Health Episodes, 2019*




To explore the potential impact of HHVBP on home health utilization, we examined trends in the utilization of home health care 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 episodes per 1,000 FFS beneficiaries per year.

Approximately one in ten Medicare FFS beneficiaries utilized home health services each year from 2013-2019 in HHVBP and non-HHVBP states (Exhibit 10). The percentage of the Medicare FFS population utilizing home health care has remained slightly higher in HHVBP states compared with non-HHVBP states (Exhibit 10). We observed a small decrease in Medicare FFS beneficiaries with at least one home health episode in both groups from 2013-2019, with a slightly larger decrease for Medicare FFS beneficiaries living in HHVBP states relative to non-HHVBP states (i.e., from 10.4 percent to 9.6 percent, and from 9.9 percent to 9.3 percent, respectively). The decrease in HHVBP states began prior to model implementation.

*Exhibit 10. Slight Decline in Home Health Utilization among Medicare FFS Beneficiaries in both HHVBP and Non-HHVBP States, 2013-2019*




Prior to the implementation of HHVBP, levels of home health utilization varied across HHVBP states, but trends in home health utilization for each HHVBP state were similar to the non-HHVBP states in their regional grouping, which are used as the comparison groups for state-level analyses in this report (Exhibit 11). Among the nine HHVBP states, the percentage of Medicare FFS beneficiaries using home health services during the pre-HHVBP period ranged from a high of approximately 15 percent in Florida to a low of approximately 5 percent in Iowa. These patterns were consistent from 2013 to 2019, with the percent of Medicare FFS beneficiaries utilizing home health care remaining more than 2.5 times higher in Florida than in Iowa during both the pre-HHVBP and post-HHVBP periods.

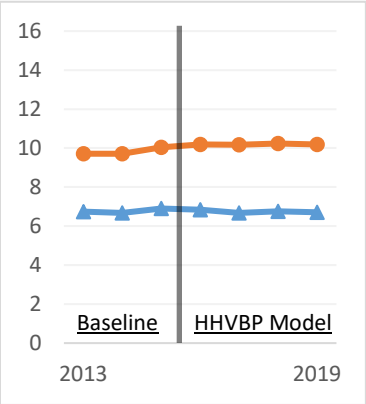
There have also been distinct trends in home health utilization among the HHVBP states. Based on trends from 2013 to 2019, home health utilization among Medicare FFS beneficiaries decreased in Florida and also to a lesser extent in Iowa, Massachusetts, and Tennessee. Home health utilization remained relatively more stable over the seven-year period in Arizona, Maryland, Nebraska, North Carolina, and Washington.

*Exhibit 11. Similar Trends in the Utilization of Home Health Services among Medicare FFS Beneficiaries in HHVBP States and their Corresponding Regional Groupings*

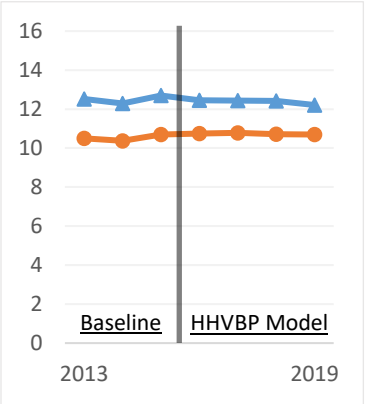
HHVBP
Non-HHVBP

"Non-HHVBP" reflects the states in the corresponding HHVBP state's Regional Grouping (Exhibit 4).

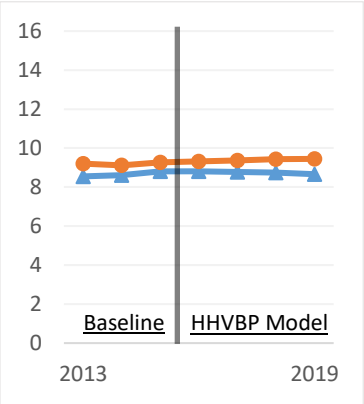
*Arizona*



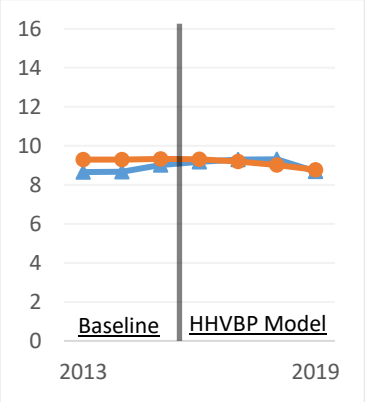

*Massachusetts*



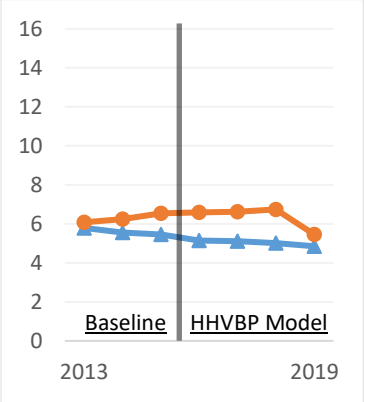

*North Carolina*



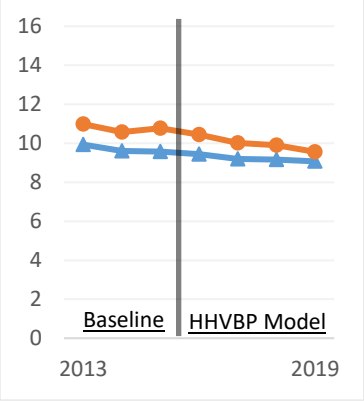

*Maryland*



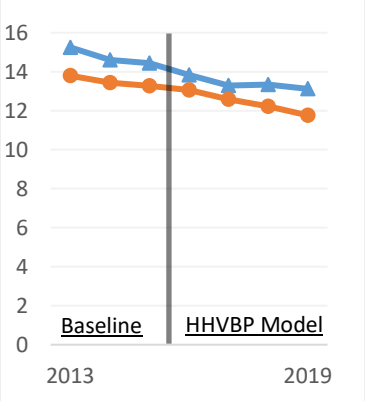

*Iowa*



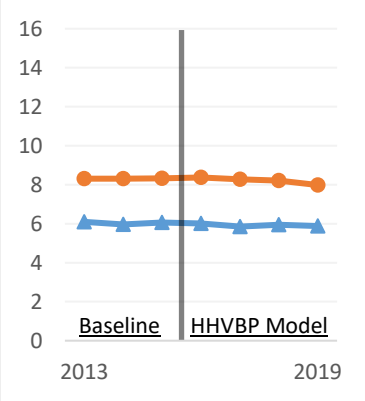

*Tennessee*



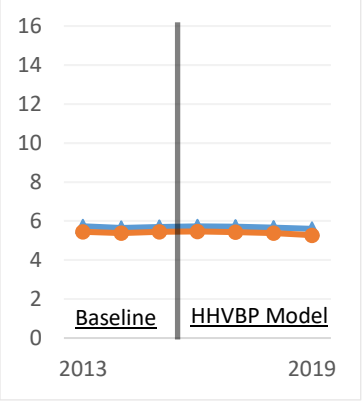

*Florida*




*Nebraska*

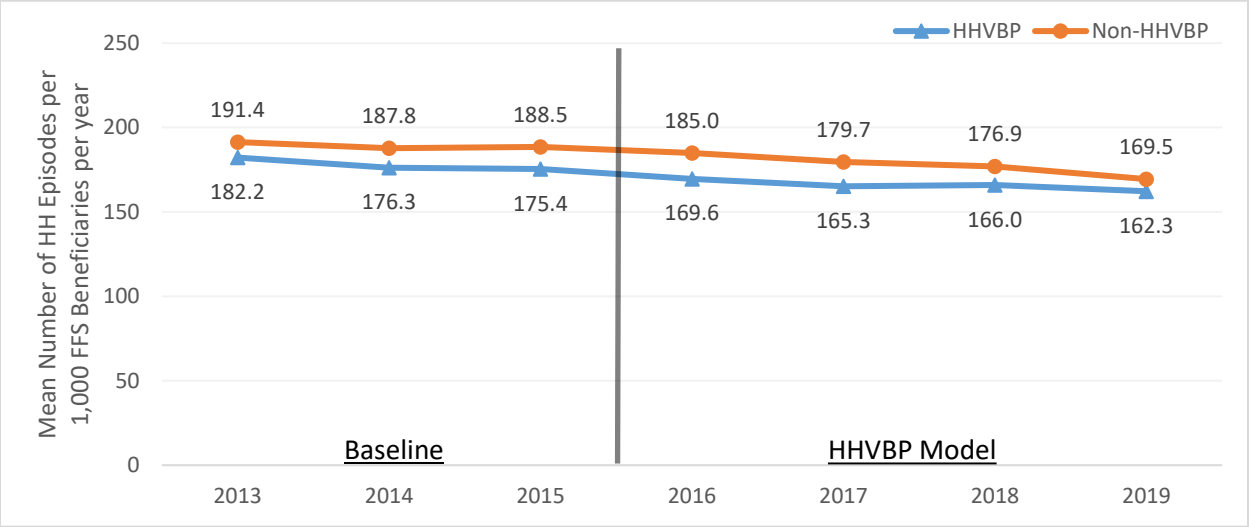



*Washington*



We also examined home health utilization based on a measure of volume: the number of home health episodes per 1,000 Medicare FFS beneficiaries. Similar to our findings above, we found that differences in overall levels of volume between the HHVBP and non-HHVBP states were within 4.8 percent and 7.5 percent during the pre-HHVBP period (2013-2015) (Exhibit 12). Moreover, we found evidence of a decline over time in the number of home health episodes per 1,000 FFS beneficiaries for both groups prior to implementation of HHVBP, with HHVBP states having a somewhat steeper decline of -3.8 percent relative to -1.5 percent for non-HHVBP states. This downward trend continued into the post-implementation period for HHVBP and non-HHVBP states.

*Exhibit 12. Volume of Home Health Utilization Trends Downward among Medicare FFS Beneficiaries in Both HHVBP and Non-HHVBP States, 2013-2019*




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 state fixed effects. These analyses yielded non-significant D-in-D estimates, suggesting that the implementation of HHVBP did not impact home health utilization for Medicare FFS beneficiaries differentially in HHVBP states relative to non-HHVBP states, either overall during 2016-2019, or in individual years of the model (Exhibit 13).

*Exhibit 13. Difference-in-Differences Analyses Reveal No Impact of HHVBP on Home Health Utilization among FFS Beneficiaries, 2013-2019*

| | 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 | -0.25 | 0.41 | -0.76 | 0.25 | 10.3% | -2.4% |
| 2017 | -0.30 | 0.39 | -0.88 | 0.28 | | -2.9% |
| 2018 | -0.22 | 0.54 | -0.81 | 0.37 | | -2.1% |
| 2019 | -0.12 | 0.74 | -0.70 | 0.47 | | -1.2% |
| Cumulative | -0.22 | 0.51 | -0.79 | 0.34 | | -2.1% |
| **Number of HH Episodes per 1,000 FFS Beneficiaries** | | | | | | |
| 2016 | -3.78 | 0.57 | -14.82 | 7.26 | 177.95 | -2.1% |
| 2017 | -2.38 | 0.77 | -15.77 | 11.01 | | -1.3% |
| 2018 | 1.07 | 0.90 | -12.55 | 14.69 | | 0.6% |
| 2019 | 4.85 | 0.56 | -8.86 | 18.55 | | 2.7% |
| Cumulative | -0.08 | 0.99 | -12.94 | 12.79 | | -0.04% |

*[a] D-in-D and 90% CI values represent percentage point changes. | CI= Confidence Interval. | These models include state fixed effects (See Section A.1.4 [Page 8] of the Technical Appendix for more details). | See Exhibit 13n (Page 165) in the Technical Appendix for each measure's sample size.*

As with all HHVBP states combined, we found no evidence of an impact of the model on home health utilization in most individual states. The exceptions included two states where there is evidence of a relative increase in home health utilization (Iowa and Tennessee) and one state where there is evidence of a relative decrease in home health utilization (North Carolina) compared with their regional groupings, for both utilization measures. Based on linear regression models with adjustments for state-specific linear trends, cumulative D-in-D estimates for the percent of FFS beneficiaries with at least one home health episode were 0.83 percent, 0.60 percent, and -0.47 percent for Iowa, Tennessee, and North Carolina, respectively (with average baseline levels of 5.6 percent, 9.7 percent, and 8.7 percent, respectively). Furthermore, results from the cumulative D-in-D model for the measure of volume (i.e., number of home health episodes per 1,000 Medicare FFS beneficiaries) suggested similar patterns for each of these three states relative to their regional comparison groups. See Exhibit C-59 (Page 168) in the Technical Appendix for additional detail.

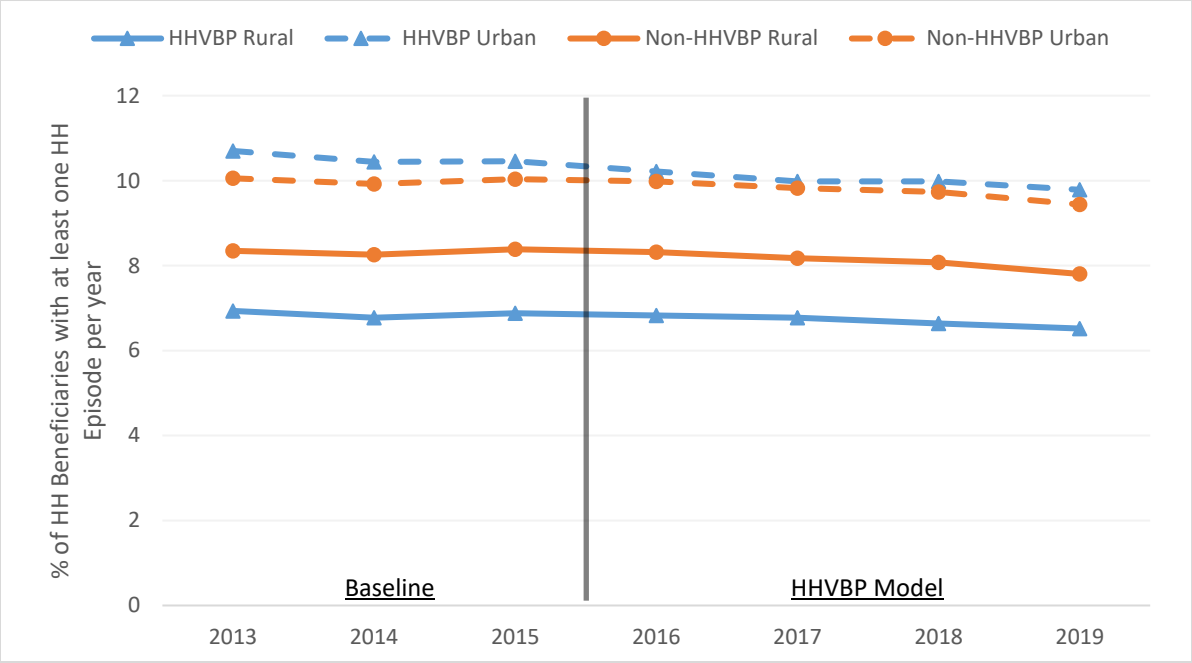
### 3.3.1 Examination of Rural vs. Urban Areas

We also examined trends in home health utilization separately for Medicare FFS beneficiaries living in rural and urban areas, defined using county-level CBSA codes (see Section A.2.1.1 [Page 46] of the Technical Appendix). Overall, we found no support that HHVBP had a differential impact in rural compared to urban regions. Beneficiaries living in rural areas may face greater barriers in access to home health care, and may therefore be more vulnerable to any unintended impacts of HHVBP in further limiting access to care. Rural counties are more likely to be served by only one HHA (Probst, 2014), while individuals in rural areas have been shown to receive fewer visits from home health providers (McAuley, 2009) and to be less likely to receive home health care after a stroke (Freburger, 2011). Especially since FFS home health beneficiaries living in rural counties account for only five percent of all FFS beneficiaries receiving home health services in HHVBP states (see Exhibit C-4 (Page

117) of the Technical Appendix), there could be effects of the model on beneficiaries in rural areas that would not be detected in the overall trends.

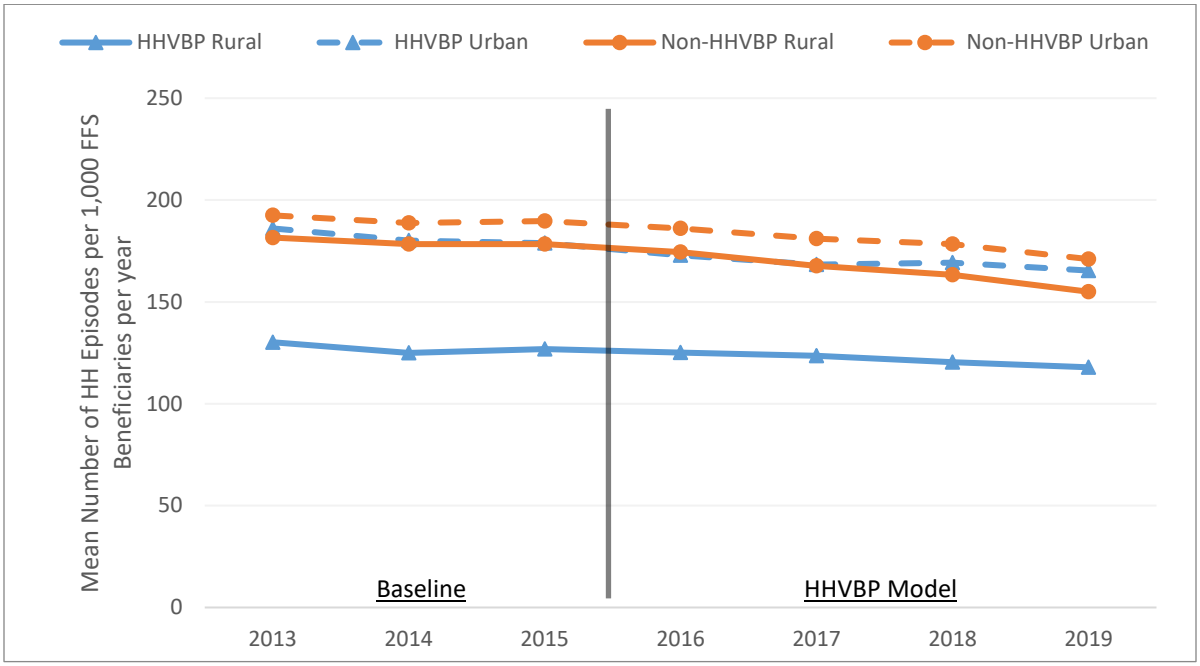
In HHVBP and non-HHVBP states, we found that beneficiaries living in rural counties were less likely to use home health services (Exhibit 14). For example, in HHVBP states, 10.7 percent of beneficiaries in urban areas used home health services in 2013, while only 6.9 percent of beneficiaries in rural areas used home health services. We found a similar pattern in non-HHVBP states, with a somewhat smaller rural-urban difference. However, there is a similar decline over time in the percentage of rural beneficiaries using home health services in HHVBP and non-HHVBP states (Exhibit 14). Therefore, just as we did not find an impact of the model on the overall utilization of home health services, we also find evidence of similar trends in home health utilization in HHVBP and non-HHVBP states separately in both rural and urban areas.

*Exhibit 14. Similar Declines in HH Utilization in HHVBP and Non-HHVBP States in both Rural and Urban Counties, 2013-2019*




We examined trends in the volume of home health services separately for beneficiaries in rural and urban areas (Exhibit 15). Again, we found a pattern of lower utilization among beneficiaries in rural areas, based on the number of home health episodes per 1,000 FFS beneficiaries, although the rural-urban difference in non-HHVBP states was small relative to that in HHVBP states. However, we also found evidence of a modest decline over time in this measure of home health utilization among rural beneficiaries in HHVBP states that was smaller than the decline observed among rural beneficiaries in non-HHVBP states. Together, the trends in home health utilization measures do not suggest adverse effects of the model on the ability of FFS beneficiaries living in rural areas to receive home health services.

*Exhibit 15. Similar Declines in the Volume of Home Health Utilization in HHVBP and Non-HHVBP States in both Rural and Urban Counties, 2013-2019*




## 3.4 Beneficiary Access to Home Health Care

A broad research question of interest for this evaluation is whether HHVBP has had an impact on beneficiary access to home health care. Of particular interest is whether the financial incentives under the model may have the unintended consequence of reducing access to care for some beneficiaries. This includes beneficiaries whom agencies may perceive as presenting greater challenges for achieving higher performance on quality measures and beneficiaries living in geographic areas with more limited options for home health care, such as those living in rural areas. In the previous section, we examined trends in HH utilization among Medicare FFS beneficiaries as indicators of realized access to home health care and found no overall impacts of the model either among all FFS beneficiaries or among all FFS beneficiaries living in rural areas. However, we also explored other approaches to identifying potential changes in access to care, which we discuss in this section. As with the analyses in the previous section, these additional approaches do not suggest an adverse impact of HHVBP on access to care among home health beneficiaries, in either rural or urban areas.

A key aspect of access to care involves the availability of health care providers. In 2019, the presence of at least one HHA serving a county was similar in HHVBP and non-HHVBP counties; 99.9 percent of Medicare FFS beneficiaries resided in HHVBP counties where at least one HHA provided services, and 100 percent of Medicare FFS beneficiaries resided in non-HHVBP counties where at least one HHA provided services in 2019 (not shown). Furthermore, 99.6 percent of Medicare FFS beneficiaries resided in HHVBP counties, and 99.4 percent of Medicare FFS beneficiaries resided in non-HHVBP counties where at least two HHAs provided services. These findings are consistent with the 2016 MedPAC Report (MedPAC, 2016) to Congress that found in 2014 “over 99 percent of beneficiaries lived in a ZIP code where a Medicare home health agency operated.”

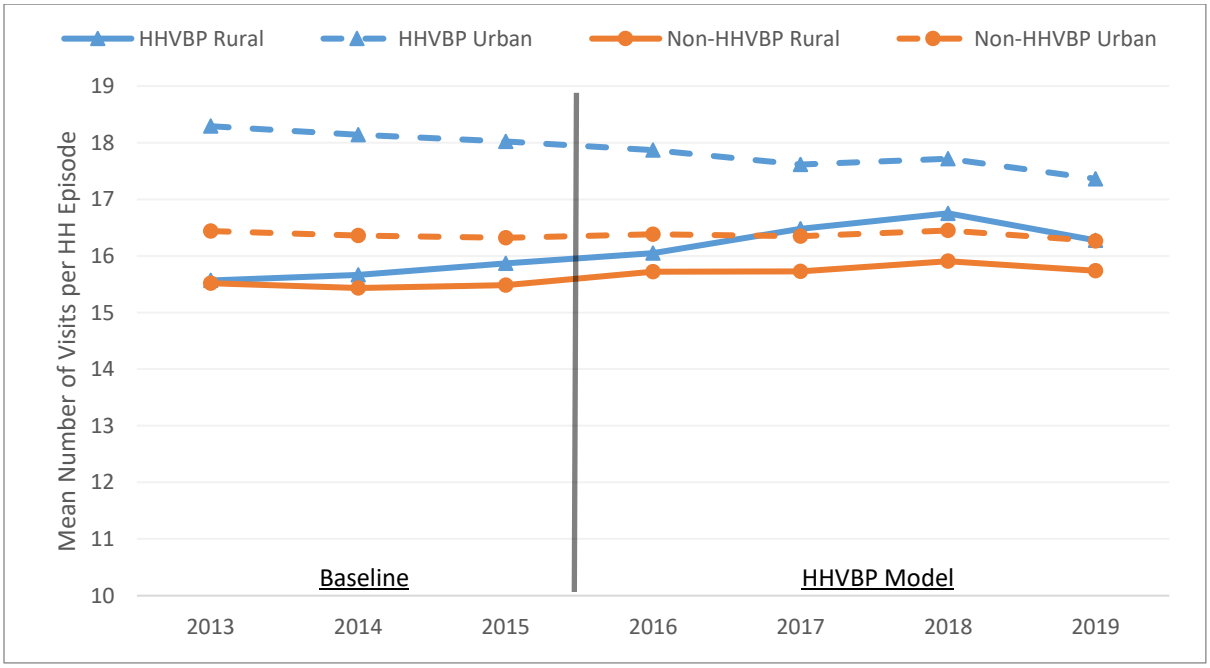
Given concerns that access to home health care may be a particular issue for rural areas, we also conducted this analysis separately for beneficiaries in rural and urban counties. There was a small difference between rural and urban counties in the percentage of Medicare FFS beneficiaries where at least one HHA provided service during 2019 (98.9 percent in rural counties vs. 100.0 percent in urban counties; Exhibit 16). However, Medicare FFS beneficiaries living in rural counties were less likely to have more than one HHA providing services compared with beneficiaries in urban counties. Our findings were similar for 2013-2018 (not shown).

*Exhibit 16. Fewer HHAs Provide Service to Medicare FFS Beneficiaries Residing in Rural Counties, 2019*

| | Percent of Medicare FFS Beneficiaries Residing in Counties Where: | | | | |
|---|---|---|---|---|---|
| | At least 1 HHA provides service | At least 2 HHAs provide service | At least 3 HHAs provide service | At least 4 HHAs provide service | At least 5 HHAs provide service |
| Rural | 98.9% | 95.5% | 87.8% | 78.8% | 69.7% |
| Urban | 100.0% | 99.8% | 99.1% | 97.8% | 95.9% |

For beneficiaries receiving home health services, another potentially important aspect of access to home health care in rural areas in particular involves the frequency of home health visits. In HHVBP and non-HHVBP states, FFS beneficiaries living in urban counties average more visits per home health episode than beneficiaries living in rural counties (Exhibit 17). This difference was initially larger in HHVBP states, and then declined over time. The difference in the number of visits between the two groups decreased from nearly three visits per episode in 2013 (15.5 among rural non-HHVBP counties and 18.3 among urban HHVBP counties) to a little over 1.5 visits per episode (15.7 among rural non-HHVBP counties and 17.4 among urban HHVBP counties) in 2019.

*Exhibit 17. Nationally Lower Frequency of HH Visits for Rural FFS Beneficiaries Compared to Urban FFS Beneficiaries, 2013-2019*



After observing lower utilization of home health care and fewer home health visits per episode in rural counties compared with urban counties, we explored whether there are certain counties with lower access to home health care, and if so, whether HHVBP affected access. As an approach for examining the impact of HHVBP in geographic areas where beneficiaries may be more vulnerable to access issues, we identified counties with a low average number of home health visits per episode and high ED rates among home health beneficiaries, since this combination may indicate lower access to home health care.[8] After adjusting for beneficiary, agency, and geographic characteristics, we found an inverse relationship between the average adjusted number of home health visits per episode in a county and the adjusted ED rate among home health beneficiaries in a county, with a correlation of -0.21 (not shown). While this correlation is not strong and should not be used to infer a causal relationship between home health visits and ED use, this inverse association is consistent with the potential for access issues in some counties and helped to motivate our approach for identifying lower access counties for our analyses.

We compared the characteristics of FFS home health episodes in counties classified as "low access" versus "not low access", separately for rural and urban counties for the baseline and post-HHVBP periods (Exhibit 18). Compared with the urban population, the rural population on average was slightly younger, more likely to be non-Hispanic White, less likely to have ESRD, and more likely to have been discharged from an inpatient facility within 14 days of the start of the home health episode. Regardless of urban or rural status, most characteristics of home health beneficiaries in low access counties and other counties were similar. An exception is that, among urban counties, low access counties had higher levels of low educational attainment compared with other counties (approximately 18 percent to 19 percent compared with 14 percent). Home health beneficiaries in low access counties also received relatively fewer home health visits from each type of health professional (Exhibit 18). See Exhibit C-14 (Page 128) in the Technical Appendix for further details, including stratification for HHVBP and non-HHVBP states.

[8] As described in more detail in Section A.4.1.6 (Page 93) in the Technical Appendix, we defined low access counties as counties in both the highest quintile of adjusted ED rates and the lowest quintile of number of visits per home health episode in each year.

*Exhibit 18. Regardless of Urban or Rural Status, Most Characteristics of Beneficiaries in Low Access Counties were Similar to Other Counties*

| | Rural | | | | Urban | | | |
|---|---|---|---|---|---|---|---|---|
| | Low Access | | Not Low Access | | Low Access | | Not Low Access | |
| | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) |
| **Total number of FFS episodes** | 70,242 | 102,364 | 1,600,889 | 1,950,149 | 164,893 | 220,633 | 18,004,304 | 22,735,242 |
| **Average age (years)** | 75.76 | 75.94 | 75.53 | 75.60 | 76.82 | 76.23 | 76.13 | 76.66 |
| **Female** | 61.9% | 59.9% | 62.6% | 61.1% | 60.4% | 59.2% | 62.6% | 61.4% |
| **Race/Ethnicity** | | | | | | | | |
| Hispanic (regardless of race) | 6.0% | 9.1% | 2.4% | 2.0% | 23.4% | 22.0% | 9.2% | 7.6% |
| Black, non-Hispanic | 12.1% | 5.8% | 12.0% | 11.1% | 4.3% | 5.0% | 15.4% | 13.3% |
| White, non-Hispanic | 80.7% | 83.4% | 83.9% | 85.2% | 69.1% | 68.6% | 72.5% | 75.8% |
| Other, non-Hispanic | 1.1% | 1.5% | 1.5% | 1.6% | 3.0% | 4.2% | 2.7% | 3.1% |
| Multiracial, non-Hispanic | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% |
| **Dual eligible** | 0.36 | 0.34 | 0.38 | 0.35 | 0.35 | 0.37 | 0.33 | 0.30 |
| **Reason for Medicare Entitlement** | | | | | | | | |
| Original End-Stage Renal Disease | 1.2% | 1.0% | 1.1% | 1.2% | 1.6% | 1.7% | 1.5% | 1.5% |
| Original Disabled | 30.8% | 31.1% | 32.4% | 33.4% | 25.8% | 28.6% | 27.6% | 26.6% |
| Current End-Stage Renal Disease | 0.9% | 0.4% | 0.8% | 0.5% | 1.1% | 0.7% | 1.0% | 0.6% |
| Current Disabled | 13.4% | 12.5% | 13.8% | 13.4% | 11.7% | 12.5% | 13.9% | 12.2% |
| **HCC Score (1st episode)** | 2.42 | 2.78 | 2.44 | 2.72 | 2.64 | 2.82 | 2.63 | 2.87 |
| **ESRD Flag** | 2.6% | 2.6% | 2.5% | 2.8% | 3.7% | 4.0% | 3.6% | 3.8% |
| **Discharged from inpatient facility in last 14 days** | 65.7% | 67.5% | 65.3% | 64.2% | 63.8% | 62.0% | 61.3% | 62.1% |
| **Average # of Visits by Type** | | | | | | | | |
| Therapy (OT, PT, speech) | 3.76 | 4.96 | 4.94 | 6.27 | 4.91 | 5.35 | 6.33 | 7.35 |
| Skilled nurse | 7.28 | 6.70 | 8.01 | 7.77 | 6.88 | 6.92 | 8.43 | 7.87 |
| Home health aide | 1.72 | 1.18 | 2.61 | 1.87 | 0.96 | 0.75 | 1.92 | 1.34 |
| Medical social services | 0.06 | 0.08 | 0.07 | 0.08 | 0.16 | 0.12 | 0.13 | 0.13 |
| **Persons aged ≥25 years with less than HS diploma in the beneficiary's county** | 18.4% | 17.8% | 18.7% | 18.5% | 18.9% | 18.4% | 13.9% | 13.6% |

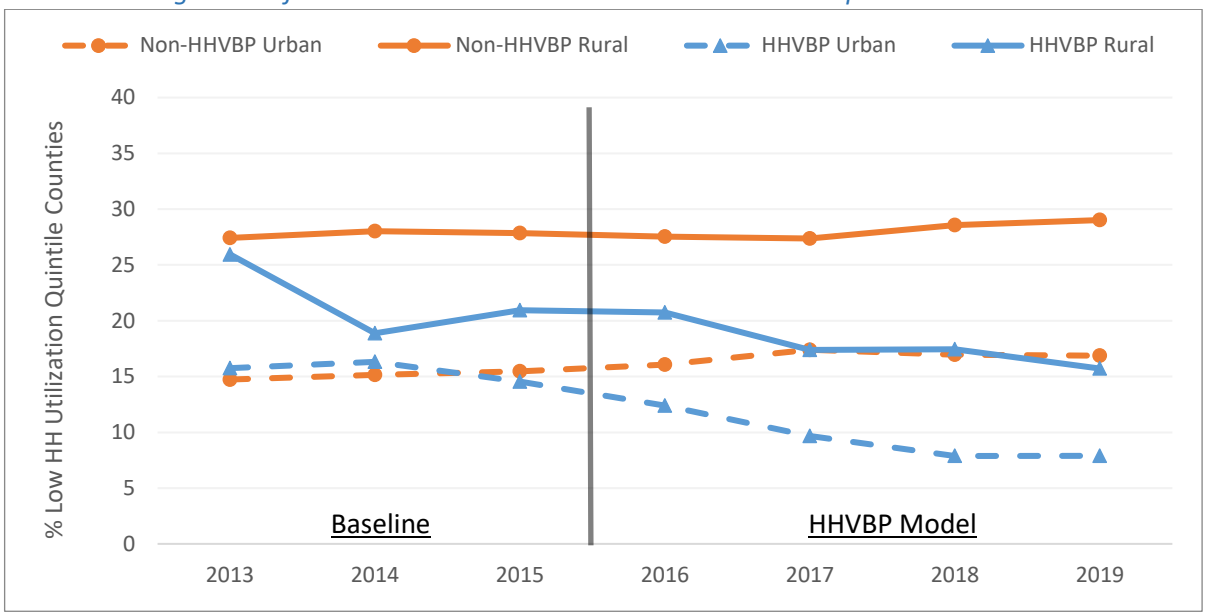
In both urban and rural counties, patterns in measures of utilization were consistent with potential access issues in counties designated as low access counties. In addition to having higher unadjusted ED rates, low access counties had lower unadjusted ACH rates and lower levels of home health utilization among Medicare FFS beneficiaries compared with other counties. The highest unadjusted ED rates and lowest percentage of Medicare FFS beneficiaries with at least one home health episode occurred in rural low access counties.

*Exhibit 19. Low Access Urban and Rural Counties had Higher Average Unadjusted ED Rates, Lower Unadjusted Acute Care Hospitalization Rates, and Lower Home Health Utilization Compared to Other Counties*

| | Rural | | | | Urban | | | |
|---|---|---|---|---|---|---|---|---|
| | Low Access | | Not Low Access | | Low Access | | Not Low Access | |
| | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) |
| **% ED visits/1st HH Episode** | 18.2% | 19.0% | 14.0% | 14.7% | 17.1% | 17.7% | 11.9% | 12.7% |
| **% Acute Care Hospitalizations/1st HH Episode** | 15.4% | 15.7% | 16.7% | 16.4% | 14.3% | 14.0% | 16.1% | 15.8% |
| **% of FFS Benes with at least 1 HH Episode** | 6.0% | 5.9% | 8.3% | 8.1% | 6.5% | 6.7% | 10.2% | 9.9% |
| **# of HH Episodes per 1,000 FFS Benes** | 127.2 | 107.8 | 175.3 | 164.1 | 108.9 | 118.8 | 189.6 | 177.6 |

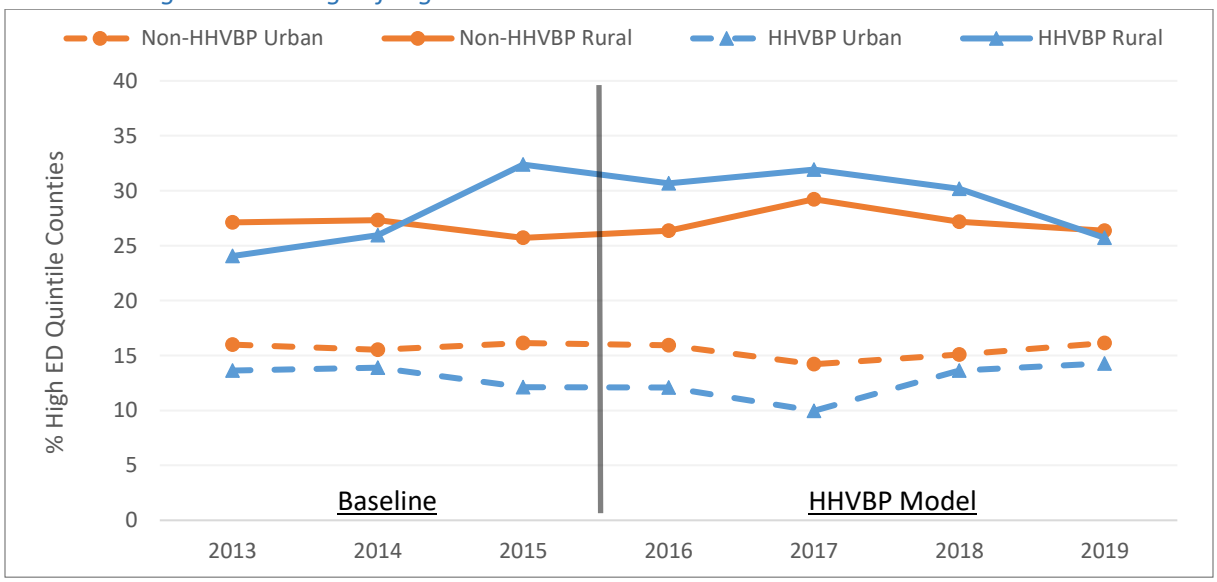
After identifying counties in the lowest quintile of adjusted number of home health visits per episode and counties in the highest quintile of adjusted ED rates, we plotted the frequency of these counties among urban and rural counties in HHVBP and non-HHVBP states during 2013-2019 (Exhibit 20 and Exhibit 21). Rural counties were consistently more likely than urban counties to be identified as having low home health visits per episode and high ED use. While the percentage of counties with low home health visits per episode remained stable over time in non-HHVBP states, there was a decrease in HHVBP states from 2013 to 2019. For example, in 2019, only 15.7 percent of rural HHVBP counties were determined to be in the lowest quintile for home health visits per episode, down from 25.9 percent of rural HHVBP counties in 2013 (Exhibit 21). Rural counties were also more often identified to have high ED rates than urban counties, with no evidence of impact by HHVBP (Exhibit 21).

*Exhibit 20. Higher Percentage of Low Home Health Utilization Counties in Rural Areas than Urban Areas with Decreasing Share of Low Utilization Counties in HHVBP States Compared to Non-HHVBP States*




*Note: HH utilization uses the adjusted number of HH visits per HH episode. See Section A.4.1.6 (Page 93) of the Technical Appendix for more information.*

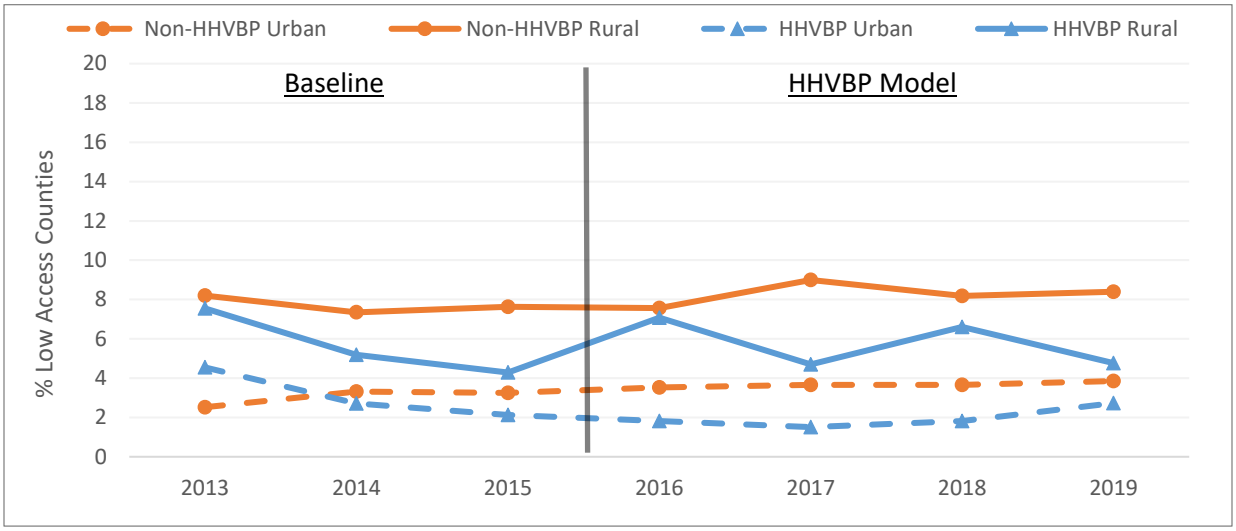
*Exhibit 21. Higher Percentage of High ED Counties in Rural Areas than Urban Areas*




*Note: ED use is adjusted. See Section A.4.1.6 (Page 93) of the Technical Appendix for more information.*

Given that rural counties were more likely than urban counties to have low home health visits per episode and high ED utilization, we found that rural counties were more likely to be classified as low access counties than urban counties (Exhibit 20). We observed the highest percentage of low access counties among rural non-HHVBP counties (approximately 8 percent), while the lowest percentage of low access counties was among urban HHVBP counties (approximately 2 percent for most of the period, Exhibit 22).

*Exhibit 22. Percentages of Counties Designated as Low Access Counties were Stable Over Time*




Overall, trends in the percentage of counties designated as low access counties were relatively stable over time, with no sustained changes in HHVBP states during 2016-2019 (Exhibit 22). In sum, these results do not suggest growing issues with access to care among home health beneficiaries due to HHVBP, in either rural or urban areas.

## 3.5 HHVBP May Have a Small Impact on Agency Selection of Less Sick Patients

To explore further how HHVBP may have affected home health utilization, we also examined changes in 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, for example, reduces access to quality home health 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 three 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.

For all three measures, higher values indicate increased patient severity. See Section A.4.1.1 of the Technical Appendix (Page 90) for more detail on these case-mix measures.

Broadly, we found increases of 7 to 22 percent over time in patient severity measures from 2013-2019 for all three measures of case-mix in HHVBP and non-HHVBP states (Exhibit 23). For example, average HCC scores at the start of care increased by 0.2 (7 and 8 percent of the respective baseline values) in

both groups, from 2.7 in the baseline period to 2.9 in the HHVBP states and from 2.6 to 2.8 in non-HHVBP states.

*Exhibit 23. Small Increases in Means for Measures of Case-Mix Severity from Baseline to Post-HHVBP Performance Period in HHVBP and Non-HHVBP States*

| Measure | HHVBP States | | Non-HHVBP States | | Change in Mean | |
|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | Post-HHVBP (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| HCC Score at the Start of Care | 2.7 | 2.9 | 2.6 | 2.8 | 0.2 | 0.2 |
| TNC Mobility at Start of Care | 5.0 | 6.1 | 5.0 | 6.0 | 1.1 | 1.0 |
| TNC Self-Care at Start of Care | 9.7 | 11.3 | 9.6 | 10.9 | 1.6 | 1.3 |

For each measure of patient case-mix, we estimated a D-in-D model, adjusted for agency characteristics (i.e., agency size, chain affiliation, ownership type), state fixed effects, and state-specific linear trends to examine differences between HHVBP and non-HHVBP states. We included state linear trends in the regression model to account for a lack of parallel trends found in the baseline period between HHVBP and non-HHVBP states in all three health status measures (see section A.1.5.3 [Page 36] of the Technical Appendix).

We found a decline in average HCC score at the start of care across the four performance years, as well as individually for each of the four years, in HHVBP states relative to non-HHVBP states (Exhibit 24). The cumulative average estimate of -0.05 for this measure translates to a decrease of 1.9 percent per year relative to the baseline average of 2.67. Given the relationship between HCC scores and average spending in the entire Medicare FFS population (CMS, 2018), which was $10,369 per Medicare FFS beneficiary during the HHVBP Model period, the average estimated impact on HCC score of -0.05 translates into an annual impact on predicted spending of approximately -$518 per beneficiary. The yearly estimate of this impact on HCC risk score increased in magnitude each year, and may suggest an emerging impact on patient selection, which will be something to continue to monitor as the HHVBP Model progresses and the magnitude of the payment adjustments increase. In contrast, we did not find evidence of a cumulative impact of HHVBP on patient severity at the start of care for two measures of functional status (Exhibit 24). However, we note evidence of a decline in functional impairment for the latest year (2019) in HHVBP states compared with non-HHVBP states (Exhibit 24).

*Exhibit 24. Slower Growth in Patient Severity for One of Three 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 | 0.02 | -0.02 | -0.004 | 2.67 | -0.4% |
| 2017 | -0.04 | <0.001 | -0.06 | -0.03 | | -1.5% |
| 2018 | -0.07 | <0.001 | -0.09 | -0.05 | | -2.6% |
| 2019 | -0.10 | <0.001 | -0.13 | -0.07 | | -3.7% |
| Cumulative | -0.05 | <0.001 | -0.07 | -0.04 | | -1.9% |
| **TNC Mobility at Start of Care** | | | | | | |
| 2016 | 0.03 | 0.24 | -0.01 | 0.07 | 4.98 | 0.6% |
| 2017 | 0.03 | 0.57 | -0.05 | 0.10 | | 0.6% |
| 2018 | -0.05 | 0.36 | -0.15 | 0.04 | | -1.0% |
| 2019 | -0.15 | 0.04 | -0.28 | -0.03 | | -3.0% |
| Cumulative | -0.04 | 0.42 | -0.12 | 0.04 | | -0.8% |
| **TNC Self-Care at Start of Care** | | | | | | |
| 2016 | 0.04 | 0.36 | -0.03 | 0.11 | 9.71 | 0.4% |
| 2017 | 0.01 | 0.95 | -0.13 | 0.14 | | 0.1% |
| 2018 | -0.12 | 0.28 | -0.30 | 0.06 | | -1.2% |
| 2019 | -0.28 | 0.06 | -0.52 | -0.04 | | -2.9% |
| Cumulative | -0.09 | 0.32 | -0.25 | 0.06 | | -0.9% |

[a] *CI = Confidence Interval. | See Exhibit 24n (Page 165) in the Technical Appendix for each measure's sample size.*

Our state-specific analysis suggests that our overall finding of a significant decline in HCC score at start of care primarily reflects agency behavior in three states: Arizona, Florida, and Tennessee (see Exhibit C-58 [Page 167] in the Technical Appendix for additional detail). For Tennessee in particular, we found evidence of a significantly smaller increase from baseline values relative to the change in its regional comparison group for all three case-mix measures, ranging from -3.3 percent for HCC score at start of care to -9.3 percent for TNC mobility at start of care. Compared with Tennessee, the relative change in HCC scores at the start of care was similar for Arizona (3.1 percent decrease relative to its baseline average of 2.9) but smaller for Florida (1.9 percent decrease relative to its baseline average of 2.6). For the other two case-mix measures, we found an opposite effect for Arizona and non-significant findings for Florida. Our state-level D-in-D analyses for the other case-mix measures in  showed no consistent patterns across multiple HHVBP states relative to their respective regional comparison groups. See Exhibit C-58 (Page 167) in the Technical Appendix for additional detail on state-level findings.

## 3.6 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 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., skilled nursing facility [SNF] services) among

beneficiaries eligible for multiple forms of PAC. 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 SNFs, inpatient rehabilitation facilities (IRFs), or hospital outpatient therapy (encompassing physical, occupational, and speech therapy).

To examine potential substitution of care, 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 five categories of PAC: 1) home health care; 2) SNF; 3) IRF; 4) hospital outpatient therapy (physical, occupational, speech); and 5) 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 HH PPS. We conducted our analysis of discharges from short-term acute care hospitals and critical access hospitals among all Medicare FFS beneficiaries who had a primary diagnosis that fell within the ten most common Major Diagnostic Categories (MDC) among beneficiaries who receive home health PAC (see Exhibit 25) 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 (2016-2019) (Exhibit 25). 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 21.8 percent to 22.2 percent in HHVBP states and from 21.7 percent to 22.1 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 (-1.5 and -1.6 percentage point changes for discharges in HHVBP and non-HHVBP states, respectively) and for Infectious and Parasitic Diseases (1.7 and 2 percentage point increases for HHVBP and non-HHVBP, respectively).

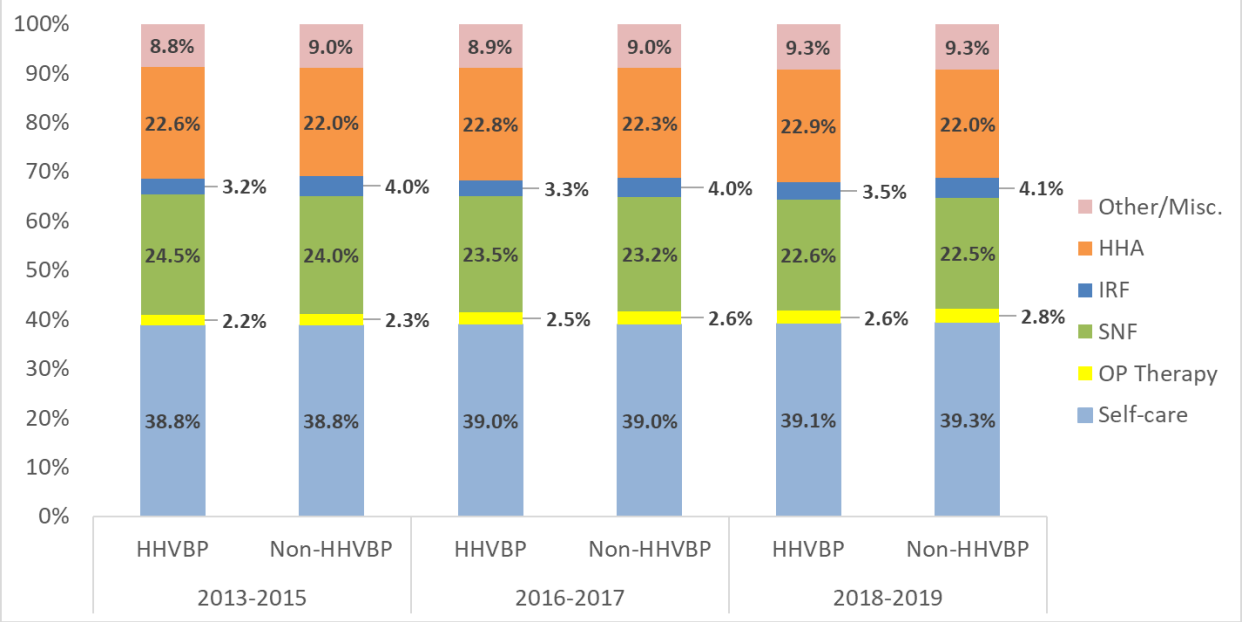
*Exhibit 25. No Substantial Changes in Most Characteristics of Medicare FFS Beneficiary Acute Care Hospitalization Discharges Between Baseline and Post-HHVBP Performance Period*

| Characteristics of Acute Care Hospitalization Discharges | HHVBP States | | Non-HHVBP States | |
|---|---|---|---|---|
| | Baseline (2013-2015) | Post-Period (2016-2019) | Baseline (2013-2015) | Post-Period (2016-2019) |
| **Beneficiary Characteristics** | | | | |
| **Age** | | | | |
| 0-64 | 16.4% | 15.2% | 17.7% | 16.7% |
| 65-84 | 60.2% | 62.3% | 59.2% | 61.4% |
| 85 and older | 23.5% | 22.4% | 23.2% | 21.9% |
| **Female** | 55.8% | 54.7% | 56.3% | 55.1% |
| **Race/Ethnicity** | | | | |
| White, non-Hispanic | 83.7% | 83.4% | 82.1% | 81.9% |
| Black, non-Hispanic | 11.6% | 11.3% | 12.1% | 11.5% |
| Other, non-Hispanic | 2.8% | 3.4% | 3.7% | 4.4% |
| Hispanic, (regardless of race) | 1.9% | 1.9% | 2.1% | 2.2% |
| **Characteristics of the precipitating hospital stay** | | | | |
| Discharged from short-term acute care hospital | 97.4% | 97.6% | 96.4% | 96.7% |
| Discharged from Critical Access Hospital | 2.6% | 2.4% | 3.5% | 3.2% |
| SNF Eligibility | 71.0% | 66.9% | 71.9% | 67.6% |
| Length of Inpatient Stay (days) | 4.8 | 4.6 | 4.8 | 4.6 |
| Rural Hospital Location | 6.8% | 6.6% | 9.9% | 9.8% |
| **County-level characteristics** | | | | |
| County-Level Median Household Income 2011-2015, Average | $59,087 | $59,456 | $59,670 | $60,128 |
| **MDC group** | | | | |
| Nervous System | 8.7% | 8.6% | 8.6% | 8.4% |
| Respiratory System | 15.8% | 14.3% | 15.9% | 14.3% |
| Circulatory System | 21.8% | 22.2% | 21.7% | 22.1% |
| Digestive System | 12.3% | 11.3% | 11.9% | 11.0% |
| Hepatobiliary System And Pancreas | 3.0% | 2.9% | 2.9% | 2.8% |
| Musculoskeletal System And Connective Tissue | 15.2% | 16.0% | 14.7% | 15.5% |
| Skin, Subcutaneous Tissue And Breast | 2.9% | 2.7% | 3.0% | 2.7% |
| Endocrine, Nutritional And Metabolic System | 3.9% | 4.0% | 4.2% | 4.3% |
| Kidney And Urinary Tract | 9.0% | 8.7% | 8.8% | 8.6% |
| Infectious and Parasitic Diseases | 7.6% | 9.3% | 8.2% | 10.2% |

The unadjusted percentages of starts to home health care, IRF, self-care, and hospital outpatient therapy stay relatively similar from the baseline period (2013-2015) through the first two years of the HHVBP Model (2016-2017) and the later period of the model (2018-2019, Exhibit 26). Discharge to self-care without any other form of PAC had the largest share of discharges—approximately 39 percent in each period in HHVBP and non-HHVBP states. Use of home health care slightly increased in HHVBP states, going from 22.6 to 22.9 percent from the baseline period to the later HHVBP period, while remaining constant at 22.0 percent in non-HHVBP states. Although accounting for a much smaller share of PAC, use of IRF and outpatient therapy visits also increased slightly in HHVBP and non-HHVBP states. Use of SNF was the only form of PAC to have a (moderate) decline, from 24.5 percent of discharges in

HHVBP states during 2013-2015 to 22.6 percent in 2018-2019, and a similar decline in non-HHVBP states (i.e., from 24.0 percent to 22.5 percent) during the same periods (Exhibit 26).

*Exhibit 26. Similar Trends in Use of Alternative Post-Acute Care Options among FFS Medicare Beneficiaries in HHVBP and Non-HHVBP States over Time*




We used a D-in-D approach with regression adjustment to test whether the HHVBP Model contributed to changes in the percentage 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 25). We also included state fixed effects and state linear trends in the model to account for the lack of parallel trends in transitions to SNF between HHVBP and non-HHVBP states during the baseline period (see Section A.1.5 [Page 20] of the Technical Appendix).

Based on our D-in-D analyses, we found that the HHVBP Model contributed to a slight increase in the use of home health care among FFS beneficiaries who had an inpatient stay. The increase was greatest during the later two years of the model, during which HHVBP accounted for significant increases in the probability of transitions to home health care of 2.7 percent in 2018 (relative to the baseline average in HHVBP states) and 3.4 percent in 2019 (Exhibit 27). Although we did not find statistically significant average annual HHVBP impacts on the use of other forms of PAC, we found that HHVBP contributed to significant declines in transitions to self-care (that is, no Medicare-paid PAC) during the two later years of the model (-1.5 percent in 2018 relative to the baseline period, and -1.9 percent in 2019). These relative decreases may account in part for the increased use of home health care we observe during the same period and suggest that HHVBP may contribute to marginally greater use of home health care among beneficiaries recently discharged from a short-term ACH who might otherwise receive no Medicare-financed PAC. In a robustness test of our D-in-D model, we adjusted for additional demographic and clinical covariates listed in Exhibit 25 as well as the 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 C-18 [Page 134] in the Technical Appendix).

*Exhibit 27. HHVBP Results in Increase in the Use of Home Health Care and an Increasingly Greater Decline in Transitions to Self-Care during the 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 | 0.09 | 0.41 | -0.10 | 0.28 | 22.6% | 0.4% |
| 2017 | 0.21 | 0.24 | -0.09 | 0.51 | | 0.9% |
| 2018 | 0.60 | 0.02 | 0.19 | 1.02 | | 2.7% |
| 2019 | 0.77 | 0.02 | 0.25 | 1.29 | | 3.4% |
| Cumulative | 0.41 | 0.04 | 0.08 | 0.75 | | 1.8% |
| **Skilled Nursing Facility** | | | | | | |
| 2016 | -0.06 | 0.57 | -0.23 | 0.11 | 24.5% | -0.2% |
| 2017 | 0.02 | 0.92 | -0.25 | 0.28 | | 0.1% |
| 2018 | 0.06 | 0.81 | -0.33 | 0.44 | | 0.2% |
| 2019 | 0.17 | 0.58 | -0.33 | 0.66 | | 0.7% |
| Cumulative | 0.04 | 0.82 | -0.27 | 0.35 | | 0.2% |
| **Inpatient Rehabilitation Facility** | | | | | | |
| 2016 | 0.04 | 0.36 | -0.04 | 0.12 | 3.2% | 1.3% |
| 2017 | 0.15 | 0.08 | 0.01 | 0.28 | | 4.7% |
| 2018 | 0.05 | 0.63 | -0.13 | 0.24 | | 1.6% |
| 2019 | 0.02 | 0.88 | -0.21 | 0.26 | | 0.6% |
| Cumulative | 0.07 | 0.46 | -0.08 | 0.22 | | 2.2% |
| **Self-Care** | | | | | | |
| 2016 | -0.09 | 0.52 | -0.34 | 0.15 | 38.8% | -0.2% |
| 2017 | -0.28 | 0.24 | -0.68 | 0.12 | | -0.7% |
| 2018 | -0.57 | 0.10 | -1.14 | -0.01 | | -1.5% |
| 2019 | -0.73 | 0.09 | -1.42 | -0.03 | | -1.9% |
| Cumulative | -0.41 | 0.13 | -0.86 | 0.03 | | -1.1% |
| **Hospital Outpatient Therapy** | | | | | | |
| 2016 | 0.004 | 0.90 | -0.05 | 0.06 | 2.2% | 0.2% |
| 2017 | -0.03 | 0.53 | -0.11 | 0.05 | | -1.4% |
| 2018 | -0.04 | 0.51 | -0.15 | 0.06 | | -1.8% |
| 2019 | -0.14 | 0.08 | -0.28 | -0.01 | | -6.4% |
| Cumulative | -0.05 | 0.31 | -0.14 | 0.03 | | -2.3% |

*[a] D-in-D and 90% CI values represent percentage point changes. | CI = Confidence Interval. | See Exhibit 27n (Page 165) in the Technical Appendix for each measure's sample size.*

## 3.7 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 HHVBP states combined, the implementation of HHVBP has not affected the overall rate of home health care utilization among Medicare FFS beneficiaries. Our analysis showed overall declines in rates of utilization of home health services that began prior to implementation of HHVBP. In addition, 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.

In smaller geographic areas (i.e., counties within states), we found that nearly all counties had at least one HHA providing services to beneficiaries in HHVBP and non-HHVBP states. We also explored potential access issues among home health patients by identifying counties with a pattern of both a low number of home health visits per episode and high ED use, when accounting for patient case-mix and other factors. While we found this pattern to be more common in rural counties – which suggests a greater risk of potential access issues for rural beneficiaries – we did not find evidence of an impact of HHVBP. A limitation of our analyses is the complexity in assessing patient access to care, which is determined by many factors (Penchansky, 1981). However, the extent of the geographic variation in indicators of access to home health care that we have observed suggests it will be important to continue to consider whether HHVBP has unintended consequences for beneficiary access to care in some geographic areas, especially where there was more limited access prior to HHVBP implementation.

Two out of three measures 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. 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, and was largely driven by Arizona, Florida, and Tennessee. Together, these mixed results for the case-mix measures raise the question of whether some agencies in HHVBP states may be making greater efforts to slow the rate of increase in their proportion of higher severity patients compared with agencies in non-HHVBP states. Because the HCC risk score is the only one indicator for which we find evidence of possible case-mix selection from multiple 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. The possibility of any such patient selection by HHAs and the potential impact on access to home health care for some groups of vulnerable patients warrants additional monitoring and analysis for future reports, especially as the HHVBP payment adjustment to agencies increases.

During the two latest years of the model, HHVBP incentives contributed to modest increases in admissions to home health care for 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. In future reports, we will examine the degree to which the impact of HHVBP

continues along the trend of increases over time in the use of home health care among this subgroup of beneficiaries and the degree to which it affects downstream acute care utilization, spending, and outcomes for users of home health care and alternative PAC options. Furthermore, some HHAs are subject to pressures created by other CMS initiatives, such as the BPCI and the CJR, to substitute less costly home health care in place of more costly institutional post-acute care. Therefore, in future reports we will build on the analysis in this report with subgroup analyses by degree of overlap between HHVBP and these other CMS initiatives to examine whether the increasing likelihood of home health care use resulting from other CMS initiatives may counteract possible HHVBP effects inducing agencies to avoid beneficiaries with complex health needs.

# 4. Results: Home Health Agencies in HHVBP States Moderately Increased Early Visits in a Manner Associated with Lower Risk of Unplanned Hospitalizations

## 4.1 Introduction

This section examines the impact of HHVBP on practice patterns of home health visits by agencies during the first four years of the model. Expanding on our previous work, we found evidence that ***HHVBP affected the agency practice of frontloading as agencies shifted the distribution of skilled nursing and therapy visits towards more visits during the first two weeks of home health episodes that followed an institutional stay relative to agencies in comparison states. Further, HHVBP agencies also moved more of those visits into the first week of care relative to the distribution of home health visits in comparison states***. We also found descriptive evidence of changes in the prevalence of different types of visits, with an increase in therapy visits and decrease in skilled nursing visits per episode in both HHVBP and non-HHVBP states during 2013 through 2019. For this annual report, we expanded our examination of the mix of services and visits provided to beneficiaries within an episode. During the last two decades, HHAs have altered their mix of visits in response to shifting payment incentives. For example, after the implementation of the home health prospective payment system (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 for their quality score, we may 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 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.

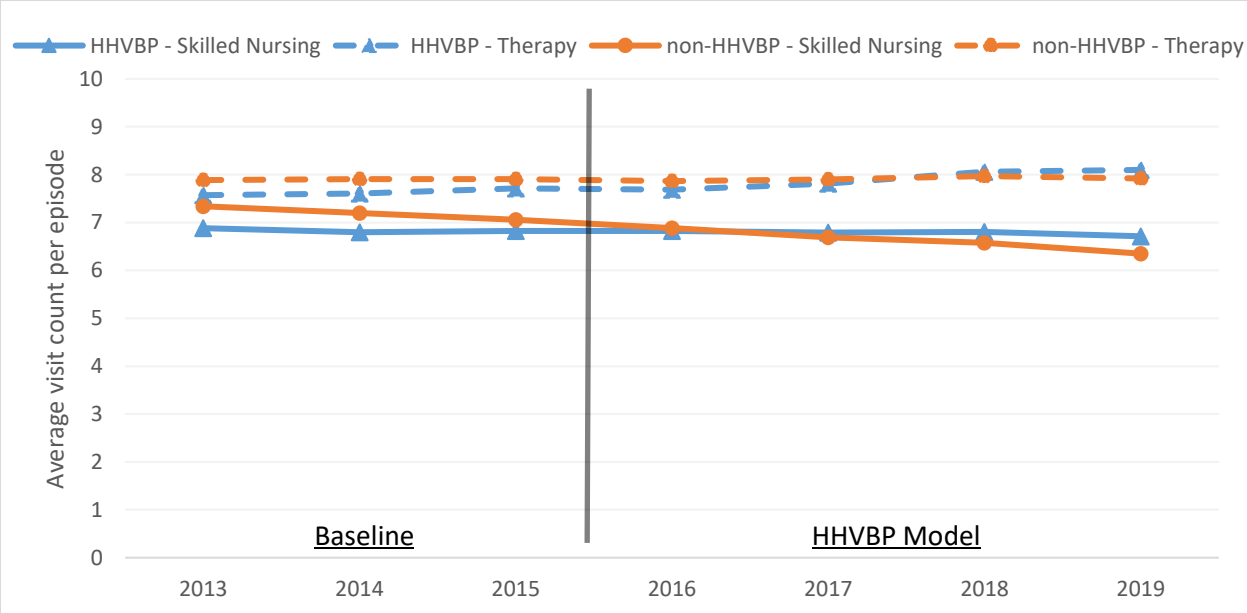
Our findings that show slower growth in claims-based utilization and spending measures in HHVBP states compared to non-HHVBP states (see Sections 6 and 7 of this report) suggest that HHAs are responding to the HHVBP incentives by making changes to their operations and practices to prevent some unplanned 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. 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; 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).

## 4.2 Frequency and Types of Visits during Home Health Episodes

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. We focused this analysis of visit types on the two home health professions that account for the largest share of

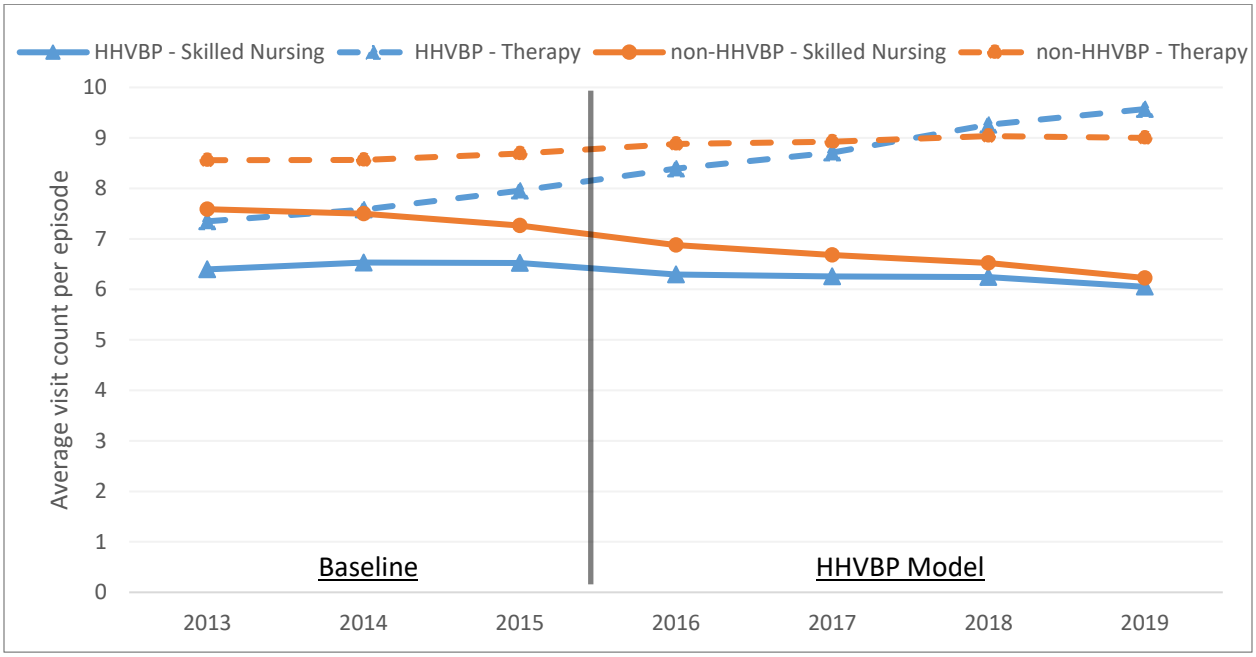
home health visits—skilled nurses and all therapists (combining physical therapists, occupational therapists, and speech therapists into one category). Throughout the study period of 2013-2019, skilled nurses and therapists each accounted for more than 40 percent of home health visits per year among all Medicare FFS home health episodes in HHVBP states. During the same period in non-HHVBP states, skilled nurses accounted for 47-51 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 (see Exhibit C-5 [Page 120] in the Technical Appendix). Exhibit 28 shows the trends in the average number of visits by skilled nurses and therapists per first home health episode that follows within 14 days of discharge from an institutional stay. The trends are adjusted for beneficiary demographic and clinical characteristics as well as agency characteristics, stratified by HHVBP and non-HHVBP states. Exhibit 29 shows adjusted trends for first home health episodes referred from a community-based provider. In both HHVBP and non-HHVBP states, the adjusted average skilled nurse visits per episode have declined over time, whereas therapy visits have increased or remained constant, depending on the source of admission to home health care. Among post-institutional episodes, adjusted total skilled nurse visits per episode declined 2.5 percent (from 6.9 to 6.7) in HHVBP states over the eight-year period and 13.5 percent (from 7.3 to 6.4) in non-HHVBP states. In contrast, the adjusted average number of therapy visits per post-institutional episode increased from 7.6 to 8.1 (7 percent) in HHVBP states and remained approximately constant at 7.9 percent for non-HHVBP states (Exhibit 28). We saw similar trends for adjusted average number of skilled nurse visits and adjusted number of therapy visits among community-referred episodes (Exhibit 29). But compared to post-institutional episodes, we observed larger increases in the adjusted average therapy visits for HHVBP states, from 7.3 to 9.6 (30 percent), and for non-HHVBP states, from 8.6 to 9.0 (5 percent). Differences in adjusted trends between HHVBP and non-HHVBP states were not statistically significant except for skilled nurse visits during community-referred episodes (not shown).

*Exhibit 28. Adjusted Trends in Visit Count per Episode Show a Decrease in Skilled Nursing and an Increase in Therapy, Admitted within 14 Days of Discharge from an Institutional Stay*




*Includes only first home health FFS episodes in a sequence. The trends are adjusted for beneficiary demographic and clinical characteristics as well as agency characteristics.*

*Exhibit 29. Adjusted Trends in Visit Count per Episode Show a Decrease in Skilled Nursing and an Increase in Therapy, Referred from a Community-Based Provider*




*Includes only first home health FFS episodes in a sequence. The trends are adjusted for beneficiary demographic and clinical characteristics as well as agency characteristics.*

In contrast to the larger shares of visits by skilled nurses and therapists, the share of visits by HH aides have been much smaller and steadily declined over the years from 9 to 6 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 continue to account for a tiny fraction of total visits—less than 0.8 percent of visits in all years in both HHVBP and non-HHVBP states (not shown). See Exhibit C-5 (Page 120) in the Technical Appendix for additional detail on visit type.

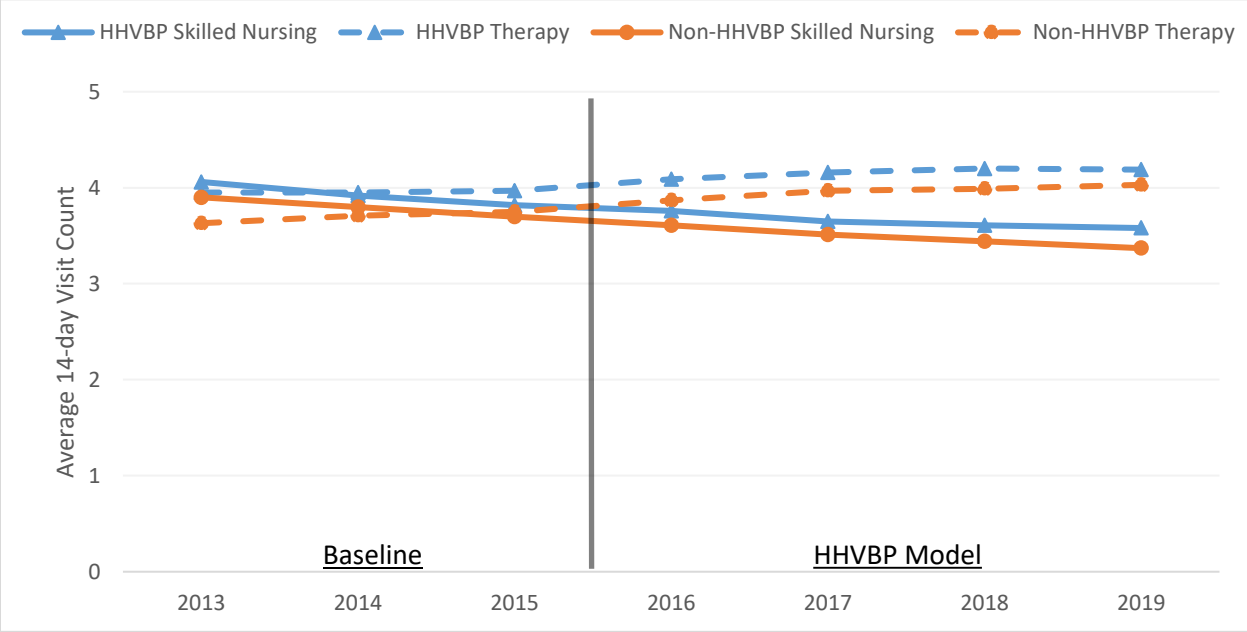
## 4.3 Frontloading Skilled Nurse and Therapy Visits is Associated with Lower Risk of Unplanned Hospitalizations in Some Circumstances and HHVBP Incentives Caused Moderately More Frontloading of Visits to Post-Institutional Episodes

Frontloading is a concept that is widely discussed in the home health industry as a means to provide high quality care to HH patients, but it lacks a standard definition. In order to explore the potential impact of HHVBP incentives on HHAs' use of frontloading as a means to improve quality, we first examined alternative approaches to define frontloading operationally using claims-based visit-level data for home health episodes. We used two alternative approaches to define frontloading that are related to one another, but emphasize different visit strategies by agencies. First, we examine visit intensity—agencies may increase the number of visits during the early part (e.g. first two weeks) of the episode. Second, we examine visit distribution—agencies may distribute a larger share of visits to the first week of the episode relative to the second week (or later weeks).

We focused our analysis on episodes that followed from an institutional stay due to the greater risk such episodes have for subsequent unplanned hospitalizations.[9] We used a regression-adjusted D-in-D approach to determine if the HHVBP Model had a discernible impact on agencies' use of frontloading using the two alternative definitions.

We examined both operational definitions of frontloading, first by determining the frequency, timing, and discipline of home health visits among all FFS first home health episodes from 2013-2019. Exhibit 30 and Exhibit 31 show unadjusted trends for two measures relevant to the concept of frontloading stratified by HHVBP and non-HHVBP episodes and by profession type of visit (i.e., skilled nurse or therapy). Exhibit 30 shows that the average count of visits during the first two weeks of an episode is very similar for HHVBP and non-HHVBP states for both skilled nursing and therapy visits. Furthermore, the percentage of first episodes that had more visits of each type during the first week than in the second week of the episode is also similar between the two groups (Exhibit 31).

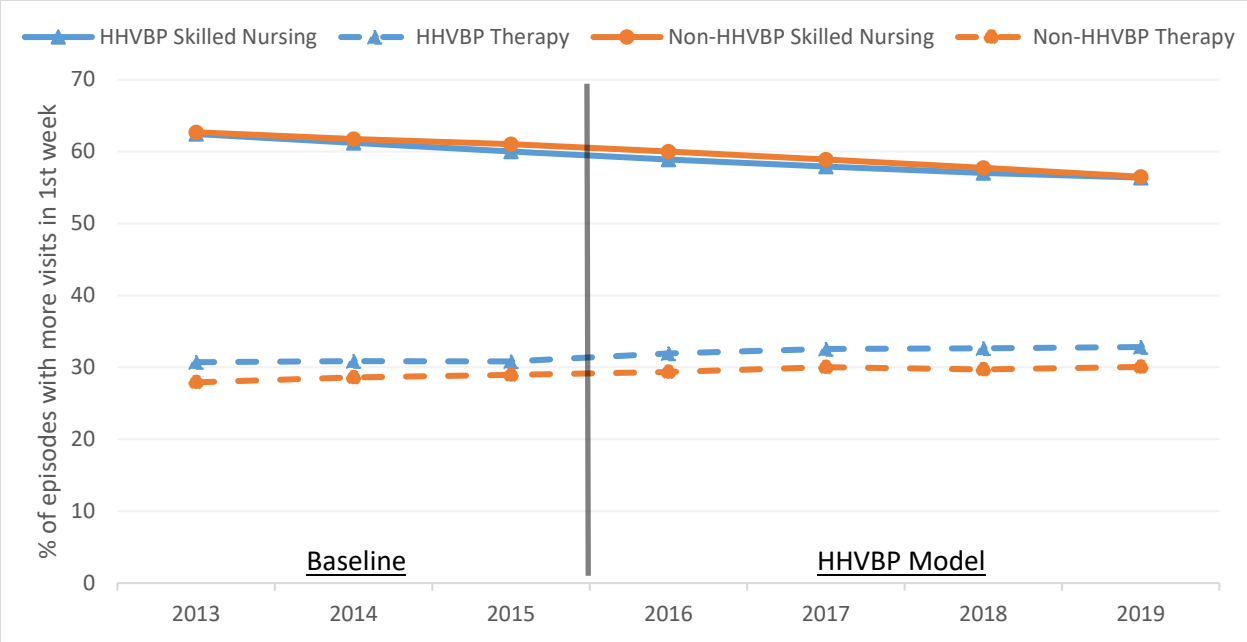
*Exhibit 30. Unadjusted Trends in the Number of Visits during the First 14 Days of Care for Post-institutional Home Health Episodes Show a Decrease in Skilled Nursing and an Increase in Therapy in HHVBP and Non-HHVBP States*




*Trends displayed above represent a subset of first home health FFS episodes in a sequence, only including post-institutional episodes directly discharged to home health care that lasted at least 14 days without a hospitalization occurring during that time that belong to the claims-based analytic sample (see A.2.1.2 [Page 55] of the Technical Appendix).*

[9] Institutional settings include acute care hospital (ACH), skilled nursing facility (SNF), inpatient rehabilitation facility (IRF), inpatient psychiatric facility (IPF), and long-term care hospital (LTCH).

*Exhibit 31. Unadjusted Trends in the Percentage of Post-institutional Home Health Episodes Show a Decrease in Skilled Nursing and an Increase in Therapy where Visits are Frontloaded with More Occurring in the First than Second Week of the Episode, by HHVBP and Non-HHVBP States*




*Trends displayed above represent a subset of first home health FFS episodes in a sequence, only including post-institutional episodes directly discharged to home health care that lasted at least 14 days without a hospitalization occurring during that time that belong to the claims-based analytic sample (see Section A.4.1.3 [Page 91] of the Technical Appendix).*

To test the validity of these modeling approaches for frontloading, we examined the extent to which these measures were associated with changes in the risk of unplanned hospitalizations during a home health episode after the first two weeks of care. We evaluated associations of home health visits during the first two weeks of the episode with hospitalizations after those initial two weeks under the assumption that unplanned hospitalizations that occur after two weeks of home health care are more likely to reflect the quality of care provided by HHAs rather than hospitalizations that occur earlier in an episode. 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 during the first two weeks.[10] We restricted our initial examination to the pre-HHVBP period (i.e., 2013-2015) to keep these assessments of frontloading definitions independent of any HHVBP impacts.

We found mixed results for the association between our first definition of frontloading (visit intensity during the first two weeks) and the probability of an unplanned hospitalization after the second week. In particular, increasing skilled nursing visits by one was associated with a 2.4 percent increase in the probability of unplanned hospitalization relative to the proportion of first home health episodes with an

[10] See Section A.1.4.2 (Page 9) 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 visit intensity and hospitalizations.

unplanned hospitalization. In contrast, increasing therapy visits was associated with a 1.1 percent decrease in the probability of unplanned hospitalization relative to the proportion of first home health episodes with an unplanned hospitalization.

We found that our second definition of frontloading—a larger share of skilled nursing or therapy visits in the first week of the episode relative to the second week—was associated with a significant decrease in the probability of an unplanned hospitalization after the second week of the episode (-0.66 and -0.71 percentage point changes for skilled nursing visits and therapy visits, respectively; Exhibit 32). These estimates correspond to 5.0 and 5.4 percent decreases in the number of skilled nursing and therapy visits, respectively, relative to the percentage of first HH episodes with an unplanned hospitalization (Exhibit 32). For the other HHVBP claims-based utilization measure—ED use without hospitalization—we found similar associations between it and the two alternative approaches to measuring frontloading, although the impacts were smaller in magnitude for both visit types (Exhibit 32).

*Exhibit 32. Frontloading Skilled Nursing or Therapy Visits Associated with a Decrease in the Probability of Unplanned Hospitalization and ED Use Without Hospitalization After Two Weeks of Home Health Care During the Baseline Period, 2013-2015*

| Model Estimates | | | | | | |
|---|---|---|---|---|---|---|
| | Point Estimate | p-value | Lower 90% CI | Upper 90% CI | Average in All States (2013-2015) | Percent Relative Difference[c] |
| **Unplanned Acute Care Hospitalization/First FFS HH Episodes** | | | | | | |
| Number of Skilled Nursing Visits in 2 Weeks | 0.32 | <0.001 | 0.30 | 0.35 | 13.2% | 2.4% |
| Number of Therapy Visits in 2 Weeks | -0.14 | <0.001 | -0.16 | -0.12 | | -1.1% |
| Frontloading Skilled Nursing Visits[a,b] | -0.66 | <0.001 | -0.77 | -0.55 | | -5.0% |
| Frontloading Therapy Visits[a,b] | -0.71 | <0.001 | -0.81 | -0.60 | | -5.4% |
| **ED Use (No Hospitalization)/First FFS HH Episodes** | | | | | | |
| Number of Skilled Nursing Visits in 2 Weeks | 0.09 | <0.001 | 0.07 | 0.12 | 12.7% | 0.7% |
| Number of Therapy Visits in 2 Weeks | -0.12 | <0.001 | -0.14 | -0.10 | | -0.9% |
| Frontloading Skilled Nursing Visits[a,b] | -0.20 | <0.001 | -0.29 | -0.10 | | -1.6% |
| Frontloading Therapy Visits[a,b] | -0.25 | <0.001 | -0.35 | -0.15 | | -2.0% |

*CI= Confidence Interval. Analysis was performed on a subset of first home health FFS episodes in a sequence, only including post-institutional episodes directly discharged to home health care 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 55] and A.4.1.3 [Page 91] of the Technical Appendix).*

*[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.*

### 4.3.1 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 reductions in the probability of unplanned hospitalizations and outpatient ED use among post-institutional episodes, we tested whether HHAs responded to HHVBP by increasing their use of frontloading for first episodes in a sequence that followed within 14 days of an institutional discharge. In particular, we conducted a D-in-D analysis of the impact of HHVBP on the probability that agencies provide more skilled nurse visits in the first week than in the second week of the episode. Similarly, we tested for an HHVBP impact on the probability that agencies provide more therapist visits in the first week than in the second week of the episode. We also tested the impact of HHVBP on the total number of visits during the first two weeks of first episodes, separately for skilled nurses and therapists.

Relative to the HHVBP states' baseline average, we found that HHVBP contributed to a significant 2.3 percent average annual increase in visit intensity (i.e., the number of visits during the first two weeks of home health care) for skilled nursing visits and a 2.0 percent average annual increase in visit intensity for therapy visits (Exhibit 33). Furthermore, we found evidence that the HHVBP incentives resulted in agencies changing the visit distribution (i.e., increasing the frontloading of visits) by providing more visits during the first than the second week of care for both types of visits. In particular, agencies in HHVBP states increased frontloading of skilled nursing visits in the first week of care by an annual average of 1.7 percent relative to their baseline level, and they increased frontloading of therapy visits in the first week of care by an annual average of 5.9 percent relative to their baseline level. All four measures had a pattern of positive impacts of HHVBP increasing in magnitude for each year from 2016 through 2019 (Exhibit 33). Moreover, we found significantly greater average impacts in 2018-2019 (the two 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 all four measures (not shown).

*Exhibit 33. HHVBP Results in Increase in the Number and Frontloading of Skilled Nurse and Therapist Visits During the First Two Weeks of Home Health Care for Post-Institutional Episodes*

| | Model Estimates | | | | Average in HHVBP States, Baseline (2013-2015) | Percent Relative Change |
|---|---|---|---|---|---|---|
| | D-in-D | p-value | Lower 90% CI | Upper 90% CI | | |
| **Number of Skilled Nursing Visits During First 2 Weeks (Visit Intensity)** | | | | | | |
| 2016 | 0.06 | <0.01 | 0.03 | 0.09 | 3.93 | 1.5% |
| 2017 | 0.07 | 0.03 | 0.02 | 0.13 | | 1.8% |
| 2018 | 0.10 | 0.04 | 0.02 | 0.18 | | 2.5% |
| 2019 | 0.14 | 0.02 | 0.04 | 0.23 | | 3.6% |
| Cumulative | 0.09 | 0.02 | 0.03 | 0.15 | | 2.3% |
| **Number of Therapy Visits During First 2 Weeks (Visit Intensity)** | | | | | | |
| 2016 | 0.03 | 0.27 | -0.01 | 0.07 | 3.96 | 0.8% |
| 2017 | 0.02 | 0.54 | -0.04 | 0.09 | | 0.5% |
| 2018 | 0.11 | 0.05 | 0.02 | 0.20 | | 2.8% |
| 2019 | 0.16 | 0.02 | 0.04 | 0.27 | | 4.0% |
| Cumulative | 0.08 | 0.09 | 0.003 | 0.15 | | 2.0% |
| **Frontloading Skilled Nursing Visits[a,b] (Visit Distribution)** | | | | | | |
| 2016 | 0.16 | 0.62 | -0.37 | 0.69 | 61.2% | 0.3% |
| 2017 | 0.86 | 0.08 | 0.05 | 1.68 | | 1.4% |
| 2018 | 1.18 | 0.07 | 0.12 | 2.24 | | 1.9% |
| 2019 | 2.02 | 0.01 | 0.69 | 3.35 | | 3.3% |
| Cumulative | 1.02 | 0.05 | 0.16 | 1.89 | | 1.7% |
| **Frontloading Therapy Visits[a,b] (Visit Distribution)** | | | | | | |
| 2016 | 1.04 | <0.001 | 0.53 | 1.54 | 30.8% | 3.4% |
| 2017 | 1.40 | <0.01 | 0.63 | 2.17 | | 4.5% |
| 2018 | 2.17 | <0.001 | 1.15 | 3.18 | | 7.0% |
| 2019 | 2.80 | <0.001 | 1.49 | 4.10 | | 9.1% |
| Cumulative | 1.82 | <0.001 | 0.98 | 2.66 | | 5.9% |

*CI = Confidence Interval. See Exhibit 33n (Page 165) in the Technical Appendix for each measure's sample size. Analysis was performed on a subset of first home health FFS episodes in a sequence, only including post-institutional episodes directly discharged to home health care 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 55] and A.4.1.3 [Page 91] of the Technical Appendix).*

*[a] D-in-D and CI values 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.*

## 4.4 Discussion

Our analysis of adjusted average visits per first home health episode shows similar trends between HHVBP and non-HHVBP states for both skilled nursing and therapy visits during both post-institutional and community-referred episodes. The trends in average visits for HHVBP and non-HHVBP states show similar directions to one another for both profession types. However, the percentage changes from 2013 to 2019 vary considerably between HHVBP and non-HHVBP states within each profession type. For

community-referred episodes, the percentage increase in therapy visits was greater among HHVBP episodes while the percentage decrease in skilled nurse visits was lower among HHVBP than non-HHVBP episodes. These differences appear to reflect that HHVBP states had a significantly lower adjusted average number of skilled nurse and therapy visits per episode relative to non-HHVBP states during the baseline years (2013-2015), which preceded a convergence toward closer average numbers of visits across the two groups in later years.

Our analysis of HHA frontloading practices prior to implementation of the HHVBP Model and changes in agency use of these practices 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. In particular, our baseline period analysis of the association between the two definitions of frontloading and key quality outcomes showed that increasing both therapy visit intensity during the first two weeks and shifting the distribution of therapy visits more heavily to the first week was associated with better outcomes. However, a similar analysis of skilled nurse visits found mixed results such that having more skilled nurse visits in the first week relative to the second was associated with better outcomes, but increasing visit intensity during the first two weeks was not. We hypothesize that the positive association between total skilled nurse visits and the probability of an unplanned hospitalization reflects confounding by unmeasured case mix despite our extensive adjustments for case mix. For example, the availability of a personal caregiver (e.g. a family member living with the beneficiary) cannot be observed in claims data but would likely correlate negatively with the risk of ACH and with the number of skilled nurse visits, therefore contributing to a positive association between skilled nurse visits and hospitalizations.

Through our D-in-D analysis, we found significant evidence that HHAs increased their use of frontloading in response to HHVBP by moderately increasing the number of skilled nurse visits and therapy visits during the first two weeks of HH episodes that followed an institutional stay. Combined with the finding of no significant difference in average total visit trends between HHVBP and non-HHVBP states, the findings of increased visits during the first two weeks suggest that HHVBP agencies are shifting the distribution of visits toward more during the first two weeks of the episode, relative to the comparison group, rather than increasing the total number of visits in the episode. Moreover, we found statistically significant evidence that HHAs responded to the HHVBP Model by increasing the share of both skilled nursing and therapy visits occurring during the first week greater than the share of visits in the second week of HH episodes that followed an institutional stay. Together, these findings suggest that HHAs view these practices as conducive to improving quality. The pattern of increasing magnitudes in the impacts of HHVBP for all four model years (2016-2019) suggests possible agency responsiveness to increasing maximum payment adjustments over this period.

In future reports, we will explore potential heterogeneous use and impacts of frontloading for patients with differing clinical reasons for using home health as well as for patients who entered home health based on referral from a community physician rather than after an institutional stay. We hypothesize that HHAs will make use of frontloading with skilled nursing and therapy visits to differing degrees depending on clinical conditions and the severity of functional impairments and comorbidities, reflecting variation in the marginal benefit to quality from additional visits by each profession type for each clinical condition.

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

## 5.1 Introduction

This section presents our analyses of the impact of the HHVBP Model on the quality performance of home health agencies in the nine model states. As discussed above, the performance of eligible agencies under the HHVBP Model is measured using Total Performance Scores (TPS), which are the basis for adjusting Medicare payments to agencies under the home health PPS. For example, CMS used agency 2016 TPS values to determine the initial payment adjustments applied to eligible HHAs in the nine HHVBP states for CY 2018. Similarly, CMS used agency 2017 TPS values to adjust payments to HHAs during CY 2019. Furthermore, CMS has proposed to report publicly the TPS for each HHA in late 2021 (HHS, 2019). The TPS is of interest as an overall performance indicator for comparing agencies in model states with those in non-model states where this metric does not affect Medicare payments to HHAs. The agency TPS also has growing financial implications for agencies in the nine HHVBP states. While the 2016 TPS determined payment adjustments of up to ±3 percent in 2018, the 2019 TPS determines payment adjustments of up to ±7 percent in 2021 (see Exhibit 34).

Using multivariate linear regression, we found ***higher TPS values in each of the first four years of the model*** for agencies in the nine 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. In examining patterns in agency TPS values for 2019, when larger weights for the claims-based measures first were applied in the TPS calculation, we did not find a strong pattern of HHVBP agencies with a lower TPS being more likely than other agencies to care for beneficiaries with social risk factors. Further, based on an analysis of profitability among freestanding HHAs using available cost report data, we continued to find no relationship between HHA profitability and overall performance under HHVBP.

## 5.2 Higher TPS among Agencies in HHVBP States Compared to Non-HHVBP States in First Four Performance Years

In 2019, we calculated a TPS for 80.0 percent of HHAs in HHVBP states[11] and 71.7 percent of HHAs in non-model states (Exhibit 34). 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 C-21 [Page 138] in the Technical Appendix). Agencies that were ineligible to receive a TPS tended to be much smaller and they account for relatively few home health episodes in the U.S. Based on our analyses of TPS values for the most recent performance year, 2019, HHAs eligible to receive a TPS accounted for 99.2 percent of OASIS episodes in HHVBP states and 98.3 percent of OASIS episodes in non-model states (Exhibit 34). We observed similar rates in 2018 (see Exhibit C-22 [Page 138] in the Technical Appendix). The TPS

[11] Among HHAs in HHVBP states, our calculated TPS aligns closely with the TPS calculated by the HHVBP Implementation Contractor (See Section A.2.7 [Page 78] in the Technical Appendix), as does the percentage of HHAs in HHVBP states that received a TPS in 2019 from the HHVBP Implementation Contractor (See Exhibit C-1 [Page 111] in the Technical Appendix).

analyses in this report will therefore reflect the quality performance of a very large proportion of the home health episodes for Medicare and Medicaid patients in the U.S.

*Exhibit 34. HHAs that are Ineligible to Receive a Total Performance Score Account for Relatively Few Home Health Episodes, 2019*

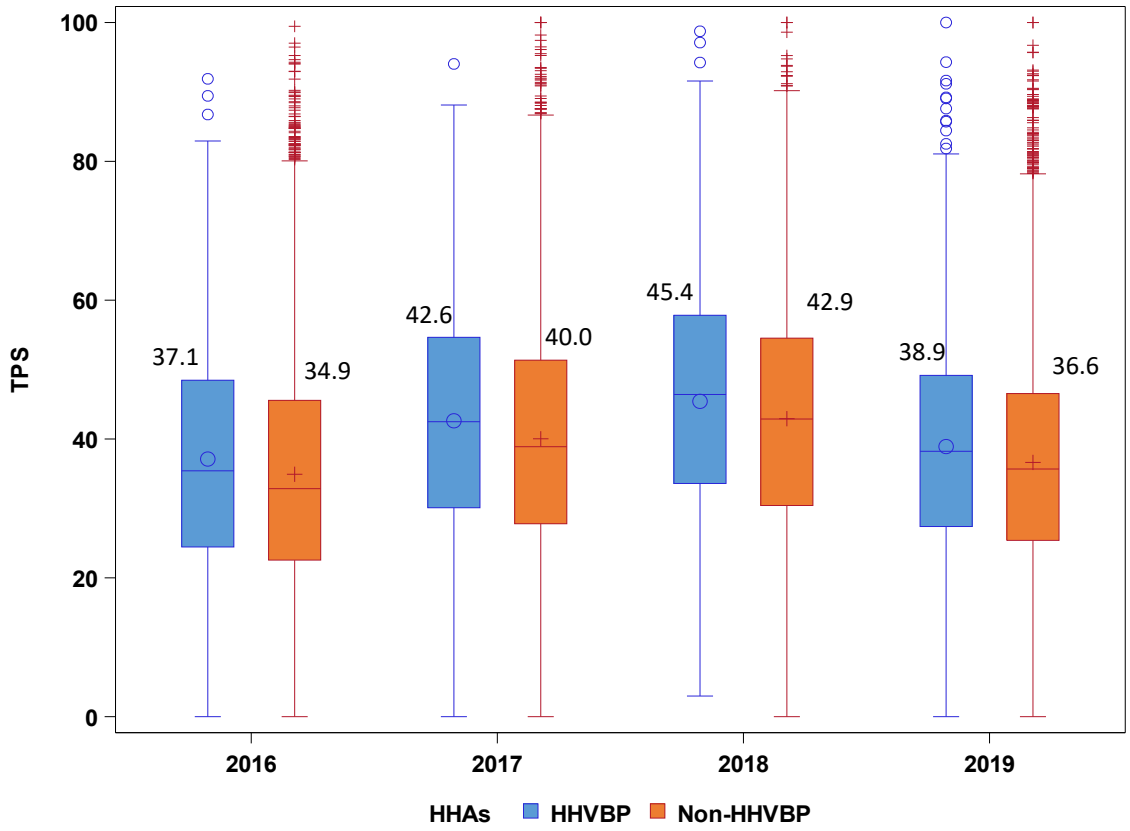
| | Agencies in HHVBP States | | | Agencies in Non-HHVBP States | | |
|---|---|---|---|---|---|---|
| | Eligible for TPS | | Total | Eligible for TPS | | Total |
| | Yes | No | | Yes | No | |
| **Total number of HHAs** | 1,545 | 386 | 1,931 | 6,273 | 2,474 | 8,747 |
| **% of HHAs** | 80.0% | 20.0% | 100.0% | 71.7% | 28.3% | 100.0% |
| **Number of OASIS episodes** | 1,684,153 | 14,400 | 1,698,553 | 5,597,181 | 99,081 | 5,696,262 |
| **% of OASIS episodes** | 99.2% | 0.8% | 100.0% | 98.3% | 1.7% | 100.0% |
| **Number of Medicare claims episodes** | 1,360,514 | 12,763 | 1,373,277 | 4,437,468 | 139,575 | 4,577,043 |
| **% of Medicare claims episodes** | 99.1% | 0.9% | 100.0% | 97.0% | 3.0% | 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 first four performance years, TPS values were slightly higher among HHAs in HHVBP states relative to those in non-model states (Exhibit 35). 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,[12] we can interpret these shifts as indicating ongoing improvement in agency performance in 2018 over 2017 (and in 2017 over 2016). Between 2018 and 2019, there was a shift downward in the TPS distributions for both groups of agencies. However, given the change in TPS methodology starting in 2019—which included the increased weighting of the two claims-based measures—these downward shifts for both groups of agencies do not reflect decreases in overall performance based on the measures included in the TPS. Instead, the lower TPS values in 2019 for agencies in both HHVBP states and non-model states reflect the larger contribution of the unplanned ACH and outpatient ED utilization measures to the TPS, since agencies had lower scores on these measures compared to most other measures included in the TPS (see Exhibit C-24 [Page 140] in the Technical Appendix). However, as shown in Exhibit 35, TPS values continued to be higher among agencies in HHVBP states compared to those in non-model states during 2019.

[12] 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 35. Higher Agency Total Performance Scores in HHVBP versus Non-HHVBP States, 2016 – 2019*




*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").*

To understand which measures represent the source(s) of the higher overall performance of agencies in HHVBP states relative to those in non-model states, we compared average scores for each of the HHVBP performance measures for the two groups of agencies. As in the first three years of HHVBP, we found that the relatively higher TPS values among agencies in HHVBP states during 2019 continue to be almost entirely the result of higher scores for the OASIS-based outcome measures (see Exhibit C-24 [Page 140] in the Technical Appendix). In 2019, however, we observed that agencies in HHVBP states also had slightly higher average measure scores for the unplanned ACH measure than those in non-model states (3.0 and 2.8, respectively).

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.[13] For each of the initial four years of the 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 1.6, 2.0,

[13] 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 42) in the Technical Appendix for additional detail.

1.6, and 2.9 points higher among agencies in HHVBP states in 2016, 2017, 2018, and 2019, respectively (Exhibit 36). These effect sizes indicate TPS values for HHVBP agencies that were 4.6 percent, 5.0 percent, 3.7 percent and 7.9 percent higher than those for non-HHVBP agencies in 2016, 2017, 2018, and 2019, respectively.

*Exhibit 36. Higher Agency TPS Values in HHVBP versus Non-HHVBP States When Also Adjusting for Patient Sociodemographic Factors and Agency Characteristics, 2016 – 2019*

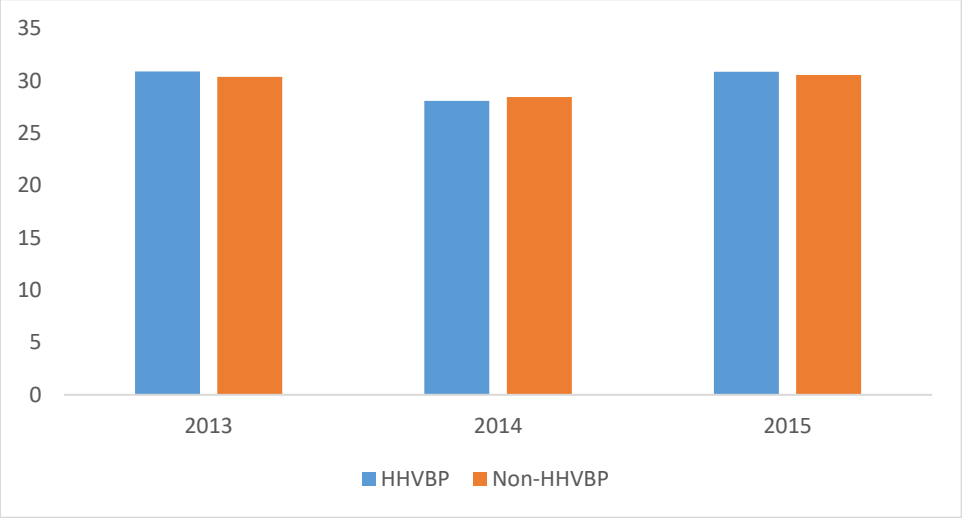
| Year | Agencies in HHVBP States | | Average TPS, Agencies in Non-HHVBP States | Percent Difference |
|---|---|---|---|---|
| | Coefficient | p-value | | |
| **2016** | 1.6 | <0.001 | 34.9 | 4.6% |
| **2017** | 2.0 | <0.001 | 40.0 | 5.0% |
| **2018** | 1.6 | <0.001 | 42.9 | 3.7% |
| **2019** | 2.9 | <0.001 | 36.6 | 7.9% |

We considered the results of these analyses of TPS through the first four years of the model in the context of pre-existing levels of agency performance on the same measures. Using a similar methodology, we calculated a TPS for each agency in each year from 2013 – 2015.[14] The resulting scores were similar in HHVBP and non-HHVBP states in each year from 2013 – 2015 (Exhibit 37), suggesting initial balance in the overall performance of agencies in these two groups prior to the implementation of the model.[15]

[14] 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.

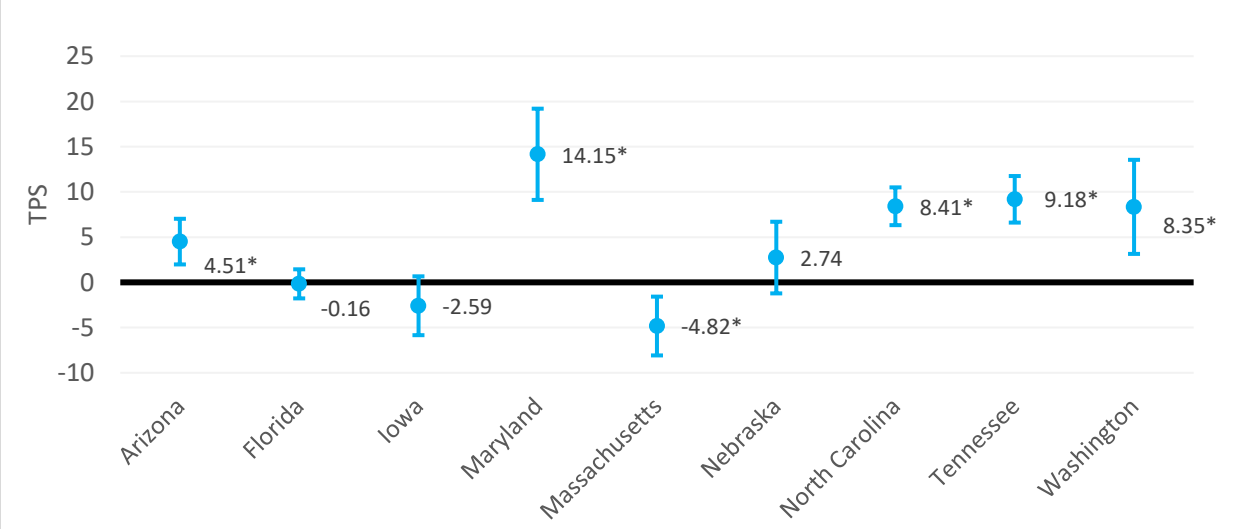
[15] We note that we do not compare TPS values during 2013-2015 with those observed during 2016 – 2018, since the TPS calculated for each performance year under the model will reflect the use of 2015 as a fixed baseline period, and are therefore not directly comparable starting in 2017 (since the baseline period is no longer the previous year).

*Exhibit 37. Similar Average Agency TPS in HHVBP and Non-HHVBP States during the Baseline Period, 2013 – 2015*




Since the effect of HHVBP on the overall quality measure performance of agencies may vary among the nine individual HHVBP states, we also separately assessed the impact of the model in each state. In 2019, agency TPS values were higher for five HHVBP states relative to their respective regional comparison groups based on linear regression analyses: Arizona, Maryland, North Carolina, Tennessee, and Washington (Exhibit 38). For all of these five states except North Carolina, agency TPS values were also higher relative to their regional comparison groups in each of the first three years of the model (see Exhibits C-25 through C-27 [Pages 141-142] in the Technical Appendix). For North Carolina, agency TPS values were also higher relative to its regional comparison group in 2018 and 2016 (also shown in the Technical Appendix). In 2019, Massachusetts was the only HHVBP state with lower agency TPS values than its regional comparison group, (Exhibit 38). The lower scores for agencies in Massachusetts relative to its regional comparison group continued a pattern also seen in 2018 (see Exhibit C-27 [Page 142] in the Technical Appendix).

*Exhibit 38. Higher Agency TPS in Five HHVBP States Relative to their Regional Comparison Groups, 2019*




*Graph shows 90% confidence intervals. * $p < 0.05$.*

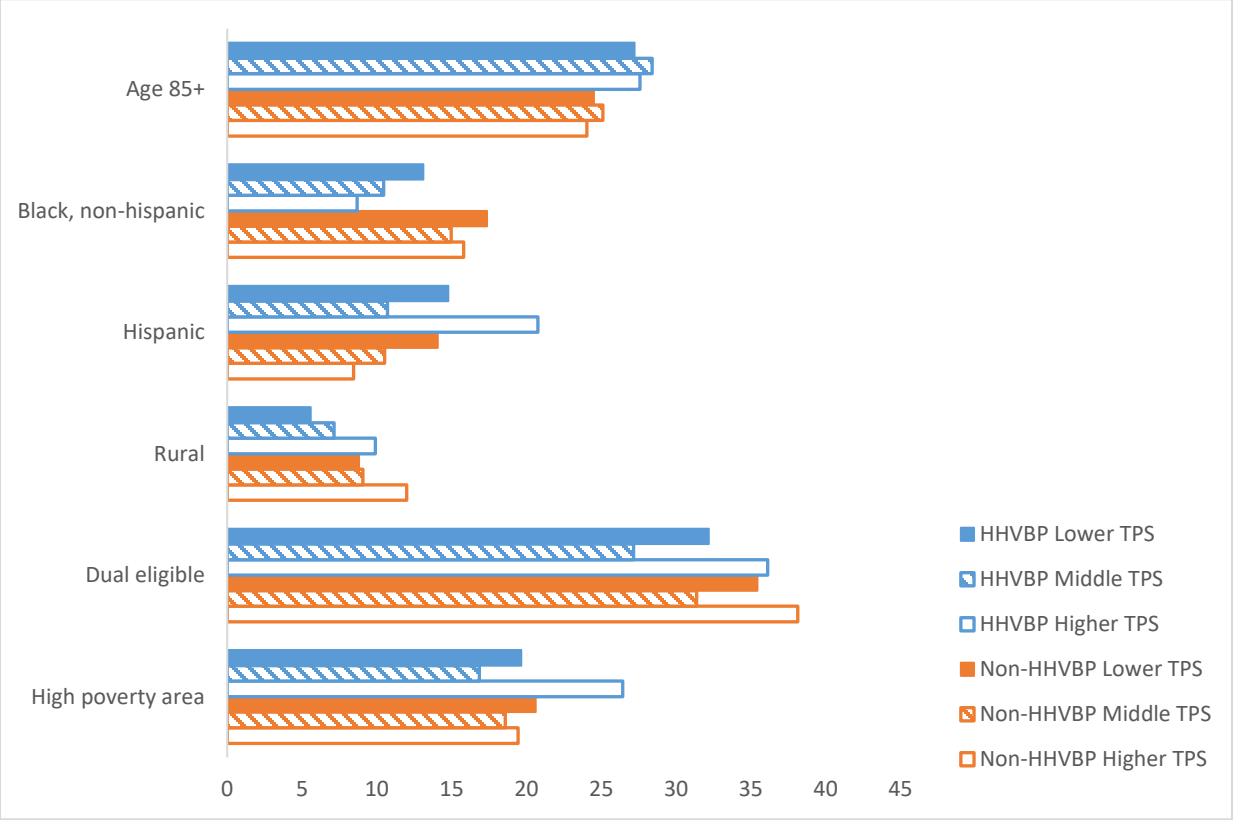
### 5.2.1 Comparison of 2019 Agency TPS by Social Risk Factors

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.

To explore this risk during the fourth year of the model, reflecting the modifications made to the TPS methodology starting in 2019, we examined agency performance based on their mix of beneficiary demographics and social risk factors. 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 2019. 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 2019; (2) Higher TPS, based on being in the highest quartile of TPS values among agencies in the same state cohort in 2019; and (3) Middle TPS, which includes all other agencies (i.e., the middle two quartiles in 2019).

Overall, we did not find that agencies in HHVBP states with a lower TPS in 2019 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 39). For example, in HHVBP states, there were higher percentages of beneficiaries who were living in a rural area, dual eligible, or living in a high poverty area among agencies with a higher 2019 TPS (Exhibit 39).While agencies in HHVBP states with a lower TPS in 2019 cared for a higher percentage of black non-Hispanic beneficiaries than other agencies in HHVBP states (Exhibit 39), we also found a similar association 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 analysis of agency TPS data for 2017 – 2018 and presented in our Third Annual Report (Arbor Research, 2020).

*Exhibit 39. Agencies in HHVBP States with a Lower 2019 TPS Do Not Care Disproportionately for Patients with Social Risk Factors Compared to Other 2019 TPS Groups*




## 5.3 Relationship between HHA Profitability and Performance

As described in Section 1, agencies in HHVBP states began receiving quality performance-based adjustments to their payments under the Medicare HH PPS in 2018. Given the increasing range of potential payment adjustments associated with the model over time, agency performance on the HHVBP measures may also have growing implications for agency profitability.

Given lags in when Medicare Cost Report data become available for measuring agency profitability, we are not yet able to observe potential effects of HHVBP payment adjustments and associated changes in HHA profitability on the future performance of HHAs. The most current Cost Report data available for this report are from 2018, the first year of HHVBP payment adjustments. In future reports, there will be additional data available to assess any impacts of HHVBP on HHA profitability and in turn on future HHA performance.

For the analyses for this report, we examined Cost Reports to determine whether HHA Medicare profit margins across the period 2016 to 2018 were associated with HHA performance under HHVBP during that period (and in turn with HHVBP payment adjustments in later years). We utilized Cost Report data from FY 2012 to FY 2018 for freestanding and hospital-based HHAs and removed agencies missing requisite variables or reporting aberrant and implausible information that would prevent analysis of agency profitability. See Section A.2.1 (Page 46) in the Technical Appendix for more information on the exclusion approach.

Further, given the different cost structures of hospital-based agencies, we focus the analyses in this report on freestanding agencies, which represent the vast majority (92 percent) of agencies in the analyzed sample. In this national sample of freestanding agencies, we observe that approximately 70 percent maintained positive profit margins in 2018, with a median profit margin of 15.9 percent.

Given our focus on observing the relationship between HHA profitability, performance, and future payment adjustments, we further limit our analysis to HHVBP states representing approximately 18 percent of the national sample analyzed. We observe that over 70 percent of HHVBP freestanding HHAs maintained positive profit margins in 2018, and had a slightly higher median profit margin of 16.8 percent. This result is similar to the national sample analyzed.

Our analysis first looks at the overall profit margin distributions across the subset of freestanding agencies in HHVBP states to assess whether there are any broad changes in 2018. Overall, findings are consistent with the distributions of agency profit margins in earlier years. For approximately a third of agencies in our study sample, Cost Reports revealed profit margins above 25 percent, and nearly a quarter of agencies faced negative profit margins (Exhibit 40). As agencies located in Florida account for nearly half of HHVBP agencies, we examined profit margin distributions with and without Florida (not shown) and observed similar results.

*Exhibit 40. Most Freestanding HHVBP Agencies Continue to Report Overall Profit Margins Exceeding 15%, FYs 2016 – 2018*

| | 2016 | 2017 | 2018 |
|---|---|---|---|
| **Total Number of Agencies** | **1,235** | **1,219** | **1,255** |
| **Profit Margin** | | | |
| Greater than or equal to 50% | 4.6% | 3.7% | 3.3% |
| 49% to 25% | 30.1% | 30.0% | 29.0% |
| 24% to 20% | 10.4% | 12.1% | 10.7% |
| 19% to 15% | 11.2% | 10.0% | 11.1% |
| 14% to 10% | 10.4% | 8.9% | 7.6% |
| 9% to 5% | 6.7% | 7.2% | 8.1% |
| 4% to 0% | 6.3% | 5.4% | 5.7% |
| -1% to -5% | 4.0% | 3.9% | 4.4% |
| -6% to -10% | 3.6% | 2.5% | 3.0% |
| -11% to -15% | 2.4% | 2.6% | 3.3% |
| -16% to -20% | 1.6% | 2.1% | 2.1% |
| -21% to -25% | 1.5% | 1.4% | 1.8% |
| -26% to -50% | 3.4% | 5.0% | 4.1% |
| Less than -50% | 3.6% | 5.3% | 5.7% |

*Source: FY 2016-2018 CMS 2552-10 and 1728-94 Cost Reports.*

We then calculated the average future payment adjustment, as determined by each agency's TPS, in a given year and examined whether it varied by agency profit margin category for that year. For example, among HHVBP HHAs in the sample reporting profit margins greater than or equal to 50 percent in FY 2018, the average HHA payment adjustment (reflecting HHA performance in 2018) was 0.53 percent. Since CMS will not apply this payment adjustment until FY 2020, we refer to this as an average "future"

payment adjustment. Further, calculating the average payment adjustment required that an agency have a TPS calculated for the given year, which reduced the sample somewhat for this analysis (For FY 2018 calculations from the initial 1,255 HHVBP HHAs we dropped 51 agencies due to a missing TPS).

Overall, we found a limited relationship between current HHA profit margins and future payment adjustments (Exhibit 41). Both categories of agencies with positive profit margins and negative profit margins recorded payment increases and decreases, on average. The average magnitude of expected HHVBP payment adjustments across profit margin categories varied by less than ±1 percent and appeared unrelated to whether or not agencies were profitable.

The lack of a strong overall relationship between agency profitability and future payment adjustments may be explained in part by the small magnitude of HHVBP payment adjustments relative to the current profit margins of many agencies (e.g., 59 percent of HHVBP freestanding agencies having profit margins exceeding 10 percent in 2018; see Exhibit C-28 [Page 143] in the Technical Appendix for further details). However, we might expect to see a stronger relationship for agencies with profit margins closer to zero, as their performance on HHVBP measures and their corresponding payment adjustments may be more likely to determine whether they are profitable in future years. To consider this possibility, we focused on agencies nearest the zero percent profit margin threshold and grouped agencies into two categories: (i) agencies with a profit margin between 0 percent and 10 percent and (ii) agencies with a profit margin between –1 percent and –10 percent. For these agencies closest to the zero percent profit margin threshold, we found that average payment adjustments were slightly positive (Exhibit 42). However, with average payment adjustments of less than 0.2 percent between these two profit margin categories in two of the three years, these results do not indicate a strong relationship of agency profitability with agency performance and in turn with future payment adjustments for this subset of agencies.

*Exhibit 41. Average HHVBP Future Payment Adjustments Do Not Vary Systematically Based on Freestanding Agency Profit Margins, FYs 2016 – 2018*

| | 2016 | 2017 | 2018 |
|---|---|---|---|
| **Total Number of Agencies** | **1,155** | **1,169** | **1,204** |
| **Profit Margin** | | | |
| Greater than or equal to 50% | 0.02% | 0.43% | 0.53% |
| 49% to 25% | -0.05% | -0.20% | -0.04% |
| 24% to 20% | 0.12% | 0.21% | 0.28% |
| 19% to 15% | 0.10% | -0.11% | -0.04% |
| 14% to 10% | 0.05% | 0.08% | 0.29% |
| 9% to 5% | 0.20% | 0.00% | -0.22% |
| 4% to 0% | 0.10% | 0.14% | 0.29% |
| -1% to -5% | 0.24% | 0.18% | -0.13% |
| -6% to -10% | -0.08% | 0.64% | 0.42% |
| -11% to -15% | -0.25% | -0.20% | 0.29% |
| -16% to -20% | -0.21% | -0.44% | -0.18% |
| -21% to -25% | -0.26% | 0.01% | -0.03% |
| -26% to -50% | 0.04% | 0.21% | 0.39% |
| Less than -50% | -0.02% | -0.11% | -0.21% |

*Source: FY 2016-2018 CMS 2552-10 and 1728-94 Cost Reports.*

*Exhibit 42. Freestanding Agencies with Profit Margins Close to Zero Have Relatively Small Average HHVBP Future Payment Adjustments, FYs 2016-2018*

| | 2016 | 2017 | 2018 |
|---|---|---|---|
| **Total Number of Agencies** | **236** | **214** | **256** |
| **Profit Margin** | | | |
| 0% to 10% | 0.15% | 0.06% | -0.01% |
| -1% to -10% | 0.09% | 0.35% | 0.08% |

*Source: FY 2016-2018 CMS 2552-10 and 1728-94 Cost Reports.*

## 5.4 HHVBP Payment Adjustments for 2020 Differ by Agency Type

In August 2019, eligible agencies in HHVBP states received notifications of their preliminary payment adjustments for 2020, the third year in which CMS adjusted Medicare payments to HHAs based on their quality performance (Exhibit 1). These HHVBP agency-specific payment adjustments were based on agency TPS values for 2018 and ranged between -6 percent and +6 percent. CMS finalized the payment adjustments in November 2019, and applied them to all Medicare FFS home health claims beginning January 1, 2020.

Among the 1,983 HHVBP agencies with at least one Medicare claims-based or OASIS-based home health episode in CY 2018, 1,606 (81 percent) were eligible to receive a payment adjustment to their FFS claims in CY 2020 (Exhibit 43). The average and median payment adjustment across HHAs was -0.073 percent and -0.042 percent, respectively, and ranged from -5.61 percent to 6 percent (not shown).

Whereas 21 percent of HHAs received payment adjustments either lower than -2 percent or higher than 2 percent in 2019, this increased to 29 percent of HHAs in 2020 (Exhibit 43). This includes 16 percent of HHAs that received a payment adjustment lower than -2 percent, and 13 percent of HHAs that received a payment adjustment greater than 2 percent. Relative to other HHAs in 2020, both the highest performing HHAs that received a 2 percent to 6 percent payment adjustment and the lowest performing HHAs that received a -2 percent to -6 percent adjustment were smaller and less likely to be affiliated with a chain (Exhibit 43). Overall, chain-affiliated agencies and non-profit agencies had slightly more favorable payment adjustments during CY 2020; we also observed this pattern in the first two years in which HHVBP payment adjustments were applied. For further details, including additional comparisons of payment adjustments based on HHA characteristics during CY 2018 through CY 2020, see Exhibits C-29 through C-31 (Pages 144-146) in the Technical Appendix.

*Exhibit 43. Slightly More Favorable HHVBP Payment Adjustments for Chain-Affiliated and Non-Profit Agencies, CY 2020*

| Characteristics* | CY 2020 HHA Payment Adjustment Categories | | | | | | Overall | p-value |
|---|---|---|---|---|---|---|---|---|
| | [-6%, -2%] | (-2%, -1%] | (-1%, 0%] | (0%, 1%] | (1%, 2%] | (2%, 6%] | | |
| **Number of HHAs with a TPS** | 256 | 198 | 373 | 359 | 209 | 211 | **1,606** | -- |
| **% of HHAs in each payment adjustment category** | 15.9% | 12.3% | 23.2% | 22.4% | 13.0% | 13.1% | **100.0%** | -- |
| **Type** | | | | | | | | |
| Hospital-based | 6.9% | 5.9% | 7.1% | 8.2% | 17.7% | 1.3% | **91.7%** | <0.001 |
| Freestanding | 93.1% | 94.1% | 92.9% | 91.8% | 82.3% | 98.7% | **8.3%** | |
| **Ownership** | | | | | | | | |
| For profit | 78.5% | 79.9% | 69.9% | 72.0% | 60.6% | 87.1% | **72.0%** | <0.001 |
| Nonprofit | 17.5% | 18.8% | 28.8% | 25.0% | 34.1% | 12.0% | **25.5%** | |
| Government owned | 4.0% | 1.3% | 1.4% | 3.0% | 5.2% | 0.9% | **2.5%** | |
| **Chain affiliation** | | | | | | | | |
| Yes | 31.3% | 58.8% | 59.4% | 56.9% | 49.3% | 25.7% | **53.7%** | <0.001 |
| No | 66.0% | 33.2% | 36.8% | 31.7% | 47.2% | 70.5% | **39.8%** | |
| Unknown | 2.6% | 8.0% | 3.8% | 11.4% | 3.5% | 3.8% | **6.5%** | |
| **Size: Number of OASIS episodes** | | | | | | | | |
| 1-59 | 1.9% | 0.4% | 0.1% | 0.1% | 0.3% | 1.9% | **0.4%** | <0.001 |
| 60-249 | 11.7% | 4.2% | 2.4% | 2.2% | 4.3% | 21.8% | **4.4%** | |
| 250-499 | 22.9% | 7.9% | 4.8% | 4.7% | 9.5% | 24.0% | **7.9%** | |
| 500-999 | 16.7% | 16.4% | 9.7% | 11.1% | 20.0% | 29.4% | **13.7%** | |
| ≥1,000 | 46.7% | 71.2% | 83.1% | 81.8% | 66.0% | 22.9% | **73.7%** | |
| **HHA Age** | | | | | | | | |
| <4 years | 2.4% | 1.1% | 1.4% | 1.5% | 2.9% | 5.3% | **1.9%** | <0.001 |
| 4-10 years | 33.4% | 14.6% | 14.5% | 16.7% | 17.5% | 37.9% | **18.0%** | |
| >10 years | 64.3% | 84.3% | 84.0% | 81.7% | 79.6% | 56.8% | **80.1%** | |

**HHA characteristics from CY 2018.*

## 5.5 Discussion

Through the first four years of HHVBP, we observed evidence of a continued positive impact of the model 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 having been 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 2019, the second year in which the model methodology adjusted Medicare home health PPS payments in HHVBP states. In late 2019, CMS notified HHAs in HHVBP states of their upcoming payment adjustments for 2020, when the maximum payment adjustments increased to ±6 percent and 29 percent received payment adjustments exceeding ±2 percent. While the potential payment adjustments under the model grow larger over time, the actual adjusted amounts remain small relative to the profit margins of many agencies. As the HHVBP payment adjustments continue to grow larger in future years, it will be important to continue to evaluate impacts of the model on agency performance.

TPS values increased over time prior to the implementation of the HHVBP Model and continued through 2018 (Exhibit 35 and Exhibit 37). We observed increasing TPS values for agencies in HHVBP as well as non-HHVBP states, which suggests that agencies were also responding to other quality of care initiatives, such as the introduction of the CMS Star Ratings program. However, the higher TPS values observed among agencies in HHVBP states during this period is consistent with an impact of HHVBP that extends beyond any effects of pre-existing initiatives such as the Star Ratings program.

While the 2019 TPS is not comparable to the TPS for earlier years because of changes in the scoring methodology, our analysis of 2019 data suggests a continued positive impact of HHVBP on overall agency performance in the most recent year of the model. Given the larger contribution of the claims-based measures to the TPS starting in 2019, agency performance on the claims-based measures is of growing interest. The changes that CMS made to the TPS methodology for 2019 strengthen financial incentives for HHVBP agencies to improve their performance on the unplanned ACH measure in particular, as the weighting of this measure in the TPS calculation increased from 6.25 percent in 2018 to 26.25 percent in 2019 (HHS, 2018). While we did not observe a large increase in average scores for this measure among HHVBP agencies relative to non-HHVBP agencies in 2019, we will continue to examine this in future years as agencies have more time to adapt to this change in incentives.

In the context of the modified approach that was used to measure overall agency performance under the model in 2019, we explored whether there were patterns in agency performance based on the presence of patient social risk factors that might indicate risks for some beneficiaries under the model. As in earlier years of HHVBP, this was not the case in 2019. We did not find a pattern of beneficiary social risk factors being more common among HHVBP agencies with a lower TPS compared to higher performing agencies. As the HHVBP payment adjustments become larger over time, it will be important to continue to assess whether agencies that care disproportionately for patients with social risk factors have lower performance, which could adversely affect access to care for some patients.

Based on available Cost Report data through 2018, we continued to find no strong association between HHA profitability and performance under HHVBP. In addition, agency profit margins remain large overall relative to payment changes under HHVBP, which indicates that the model qualitatively does not affect profitability for most agencies. As the payment adjustments continue to become larger over time under HHVBP, however, they may be more likely to determine whether individual agencies are profitable, and agencies may be increasingly aware of this prospect as the model continues to evolve.

# 6. Results: HHVBP Continues to Have Modest Impacts on Medicare Utilization in the First Four Model Years

## 6.1 Introduction

This section examines the impact of HHVBP on measures of health care utilization during the first four years of the model. We found that HHVBP produced ***intended impacts on claims-based acute care hospitalization (ACH), ED use followed by inpatient admission, and skilled nursing facility (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 supporting descriptive analyses, we found that the magnitude of the impact of HHVBP on ACH varied depending on the primary diagnosis for ACHs during home health episodes.

More specifically, the 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 0.1 to 0.4 percentage points (1 to 5 percent relative to baseline averages in HHVBP states). These findings provide evidence of the HHVBP Model's achievement of intended impacts, since hospitalization is an important indicator of health status and the largest driver of health care expenditures among FFS beneficiaries receiving home health services. While we also observe a relative increase in outpatient ED use among HHVBP states of 0.3 percentage points, there is also a relative decline in ED use followed by an inpatient admission of 0.2 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 occurs during the first two years of the model prior to application of the initial payment adjustments (2016 – 2017) as well as the first two years of HHVBP payment adjustments, CYs 2018 and 2019, when agencies in HHVBP states received adjustments up to ±3 percent and ±5 percent, respectively. These changes in utilization are consistent with our findings for Medicare spending measures presented in the following section.

Below, we present detailed findings about the impact of HHVBP on the utilization measures. 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 performance relative to 2016 – 2018 performance, which affects payment adjustments to agencies starting in 2021; and (2) differences in the impact of HHVBP on ACH and rehospitalization during home health episodes as a function of primary diagnoses associated with the hospitalizations.

## 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 HHVBP measures (listed in italics in Exhibit 44). The 15.7 percent rate of unplanned ACHs 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 15.8 percent and 15.9 percent, respectively, during 2016-2019. In contrast, the baseline period measure of unplanned ACHs 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 slightly by 0.1 percentage points to rates of 16.9 percent and 15.8 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, which had a 12.3 percent rate. The HHVBP average increased by 1.1 percentage points to a 12.8 percent rate similar to the 12.9 percent rate of non-HHVBP states post HHVBP (2016-2019). 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 14.6 percent rate in HHVBP states in the post-implementation period, while the rate in non-HHVBP states remained unchanged. 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); both of these rates increased post HHVBP to a rate of 28.1 percent in HHVBP and 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 remained higher at an average of 5 percent for HHVBP relative to a 4.2 percent average for non-HHVBP states during the first four years of the model.

*Exhibit 44. Baseline and Post-HHVBP Performance 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 (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| *Unplanned Acute Care Hospitalization/First FFS HH Episodes* | 15.7% | 15.8% | 16.3% | 15.9% | 0.1 | -0.4 |
| *Outpatient ED Use (no Hospitalization)/First FFS HH Episodes* | 11.7% | 12.8% | 12.3% | 12.9% | 1.1 | 0.6 |
| ED Use followed by Inpatient Admission/First FFS HH Episodes | 14.2% | 14.6% | 14.2% | 14.2% | 0.4 | 0.0 |
| Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes | 26.6% | 28.1% | 27.6% | 28.1% | 1.5 | 0.5 |
| Unplanned Acute Care Hospitalization/All FFS HH Episodes | 17.0% | 16.9% | 15.9% | 15.8% | -0.1 | -0.1 |
| SNF Use /All FFS HH Episodes | 4.9% | 5.0% | 4.0% | 4.2% | 0.1 | 0.2 |

*HHVBP Measures 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 results of these analyses suggest that trends in these claims-based measures for the two groups 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 (Page 20) 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 HHVBP 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 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 ACH use and ED use without hospitalization among first home health episodes. We also report on our examination of SNF use and other measures of hospitalization and ED use.

Overall, we found the average annual impact of the HHVBP Model over 2016-2019 to involve relative decreases in utilization in HHVBP states compared with non-HHVBP states for most of these measures, but we also found relative increases in ED use not followed by hospitalization (Exhibit 45). HHVBP produced an average annual 0.18 percentage point decrease in unplanned ACH use in first episodes among FFS home health beneficiaries in HHVBP states relative to non-HHVBP states during the first four years of the model and an average annual impact of a 0.31 percentage point increase in outpatient ED utilization during first episodes (Exhibit 45). These effects translate to a 1.1 percent decrease per 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 2.6 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, a trend that we will continue to monitor in future years.

In contrast to the outpatient ED utilization measure, we observed a 0.15 percentage point decrease in ED utilization followed by inpatient admission among first episodes in HHVBP states relative to non-HHVBP states from 2016 to 2019. This corresponds to a 1.1 percent decrease relative to the baseline average of 14.2 percent and is consistent with the findings for impact on ACH utilization. The total ED use measure, which combines outpatient ED utilization with ED visits that result in an inpatient admission, showed no cumulative impact of HHVBP states compared with non-HHVBP states from 2016 to 2019. 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 did a sensitivity analysis examining the rate of combined ED visits and observation stays during first FFS home health episodes that did not result in hospitalizations for comparison with results using 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 greater than for outpatient ED visits alone and followed a similar pattern of slightly increasing prevalence over time. 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 and rose further to 15.5 percent by 2019 (see Exhibit

C-6 [Page 121] 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 and 15.2 percent in 2019 (see Exhibit C-7 [Page 123] in the Technical Appendix). A D-in-D analysis (not shown) revealed that HHVBP contributed to statistically significant greater use for a combined measure of ED visits or observation stays of 0.67 percentage points on average per year—more than double the magnitude in the same direction as the HHVBP impact on outpatient ED use alone. Therefore, the impact of HHVBP on observation stays that do not result in an inpatient stay aligns closely with the impact on ED visits that do not result in an inpatient stay.

We also report results for the broader measure of unplanned hospitalizations among all FFS home health episodes to have 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 only includes hospitalization during first episodes, we estimated a similar reduction for unplanned hospitalizations among all home health episodes: cumulative estimate of -0.19 percentage points, corresponding to an average annual decrease of 1.1 percent in HHVBP states relative to the baseline period rate of 17.0 percent. We found a relative decline of 0.24 percentage points per year in SNF use among home health FFS beneficiaries in HHVBP states compared with those in non-HHVBP states, reflecting a 4.9 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 2016-2019 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 (-0.29 percentage points), 2018 (-0.21 percentage points), and 2019 (-0.22 percentage points) but no statistically significant impact in 2017. Three of the six utilization measures had a statistically significant change in the average magnitude of impact estimates during the two years of payment adjustments (2018-2019) relative to the first two years (2016-2017) of the HHVBP Model (Exhibit 46). However, only one of these, SNF utilization among all home health FFS beneficiaries, had impacts that grew in magnitude in the intended direction of decreased use. Furthermore, SNF use is the only utilization measure that had a pattern of steadily increasing statistically significant impact magnitudes over the first three HHVBP Model years (i.e., -0.20, -0.22, and -0.28 percentage points in 2016, 2017, and 2018, respectively), but then decreased slightly to -0.26 in 2019. Two other measures, Outpatient ED Use and Total ED Use within first FFS HH episodes, had significantly greater impacts in an unintended positive direction in the latter two years of the model than during the first two years. The change in magnitude of impact from 2018 to 2019 was not statistically significant for these measures, with the largest change being an increase of 0.06 percentage points (43 percent) from -0.14 to -0.20 for ED use followed by a hospitalization among first home health episodes.

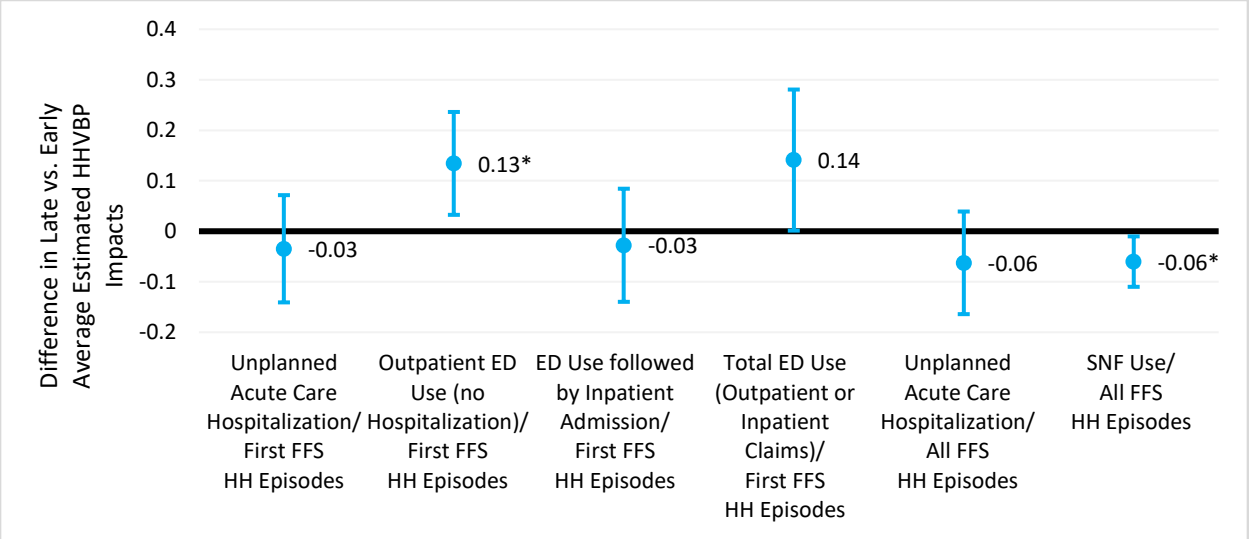
*Exhibit 45. HHVBP Leads to Continued Reduction in Unplanned hospitalization, SNF Use, and ED Use Followed by an Inpatient Admission, but Increasing Outpatient ED Use*

| | 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 | -0.25 | <0.01 | -0.38 | -0.11 | 15.7% | -1.6% |
| 2017 | -0.07 | 0.44 | -0.21 | 0.08 | | -0.4% |
| 2018 | -0.17 | 0.07 | -0.32 | -0.01 | | -1.1% |
| 2019 | -0.22 | 0.03 | -0.39 | -0.06 | | -1.4% |
| Cumulative | -0.18 | 0.02 | -0.30 | -0.06 | | -1.1% |
| ***Outpatient ED Use (No Hospitalization)/First FFS HH Episodes*** | | | | | | |
| 2016 | 0.26 | <0.001 | 0.14 | 0.37 | 11.7% | 2.2% |
| 2017 | 0.24 | <0.01 | 0.11 | 0.36 | | 2.1% |
| 2018 | 0.38 | <0.001 | 0.25 | 0.51 | | 3.2% |
| 2019 | 0.38 | <0.001 | 0.23 | 0.53 | | 3.2% |
| Cumulative | 0.31 | <0.001 | 0.20 | 0.42 | | 2.6% |
| **ED Use Followed by Inpatient Admission/First FFS HH Episodes** | | | | | | |
| 2016 | -0.21 | <0.01 | -0.34 | -0.08 | 14.2% | -1.5% |
| 2017 | -0.07 | 0.42 | -0.21 | 0.07 | | -0.5% |
| 2018 | -0.14 | 0.14 | -0.30 | 0.02 | | -1.0% |
| 2019 | -0.20 | 0.05 | -0.36 | -0.03 | | -1.4% |
| Cumulative | -0.15 | 0.04 | -0.27 | -0.03 | | -1.1% |
| **Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes** | | | | | | |
| 2016 | 0.01 | 0.90 | -0.15 | 0.17 | 26.6% | 0.04% |
| 2017 | 0.14 | 0.21 | -0.04 | 0.33 | | 0.5% |
| 2018 | 0.24 | 0.05 | 0.04 | 0.43 | | 0.9% |
| 2019 | 0.20 | 0.12 | -0.01 | 0.41 | | 0.8% |
| Cumulative | 0.15 | 0.12 | -0.01 | 0.30 | | 0.6% |
| **Unplanned Acute Care Hospitalization/All FFS HH Episodes** | | | | | | |
| 2016 | -0.18 | <0.01 | -0.30 | -0.07 | 17.0% | -1.1% |
| 2017 | -0.14 | 0.07 | -0.27 | -0.01 | | -0.8% |
| 2018 | -0.22 | 0.01 | -0.36 | -0.08 | | -1.3% |
| 2019 | -0.23 | 0.02 | -0.38 | -0.07 | | -1.4% |
| Cumulative | -0.19 | <0.01 | -0.31 | -0.08 | | -1.1% |
| **SNF Use/All FFS HH Episodes** | | | | | | |
| 2016 | -0.20 | <0.001 | -0.26 | -0.15 | 4.9% | -4.1% |
| 2017 | -0.22 | <0.001 | -0.28 | -0.16 | | -4.5% |
| 2018 | -0.28 | <0.001 | -0.35 | -0.21 | | -5.7% |
| 2019 | -0.26 | <0.001 | -0.34 | -0.18 | | -5.3% |
| Cumulative | -0.24 | <0.001 | -0.29 | -0.19 | | -4.9% |

*HHVBP Measures indicated by italic text. CI= Confidence Interval. See Exhibit 45n (Page 165) in the Technical Appendix for each measure's sample size.*

*[a] Values represent percentage point changes.*

*Exhibit 46. Greater Outpatient ED Use Increase and SNF Use Reduction when Comparing Average Estimated HHVBP Impacts between Early Years (2016-2017) versus Later Years (2018-2019) of HHVBP for FFS Claims-Based Utilization Measures*




*Graph show 90% confidence intervals. * p < 0.05.*

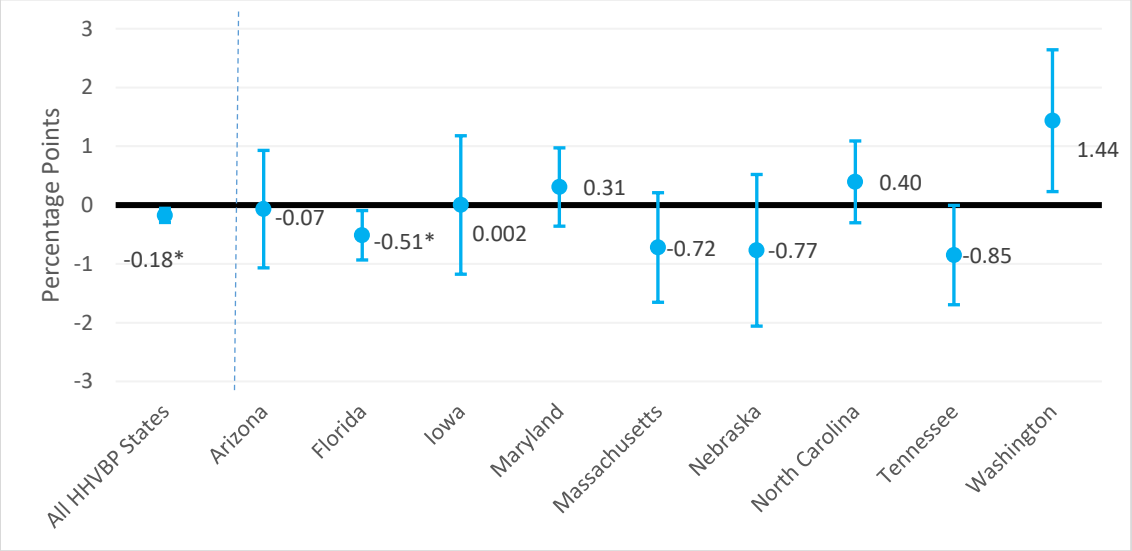
### 6.3.1 HHVBP Impacts on Acute Care Hospitalizations and Unintended Impacts on Outpatient ED Use Are Driven Primarily by Florida

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 one state in particular, Florida, we found consistently strong evidence of intended impacts on unplanned hospitalizations among first and all home health episodes and ED use followed by an inpatient admission, with offsetting unintended impacts on ED use without hospitalization during first episodes (Exhibit 47 and Exhibit 48).

Florida had average annual impact estimates of -0.5 percentage points (-3.6 percent relative to Florida's baseline level) for unplanned hospitalizations among first home health episodes (Exhibit 47), -1.0 percentage points (-6.3 percent relative to Florida's baseline level) for unplanned hospitalizations among all home health episodes, and -0.9 percentage points (-6.7 percent relative to Florida's baseline level) for ED use followed by an inpatient admission among first home health episodes (see Exhibit C-60 [Page 168] in the Technical Appendix). We also found strong evidence that the HHVBP incentives contributed to intended impacts in Tennessee on unplanned hospitalizations among first home health episodes (-0.85 percentage points; -4.9 percent relative to Tennessee's baseline level), unplanned hospitalizations among all home health episodes (-0.77 percentage points; -4.5 percent relative to Tennessee's baseline level) and for SNF use (-0.6 percentage points; -12.2 percent relative to Tennessee's baseline level) (see Exhibit C-60 [Page 168] in the Technical Appendix). We found some evidence of unintended impacts increasing unplanned hospitalizations among first home health episodes by 1.4 percentage points (+9.4 percent relative to the state baseline level) and increasing ED use followed by an inpatient admission by 1.4 percentage points (+10.8 percent relative to the state baseline level) in Washington (see Exhibit C-60 [Page 168] in the Technical Appendix). For Florida only, we found strong evidence of unintended

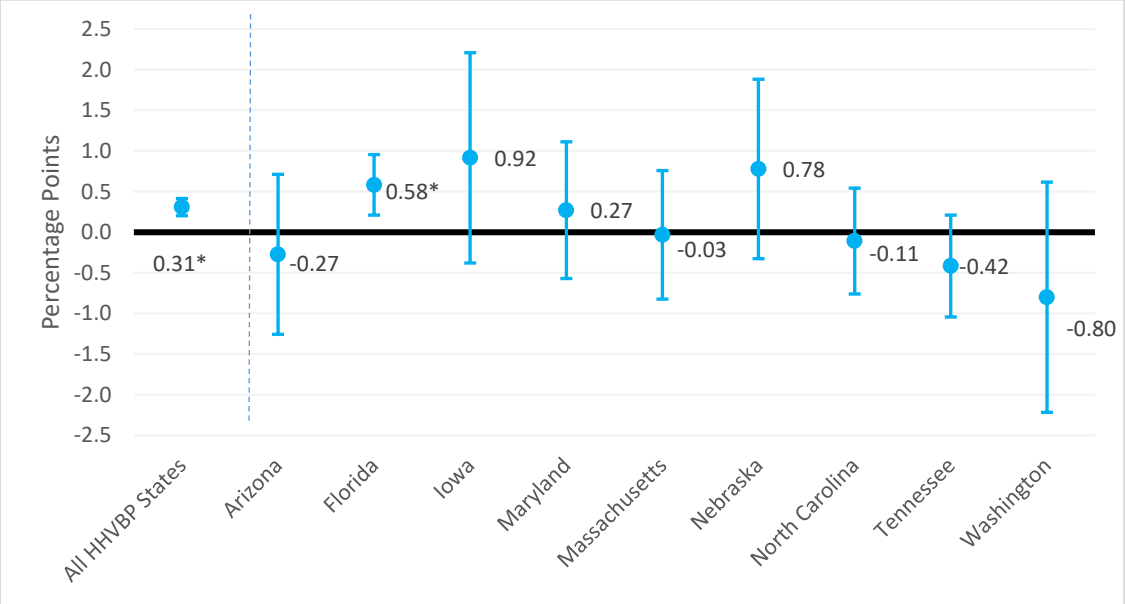
cumulative impacts increasing ED use during first episodes by 0.6 percentage points (+5.9 percent relative to the state baseline level; see Exhibit 48).

*Exhibit 47. Cumulative D-in-D Estimates Indicate Reductions in Unplanned Acute Care Hospitalization/First FFS HH Episodes Overall are Driven Primarily 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.*

*Exhibit 48. 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 No Observed Impact of Larger TPS Weight for the Unplanned Hospitalization Measure in 2019

As discussed in Section 1, CMS designed the HHVBP Model to evolve over time, with successively larger payment adjustments applied with each performance year. However, as of the fourth performance year, 2019, CMS also applied several changes to the HHVBP measure set and to the weights of the HHVBP measures when calculating each agency's TPS. These changes affect the payment adjustments to agencies starting in 2021.

In addition 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. Between 2018 and 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 measure (without hospitalization) 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.

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 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 low 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 high 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 between HHVBP states and the comparison states. 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 ranged from an average of 19.1 percent and 19.8 percent of episodes in agencies in the high quartile in HHVBP and non-HHVBP states, respectively, to an average of 13.4 percent and 12.0 percent of episodes in agencies in the low quartile in the two groups of states, respectively (Exhibit 49). Between 2018 and 2019, there was a decline in hospitalizations in agencies that were in the high quartile during 2018, in both groups of states. However, the decline for HHVBP states (-1.6 percent) was smaller than the decline for non-HHVBP states (-2.2 percent; Exhibit 49), where no additional financial incentive was introduced in 2019 for agencies to reduce hospitalizations.

*Exhibit 49. Patterns in Unplanned Acute Care Hospitalization (ACH) during 2018-2019 Do Not Provide Evidence of an Impact of the Increased TPS Weight Assigned to the ACH Measure in 2019*

| 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 |
|---|---|---|
| *Low Quartile* | | |
| HHVBP States | 13.4% | 1.8%** |
| Non-HHVBP States | 12.0% | 2.3%** |
| *Middle Quartiles* | | |
| HHVBP States | 16.1% | 0.1% |
| Non-HHVBP States | 16.0% | 0.2% |
| *High Quartile* | | |
| HHVBP States | 19.1% | -1.6%** |
| Non-HHVBP States | 19.8% | -2.2%** |

*^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<0.05 comparing estimated change in unplanned acute care hospitalization/first HH 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; *p<0.1.*

Among agencies that were in the low quartile for hospitalizations in 2018, hospitalizations increased during 2019, in HHVBP and non-HHVBP states. However, the increase in hospitalization was smaller in HHVBP states (1.8 percent) than in non-HHVBP states (2.3 percent; Exhibit 49). For the middle quartiles of agencies, the change in hospitalization over time did not differ between the two groups of states.

The results in Exhibit 49 suggest year-to-year variation in agency performance on the HHVBP hospitalization measure, as agencies with lower performance in 2018 improved on average in 2019 and agencies with higher performance in 2018 worsened on average in 2019. 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 49, 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.

Overall, the results in Exhibit 49 are not consistent with the change in TPS weights incentivizing greater improvements in performance on this measure in 2019, beyond the gains that had already occurred under HHVBP. Given the patterns we observe across the three groups in Exhibit 49, one possible explanation is that yearly changes in the performance of individual agencies on this measure may in part reflect the effects of regression to the mean. In future years, it may be informative to combine data over multiple years following the change in TPS weights because that may yield a more stable measure of agency performance on a single measure for evaluating effects of the change in weighting. We will also

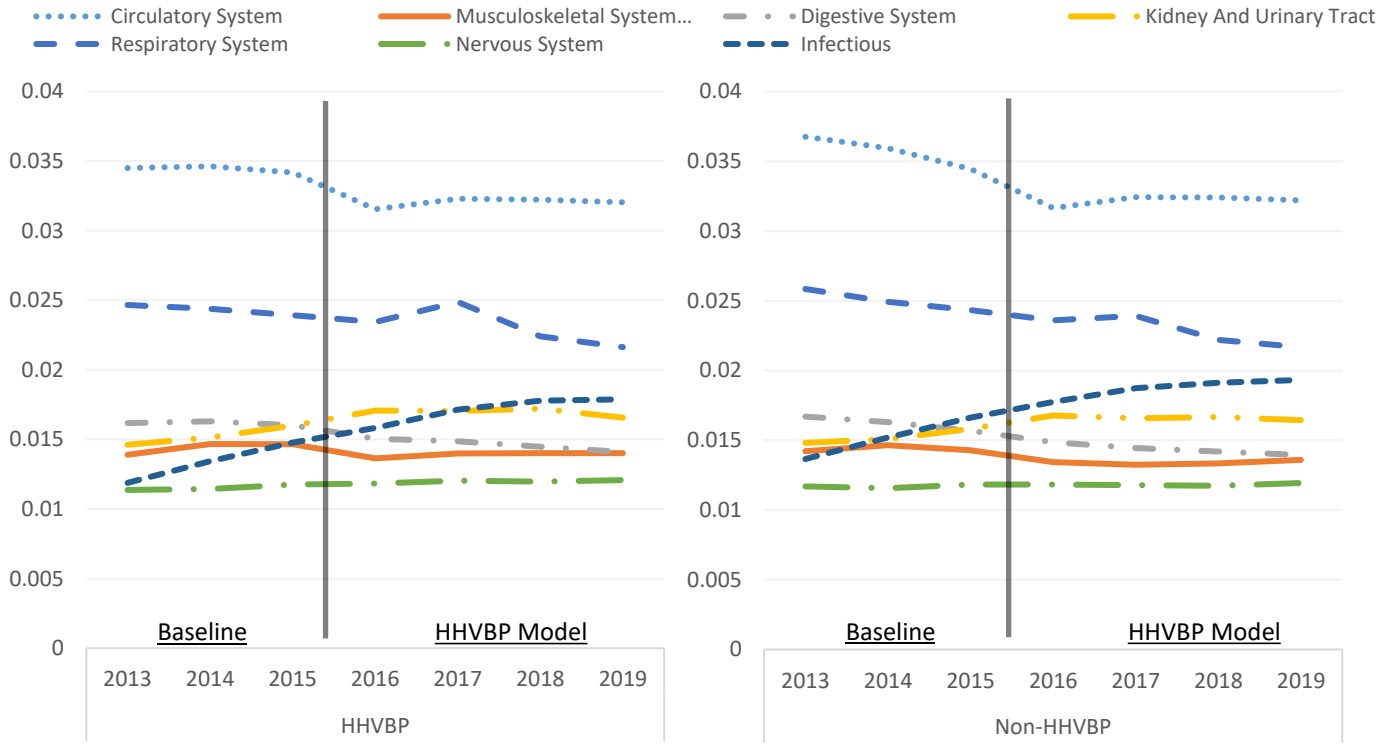
examine whether the larger weights for the claims-based measures may have effects over the longer term, as agencies have more time to adapt to this change in incentives.

## 6.5 HHVBP Hospitalization Effect Applies to Multiple Causes of Hospitalization

We conducted supplementary analyses to determine if our finding that unplanned hospitalizations during home health episodes declined more rapidly for beneficiaries in HHVBP states compared with non-HHVBP states (discussed above) reflected impacts on particular types of hospitalizations. Specifically, we examined trends in the causes of hospitalizations associated with home health episodes. We categorized hospitalizations during home health episodes into Major Diagnostic Categories (MDC) based on the Medicare Severity Diagnosis Related Group (MS-DRG). The 25 MDCs are largely organized by organ system (e.g. cardiovascular, respiratory, etc.).

Seven MDCs accounted for 81.6 percent of hospitalizations during home health episodes throughout the study period. As we reported previously (Arbor Research, 2020), the percent of hospitalizations related to infectious diseases and to kidney and urinary tract conditions showed an upward trend for HHVBP and non-HHVBP states (Exhibit 50). The percent of hospitalizations for other MDCs showed stable or declining trends. As discussed, it appears that the distribution of reasons for hospitalization was affected by the change from ICD-9 to ICD-10 in 2016.

*Exhibit 50. Stable or Downward Trends in Most Causes of Hospitalization for HHVBP (left panel) and Non-HHVBP (right panel) States, With the Exception of Infectious and Kidney and Urinary Tract Conditions*

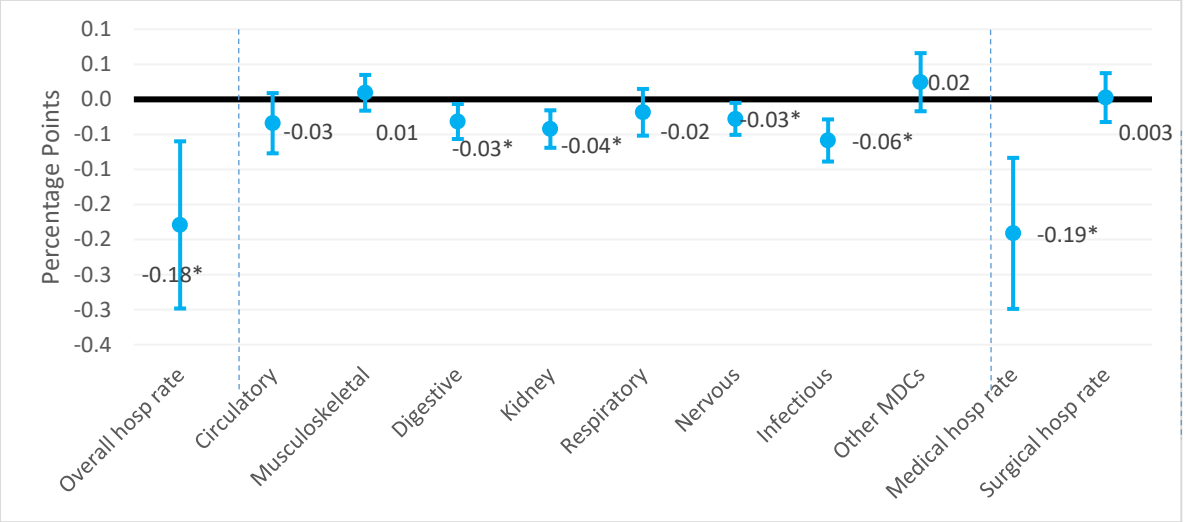



The unadjusted analysis in Exhibit 50 did not reveal obvious different trends in HHVBP vs. non-HHVBP states. However, a D-in-D analysis showed a relatively faster decline in HHVBP states for hospitalizations related to digestive diseases, kidney and urologic diseases, nervous system diseases and infectious diseases (Exhibit 51; see Section A.4.1.2 [Page 90] in the Technical Appendix for additional details; see

Section A.1.5.2 [Page 22] for results from falsification tests supporting the parallel trends assumption). This pattern of small difference in multiple MDCs contributed to the overall favorable relative decline (-0.18 percent) in HHVBP vs. non-HHVBP states. That is, the effect of HHVBP on hospitalization during home health episodes discussed in Section 6.3 appears to apply to a broad range of diagnostic conditions rather than a small subset of conditions. However, an HHVBP effect was not apparent for some conditions, such as the musculoskeletal category.

The D-in-D analysis also showed HHVBP impacts on hospitalization for medical but not surgical conditions (Exhibit 51). Medical hospitalizations are usually unplanned and often involve complications of chronic health conditions such as heart disease and diabetes. In general, we expect that effective home health services would provide educational, monitoring and treatment services that could prevent some medical hospitalizations. In contrast, surgical hospitalizations are more often planned events for elective procedures such as joint replacements. We would not expect home health services to prevent hospitalizations of this type. We found that the bulk of the HHVBP effect applies to medical hospitalizations for which there was a 0.19 percentage point average annual decline attributable to HHVBP (Exhibit 51).

*Exhibit 51. HHVBP Model Results in Reductions in Some but Not all Types of Hospitalizations*




*Graph shows 90% confidence intervals; * p < 0.05; 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 9] in the Technical Appendix).*

### 6.5.1 HHVBP is Associated with Greater Decline in Rate of Rehospitalization

Our hospitalization findings are consistent with the idea that HHVBP incentivizes more effective home health services. We also examined the effect of HHVBP on the rate of rehospitalization for home health episodes preceded by an inpatient stay in the 14-day period prior to the start of the home health episode. Patients who come to home health care from a hospital setting have a higher risk of hospitalization during the home health episode. Home health care providers should tailor services to the condition that caused the index hospitalization. Therefore, one would expect that efforts to enhance the quality of home health services might affect the rate of rehospitalization, particularly for causes related to the index condition. We tested this hypothesis; see results in Exhibit 52.

Exhibit 52 shows that overall rehospitalization declined faster in HHVBP than non-HHVBP states. The D-in-D estimate was -0.20 percentage points for rehospitalization, which is comparable to the estimated impact of -0.18 percentage points for hospitalization generally (which includes rehospitalization, Exhibit 51). This finding indicates that the apparent effect of HHVBP on hospitalization was similar for patients referred from inpatient and community settings.

As noted, HHVBP had the greatest impact on medical hospitalizations (Exhibit 51). We explored this observation further by classifying rehospitalization events according to MDC match with the index medical hospitalization. Rehospitalizations for the same MDC occurred in 6.5 percent of cases in the baseline period (Exhibit 52). As expected, HHVBP had the greatest impact on reducing medical rehospitalization for the same MDC as the index hospitalization. The D-in-D effect was -0.17 percent, representing a relative change of -2.6 percent from the baseline rate. Rehospitalizations with an MDC that was different from the index Medical hospitalization occurred at a frequency of 16.6 percent in the baseline period. As hypothesized, the effect of HHVBP on such events was smaller (-0.11 percent) and not statistically significant.

*Exhibit 52. HHVBP Model Results in Reductions in Rehospitalizations Overall and Those for the Same Condition as Previous Hospitalization*

| | 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] | | |
| **Rehospitalization (Overall)** | | | | | | |
| Cumulative | -0.20 | 0.05 | -0.37 | -0.03 | 19.4% | -1.0% |
| **Rehospitalization for Same MDC as Index Medical Hospitalization** | | | | | | |
| Cumulative | -0.17 | <0.01 | -0.27 | -0.07 | 6.5% | -2.6% |
| **Rehospitalization for Different MDC as Index Medical Hospitalization** | | | | | | |
| Cumulative | -0.11 | 0.29 | -0.27 | 0.06 | 16.6% | -0.7% |

*CI= Confidence Interval. [a] Values represent percentage point changes. All regression models include the standard set of covariates for claims-based D-in-D models (see Section A.1.4.2 [Page 9] in the Technical Appendix).*

## 6.6 Discussion

Our findings that HHVBP has decreased acute hospital use, 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. In addition, findings from our 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, 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.

During 2016-2019, we find little evidence that changes in the HHVBP payment adjustment methodology produced substantially different impacts in later years relative to early years of the model. In particular, the average estimated HHVBP impacts on unplanned ACH use in 2018-2019, when HHAs received

performance-based payment adjustments, was not significantly different from the average impact during HHVBP Model years 2016-2017, prior to payment adjustments. Furthermore, our analysis of changes in ACH use from 2018 to 2019 among agencies categorized according to the high, middle, and low quartiles of adjusted unplanned ACH in 2018 shows no evidence of a notable response among HHVBP agencies to the substantial increase in weighting of ACH in the TPS from 6.25 percent in 2018 to 26.25 percent in 2019. Aside from this finding of little or no change in average performance of HHVBP agencies on the ACH measure in later years of the model relative to early years, we do find some evidence of an increasing intended impact reducing SNF utilization to a greater degree in 2018-2019 relative to 2016-2017. These findings suggest that HHAs may find it easier to engage in activities that reduce the need for SNF services to a greater degree in response to changing HHVBP incentives than further reduce risk of unplanned ACH. For future reports, we will investigate possible mechanisms by which HHAs may reduce the severity of conditions even among those that require acute care during the episode, which may help explain the increasing reduction in SNF use in later years of the HHVBP Model.

Our regression-adjusted D-in-D analysis of HHVBP impacts on various types of hospitalizations, categorized by primary diagnoses for hospital events during home health episodes, provides evidence that HHA activities responding to HHVBP incentives produces benefits across a broad range of conditions rather than concentrating narrowly on a few conditions. However, we also find, as expected, that HHVBP impacts on hospitalizations almost exclusively reflect impacts on medical hospitalizations, which often involve complications of chronic health conditions, in contrast with its negligible impact on surgical hospitalizations, which are usually planned events for elective procedures. Furthermore, our finding of greater intended HHVBP impacts on medical rehospitalizations that have a primary diagnosis from the same condition category as the primary diagnosis of the index hospitalization supports the hypothesis that HHAs respond to HHVBP incentives by improving quality through services tailored to the condition that caused the index hospitalization precipitating the home health episode. This result suggests that HHAs may be able to achieve some reductions in beneficiaries' acute care use by changing the mix of patients HHAs admit to accommodate a larger share of those who may benefit more from home health care relative to other forms of post-acute care. For future reports, we will investigate this possible mechanism for impacts of the HHVBP Model on health care utilization.

# 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

By design, the HHVBP Model aims to incentivize higher quality of care by HHAs, which may prevent hospitalizations and other forms of health care utilization that in turn reduce Medicare spending. However, there may also be offsetting changes in utilization that lead to increased spending for other types of services, such as for outpatient ED use which we found in Section 6 to have increased due to HHVBP. 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.

Overall, we found that HHVBP led to a ***decline in Medicare spending for FFS beneficiaries receiving home health services*** through the first four years of the model. There is evidence of a 1.3 percent decline in average Medicare expenditures per day for FFS beneficiaries during and within 30 days following home health episodes due to HHVBP. 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 $151 million during 2016 – 2019. We find that much of this overall decline reflects impacts on spending for inpatient and SNF services, and corresponds to estimated annual savings of $95 million and $41 million, respectively.

In contrast, there is 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 HHVBP states represents a small offset to the other 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).

In the remainder of this section, we first provide an overview of the measures of Medicare spending that are examined in this report. 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 for individual HHVBP states.

## 7.2 Overview of Medicare Spending Measures

To assess average effects of HHVBP on Medicare spending for all nine HHVBP states combined and for individual HHVBP states, we focused on three primary spending measures. These measures are related to total Medicare spending for FFS beneficiaries receiving home health care. The **Average Medicare Spending per Day during 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.[16] For the 60 percent of home health episodes that had no subsequent home

[16] We define "during home health episodes of care" as the time period between home health claim start date through a) the last visit date reported on the FFS claim plus seven days, or b) the start of the next home heath episode. See Section A.2.2 (Page 60) in the Technical Appendix for more detail.

health episode, we were able to examine a second measure, **Average Medicare Spending per Day following 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.[17] For the remaining approximately 40 percent of home health episodes, there was a subsequent home health episode within seven days such that no post-home health spending could be examined for that episode. The former measure includes expenditures for inpatient hospitalizations that occurred concurrently with the home health episode of care, while the latter measure captures expenditures associated with any hospitalizations or other services occurring within 30 days after a home health episode ends. We combine these two measures to calculate a measure of **Average Medicare Spending per Day during and following FFS Home Health Episodes of Care**. For home health episodes followed within seven days by a subsequent home health episode, 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 60] 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 the average Medicare spending per day during home health episodes of care increased at a slower rate between the baseline and post-implementation period in the HHVBP states than in the non-HHVBP states (by 7.3 percent and 11.0 percent which corresponds to a change in the mean of $11 and $15 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-7 [Page 25] in the Technical Appendix for a comparison of trends in spending between the two groups, and Exhibits C-6 [Page 121] and C-7 [Page 123] in the Technical Appendix for unadjusted annual means during 2013 – 2019 for the two groups). Since we examined measures of average spending per day during or following home health episodes of care, we also compared the number of days used to define spending measures in HHVBP and non-HHVBP states. The average number of days for these spending measures is similar between the two groups for both the baseline and post-implementation periods (see Exhibit C-35 [Page 150] in the Technical Appendix).

[17] 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 a HHA through a) a 30-day lookout period, or b) a new home health episode begins. In the event that another episode starts before the full lookout period, the time window is truncated. See Section A.2.2 (Page 60) in the Technical Appendix for more detail.

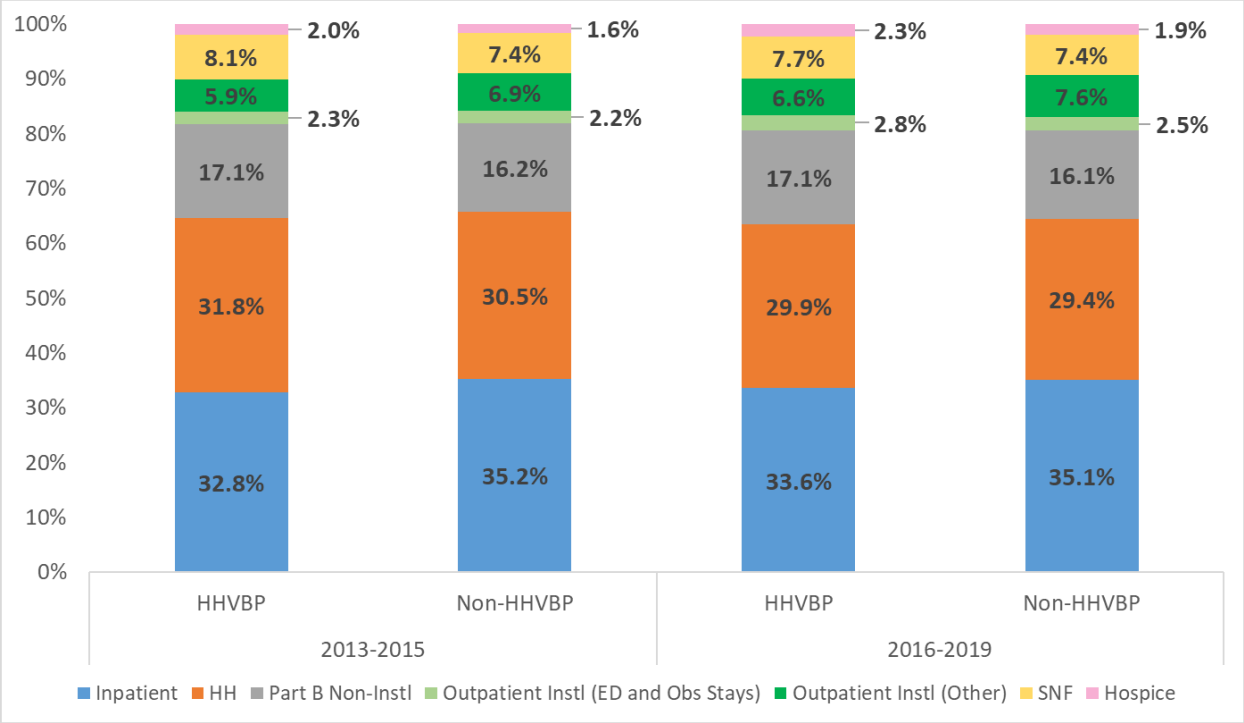
*Exhibit 53. Average Spending for FFS Home Health Beneficiaries Increased at a Slower Rate between Baseline and Post-Implementation Period in HHVBP States versus Non-HHVBP States*

| Measure | HHVBP States | | Non-HHVBP States | | Change in Mean | |
|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | Post-HHVBP (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| Average Medicare Spending per Day during and following FFS HH Episodes of Care | $138.33 | $148.72 | $131.61 | $144.26 | $10.39 | $12.65 |
| Average Medicare Spending per Day during FFS HH Episodes of Care | $150.60 | $161.56 | $135.34 | $150.25 | $10.96 | $14.91 |
| Average Medicare Spending per Day following FFS HH Episodes of Care | $105.97 | $114.80 | $116.54 | $123.35 | $8.83 | $6.81 |

*Average is based on capped expenditure measures.*

The 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 of care 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 skilled nursing facility 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).

*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 Post-Implementation (2016 – 2019) Periods*




*Percentages are based on uncapped total Medicare spending during and following FFS home health episodes of care.*

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, increasing by 14.6 percent for HHVBP and 11.0 percent for non-HHVBP relative to their baseline period shares. Meanwhile home health and Part B non-institutional services accounted for a declining share of total spending (Exhibit 54)—decreasing by 0.6 percent for Part B non-institutional services in non-HHVBP states (unchanged in HHVBP states) and by six and four percent respectively for HHVBP and non-HHVBP home health spending relative to baseline period shares of total spending. These trends were also reflected in the average expenditure per day amounts for each period (Exhibit 55). 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. Unadjusted means for the components of the other total spending measures, corresponding to spending during home health episodes of care and up to 30 days following home health episodes of care, are included in the Technical Appendix (see Exhibit C-38 [Page 151] in the Technical Appendix).

*Exhibit 55. Average Medicare Spending per Day During and Following FFS Home Health Episodes of Care Increased for all Service Categories in HHVBP and Non-HHVBP States between 2013 – 2015 and 2016 – 2019, with the Largest Increases Occurring in Inpatient and Outpatient Institutional Categories*

| Measure | HHVBP States | | Non-HHVBP States | | Change in Mean | |
|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | Post-HHVBP (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| **Total** | $138.33 | $148.72 | $131.61 | $144.26 | $10.39 | $12.65 |
| Home health | $44.87 | $45.42 | $41.07 | $43.36 | $0.55 | $2.29 |
| Inpatient | $45.60 | $50.12 | $46.70 | $50.83 | $4.52 | $4.13 |
| Outpatient institutional | $10.95 | $13.51 | $11.62 | $14.22 | $2.56 | $2.60 |
| ED and Observation Stays | $3.14 | $4.02 | $2.81 | $3.57 | $0.88 | $0.76 |
| Other | $7.72 | $9.37 | $8.73 | $10.54 | $1.65 | $1.81 |
| Skilled nursing facility | $11.36 | $11.67 | $9.93 | $10.83 | $0.31 | $0.90 |
| Hospice | $2.81 | $3.44 | $2.19 | $2.85 | $0.63 | $0.66 |
| Part B non-institutional | $23.32 | $25.05 | $21.20 | $22.96 | $1.73 | $1.76 |

*Average is based on capped expenditure measures.*

## 7.4 HHVBP Continues to Result in Overall Reductions in Medicare Spending

Based on data through the fourth year of the model, we continued to find HHVBP to be associated with a decline in Medicare spending for two of the three total spending measures (Exhibit 56). The cumulative D-in-D estimate of -$1.76 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 1.3 percent decrease compared to average HHVBP levels observed for 2013 – 2015. This D-in-D estimate translated to an estimated average annual savings among FFS beneficiaries receiving home health services of $151 million during 2016 – 2019. 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 care (i.e., through 37 days following the date of the last home health visit).

These overall savings reflect the impact on spending during, rather than in the 30 days following, home health episodes of care. The cumulative D-in-D results for average daily Medicare spending during FFS home health episodes were relatively similar in magnitude to those of the combined spending measure (e.g., -$1.46 vs. -$1.76, respectively), and corresponded to a 1.0 percent decline relative to pre-HHVBP levels (Exhibit 56). Based on the cumulative D-in-D estimate of -$1.46 for the measure of total Medicare spending per day during home health care, the estimated average annual savings among FFS beneficiaries receiving home health services were $89 million during 2016 – 2019. 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. The 2019 D-in-D estimate was similar in magnitude to that of prior years but was not statistically significant (-$1.51). D-in-D estimates for the third spending measure, average daily Medicare spending *following* home health episodes, were smaller and not statistically significant.

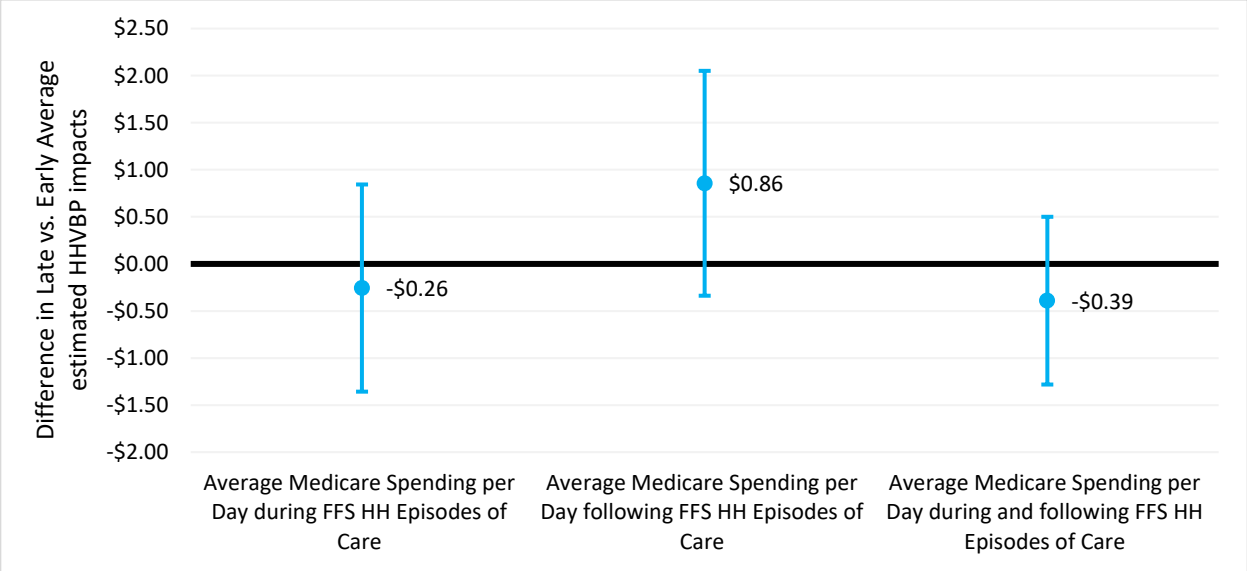
Overall, the D-in-D estimates for the total spending measures suggest relatively slower growth in average spending per day in HHVBP states compared to non-HHVBP states. Although there are increasing financial incentives with every year of the model, there is no strong evidence through 2019 of an increasingly larger impact on Medicare spending emerging over time under the model. We did not find a change in the impact of HHVBP between the first two years of the model before payment adjustments were applied (2016 – 2017) and the second two years of the model (2018 – 2019), for any of the three spending measures (Exhibit 57). 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 agencies may have been anticipating that their performance would affect their future Medicare payments.

*Exhibit 56. HHVBP Leads to Reductions in Overall Medicare Part A and Part B Spending for FFS Home Health Beneficiaries*

| 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 | -$2.03 | <0.01 | -$3.09 | -$0.98 | | -1.5% |
| 2018 | -$1.93 | 0.02 | -$3.32 | -$0.54 | | -1.4% |
| 2019 | -$2.00 | 0.06 | -$3.74 | -$0.26 | | -1.4% |
| Cumulative | -$1.76 | 0.01 | -$2.89 | -$0.63 | | -1.3% |
| **Average Medicare Spending per Day during FFS HH Episodes of Care** | | | | | | |
| 2016 | -$0.90 | 0.05 | -$1.66 | -$0.13 | $150.60 | -0.6% |
| 2017 | -$1.79 | 0.02 | -$3.03 | -$0.55 | | -1.2% |
| 2018 | -$1.67 | 0.097 | -$3.33 | -$0.01 | | -1.1% |
| 2019 | -$1.51 | 0.24 | -$3.60 | $0.59 | | -1.0% |
| Cumulative | -$1.46 | 0.07 | -$2.80 | -$0.12 | | -1.0% |
| **Average Medicare Spending per Day following FFS HH Episodes of Care** | | | | | | |
| 2016 | -$0.43 | 0.54 | -$1.58 | $0.73 | $105.97 | -0.4% |
| 2017 | -$0.43 | 0.67 | -$2.04 | $1.19 | | -0.4% |
| 2018 | $0.39 | 0.75 | -$1.64 | $2.43 | | 0.4% |
| 2019 | $0.47 | 0.76 | -$2.07 | $3.01 | | 0.4% |
| Cumulative | -$0.01 | 0.99 | -$1.72 | $1.70 | | -0.01% |

*CI= Confidence Interval. These models include state-specific linear time trends (See Section A.1.5.3 [Page 36] in the Technical Appendix for more details). See Exhibit 56n (Page 166) in the Technical Appendix for each measure's sample size.*

*Exhibit 57. No Change in the Average Estimated HHVBP Impacts between Early Years (2016 – 2017) versus Later Years (2018 – 2019) of HHVBP for FFS Claims-Based Spending Measures*




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

In this section, we examine components of the three total Medicare spending impact measures to identify service categories that accounted for the estimated savings to Medicare. We also evaluate the impact of HHVBP on Medicare spending in each of the nine HHVBP states for our three primary spending impact measures. As we did for analyses at the national level, we applied a D-in-D model specification that incorporated state-specific linear time trends for the spending measures at the state level.

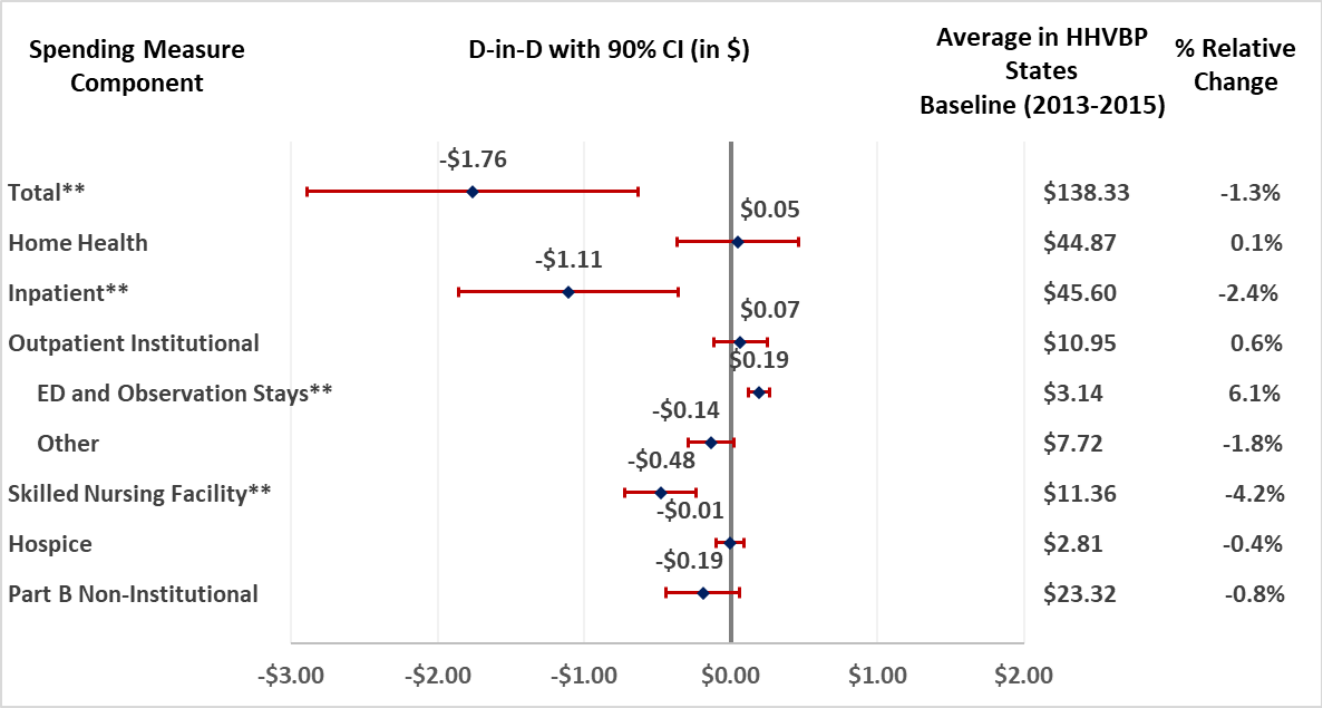
Consistent with what we reported in the Third Annual Report, (Arbor Research, 2020) inpatient and SNF services were the largest contributors to the overall reduction in average Medicare spending *during and following* home health episodes of care due to HHVBP (Exhibit 58). The cumulative D-in-D estimates indicate that HHVBP led to a $1.11 and $0.48 reduction in average daily spending for inpatient and SNF services, respectively, which corresponds to a 2.4 and 4.2 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 $95 million and $41 million, respectively.

In contrast, there was 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 annual cost to Medicare of $17 million. The yearly D-in-D estimates for the spending components (see Exhibit C-40 [Page 153] 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.

Unlike the first two years of the model, we observed a decline in spending for "other" outpatient institutional services due to HHVBP in the most recent two years of the model, with a 2.7 percent

decline in 2018 and a 4.0 percent decline in 2019 relative to baseline averages (see Exhibit C-40 [Page 153] in the Technical Appendix). In contrast, yearly D-in-D estimates for outpatient ED and observation stay expenditures remained consistently positive and increased over time relative to pre-HHVBP levels (4.1 percent in 2016 to 8.3 percent in 2019). Compared to ED visits and observation stays, which together account for slightly over two percent of total expenditures for both groups, other outpatient institutional services account for approximately six and seven percent of total expenditures in HHVBP and non-HHVBP states, respectively, during the baseline period (Exhibit C-39 [Page 152] in the Technical Appendix). However, trends in the impact of HHVBP on these two components offset each other, such that we observe a null effect for the combined outpatient institutional component of overall Medicare spending (Exhibit 58).

*Exhibit 58. Reduction in Average Medicare Spending per Day during and following FFS HH Episodes of Care in HHVBP States versus Non-HHVBP States Driven by Declines in Inpatient and SNF Components*



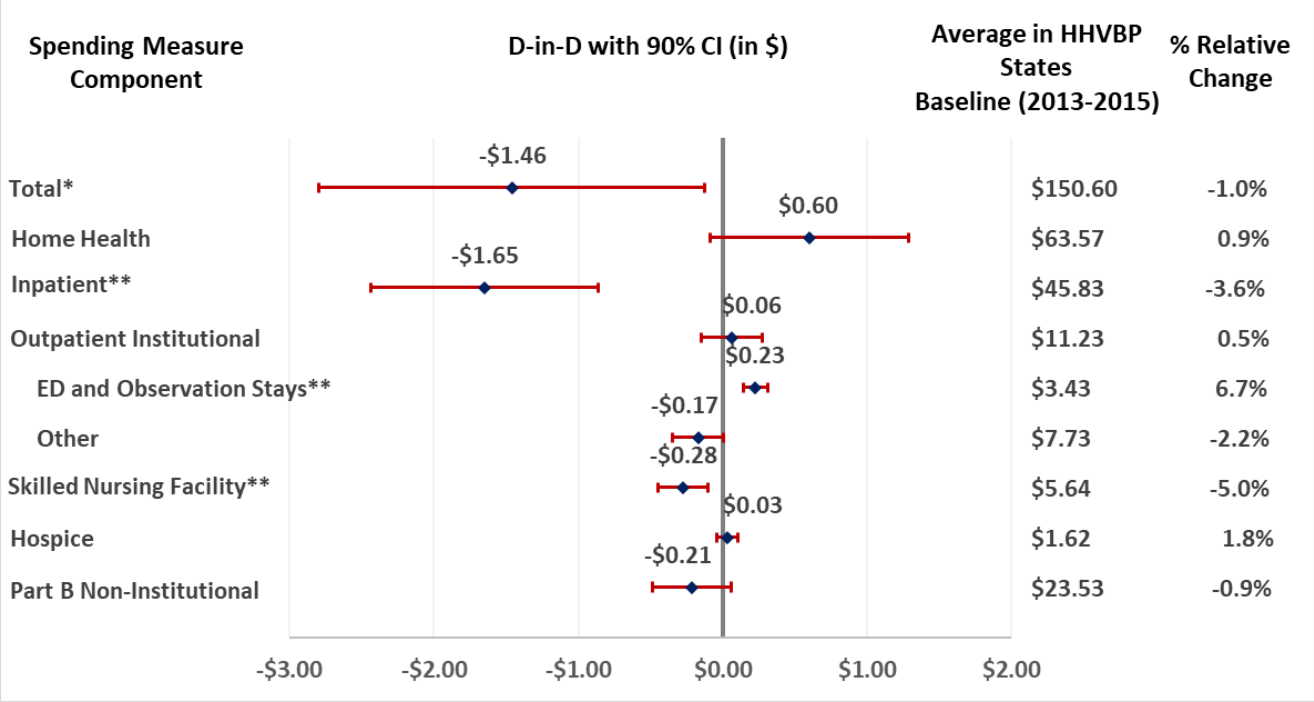

*Average is calculated based on the capped expenditure components. | *Indicates significance at the p<0.10 level. | **Indicates significance at the p<0.05 level.*

We noted similar declines in inpatient and SNF expenditure components and an increase in outpatient ED and observation stay expenditures due to HHVBP for average Medicare spending *during* home health episodes (Exhibit 59). The total estimated savings due to HHVBP for this measure (cumulative D-in-D estimate of -$1.46; Exhibit 56) largely reflected the impact on spending for inpatient services (cumulative D-in-D estimate of -$1.65) and SNF use (cumulative D-in-D estimate of -$0.28). We found no overall effect of HHVBP on expenditures for home health services *during* home health episodes. The cumulative D-in-D estimate for home health services was positive ($0.60) but not statistically significant (Exhibit 59).

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

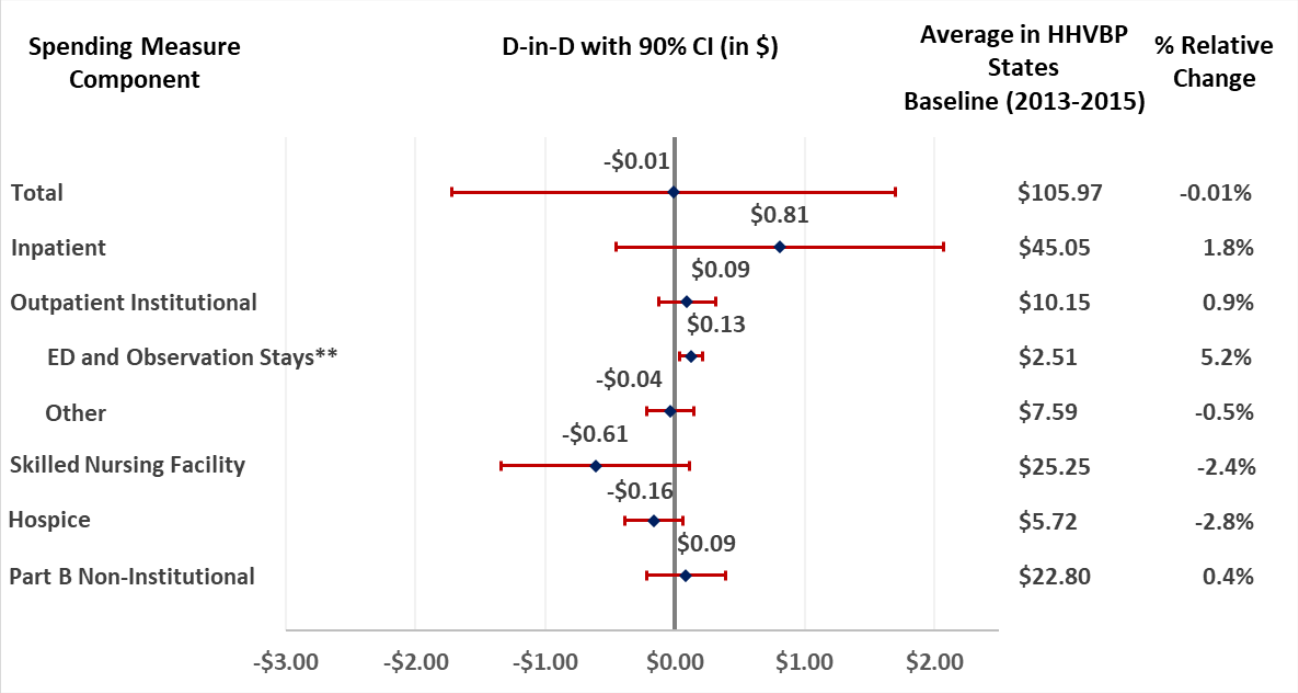
episodes (Exhibit 60) with the exception of a small positive impact of the model on spending for outpatient ED visits and observation stays (cumulative D-in-D estimate of $0.13).

*Exhibit 59. 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. | *Indicates significance at the p<0.10 level. | **Indicates significance at the p<0.05 level.*

*Exhibit 60. No Reduction in Average Medicare Spending per Day following FFS Home Health Episodes of Care in HHVBP States versus Non-HHVBP States*

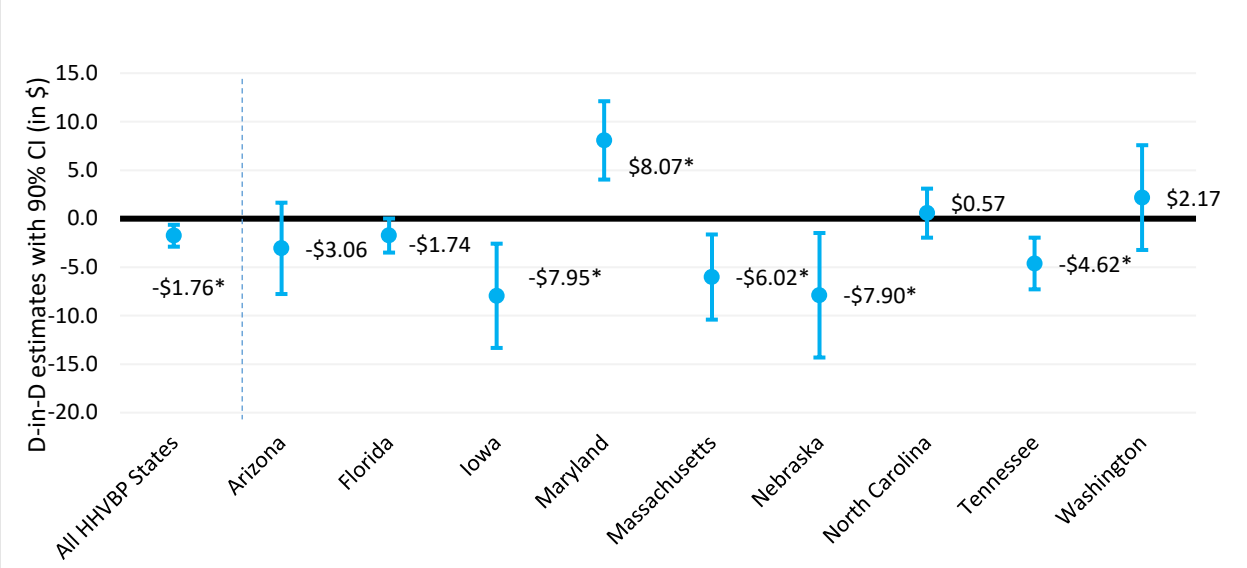



*Average is calculated based on the capped expenditure components. | *Indicates significance at the p<0.10 level. | **Indicates significance at the p<0.05 level.*

## 7.6 Cumulative HHVBP Impact on Total Medicare Spending in Four HHVBP States

Among the nine HHVBP states, we found evidence of overall savings due to HHVBP relative to regional comparison groups for four HHVBP states: Iowa, Massachusetts, Nebraska, and Tennessee (Exhibit 61). Among these four states, 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 Iowa (-$7.95), Nebraska (-$7.90), Massachusetts (-$6.02), and Tennessee (-$4.62). There was a negative cumulative D-in-D estimate for Florida that did not reach statistically significance (-$1.74, p=0.103) (see Exhibit C-61 [Page 170] in the Technical Appendix). However, the yearly D-in-D estimates for Florida were consistently negative during 2016 – 2019 and statistically significant in each year from 2016 – 2018 (results not shown). In contrast, there was a positive cumulative D-in-D estimate for Maryland, which suggests that the model led to an increase in average spending per day during and following FFS home health episodes of care of $8.07 (Exhibit 61).

*Exhibit 61. Impact of HHVBP Model on Average Medicare Spending per Day during and following FFS Home Health Episodes of Care Varies by State*




*Graph shows 90% confidence intervals; * p < 0.05. State-level models include state-specific linear time trends (See Section A.1.6 [Page 41] in the Technical Appendix for more details).*

Our analysis of 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 the same four states: Iowa, Massachusetts, Nebraska and Tennessee (see Exhibit C-61 [Page 170] in the Technical Appendix). As we found above for all HHVBP states combined (Exhibit 56, 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 largely appears to reflect a positive impact on spending following home health episodes of care ($11.36, p<0.01) rather than during home health episodes of care ($5.38, p=0.11; see Exhibit C-61 [Page 170] in the Technical Appendix).

Since the overall decline in Medicare spending due to HHVBP largely reflects impacts on spending for inpatient and SNF services, we examined these two components of spending for each of the nine HHVBP states (see Exhibit C-62 [Page 171] in the Technical Appendix). When examining average spending per day during and following home health episodes of care, we found evidence of cumulative declines in spending for inpatient services in Massachusetts (-$4.12) and Tennessee (-$1.93) and cumulative declines in spending for SNF services in Iowa (-$3.23), Nebraska (-$1.87), and Tennessee (-$1.32). 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 ($5.59). When examining average spending per day during home health episodes of care, we noted reductions in spending associated with inpatient hospitalizations in Florida (-$1.45), Iowa (-$5.28), Massachusetts (-$4.84) and Tennessee (-$2.46). Iowa (-$3.78) and Tennessee (-$0.65) continued to be the drivers of savings associated with SNF services for this measure (see Exhibit C-62 [Page 171] in the Technical Appendix).

## 7.7 Discussion

There continues to be broad alignment between the overall findings of this evaluation regarding the impact of HHVBP on the utilization of services for FFS beneficiaries receiving home health care and the

impact on Medicare spending. Through the first four years of the model, there is evidence of overall reductions in spending due to HHVBP that appear to largely reflect savings related to inpatient hospital and SNF services. As shown in Section 6, we observe declines in utilization in each of these areas due to HHVBP. These findings are consistent with intended effects of the HHVBP Model to reduce unplanned ACH and may indicate that HHVBP has successfully incentivized quality improvements that have reduced the need for more resource-intensive forms of care. In section 6, we observed HHVBP impacts on ACH across a wide range of hospitalization types and concentrated among medical hospitalizations rather than surgical hospitalizations during home health episodes. We plan to further examine the sources of cost savings related to inpatient hospital services in future reports.

Our findings of increased expenditures associated with outpatient ED visits and observation stays are again 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 we show that the increase in spending for outpatient ED visits and observation stays has the effect of offsetting savings related to inpatient hospitalizations somewhat, this has a limited impact due to the relatively small share of overall spending that is related to outpatient ED visits and observation stays.

We observed that unlike the earlier years of the model, HHVBP was no longer associated with a statistically significant reduction in spending during home health episodes of care during 2019, despite a D-in-D estimate that was comparable in magnitude to those of the earlier years (as shown in Exhibit 56). Loss of precision in the impact estimate for this measure in 2019 could be potentially due to the adjustment for state-specific linear trends in the model. This adjustment is a well-motivated method for establishing a valid comparison group and analytic approach within a D-in-D framework that we have used to make inferences about the impact of HHVBP (Section A.1.5.3 [Page 36] in the Technical Appendix). However, use of this adjustment is accompanied by a reduction in the level of precision of the annual D-in-D estimates as we incorporate additional years of data into the analyses. This underscores the importance of checking the practical significance of impact estimates in addition to their statistical significance (Wasserstein, 2019). Since both the yearly D-in-D estimates for 2016 – 2018 and the cumulative D-in-D estimates were statistically significant, and the magnitude of the estimate for 2019 was comparable to those for earlier years (-$1.51 vs. estimates that ranged from -$0.90 to -$1.67), one can credibly infer that the HHVBP Model continued to have an intended impact on this measure in 2019. However, we will need to carefully weigh the strength of the evidence in terms of the magnitude of point estimates and consistency of impact findings over multiple years along with other criteria (Section 2.2.3) to facilitate interpretation of results as the model continues to mature.

As we found for measures of quality performance (e.g., agency TPS scores in Section 5) and utilization (Section 6), there is no evidence of an acceleration in the overall impact of HHVBP on Medicare spending through the fourth year of the model. Even though the financial stakes for agencies are growing over time through yearly increases in the maximum payment adjustments under the model, we did not find any evidence of a differential impact in the two most recent years of the model relative to the two initial years of the model. However, given the ongoing phase-in of the payment adjustments, it will be important to monitor and assess whether larger cost savings to Medicare emerge in future years.

Our finding at the national level of overall cost savings to Medicare due to HHVBP is not uniform across the HHVBP states. There is evidence of a cumulative impact of HHVBP in reducing overall Medicare

spending in four of the nine states. There was evidence of reductions in overall spending in three of the four years of the model in Florida, but not cumulatively over the 2016 – 2019 period. For Florida, we note a loss of precision in the cumulative D-in-D estimate that is due to the adjustment for state-specific linear trends in the model. Use of this adjustment (Section A.1.5.3 [Page 36] in the Technical Appendix) results in a reduction in the level of precision of the annual D-in-D estimates as we incorporate additional years of data into the analyses. However, the pattern of consistently negative yearly D-in-D estimates for Florida over the first four years of the model that were statistically significant each year from 2016 – 2018 credibly indicate that the HHVBP Model has had an intended impact on Medicare spending in Florida. Declines in spending related to inpatient hospitalization and SNF services at the national level were also the main drivers of savings at the state level.

HHVBP was not expected to lead to an increase in Medicare spending for FFS beneficiaries receiving home health services, which is what we observed in one HHVBP state, Maryland. As explained in the Third Annual Report (Arbor Research, 2020), an additional potential confounder for our analyses of the impact of HHVBP in Maryland, is the implementation of the Maryland All-Payer Model, which began in 2014. The evaluation of the Maryland All-Payer Model found evidence of cost savings for Medicare beneficiaries starting in 2016 (RTI International 2019). Since this model is a statewide initiative that overlapped with the implementation of HHVBP and was not also adopted in other states, we are unable to formally control for any effects it may have had specifically for FFS beneficiaries receiving home health services specifically in the post-HHVBP period that would not also have occurred for beneficiaries in its regional comparison states. In future Annual Reports, we will continue to evaluate trends in both overall spending and in individual components of spending in Maryland to further explore the impact of HHVBP in this state.

# 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 HHVBP on seven OASIS-based quality measures of interest, comprised of the six HHVBP impact measures used to tabulate the TPS in 2019 and one publicly reported measure. Of note, two of the HHVBP measures are new, introduced to the model in 2019: the Total Normalized Composite (TNC) Change in Mobility and the TNC Change in Self-Care. Using a linear time trend in our D-in-D analyses, we found a ***modest, positive impact of HHVBP for most of the OASIS-based outcome measures*** for agencies in the nine model states compared to those in the non-model states after the first four years of the model. These relative gains occurred in a context where average measure rates tended to be high (e.g., 52 to 71 percent) among the original, non-TNC OASIS-based outcome measures, prior to 2016 in both HHVBP and non-HHVBP states. At the state level, Arizona and Maryland were consistent drivers of the overall HHVBP findings for many of the OASIS-based outcome measures.

We continued to find a trend of lower functional status reported at the start of care on OASIS assessments for beneficiaries in both HHVBP and non-HHVBP states; this finding was supported by our multivariate analyses relying on the relationship between health-related covariates and reported functional status in the baseline period to predict post-HHVBP functional status. We found substantial differences between predicted and reported functional status for three diagnostic cohorts and across three measures, suggesting that changes in the OASIS measures may reflect something other than changes in functional or health status. New this year, our analyses of mortality rates found larger declines in mortality rates among FFS beneficiaries receiving home health in HHVBP states than non-HHVBP states.

Before presenting our analyses, we first provide background information on the two new OASIS-based composite HHVBP performance measures introduced in 2019. We then present detailed findings about the impact of HHVBP on the OASIS-based quality measures—including analyses of changes in functional status at the start of care—as well our new analyses of mortality rates among FFS beneficiary home health users.

## 8.2 Total Normalized Composite (TNC) Change HHVBP Measures Introduced in 2019

In the CY 2019 home health final rule (FR), CMS introduced two new measures to the HHVBP measure set: TNC Change in Mobility and the TNC Change in Self-Care (HHS, 2018). These TNC change measures are composed of several single-item OASIS outcome measures, including three HHVBP OASIS-based measures that previously used in the TPS calculation: Improvement in Bathing, Improvement in Bed Transferring, and Improvement in Ambulation/Locomotion. Unlike the OASIS measures they replaced—which emphasize improvement over time for a single area of functional status (e.g., walking)—the two new composite measures assess changes in multiple areas of function. Specifically, the TNC Change in Mobility measure accounts for either a positive or negative change over the course of an OASIS episode in three related areas of functioning: toilet transferring, bed transferring, and ambulation. The TNC Change in Self-Care measure accounts for either a positive or negative change over the course of an

OASIS episode in six related areas of functioning: eating, grooming, upper and lower dressing, bathing, and toilet hygiene.[18]

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. (For example, the OASIS item that assesses bathing ranges from 0 to 6, allowing a change score for bathing to range from -6 to +6.) The range for each of the episode-level composite measures therefore 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 Exhibit A-53 and A-54 (Pages 72-73) of the Technical Appendix for additional detail.

## 8.3 OASIS-Based Quality Measures, Pre- and Post-HHVBP Implementation

Trends for the six OASIS-based outcome measures that were used in the TPS calculation in 2019 showed a general trend toward increasing rates of improvement over time in both HHVBP and non-HHVBP states (Exhibit 62); this trend began prior to HHVBP implementation (see Exhibits C-6 and C-7 [Pages 121-122] in the Technical Appendix). For example, rates for Improvement in Management of Oral Medications increased by 18.1 percentage points for HHVBP states (51.5 percent to 69.6 percent) and by 14 percentage points for non-HHVBP states (53.9 percent to 67.9 percent). The smaller increase of approximately 2 percentage points between baseline and post-implementation for the sole OASIS measure analyzed that is not an HHVBP performance measure (Improvement in Status of Surgical Wound) in both HHVBP and non-HHVBP states was likely due to the relatively high baseline measure rates for both groups of states (90.3 percent and 89.2 percent, respectively; Exhibit 62).

Performance scores also increased for the two new composite measures. In HHVBP states, the average score for the TNC Change in Self-Care measures increased from 1.37 in the baseline period to 1.83 post-intervention, while average scores in non-HHVBP states increased from 1.28 to 1.70. For the TNC Change in Mobility measure, average scores in HHVBP states increased by 0.23 between baseline and post-intervention (i.e., 0.43 to 0.66) and by 0.19 (0.41 to 0.60) in non-HHVBP states (Exhibit 62).

[18] See Section A.2.3 (Page 72) of the Technical Appendix for additional information on the specific OASIS items that comprise the TNC measures.

*Exhibit 62. Mean Rates of Improvement Increased in Both HHVBP and Non-HHVBP States from Baseline to Post-HHVBP Performance Period for OASIS-Based Impact Measures*

| Measure | HHVBP States | | Non-HHVBP States | | Change in Mean | |
|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | Post-HHVBP (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| *Discharged to Community* | 72.8% | 73.1% | 70.1% | 71.6% | 0.30 | 1.50 |
| *TNC Change in Self-Care* | 1.37 | 1.83 | 1.28 | 1.70 | 0.46 | 0.42 |
| *TNC Change in Mobility* | 0.43 | 0.66 | 0.41 | 0.60 | 0.23 | 0.19 |
| *Improvement in Dyspnea* | 66.7% | 80.5% | 66.1% | 77.7% | 13.8 | 11.6 |
| *Improvement in Management of Oral Medications* | 51.5% | 69.6% | 53.9% | 67.9% | 18.1 | 14.0 |
| *Improvement in Pain Interfering with Activity* | 70.7% | 81.1% | 67.7% | 78.2% | 10.4 | 10.5 |
| Improvement in Status of Surgical Wounds | 90.3% | 92.3% | 89.2% | 90.9% | 2.0 | 1.70 |

*HHVBP Measures indicated by italic text.*

## 8.4 Modest Improvements for OASIS-Based Outcome Impact Measures

We present our findings for the seven OASIS-based outcome measures for the first four years of the HHVBP Model in Exhibit 63. We observed relative gains of 0.78 percentage points in the percentage of patients discharged to the community in HHVBP states relative to non-HHVBP states over the first four years of the HHVBP Model, translating to 1.1 percent change relative to its 72.8 percent baseline value (Exhibit 63). In each of the first two years of HHVBP, our D-in-D analysis indicated an increase in HHVBP states relative to non-HHVBP states of approximately 0.5 percentage points, followed by larger relative increases in the most recent two years of the model when agencies started receiving payment adjustments: 0.95 percentage points in 2018 and 1.17 percentage points in 2019. This difference in impact between the early years of the HHVBP Model (i.e., 2016-2017) and the most recent two years (i.e., 2018-2019) was statistically significant, suggesting a larger effect in the latter two years of the model where HHAs received a payment adjustment (see Exhibit C-47 [Page 157] in the Technical Appendix).

The cumulative D-in-D effects were also statistically significant and positive for the two new 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 63). 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 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).[18] 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 63).

We also found cumulative D-in-D effects to be statistically significant and positive for two of the three improvement measures used to calculate the TPS in 2019, with Improvement in Dyspnea continuing to be the exception (Exhibit 63). Relative to the comparison group, the magnitude of the increase in the percentage of patients showing improvement in HHVBP states ranged from 1.86 percentage points for pain interfering with activity to 2.77 percentage points for management of oral medications. For both measures, these relative changes led to a larger gap between the two groups, with higher levels of improvement observed among patients in HHVBP states post HHVBP implementation. In addition, the relative increases observed in HHVBP states based on the D-in-D estimates occurred in a context where there were relatively large increases in these 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 18.1 percentage points between the baseline period and post-HHVBP implementation (i.e., from 51.5 percent to 69.6 percent of patients; Exhibit 62). We did not find a significant difference between the early years (2016-2017) vs. later years of HHVBP (2018-2019) for any of these OASIS-based measures (see Exhibit C-47 [Page 157] in the Technical Appendix).

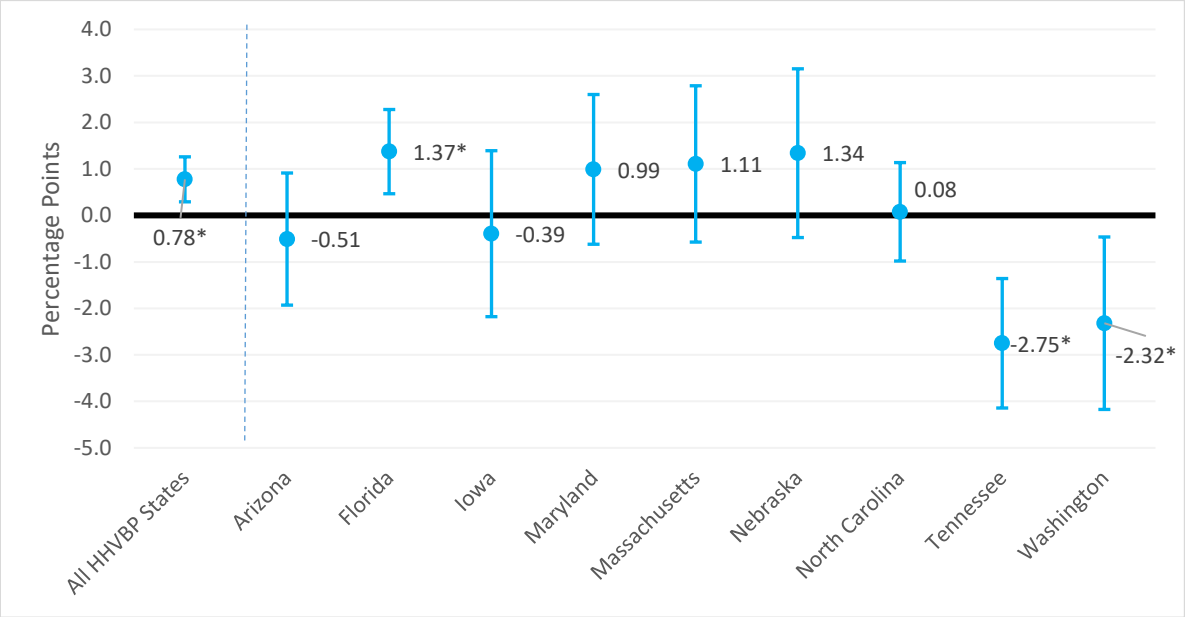
*Exhibit 63. HHVBP Model Results in Greater Improvement for Five OASIS-Based Outcome Measures*

| 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 | 0.41 | 0.01 | 0.14 | 0.69 | | 0.6% |
| 2017 | 0.54 | 0.04 | 0.10 | 0.97 | | 0.7% |
| 2018 | 0.95 | 0.01 | 0.37 | 1.52 | 72.8% | 1.3% |
| 2019 | 1.17 | 0.01 | 0.44 | 1.90 | | 1.6% |
| Cumulative | 0.78 | 0.01 | 0.29 | 1.26 | | 1.1% |
| ***TNC Change in Self Care*** | | | | | | |
| 2016 | 0.02 | 0.01 | 0.01 | 0.04 | | 1.5% |
| 2017 | 0.04 | 0.01 | 0.01 | 0.06 | | 2.9% |
| 2018 | 0.05 | 0.01 | 0.02 | 0.08 | 1.37 | 3.6% |
| 2019 | 0.05 | 0.04 | 0.01 | 0.09 | | 3.6% |
| Cumulative | 0.04 | 0.01 | 0.01 | 0.07 | | 2.9% |
| ***TNC Change in Mobility*** | | | | | | |
| 2016 | 0.01 | <0.01 | 0.004 | 0.02 | | 2.3% |
| 2017 | 0.01 | 0.01 | 0.005 | 0.02 | | 2.3% |
| 2018 | 0.02 | 0.01 | 0.01 | 0.03 | 0.43 | 4.7% |
| 2019 | 0.02 | 0.07 | 0.002 | 0.03 | | 4.7% |
| Cumulative | 0.01 | 0.01 | 0.005 | 0.02 | | 2.3% |
| ***Improvement in Dyspnea*** | | | | | | |
| 2016 | 0.82 | 0.05 | 0.15 | 1.49 | | 1.2% |
| 2017 | 0.78 | 0.23 | -0.28 | 1.85 | | 1.2% |
| 2018 | 0.12 | 0.89 | -1.29 | 1.53 | 66.7% | 0.2% |
| 2019 | -0.32 | 0.76 | -2.08 | 1.43 | | -0.5% |
| Cumulative | 0.32 | 0.66 | -0.88 | 1.51 | | 0.5% |
| ***Improvement in Management of Oral Medications*** | | | | | | |
| 2016 | 1.92 | <0.001 | 1.04 | 2.81 | | 3.7% |
| 2017 | 3.10 | <0.001 | 1.75 | 4.44 | | 6.0% |
| 2018 | 3.25 | <0.01 | 1.56 | 4.94 | 51.5% | 6.3% |
| 2019 | 2.68 | 0.04 | 0.49 | 4.87 | | 5.2% |
| Cumulative | 2.77 | <0.01 | 1.28 | 4.25 | | 5.4% |
| ***Improvement in Pain Interfering with Activity*** | | | | | | |
| 2016 | 1.24 | <0.001 | 0.63 | 1.84 | | 1.8% |
| 2017 | 1.74 | <0.01 | 0.82 | 2.66 | | 2.5% |
| 2018 | 1.94 | <0.01 | 0.76 | 3.12 | 70.7% | 2.7% |
| 2019 | 2.45 | <0.01 | 1.02 | 3.87 | | 3.5% |
| Cumulative | 1.86 | <0.01 | 0.88 | 2.85 | | 2.6% |
| **Improvement in Status of Surgical Wounds** | | | | | | |
| 2016 | 0.23 | 0.41 | -0.23 | 0.68 | | 0.3% |
| 2017 | 0.69 | 0.12 | -0.03 | 1.41 | | 0.8% |
| 2018 | 0.83 | 0.17 | -0.17 | 1.82 | 90.3% | 0.9% |
| 2019 | 0.84 | 0.28 | -0.43 | 2.10 | | 0.9% |
| Cumulative | 0.63 | 0.19 | -0.16 | 1.41 | | 0.7% |

*[a] Values represent percentage point changes with the exception of the TNC measures. | HHVBP Measures indicated by italic text. | CI= Confidence Interval.| These models include state-specific linear time trends (See Section A.1.5.3 [Page 36] in the Technical Appendix for more details). See Exhibit 63n (Page 166) in the Technical Appendix for each measure's sample size.*

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 64). This suggests that the HHVBP Model resulted in an increase in discharge of beneficiaries to the community in Florida relative to the states in its regional grouping after the first four years of HHVBP. For this measure, we found lower rates of discharge to community in Tennessee and Washington relative to the states in each of their respective regional groupings (Exhibit 64).

*Exhibit 64. 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 < 0.05.*

We found Arizona and Maryland to be consistent drivers of the overall HHVBP findings for the other OASIS-based quality measures, with positive, significant D-in-D cumulative results for five and three of the measures, respectively. In contrast, Massachusetts' D-in-D estimates were mostly negative, and statistically significant for two (see Exhibit C-63 [Page 173] in the Technical Appendix for the state-level D-in-D cumulative results for the OASIS-based measures). Across these six measures, the magnitude of the D-in-D cumulative estimate was considerably larger for Arizona and Maryland than the overall estimate for all HHVBP states combined. For example, the cumulative estimate for the Improvement in Management of Oral Medications measure in Arizona and Maryland was 10.09 percentage points and 5.18 percentage points, respectively, compared to 2.77 reported for all HHVBP states (Exhibit 63). In turn, these estimates translate to much larger relative changes from baseline for these two states (e.g., Arizona had a 20.1 percent increase from its baseline average of 50.2 percent; see Exhibit C-63 [Page 173] in the Technical Appendix). Both states also saw larger improvements than their regional groupings for the two TNC measures. For example, for the TNC Change in Mobility measure, Arizona had an 11.1 percent increase from its baseline average of 0.40, while Maryland increased over 15 percent from its baseline average of 0.46.

## 8.5 Continued Declines in Reported Functional Status on OASIS Start of Care Assessment Not Accounted for by Changes in Health Status

In previous reports (Arbor Research, 2020), we reported a downward trend in functional status for OASIS start of care (SOC) assessments among FFS home health users in both HHVBP and non-HHVBP states. Our interviews with HHAs also found many agencies changed their approach to administering OASIS SOC assessments in response to HHVBP as well as other quality-related initiatives. This section examines these trends in greater depth to better understand drivers of the changes in reported functional status. Changes observed in *reported* functional status may have two components: actual change in functional status (which is unobservable in the data) and changes in reporting of functional status. If the latter component is substantial, then it is important to understand the mechanism underlying the change and how it manifests in the assessments. This is essential to identifying the effect of HHVBP on OASIS reporting practices, to appropriately interpret the OASIS improvement measures.

Building on these earlier findings and using a multivariate framework, we examined trends in OASIS SOC assessments to address the following questions:

1. To what extent do we observe changes in SOC functional status for select OASIS measures in HHVBP and non-HHVBP states through 2019 for Medicare beneficiaries with the same primary diagnosis for a prior inpatient stay?
2. To what extent are the changes in reported functional status at SOC associated with changes in health-related beneficiary characteristics?
3. How does the difference between reported and predicted functional status for the OASIS SOC assessment differ across HHVBP and non-HHVBP states?

Consistent with our Third Annual Report results (Arbor Research, 2020), we found declines in SOC functional status for three OASIS measures from 2013-2019 for Medicare FFS home health users who had a prior inpatient stay for pneumonia, heart failure or hip/knee replacement. These declines were greater in HHVBP states that in non-HHVBP states. Our analysis of a range of health-related beneficiary characteristics revealed small changes between pre- and post-HHVBP, suggesting that beneficiary case-mix was not a large contributing factor in explaining the SOC functional status declines. To understand the relative contribution of health-related beneficiary characteristics more explicitly, we used a multivariate model to estimate predicted values for functional status post-HHVBP—that is, what functional status outcomes we would expect to observe after the HHVBP Model was implemented, if the baseline relationship between health-related factors and SOC functional status persisted. When comparing predicted functional status to the reported functional status in the post-HHVBP period, we found that the reported functional status on the OASIS SOC assessment was consistently lower than the predicted value, and particularly so in HHVBP states compared to non-HHVBP states. That is, the changes in health-related beneficiary characteristics do not fully explain the changes in functional status reported on the OASIS SOC assessment. We discuss the findings in more detail below.

### 8.5.1 Increasing Share of SOC OASIS Assessments with Lower Functional Status within Primary Inpatient Admission Diagnosis, Pre- and Post-HHVBP Implementation

Using OASIS data from 2013-2019, we explored trends between HHVBP states and non-HHVBP states in reported functional status in OASIS SOC assessments, as captured in three of the OASIS measures: Improvement in Ambulation-Locomotion, Improvement in Dyspnea, and Improvement in Grooming. We

chose these three OASIS measures to explore whether the observed trends depended on attributes of the measures that may affect reporting, including type of functioning assessed, inclusion in the HHVBP TPS score, number of response categories, and publicly reported on Home Health Compare (see Exhibit 2). For each measure, the main outcome in our analysis was the share of assessments in which one of the "lower functioning" categories was recorded for the three measures of interest (see Section A.4.1.10 [Page 99] in the Technical Appendix for more details).

To reduce the influence of confounding factors and improve clinical homogeneity among beneficiaries, we focused our analysis on FFS home health users with a prior inpatient stay and one of three "cohorts"—pneumonia, heart failure or hip/knee replacement—defined by the primary diagnosis associated with the inpatient admission stay that preceded the home health episode. These diagnoses are highly prevalent in the Medicare population and involve beneficiary populations with diverse characteristics.[19]

Exhibit 65 presents the share of assessments with lower functional status for each of the three measures for 2013-2019, by diagnosis cohort and HHVBP. Comparing the pre- and post- periods, we found a substantial increases in the share of assessments with lower functional status for all three measures. For example, for the Improvement in Ambulation measure (Exhibit 65 panel a), 52.7 percent of SOC assessments for the heart failure cohort in HHVBP states documented lower functional status in the baseline period (2013-2015) compared to 74.0 percent in the first two years of the HHVBP Model and 82.9 percent in 2018-2019. We observed similar patterns for the other two cohorts for this measure. The extent of the increase in lower functional status was similar for the Improvement in Ambulation and Improvement in Grooming measures. In contrast, we observe smaller increases for the Improvement in Dyspnea measure. For example, for that measure's pneumonia cohort (Exhibit 65 panel b), 74.8 percent of SOC assessments in HHVBP states documented lower functional status in the baseline period (2013-2015) compared to 77.6 percent in the first two years of the HHVBP Model and 83.4 percent in 2018-2019.For ambulation, the pattern was similar across all three diagnostic cohorts. For grooming and dyspnea, the hip/knee replacement cohort had much lower baseline values and showed larger percentage point changes.[20]

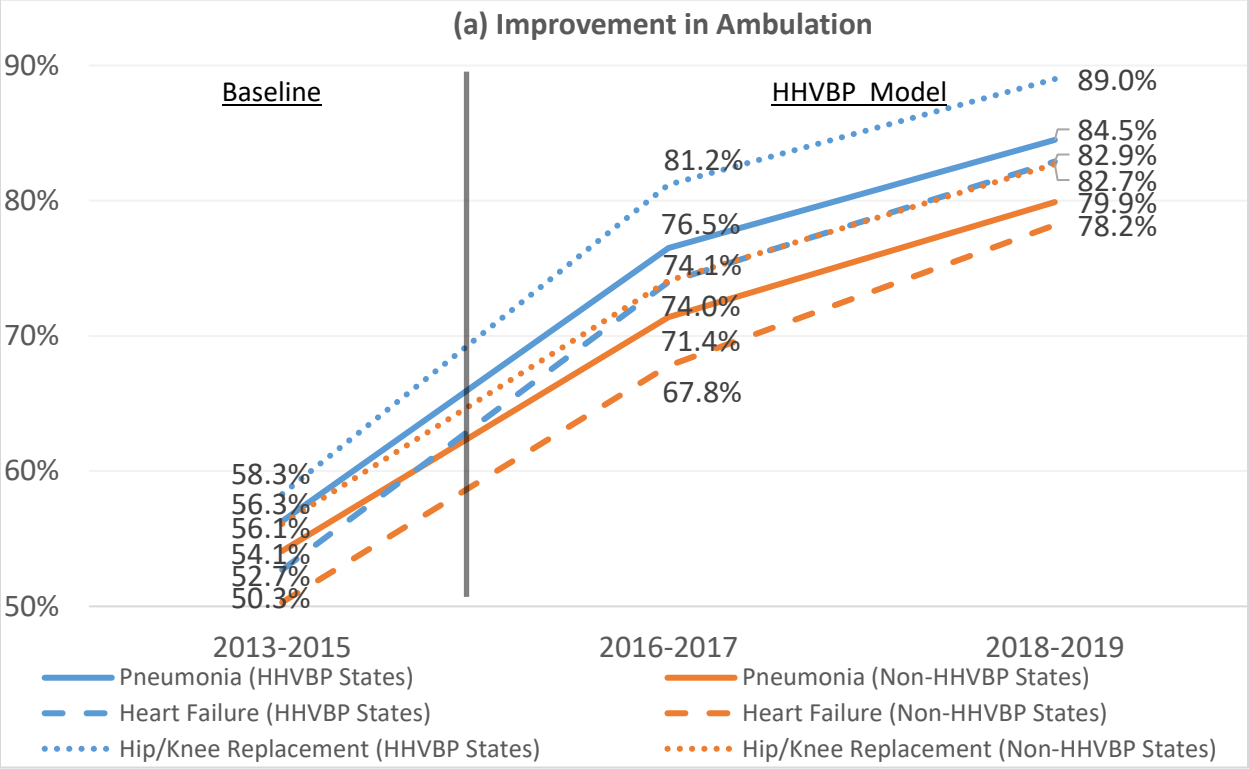
While we observed changes across HHVBP and non-HHVBP states, the changes were larger for HHVBP states. For example, between the pre-HHVBP period and the later years of HHVBP (2018-2019), the increase in lower functional status in the pneumonia cohort for the Improvement in Ambulation measures was 28.2 percentage points (from 84.5 percent to 56.3 percent) for HHVBP states and 25.8 percentage points (from 79.9 percent to 54.1 percent) for non-HHVBP states. This pattern holds for the three cohorts and measures, with the exception of the heart failure cohort for the Improvement in Dyspnea measure where the change between the pre-HHVBP period and the later years of HHVBP

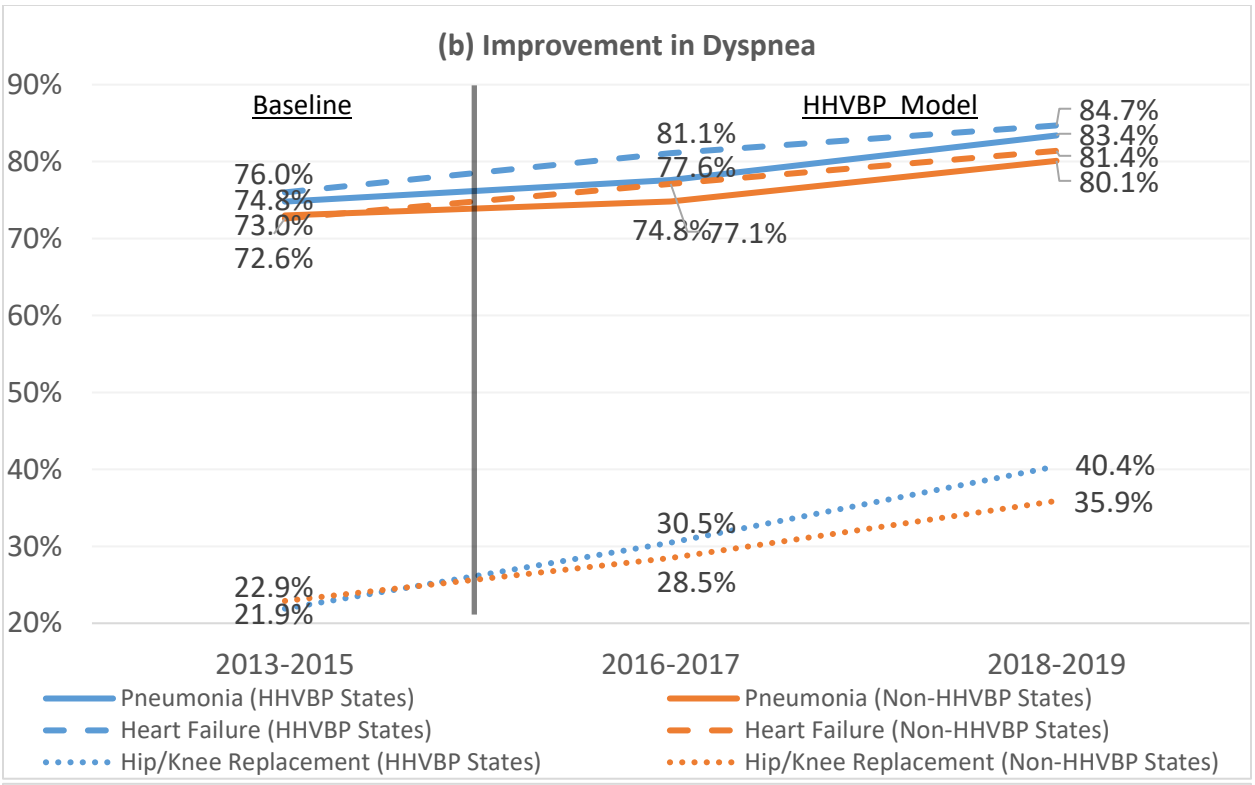
[19] The episodes examined represent 22.7 percent of all home health episodes for FFS beneficiaries delivered following an inpatient stay. See Section A.4.1.10 (Page 99) of the Technical Appendix for additional details on the selection and defining of the variables.

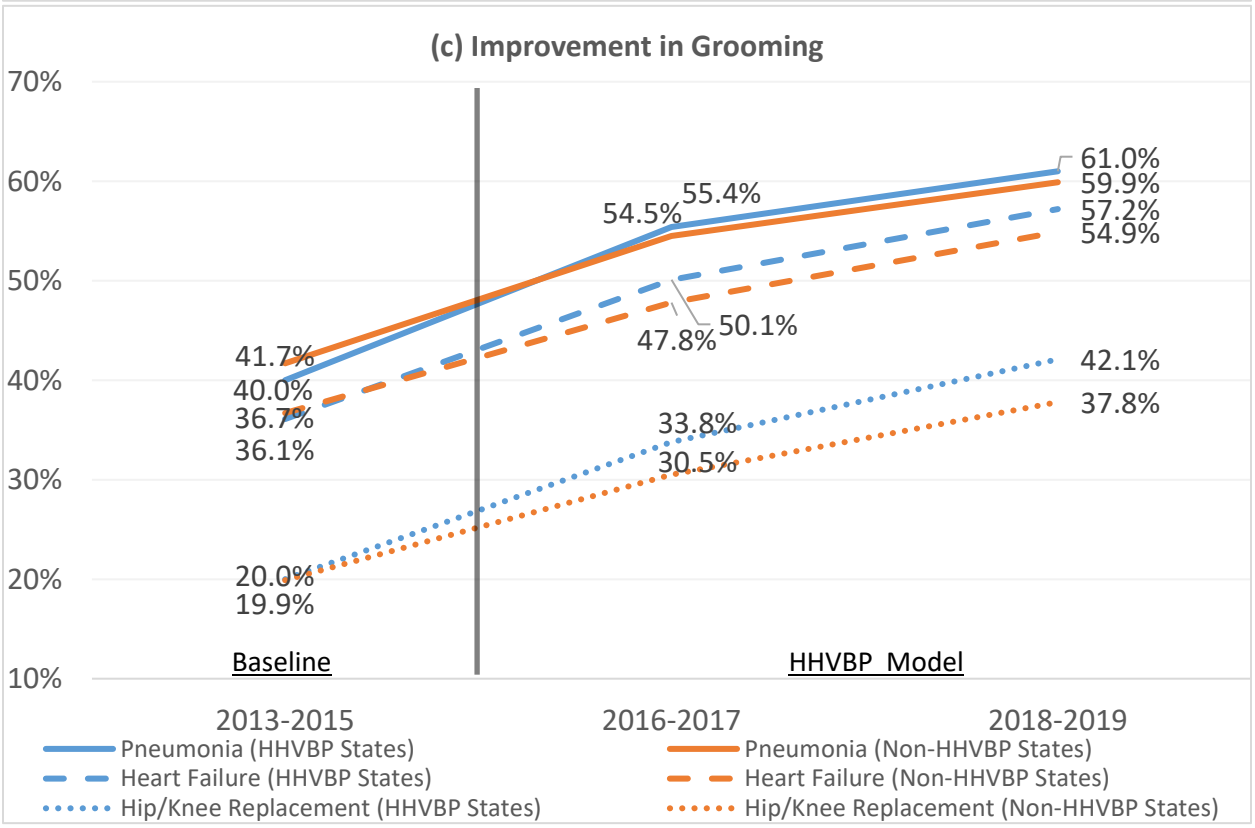
[20] We observed a similar increase in lower reported functional status for *all* FFS beneficiaries receiving home health care, regardless of primary diagnosis or whether they had a prior inpatient stay (Exhibit C-48 [Page 158] in the Technical Appendix), suggesting that these within-diagnosis results may provide broader insights to the Medicare FFS home health patient population as a whole.

(2018-2019) for HHVBP and non-HHVBP states was almost the same (8.7 vs. 8.8 percentage points, respectively).

*Exhibit 65. Substantial Increases in Share of SOC Assessments with Lower Functional Status for Beneficiaries Discharged from an Acute Inpatient Stay (%) in HHVBP and non-HHVBP States for Select OASIS Measures*




(b) Improvement in Dyspnea
90%
80%
70%
60%
50%
40%
30%
20%
Baseline
HHVBP Model
76.0%
74.8%
73.0%
72.6%
81.1%
77.6%
74.8%
77.1%
84.7%
83.4%
81.4%
80.1%
40.4%
35.9%
30.5%
28.5%
22.9%
21.9%
2013-2015
2016-2017
2018-2019
Pneumonia (HHVBP States)
Pneumonia (Non-HHVBP States)
Heart Failure (HHVBP States)
Heart Failure (Non-HHVBP States)
Hip/Knee Replacement (HHVBP States)
Hip/Knee Replacement (Non-HHVBP States)


(c) Improvement in Grooming
70%
60%
50%
40%
30%
20%
10%
Baseline
HHVBP Model
41.7%
40.0%
36.7%
36.1%
54.5%
55.4%
47.8%
50.1%
61.0%
59.9%
57.2%
54.9%
42.1%
37.8%
33.8%
30.5%
20.0%
19.9%
2013-2015
2016-2017
2018-2019
Pneumonia (HHVBP States)
Pneumonia (Non-HHVBP States)
Heart Failure (HHVBP States)
Heart Failure (Non-HHVBP States)
Hip/Knee Replacement (HHVBP States)
Hip/Knee Replacement (Non-HHVBP States)

### 8.5.2 Changing Case Mix May Be Contributing to Declining Reported Functional Status at Start of Care, though Unlikely to Account for Large Observed Decreases

To understand the role of case-mix changes in explaining observed decreases in functional status in SOC assessments, we examined the time trends for a range of characteristics from both OASIS assessments and claims describing beneficiary demographics and health status, prior inpatient stay, and the period between inpatient discharge and home health admission. As shown in Exhibit 66, several of the health-related characteristics differ somewhat between pre- and post-HHVBP periods for the three cohorts, in both HHVBP and non-HHVBP states. While these differences suggest that beneficiary case-mix may have changed over time, they do not reflect large or consistent increases in severity.

*Exhibit 66. Some Variation in Beneficiary Characteristics across All Three Cohorts between Baseline and Post-HHVBP Periods*

| Health-Related Characteristics | HHVBP States | | | Non-HHVBP States | | |
|---|---|---|---|---|---|---|
| | Baseline | Post-HHVBP | | Baseline | Post-HHVBP | |
| | 2013-2015 | 2016-2017 | 2018-2019 | 2013-2015 | 2016-2017 | 2018-2019 |
| **Pneumonia** | | | | | | |
| Age in years (mean) | 79.1 | 79.7 | 79.8 | 78.8 | 79.4 | 79.3 |
| Inpatient LOS in days (mean) | 5.4 | 5.2 | 5.2 | 5.6 | 5.4 | 5.3 |
| ER visit between IP stay and HH episode | 2.0% | 2.1% | 2.3% | 2.0% | 2.2% | 2.4% |
| History of falls | 27.0% | 27.2% | 28.0% | 25.9% | 26.7% | 27.3% |
| HCC score at HH admission | 3.6 | 3.9 | 4.2 | 3.6 | 3.9 | 4.2 |
| **Heart Failure** | | | | | | |
| Age in years (mean) | 79.6 | 79.5 | 79.9 | 79.2 | 79.2 | 79.4 |
| Inpatient LOS in days (mean) | 5.4 | 5.5 | 5.4 | 5.6 | 5.5 | 5.5 |
| ER visit between IP stay and HH episode | 1.9% | 2.1% | 2.1% | 2.1% | 2.3% | 2.4% |
| History of falls | 24.0% | 23.3% | 24.9% | 22.4% | 22.7% | 24.0% |
| HCC score at HH admission | 3.9 | 4.2 | 4.4 | 3.9 | 4.2 | 4.4 |
| **Hip/Knee Replacement** | | | | | | |
| Age in years (mean) | 71.5 | 72.0 | 72.8 | 71.1 | 71.6 | 72.2 |
| Inpatient LOS in days (mean) | 2.7 | 2.3 | 2.2 | 2.7 | 2.3 | 2.0 |
| ER visit between IP stay and HH episode | 0.9% | 1.0% | 1.0% | 0.9% | 1.0% | 1.1% |
| History of falls | 8.9% | 9.2% | 11.0% | 9.4% | 9.4% | 10.7% |
| HCC score at HH admission | 1.1 | 1.2 | 1.4 | 1.1 | 1.2 | 1.3 |

*LOS=length of stay; HCC= Hierarchical Condition Category. Among FFS beneficiaries with a home health episode that had a preceding inpatient stay. Cohorts defined by primary diagnosis from preceding inpatient stay.*

Across all three cohorts, we found little change in average beneficiary age over time but observed increases in the percent of beneficiaries with an ED visit between inpatient discharge and home health

admission, the percent of beneficiaries with a history of falls, and mean HCC score (Exhibit 66). For example, for the pneumonia cohort, from the pre-HHVBP period through the later years of HHVBP (2018-2019), the percentage with an ED visit between inpatient discharge and home health admission increased from 2.0 to 2.3 percent in HHVBP states and from 2.0 to 2.4 percent in non-HHVBP states. For the percentage of beneficiaries with a history of falls in the hip/knee replacement cohort, the share of beneficiaries rose from 8.9 percent in the baseline period for HHVBP states to 11.0 percent post-HHVBP; for non-HHVBP states, it was 9.4 percent and 10.7 percent, respectively.

We observed a substantial decrease in inpatient length of stay (LOS) in both HHVBP and non-HHVBP states within the hip/knee replacement cohort—likely attributable to improvements in the procedure and unrelated to changes in health status—but this remained largely unchanged for the other two cohorts.

### 8.5.3 Differences between Reported and Predicted Functional Status, Larger for HHVBP than for Non-HHVBP States

To investigate the extent to which health-related covariates explained declines in reported functional status for OASIS SOC, we conducted a multivariate analysis to predict post-HHVBP functional status below. If the health-related covariates are not sufficient to explain changes in reported functional status, then we must look for alternative reasons for the observed trends.

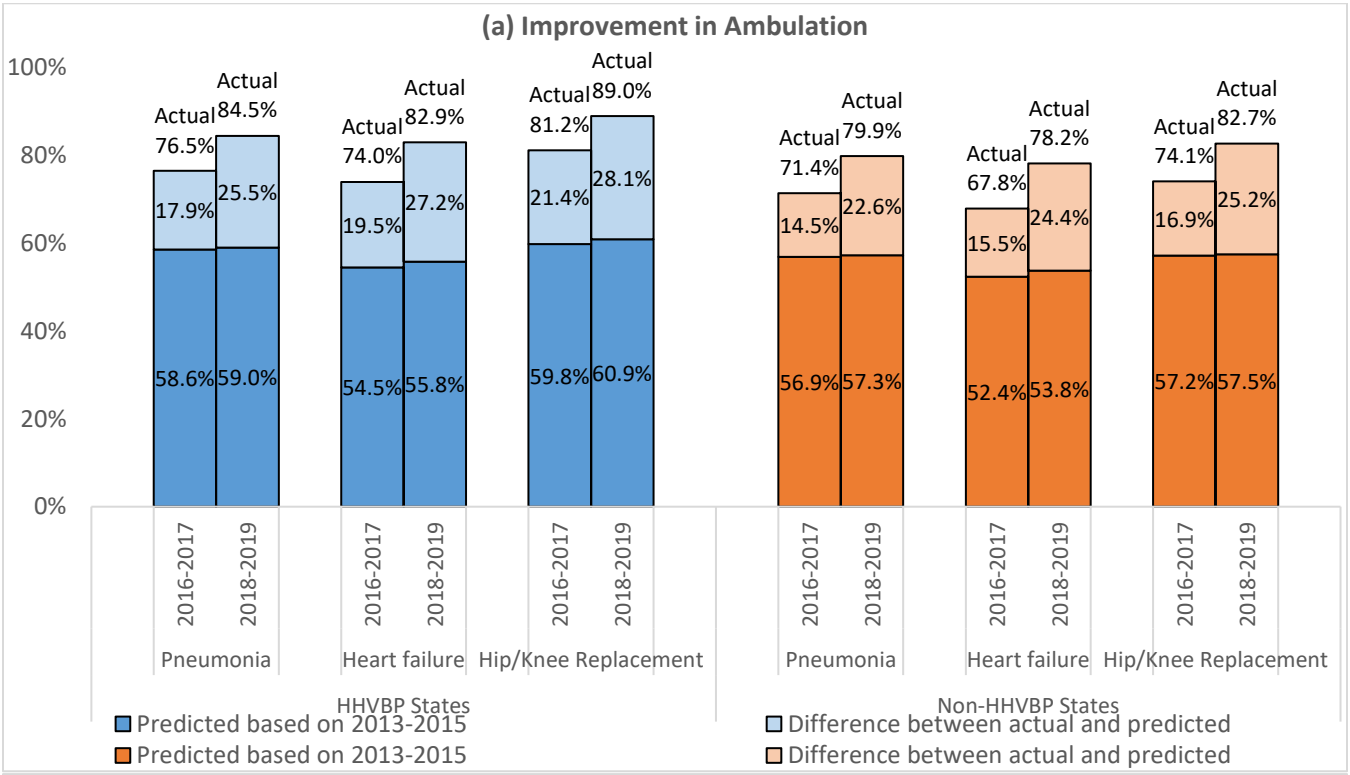
We first estimated the relationship between baseline covariate values and reported functional status for the three OASIS measures and three cohorts, separately for HHVBP and non-HHVBP states. The majority of the covariates used in the regressions to capture health-related variables were based on Medicare enrollment information and FFS claims (see Exhibit A-63 [Page 100] in the Technical Appendix). As such, these variables were not subject to the potential changes in OASIS reporting affecting the functional status measures analyzed.[21] Based on these estimated relationships, we used covariates from the two post-HHVBP periods (i.e., 2016-2017 and 2018-2019) to predict functional status in these later timeframes. The difference between the reported and predicted functional status indicates the extent to which observable health-related beneficiary characteristics explain the observed declines between the pre- and post-HHVBP periods.

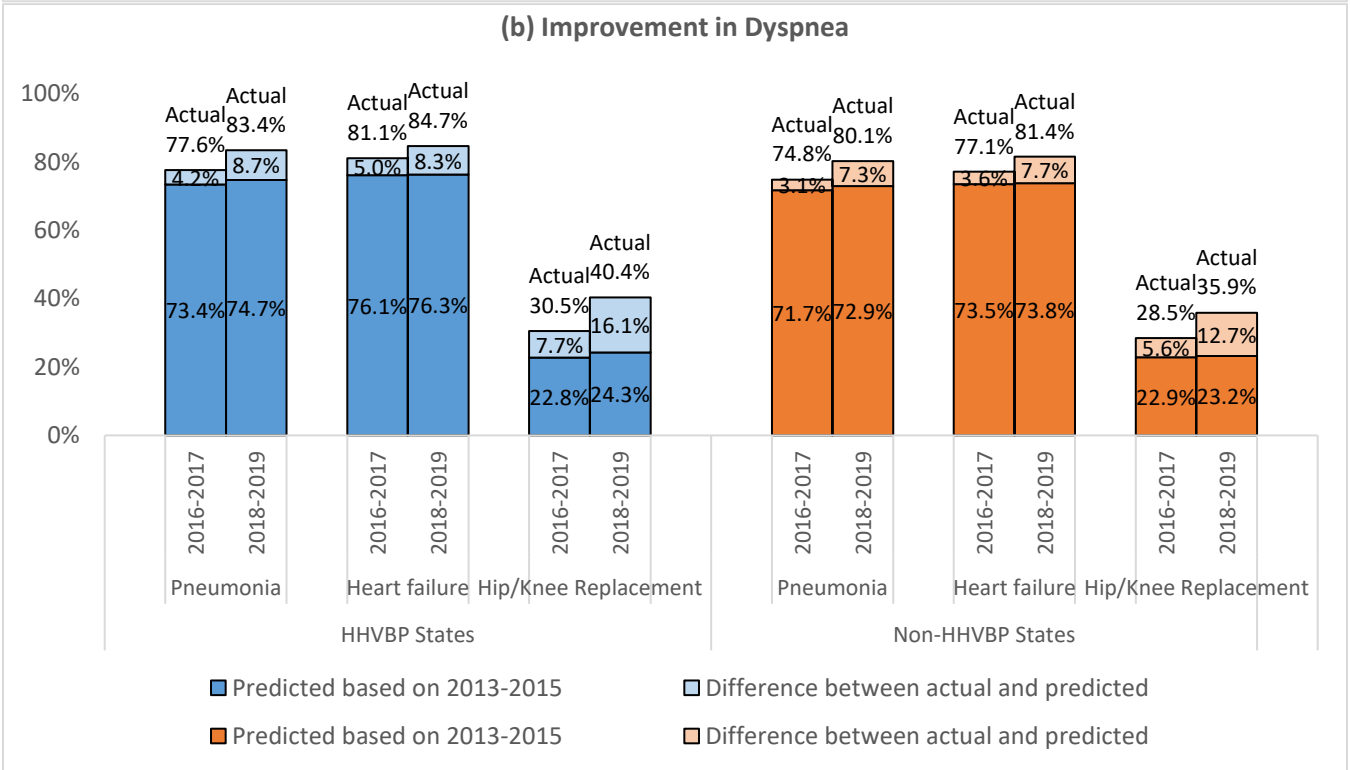
As shown in Exhibit 67, we found substantial and statistically significant differences between reported and predicted functional status, with the difference increasing steadily from the earlier (2016-2017) to the later (2018-2019) post-HHVBP time periods. All differences were statistically significant at the $p<0.05$ level, using a Bonferroni correction for testing multiple hypotheses (Dunn, 1961). For example, for the heart failure cohort in the Improvement in Ambulation measure (Exhibit 67 panel a), the reported (actual) percentage of SOC assessments with lower functioning was 74.0 percent in 2016-2017 and 82.9 percent in 2018-2019, substantially higher than the predicted values of 54.5 percent and 55.8 percent, respectively (i.e., a differential of 19.5 and 27.2 percentage points, respectively, in the two post-HHVBP periods). Notably, differences between actual and predicted values were generally larger in HHVBP states than in non-HHVBP states. These differences between HHVBP and non-HHVBP in Exhibit 67 were statistically different at the $p<0.05$ level with the exception of the pneumonia cohort in 2016-

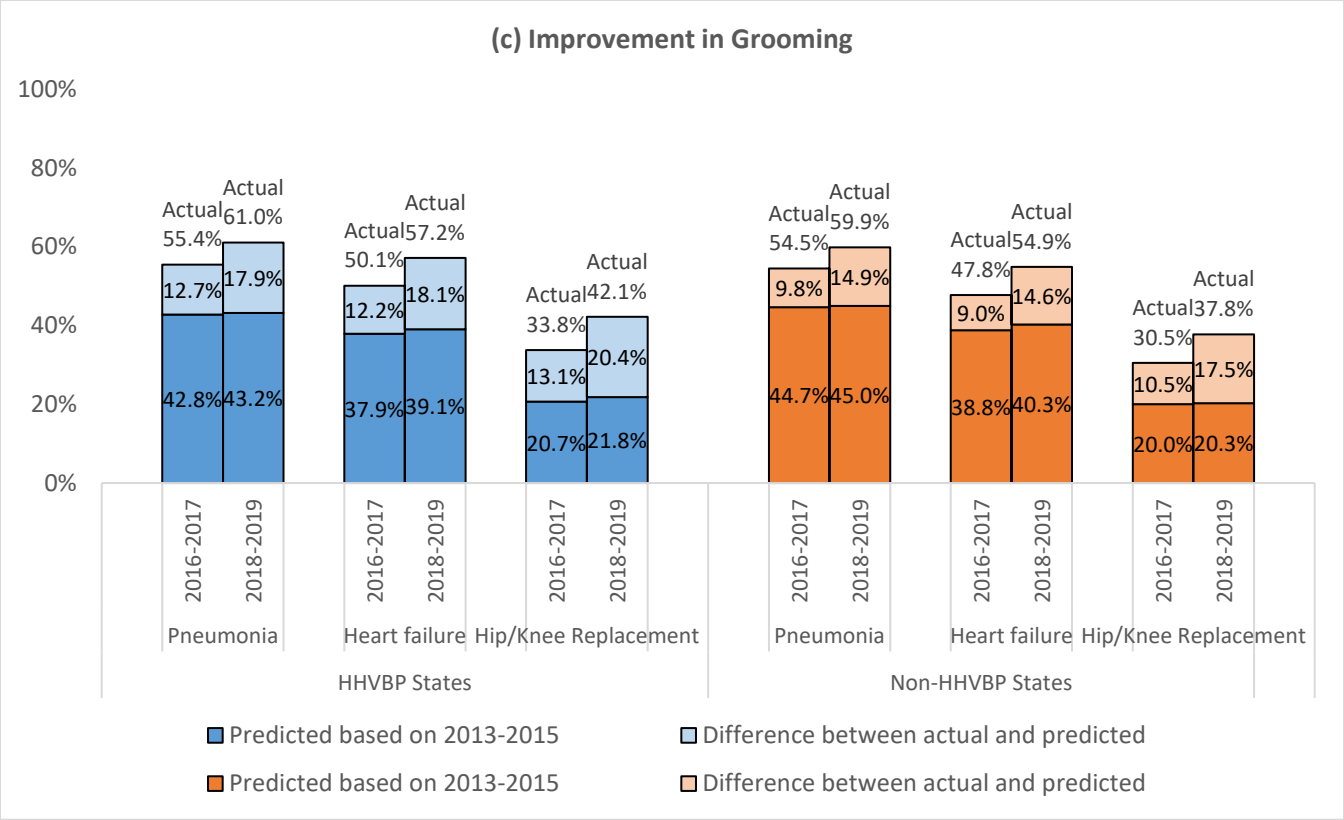
[21] The covariates used in the regression that are derived from the OASIS assessment exhibited considerably less variability across the years compared to the functional status measures used in the SOC assessment analysis discussed earlier (not shown).

2017 and heart failure cohort in 2018-2019 for the Improvement in Dyspnea measure. The patterns held across the three measures, with the differences largest for Improvement in Ambulation, followed by Improvement in Grooming and Improvement in Dyspnea. Within each measure, differences were most substantial for the hip/knee replacement cohort, though the variation was generally not large.

*Exhibit 67. Larger Differences Between Actual and Predicted Percent of SOC OASIS Assessments with Lower Functional Status in HHVBP States versus Non-HHVBP States for Select OASIS Measures, by Cohort*






*Notes: Differences (lighter shading) are represented in percentage points as the actual value minus the predicted value, which may not necessary indicate the relative size of the change. For example, in the HHVBP hip/knee replacement cohort for Improvement in Grooming measure, the difference is 13.1 percentage points, which is in the middle of the range of differences across cohorts, but quite large relative to the baseline value (i.e., 20.7% versus 33.8%).*

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

HHAs in HHVBP states received their first HHVBP payment adjustment in 2018. While the payment adjustments are relatively modest (e.g., ±3 percent in 2018 and ±5 percent in 2019; see Exhibit 1), we examined whether agencies reacted to these financial incentives by changing the quality or intensity of their care such that the mortality rate of home health patients is affected. 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-50 (Page 70) in the Technical Appendix for additional detail.

The average unadjusted mortality rate increased slightly in HHVBP states, from 3.5 percent in the baseline period (2013-2015) to 3.6 percent for the first four years of the HHVBP Model (Exhibit 68). For non-HHVBP states, the average unadjusted mortality rate was slightly lower and remained constant at 3.3 percent in the baseline and post-HHVBP periods.

*Exhibit 68. 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 (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| Mortality Rate/All FFS Episodes | 3.5% | 3.6% | 3.3% | 3.3% | 0.1% | 0% |

After adjusting for the core set of covariates (see Exhibit A-3 [Page 15] in the Technical Appendix) including state fixed effects, our D-in-D model indicated that HHVBP led to a 0.1 percentage point decrease in the mortality rate among FFS home health beneficiaries in HHVBP states relative to non-HHVBP states during the first four years of the HHVBP Model (Exhibit 69). This cumulative effect translates to a 2.9 percent decrease relative to the 3.5 percent average mortality rate in HHVBP states during the baseline period.[22] The separate yearly D-in-D estimates are all negative and statistically significant, though we observe a slight downward trend in D-in-D estimates over the four years (i.e., -0.13 percentage points in 2016 to -0.08 percentage point in 2019).

*Exhibit 69. 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 | -0.13 | <0.001 | -0.17 | -0.09 | 3.5% | -3.7% |
| 2017 | -0.10 | <0.01 | -0.15 | -0.05 | | -2.9% |
| 2018 | -0.08 | 0.01 | -0.12 | -0.03 | | -2.3% |
| 2019 | -0.08 | 0.01 | -0.14 | -0.03 | | -2.3% |
| Cumulative | -0.10 | <0.001 | -0.13 | -0.06 | | -2.9% |

*[a]Values represent percentage point changes| CI= Confidence Interval.| See Exhibit 63n (Page 166) in the Technical Appendix for measure's sample size.*

## 8.7 Discussion

Our findings for most of the OASIS-based outcome measures show a modest, positive impact of HHVBP, reflecting a relative increase in discharge to the community and improvement in functional status measures in HHVBP states compared to non-HHVBP states. We observed similar results for the two new composite measures reflecting improvement in patients' self-care and mobility. Cumulative impacts for the single item OASIS measures ranged from 0.8 to 2.8 percentage points. These relative gains occurred in a context where average measure achievement rates were already high (e.g., 52 to 71 percent) prior to implementation of HHVBP. In particular, for the four improvement measures examined (as well as the two new composite measures), these relative gains occurred in the context of increases in measure rates that were already occurring in both groups 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

[22] 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 C-49, C-50, and C-51 (Pages 158-159) in the Technical Appendix.

qualitative work discussed in our previous three annual reports that found quality improvement efforts for OASIS assessment to be a central focus of agencies (Arbor Research, 2018; 2019; 2020).

At the state level, the D-in-D estimates for Arizona and Maryland followed the sign of the overall HHVBP impact estimates for most of the OASIS-based measures, while Massachusetts' D-in-D estimates across the measures were usually in the opposite direction. Similar to the state-level findings discussed above around the other measures, we will continue to examine state-specific events that may be driving these differences observed across the HHVBP states.

Our results suggest a continued trend towards declines in functional status at the initiation of home health within three beneficiary cohorts defined by the diagnosis from a prior inpatient stay. We also found substantial differences between predicted and reported functional status for three diagnostic cohorts and across three measures, suggesting that changes in the OASIS measures cannot be fully explained alone by changes in the patient's functional or health status.

Interviews with agencies have revealed that agency perspectives and approaches to administering OASIS SOC assessments have evolved over time. Our findings reaffirm this, and may also reflect that agencies are taking a more focused and intensive approach to conducting and recording assessments. Other quality-related initiatives may have contributed to changes in functional status in both groups, but larger differences between predicted and reported functional status observed in HHVBP states relative to non-HHVBP states in the post-implementation period suggest a HHVBP effect. Our findings of a declining trend of lower functional status reported at the start of care continuing through later years of HHVBP (2018-2019) suggest that the impact of HHVBP or other quality initiatives on OASIS assessments is ongoing and may continue to increase in the future years.

Underlying the accuracy of the OASIS assessments is the objectivity and validity of the measures themselves. If measure reporting is subject to teaching or influence, and is potentially related to the level of available resources, then using those measures in a payment system may be of concern. At the same time, while OASIS measures are more susceptible to changes in procedures than claims-based measures, OASIS measures are conceptually what CMS wants to capture with respect to HHA performance. As such, abandoning such measures to rely on claims-based measures alone would impart a different kind of risk to measuring the quality of care.

# 9. Results: HHVBP Had Modest Unintended Impact on Two of Five Measures of Patient Experience with Care

## 9.1 Introduction

In this section, we examine the impact of HHVBP on five measures of the experience of home health patients with their care that are derived from the HHCAHPS survey and used to calculate an agency's TPS. Overall, these measures of patient experience with care remained relatively stable during the post-implementation period in both HHVBP and non-HHVBP states. Based on D-in-D analyses, we found no impact of HHVBP on three of these five HHCAHPS-based performance measures through the first four years of the model, including patient ratings of overall care from the agency. For both of the remaining two measures, we found ***HHVBP was associated with a -0.3 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 stable over time in HHVBP states and non-HHVBP states (Exhibit 70). The unadjusted values for two of these measures (Overall Care and Likely to Recommend) remained similar between the HHVBP states and non-HHVBP states during the baseline period, and with a small decline of 0.7 percentage points in the two groups, they remained similar post-implementation (Exhibit 70). 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 baseline, with values for both groups trending downward. For example, for the Communication measure, the difference between groups decreased from 0.6 percentage points (85.9% for HHVBP compared to 85.3% for non-HHVBP) in the baseline period to just 0.2 percentage points (85.4% and 85.2% respectively) post-HHVBP implementation. We observed an opposite trend for the Discussion of Care measure, where the difference between HHVBP states and non-HHVBP states increased from the baseline period (1.0 percentage point) to post-implementation (1.2 percentage points).

*Exhibit 70. HHCAHPS-Based Patient Experience Measures Values 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 (2016-2019) | Baseline (2013-2015) | Post-HHVBP (2016-2019) | HHVBP States | Non-HHVBP States |
| *How often the home health team gave care in a professional way (Professional Care)* | 88.8% | 88.4% | 88.2% | 88.0% | -0.4% | -0.2% |
| *How well did the home health team communicate with patients (Communication)* | 85.9% | 85.4% | 85.3% | 85.2% | -0.5% | -0.1% |
| *Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)* | 82.8% | 82.3% | 83.8% | 83.5% | -0.5% | -0.3% |
| *How do patients rate the overall care from the home health agency (Overall Care)* | 84.4% | 84.2% | 83.7% | 83.6% | -0.2% | -0.1% |
| *Would patients recommend the home health agency to friends and family (Likely to Recommend)* | 79.6% | 78.9% | 78.4% | 77.7% | -0.7% | -0.7% |

*HHVBP Measures indicated by italic text.*

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

Our cumulative D-in-D findings through the fourth year of the model indicate no impact of HHVBP on three of the five HHCAHPS-based measures (Exhibit 71). These include measures of Professional Care, Overall Care, and Likely to Recommend. For the remaining two measures, we found a cumulative negative effect of the model. Relative to non-HHVBP states, HHVBP led to a cumulative impact of a 0.24 percentage point decrease in the Communication measure and a 0.25 percentage point decrease in the Discussion of Care measure in HHVBP states (Exhibit 71). For both of these measures, the cumulative effect translates to a 0.3% decrease relative to the baseline averages of 85.9 percent and 82.9 percent, respectively, in HHVBP states during the baseline period. Results for the most recent year of the model indicate a small negative effect of HHVBP for these two measures, as well as the Professional Care measure. The HHVBP impacts for 2019 for these three measures were larger than the cumulative impacts (e.g., for the Discussion of Care measure, we found an impact of -0.63 percentage points in 2019 vs. cumulative impact of 0.25 percentage points; Exhibit 71). This translates to a larger but still modest decrease for 2019 compared with baseline values (e.g., 0.8 percent decrease for the Discussion of Care measure relative to its baseline average of 82.9 percent). Except for the Discussion of Care measure, we did not find a significant difference between the early years of the HHVBP Model (i.e., 2016 – 2017) and the most recent two years where HHAs received a payment adjustment (i.e., 2018 – 2019) for any of the HHCAHPS-based measures (see Exhibit C-52 [Page 160] in the Technical Appendix).

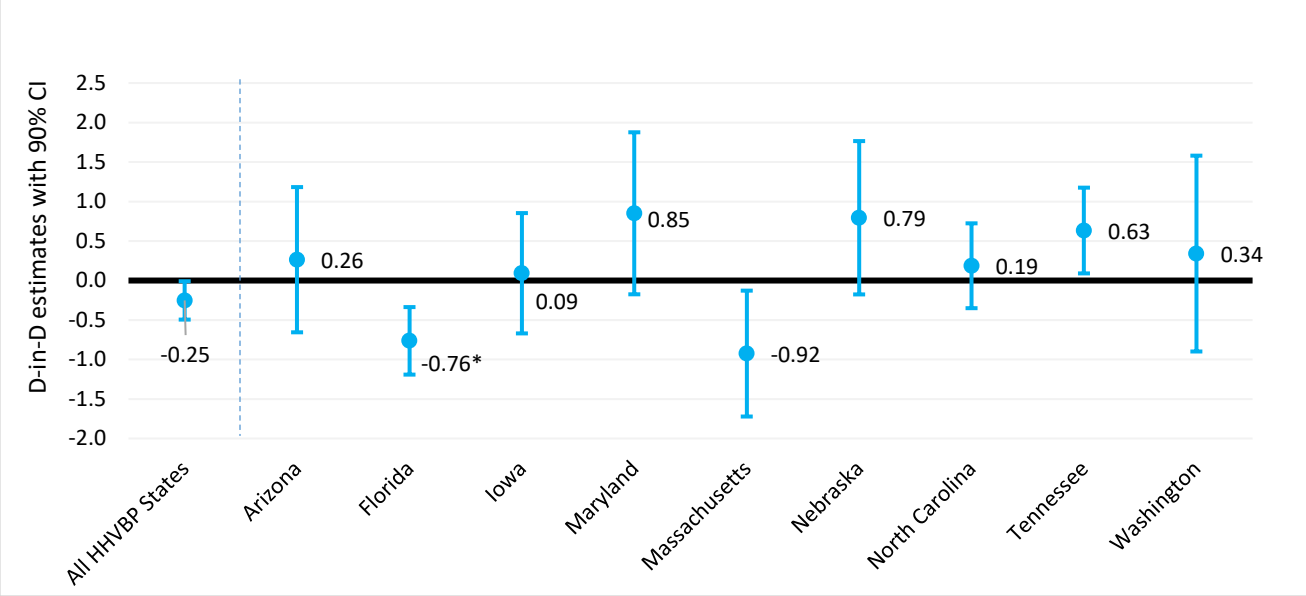
*Exhibit 71. HHVBP Model Results in Modest Decrease in Two HHCAHPS-Based Measures*

| 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 | 0.43 | -0.34 | 0.12 | 88.8% | -0.1% |
| 2017 | 0.02 | 0.90 | -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% |
| Cumulative | -0.14 | 0.21 | -0.32 | 0.04 | | -0.2% |
| ***How well did the home health team communicate with patients (Communication)*** | | | | | | |
| 2016 | -0.22 | 0.17 | -0.49 | 0.04 | 85.9% | -0.3% |
| 2017 | -0.05 | 0.78 | -0.34 | 0.24 | | -0.1% |
| 2018 | -0.30 | 0.096 | -0.60 | -0.003 | | -0.3% |
| 2019 | -0.41 | 0.03 | -0.72 | -0.09 | | -0.5% |
| Cumulative | -0.24 | 0.06 | -0.46 | -0.03 | | -0.3% |
| ***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 | 82.9% | -0.4% |
| 2017 | 0.21 | 0.28 | -0.11 | 0.53 | | 0.3% |
| 2018 | -0.24 | 0.25 | -0.59 | 0.10 | | -0.3% |
| 2019 | -0.63 | 0.01 | -1.00 | -0.26 | | -0.8% |
| Cumulative | -0.25 | 0.09 | -0.49 | -0.01 | | -0.3% |
| ***How do patients rate the overall care from the home health agency (Overall Care)*** | | | | | | |
| 2016 | -0.10 | 0.67 | -0.48 | 0.29 | 84.4% | -0.1% |
| 2017 | 0.03 | 0.89 | -0.36 | 0.42 | | 0.04% |
| 2018 | 0.25 | 0.31 | -0.15 | 0.65 | | 0.3% |
| 2019 | -0.18 | 0.49 | -0.61 | 0.25 | | -0.2% |
| Cumulative | 0.002 | 0.99 | -0.29 | 0.29 | | 0.002% |
| ***Would patients recommend the home health agency to friends and family (Likely to Recommend)*** | | | | | | |
| 2016 | 0.01 | 0.96 | -0.43 | 0.46 | 79.6% | 0.01% |
| 2017 | 0.30 | 0.29 | -0.16 | 0.76 | | 0.4% |
| 2018 | 0.40 | 0.18 | -0.10 | 0.90 | | 0.5% |
| 2019 | -0.03 | 0.92 | -0.53 | 0.47 | | -0.04% |
| Cumulative | 0.17 | 0.41 | -0.17 | 0.52 | | 0.2% |

[a] *Values represent percentage point changes. | HHVBP Measures indicated by italic text. | CI= Confidence Interval. See Exhibit 71n (Page 166) in the Technical Appendix for each measure's sample size.*

In our analysis of state-specific impacts, we found that Florida and Massachusetts drove the overall results for the Communication and Discussion of Care measures, with negative, statistically significant cumulative D-in-D estimates relative to their respective regional comparison groups for both measures (see Exhibit C-65 [Page 175] 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 for both measures in Tennessee. For both the Communication and Discussion of Care measures, the magnitude of the D-in-D estimates was larger for these three states than the overall estimate for all HHVBP states combined; see the Discussion of Care measure in Exhibit 72.

*Exhibit 72. Decrease in HHCAHPS-based Discussion of Care Measure for All HHVBP States Combined, Florida, and Massachusetts, but Increase in Tennessee*




*Graph shows 90% confidence intervals; * 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 HHVBP Model reflects this, as five of the original 17 performance measures (and 13 of the performance scores for CY 2019) included in the agency TPS calculation reflected measures of patient experience with care based on the HHCAHPS survey. As part of our evaluation of the HHVBP Model, we used these five HHCAHPS-based measures to examine the effect of the HHVBP Model on patient experience with care.

Measure rates were relatively high for all five measures during the baseline period, ranging from 78 percent to 89 percent, and have remained relatively stable over time. For all five measures, there was less than a one percentage point change in measure rates between the baseline period and the post-implementation period, in both HHVBP and non-HHVBP states.

While we continued to find no effect of HHVBP for three of the measures of patient experience with care, including the Overall Care measure, our D-in-D analyses suggest a small negative impact of HHVBP on the Communication and Discussion of Care measures after the first four years of HHVBP. These cumulative findings appear to be driven largely by results for 2019, the most recent year of the model in which there was up to a ±5 percent payment adjustment to HHAs. However, the cumulative impact estimates for these measures correspond to only a 0.3 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 over the past four years, where we heard that many agencies were making changes to improve their performance on the HHCAHPS measures.

It is also important to view these findings within the broader set of findings from this evaluation discussed above. For example, in addition to a larger payment adjustment to HHAs, CMS also made several changes to other aspects of HHVBP in 2019, including adding new OASIS composite measures, dropping OASIS process measures, and weighting the two claims-based measures more heavily in the TPS calculation (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. We will continue to examine how these measures of patient experience change as the payment adjustments to agencies in HHVBP states continue to increase over the remaining three payment years.

# 10. Results: Differential Impacts by Medicaid Status but Not by Rural versus Urban Location

## 10.1 Introduction

As part of our evaluation, we are exploring the implications of HHVBP for vulnerable populations of beneficiaries. In this section, we focus on two populations of interest: home health patients who are dually eligible for Medicare and Medicaid (or who have Medicaid coverage only), and home health patients who live in rural areas. As we detail below, there are potential unintended consequences of value-based purchasing (VBP) for both populations, who tended to have worse outcomes than other patients in certain respects before the HHVBP Model was implemented. If HHVBP does not uniformly affect all patients in the same way, and disadvantages more vulnerable populations, there is a risk that HHVBP could contribute to health disparities. On the other hand, if quality incentives encourage greater gains among populations who initially had worse outcomes, HHVBP may mitigate existing disparities.

As described in this section, we found a pattern of ***differential impacts of the HHVBP Model based on Medicaid coverage***. The overall impacts of the model in leading to fewer unplanned hospitalizations and greater improvements in functioning were not observed among Medicaid patients. As a result, there was a pattern of modest growth in disparities for this population. In contrast, we found no evidence that the model has had a differential impact on outcomes for patients living in rural areas. As the payment adjustments continue to become larger under HHVBP, it will be important to continue to understand the extent of the improvements occurring among vulnerable patient subgroups and whether there are implications for health disparities.

## 10.2 Motivation: Potential Unintended Consequences of VBP

As with other VBP programs, there is a need to understand the impact of HHVBP on more vulnerable patient populations. VBP programs are designed to promote overall quality improvement, by adjusting Medicare payments based on quality performance. However, a potential unintended consequence of such 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).There is a risk that VBP programs may redistribute resources away from providers who care for vulnerable 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, as the payment adjustments grow larger over time relative to other VBP programs.

In Section 5 of this report, we found no evidence that HHVBP is systematically penalizing agencies who care disproportionately for patients with social risk factors. However, these findings do not preclude the possibility that gains in quality under HHVBP may not be 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 are economically disadvantaged or who have limited access to other forms of care. 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 gains among patient groups for whom there are greater opportunities for improvement.

In the remainder of this section, we assess whether there were disparities in key home health patient outcomes prior to the implementation of HHVBP. We then evaluate whether there is a widening gap in home health patient outcomes emerging under the Model, or whether there are gains under the Model favoring vulnerable populations that have potentially reduced any existing disparities.

## 10.3 Impact on Patients with Medicaid

In HHVBP states and comparison states, FFS beneficiaries who are dually eligible for Medicare and Medicaid account for 30 percent to 35 percent of all FFS home health episodes. They also have several distinguishing characteristics (Exhibit 73). Relative to other beneficiaries, dual 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 73). Dual eligible beneficiaries are also predisposed to receive care from for-profit agencies and agencies that are not affiliated with a home health chain (Exhibit 73). These patterns remain similar between the baseline period and the post-HHVBP period. Similar patterns by Medicaid status emerged when describing the characteristics of a broader population of home health patients with OASIS data (see Exhibit C-53 [Page 161] in the Technical Appendix).

*Exhibit 73. Dual Eligible Status is Associated with Many Differences in the Characteristics of FFS Home Health Beneficiaries, 2013-2019*

| | HHVBP | | | | Non-HHVBP | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | | Post Period (2016-2019) | | Baseline (2013-2015) | | Post Period (2016-2019) | |
| | Duals | Non-Dual FFS | Duals | Non-Dual FFS | Duals | Non-Dual FFS | Duals | Non-Dual FFS |
| FFS Episodes (N) | 1,340,689 | 3,082,241 | 1,426,914 | 4,191,070 | 5,322,666 | 10,094,882 | 6,278,169 | 13,112,460 |
| Average Age (Years) | 70.87 | 79.67 | 70.80 | 79.85 | 70.22 | 78.79 | 70.59 | 79.01 |
| Female | 66.4% | 60.2% | 65.5% | 59.2% | 66.9% | 60.6% | 65.4% | 59.7% |
| **Race/Ethnicity (Mutually Exclusive):** | | | | | | | | |
| Hispanic | 25.5% | 2.5% | 17.9% | 2.2% | 17.4% | 3.8% | 16.0% | 3.6% |
| Non-Hispanic Black | 17.8% | 6.7% | 18.9% | 7.0% | 27.3% | 10.8% | 23.8% | 9.1% |
| Non-Hispanic White | 54.4% | 89.8% | 60.5% | 89.7% | 49.3% | 83.7% | 53.2% | 85.2% |
| Non-Hispanic Other Race | 2.0% | 0.9% | 2.6% | 1.0% | 5.8% | 1.6% | 6.7% | 1.9% |
| Non-Hispanic Multiracial | 0.2% | 0.1% | 0.2% | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% |
| Average HCC Score (1st Episode) | 2.82 | 2.60 | 3.23 | 2.82 | 2.69 | 2.55 | 2.96 | 2.78 |
| ESRD Flag | 4.4% | 2.2% | 5.6% | 2.4% | 5.7% | 2.6% | 6.2% | 2.8% |
| Discharge from Inpatient Facility within 14 Days | 53.3% | 64.9% | 58.1% | 64.6% | 54.1% | 65.8% | 53.9% | 66.2% |
| Rural | 6.0% | 4.5% | 6.5% | 4.4% | 10.4% | 8.9% | 10.0% | 8.8% |
| **HHA Ownership:** | | | | | | | | |
| For-Profit | 76.8% | 68.5% | 75.3% | 70.3% | 77.2% | 65.5% | 78.2% | 68.0% |
| Non-Profit | 20.4% | 28.3% | 22.3% | 27.2% | 20.5% | 31.9% | 20.2% | 30.1% |
| Government-Owned | 2.8% | 3.3% | 2.4% | 2.6% | 2.2% | 2.6% | 1.6% | 1.9% |
| **HHA Chain Affiliation:** | | | | | | | | |
| Chain-Affiliated | 39.4% | 53.0% | 46.8% | 56.0% | 28.1% | 37.7% | 31.5% | 42.3% |
| No Chain Affiliation | 49.9% | 39.0% | 46.5% | 36.5% | 65.7% | 53.6% | 63.5% | 50.0% |
| Chain Affiliation Unknown/Missing | 10.7% | 8.0% | 6.7% | 7.4% | 6.1% | 8.7% | 5.0% | 7.7% |

To evaluate the effects of HHVBP on patients with Medicaid coverage, we conducted analyses of five 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; average Medicare spending for Part A and Part B services during and following home health episodes of care; and composite measures of improvement in mobility and improvement in self-care, which correspond to two of the OASIS-based HHVBP performance measures.

When not adjusting for differences in patient case-mix, there were mixed patterns in key measures of utilization when comparing dual eligible beneficiaries to other beneficiaries. Among HHVBP states, unplanned ACH were less common among dual eligible beneficiaries during the baseline period and slightly more common during the post-HHVBP period. Whereas, in non-HHVBP states, unplanned ACH remained slightly more common among dual eligible beneficiaries in both periods. The frequency of ED visits and average Medicare spending for Part A and Part B services were consistently lower among dual eligible beneficiaries compared with other beneficiaries (Exhibit 74).

*Exhibit 74. Lower Levels of Unadjusted Outpatient ED Use and Medicare Spending Among Dual Eligible FFS Beneficiaries in Both HHVBP and Non-HHVBP States, 2013-2019*

| HHVBP | | | | Non-HHVBP | | | |
|---|---|---|---|---|---|---|---|
| Baseline (2013-2015) | | Post Period (2016-2019) | | Baseline (2013-2015) | | Post Period (2016-2019) | |
| Duals | Non-Dual FFS | Duals | Non-Dual FFS | Duals | Non-Dual FFS | Duals | Non-Dual FFS |
| **Unplanned Acute Care Hospitalization/First HH Episodes** | | | | | | | |
| 15.5% | 17.6% | 15.7% | 15.3% | 16.9% | 16.4% | 16.0% | 15.7% |
| **ED Use (No Hospitalization)/First FFS HH Episodes** | | | | | | | |
| 13.0% | 15.1% | 11.3% | 12.2% | 14.4% | 14.7% | 11.5% | 12.3% |
| **Medicare Spending per Day during and following FFS HH Episodes of Care** | | | | | | | |
| $139.43 | $154.55 | $137.84 | $146.73 | $130.78 | $143.97 | $132.04 | $144.40 |

For a broader population of home health patients with OASIS data, we examined changes over time in functioning based on changes in a composite measure of self-care and changes in a composite measure of mobility. Medicaid patients were consistently less likely to improve functioning during home health episodes, in HHVBP and non-HHVBP states and in both time periods (Exhibit 75).

*Exhibit 75. 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, 2013-2019*

| HHVBP | | | | Non-HHVBP | | | |
|---|---|---|---|---|---|---|---|
| Baseline (2013-2015) | | Post Period (2016-2019) | | Baseline (2013-2015) | | Post Period (2016-2019) | |
| Medicaid | Non-Medicaid | Medicaid | Non-Medicaid | Medicaid | Non-Medicaid | Medicaid | Non-Medicaid |
| **Total Normalized Composite (TNC) Change in Self-Care** | | | | | | | |
| 1.25 | 1.63 | 1.42 | 1.90 | 1.14 | 1.53 | 1.35 | 1.77 |
| **Total Normalized Composite (TNC) Change in Mobility** | | | | | | | |
| 0.39 | 0.58 | 0.45 | 0.68 | 0.36 | 0.54 | 0.43 | 0.63 |

Based on multivariate analyses, there was a tendency for patients with Medicaid to have worse outcomes before HHVBP was implemented. Medicaid coverage was associated with more frequent outpatient ED visits and with less improvement in self-care and mobility (Exhibit 76). 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 Center for Medicare & Medicaid Innovation (CMMI) models, and agency

characteristics (see Section A.4.1.7 [Page 94] in the Technical Appendix for details). Among FFS beneficiaries, dual eligible patients had lower unplanned ACH and lower average Medicare spending per day (Exhibit 76).[23]

We also conducted sensitivity analyses of the functional improvement measures for the subset of patients covered under Medicare FFS that controlled for their HCC risk score at the start of HH care, since this covariate was not available for all patients with OASIS data. The results of these analyses indicated disparities in functional improvement for dual eligible beneficiaries that are similar to those shown in Exhibit 76 (see Exhibit C-56 [Page 163] in the Technical Appendix). As part of our evaluation of the effects of HHVBP, we will examine whether the measured disparities for patients with Medicaid coverage during 2013-2015 may have worsened or improved under the model.

*Exhibit 76. Medicaid Coverage Associated with Differences in Adjusted Outcomes Prior to HHVBP Implementation, 2013-2015*

| Measure | Subgroup Comparison | Difference Estimate | p-value |
|---|---|---|---|
| Unplanned Acute Care Hospitalization/First FFS HH Episodes** [a] | Dual vs. Non-Dual | -0.17 | <0.001 |
| ED Use (No Hospitalization)/First FFS HH Episodes** [a] | Dual vs. Non-Dual | 2.05 | <0.001 |
| Medicare Spending per Day during and following FFS HH Episodes of Care~ | Dual vs. Non-Dual | -$4.63 | <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.4.1.7 (Page 94) 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*
*~ Results obtained from linear regression with Core-Based Statistical Area (CBSA) 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, we conducted difference-in-difference-in-differences (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.4.1.7 (Page 94) in the Technical Appendix.

The results of our analyses suggest that the improvements occurring under HHVBP are largely occurring among patients without Medicaid coverage (Exhibit 77). For example, the D-in-D estimates by subgroup indicate lower unplanned ACH due to HHVBP among beneficiaries who are not dual eligible (-0.42 percentage points, p<0.01), while there was no statistically significant impact of HHVBP for dual eligible

[23] In a sensitivity analysis that omitted HCC risk score at the start of HH care as a covariate, we found unplanned acute care hospitalizations to be 0.8 percentage points higher among dual eligible beneficiaries during the baseline period (see Exhibit C-55 [Page 163] in the Technical Appendix). However, the inclusion of HCC risk score as an additional covariate led dual eligibility to be associated with slightly lower hospitalizations (as shown in Exhibit 77).

beneficiaries (-0.07 percentage points, p=0.69). A comparison of these D-in-D estimates points to a differential impact of HHVBP on beneficiaries based on whether they were dual eligible, with HHVBP leading to an increase in unplanned hospitalizations for dual eligible beneficiaries relative to those who are not dual eligible (D-in-D-in-D estimate of 0.36 percentage points, p<0.01).

There is a similar pattern in the findings for the two composite functional improvement measures (Exhibit 77). As with other impact measures that are based on OASIS data, the composite functional improvement 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>0.1 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<0.001 for both measures in Exhibit 77). These results were similar based on sensitivity analyses of improvements in functioning that also controlled for HCC risk score for the subset of patients with Medicare FFS coverage (see Exhibit C-57 [Page 163] in the Technical Appendix for details).

Results for the ED measure indicate a larger increase in outpatient ED visits under HHVBP for dual eligible beneficiaries (D-in-D-in-D estimate of 0.25 percentage points, p=0.01). Analyses of Medicare spending for Part A and Part B services during and within 30 days following home health episodes of care indicate a similar reduction in spending due to HHVBP among dual eligible beneficiaries and beneficiaries who are not dual eligible.

*Exhibit 77. Differential Impact of HHVBP Based on Medicaid Coverage, 2013-2019*

| Measure | Dual (Medicaid) | | | Non-Dual (Non-Medicaid) | | | Dual (Medicaid) minus Non-Dual (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] | -0.07 | 0.69 | -0.5% | -0.42 | <0.01 | -2.4% | 0.36 | <0.01 | 2.3% |
| ED Use (No Hospitalization)/First FFS HH Episodes ††[a] | 0.48 | <0.01 | 3.7% | 0.23 | 0.11 | 1.5% | 0.25 | 0.01 | 1.9% |
| Medicare Spending per Day during and following FFS HH Episodes of Care †† | -$1.64 | 0.02 | -1.2% | -$1.61 | 0.01 | -1.0% | -$0.03 | 0.95 | 0.0% |
| Total Normalized Composite (TNC) Change in Self-Care † | -0.0002 | 0.99 | 0.02% | 0.05 | <0.01 | 3.1% | -0.05 | <0.001 | -4.0% |
| Total Normalized Composite (TNC) Change in Mobility † | 0.004 | 0.46 | 1.0% | 0.02 | <0.01 | 3.4% | -0.01 | <0.001 | -2.6% |

*See Section A.4.1.7 (Page 94) 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 dual eligible or Medicaid patients in HHVBP states (shown in Exhibit 74 and Exhibit* 75*).*

[c] *Calculated by dividing the model estimate by the baseline mean for non-dual eligible or non-Medicaid patients in HHVBP states (shown in Exhibit 74 and Exhibit* 75*).*

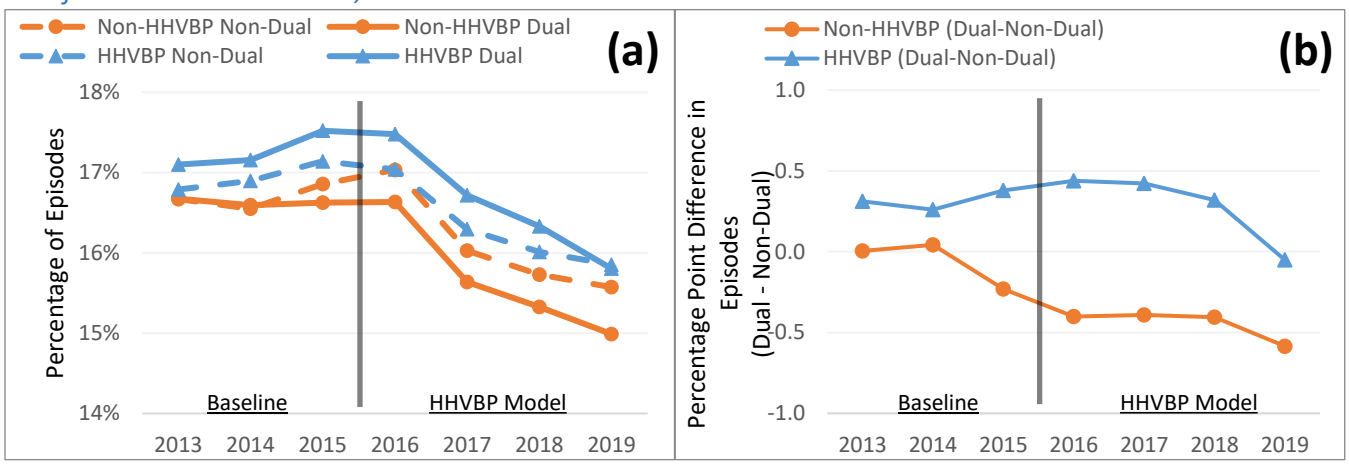
To further understand the implications of HHVBP for patients with and without Medicaid coverage, we plotted adjusted measure rates using estimates from the D-in-D-in-D analyses (see Exhibit 78 through Exhibit 81 below). For each measure, we first show trends during 2013-2019 by HHVBP status and dual eligible status (panel a of each Exhibit). 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.

For example, as shown in Exhibit 78 panel a, there are declines in adjusted unplanned ACH among both dual eligible and non-dual eligible beneficiaries, in HHVBP and non-HHVBP states, during 2016-2019.

These post-HHVBP trends followed relatively stable or rising hospitalizations among all subgroups during the baseline period, when there were increases over time in HHVBP states.

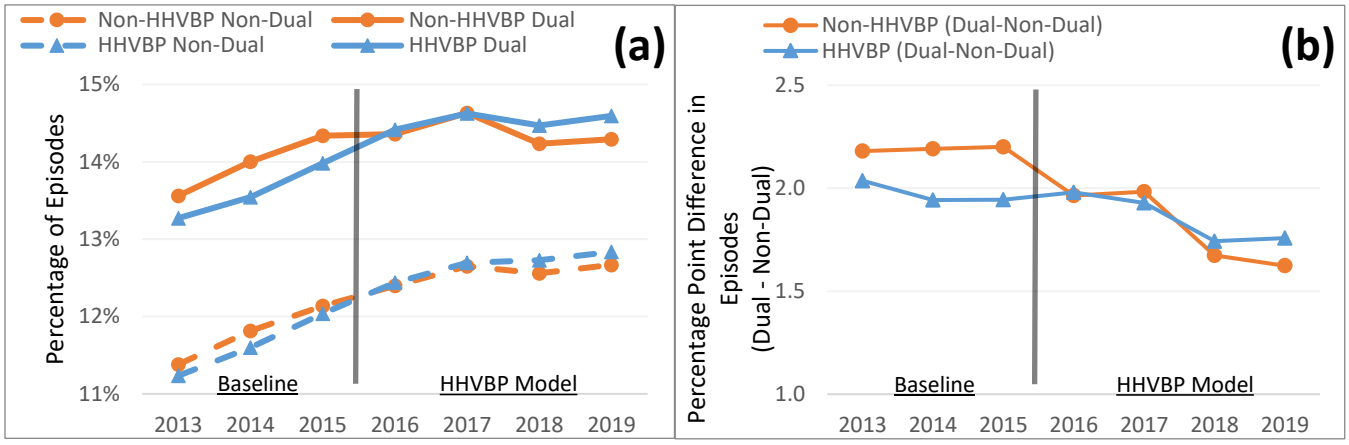
The difference in hospitalization by dual eligible status among beneficiaries in HHVBP states remained positive during most of the 2013-2019 period, reflecting higher hospitalizations among dual eligible patients (Exhibit 78 panel b). In contrast, the difference in the percentage of patients hospitalized became negative over time in non-HHVBP states, indicating a trend towards lower hospitalizations among dual eligible beneficiaries relative to other beneficiaries. Therefore, the positive D-in-D-in-D estimate for the hospitalization measure in Exhibit 77 does not reflect a worsening disparity in hospitalization among dual eligible beneficiaries in HHVBP states. Instead, the differential impact of HHVBP reflects gains occurring among dual eligible beneficiaries relative to other beneficiaries during the post-implementation period in non-HHVBP states that have not also been observed in HHVBP states.

*Exhibit 78. (a) Decline in Adjusted Unplanned ACH among Both Dual Eligible and Non-Dual Eligible Beneficiaries and (b) No Evidence of a Growing Disparity in Adjusted Unplanned ACH among Dual Eligible Beneficiaries in HHVBP States, 2013-2019*



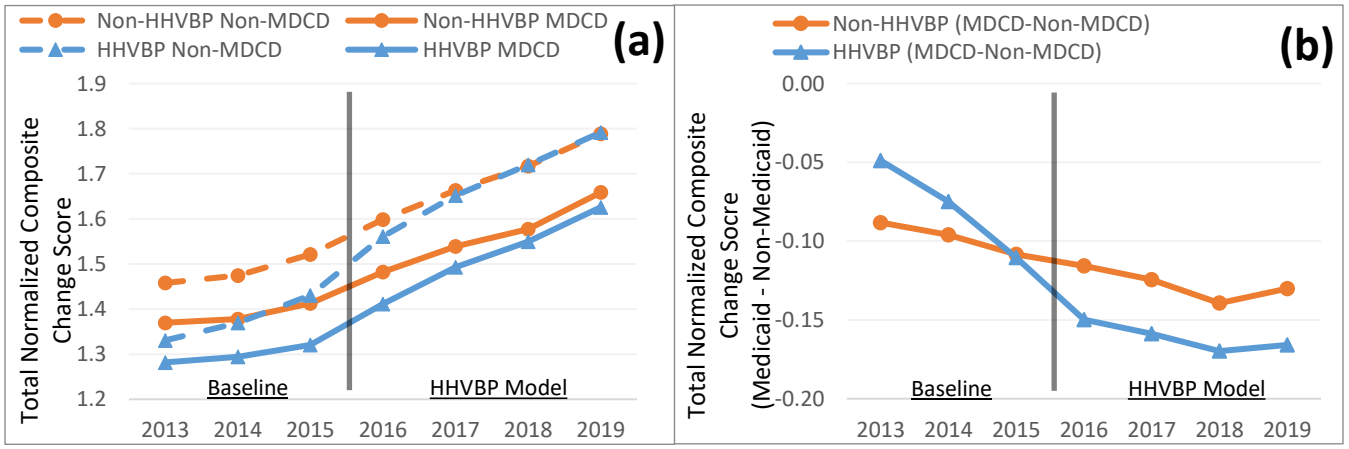

We used a similar approach to evaluate other key impact measures. While ED use increased over time among all patient subgroups (first panel of Exhibit 79), the gap in ED use between dual eligible beneficiaries and other beneficiaries became somewhat smaller in the post-implementation period in HHVBP and non-HHVBP states. That is, there was a narrowing over time in disparities in ED use in both groups, such that ED use was less than two percentage points higher among dual eligible beneficiaries in 2018 and 2019 (Exhibit 79 panel b). However, this narrowing in disparities was slightly larger in non-HHVBP states than in HHVBP states. This pattern explains the positive differential impact of HHVBP on ED use among dual eligible beneficiaries relative to non-dual eligible beneficiaries reported in Exhibit 77 above.

*Exhibit 79. (a) Increase in Adjusted ED Use (No Hospitalization) among both Dual Eligible and Non-Dual Eligible Beneficiaries and (b) Slightly Smaller Narrowing in the Disparity in Adjusted ED Use for Dual Eligible Beneficiaries in HHVBP States Compared to Non-HHVBP States, 2013-2019*




Unlike trends in unplanned ACH and ED use, trends in composite measures of improvement in functioning indicate widening disparities over time, in HHVBP and non-HHVBP states. For example, while there were increasing rates of improvement in self-care over time among patients with and without Medicaid coverage, based on the TNC change in self-care, there was somewhat greater improvement among patients without Medicaid coverage (first panel of Exhibit 80). As a result, the disparities in improvement in self-care for patients with Medicaid became larger over time, as shown by the difference in TNC change scores becoming more negative over time in the second panel of Exhibit 80. However, since a larger gap in the rate of improvement by Medicaid status emerged over time in HHVBP states compared with non-HHVBP states (Exhibit 80 panel a), there was a slightly larger widening in the disparity over time in HHVBP states (Exhibit 80 panel b).

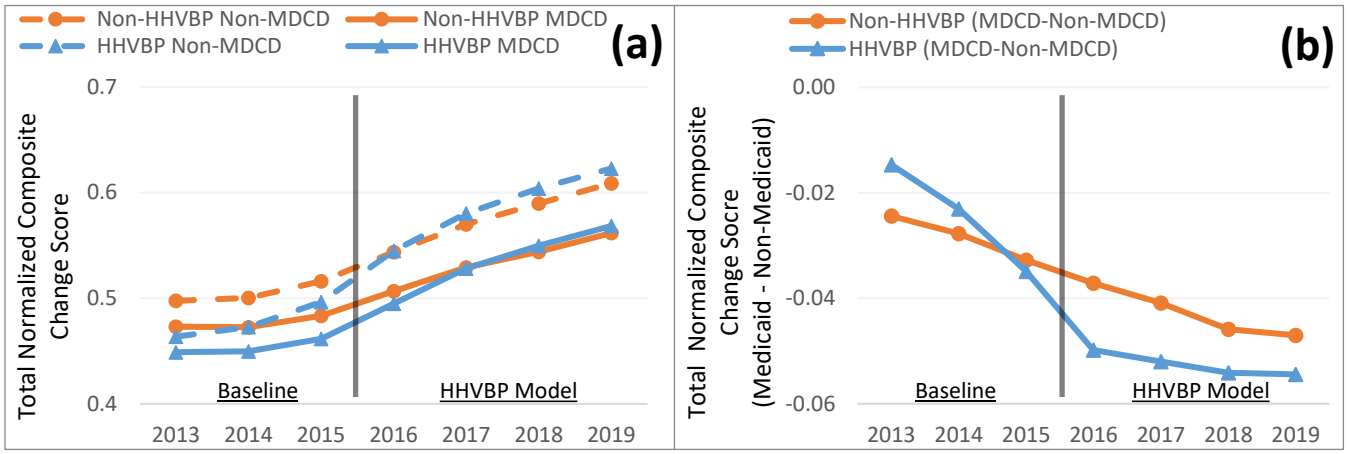
*Exhibit 80. (a) Slower Increase in Adjusted Total Normalized Composite (TNC) Change in Self Care among Medicaid Patients Compared to Non-Medicaid Patients and (b) Slightly Widening Disparity in Adjusted TNC Change in Self Care for Medicaid Patients in HHVBP States Relative to Non-HHVBP States, 2013-2019*




Findings were similar for the composite measure of improvement in mobility. Relatively smaller gains over time for Medicaid patients compared with non-Medicaid patients in HHVBP states (Exhibit 81 panel

a) led to a greater widening in disparities based on Medicaid status in HHVBP states compared with non-HHVBP states (Exhibit 81 panel b).

*Exhibit 81. (a) Slower Increase in Adjusted TNC Change in Mobility among Medicaid Patients Relative to Non-Medicaid Patients and (b) Slightly Widening Disparity in Adjusted TNC Change in Mobility for Medicaid Patients in HHVBP States Relative to Non-HHVBP States, 2013-2019*




## 10.4 Impact on Patients in Rural Areas

We used a similar approach to examine the impact of HHVBP on home health patients living in rural areas. To do this, we identified home health patients living in rural counties, who account for approximately 5 percent to 10 percent of all home health episodes among Medicare FFS beneficiaries (Exhibit 82). Beneficiaries receiving home health services in rural areas are less likely to be Hispanic, have slightly lower average HCC risk scores, are more likely to be dual eligible, and are more likely to have been recently discharged from an inpatient facility prior to the start of home health care. Beneficiaries in rural areas are also more likely to receive services from a government-owned home health agency. There were similar patterns when using OASIS data to compare the characteristics of a broader population of home health patients in rural and urban areas (see Exhibit C-54 [Page 162] in the Technical Appendix).

*Exhibit 82. Differences in Certain Characteristics of Rural and Urban FFS Home Health Beneficiaries, 2013-2019*

| | HHVBP | | | | Non-HHVBP | | | |
|---|---|---|---|---|---|---|---|---|
| | Baseline (2013-2015) | | Post Period (2016-2019) | | Baseline (2013-2015) | | Post Period (2016-2019) | |
| | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| N FFS Episodes | 218,102 | 4,204,828 | 277,225 | 5,340,759 | 1,453,176 | 13,964,371 | 1,775,506 | 17,615,122 |
| Average Age (Years) | 75.78 | 77.06 | 76.09 | 77.63 | 75.50 | 75.86 | 75.54 | 76.36 |
| Female | 62.3% | 62.1% | 61.0% | 60.8% | 62.6% | 62.8% | 61.1% | 61.6% |
| **Race/Ethnicity (Mutually Exclusive):** | | | | | | | | |
| Hispanic | 0.4% | 9.9% | 0.5% | 6.5% | 2.9% | 9.1% | 2.6% | 8.2% |
| Non-Hispanic Black | 9.4% | 10.1% | 9.7% | 10.0% | 12.3% | 16.9% | 11.0% | 14.2% |
| Non-Hispanic White | 89.5% | 78.5% | 89.0% | 81.9% | 82.9% | 70.6% | 84.5% | 73.9% |
| Non-Hispanic Other Race | 0.6% | 1.3% | 0.7% | 1.5% | 1.6% | 3.2% | 1.7% | 3.6% |
| Non-Hispanic Multiracial | 0.1% | 0.1% | 0.1% | 0.1% | 0.2% | 0.2% | 0.2% | 0.2% |
| Average HCC Score (1st Episode) | 2.61 | 2.67 | 2.88 | 2.93 | 2.41 | 2.62 | 2.70 | 2.85 |
| ESRD Flag | 2.5% | 2.9% | 2.7% | 3.2% | 2.5% | 3.8% | 2.8% | 4.0% |
| Discharge from Inpatient within 14 Days | 67.4% | 61.1% | 65.5% | 62.8% | 65.0% | 61.5% | 64.2% | 61.9% |
| Dual Eligible | 36.9% | 30.0% | 33.2% | 25.0% | 38.1% | 34.2% | 35.3% | 32.1% |
| **HHA Ownership:** | | | | | | | | |
| For-Profit | 64.3% | 71.3% | 70.3% | 71.6% | 66.7% | 69.8% | 70.8% | 71.3% |
| Non-Profit | 20.7% | 26.1% | 20.0% | 26.2% | 25.5% | 28.3% | 23.4% | 27.2% |
| Government-Owned | 15.0% | 2.5% | 9.7% | 2.1% | 7.8% | 1.9% | 5.8% | 1.4% |
| **HHA Chain Affiliation:** | | | | | | | | |
| Chain-Affiliated | 53.9% | 48.7% | 57.1% | 53.5% | 45.4% | 33.2% | 51.0% | 37.6% |
| No Chain Affiliation | 40.1% | 42.4% | 37.1% | 39.2% | 47.5% | 58.9% | 43.5% | 55.5% |
| Chain Affiliation Unknown/Missing | 6.1% | 8.9% | 5.8% | 7.3% | 7.2% | 7.9% | 5.5% | 6.9% |

To evaluate the effects of HHVBP on patients living in rural areas, we examined the same set of five impact measures that we used above for analyses of Medicaid patients and that reflect a range of outcomes that are highly relevant to the model. This measure set includes measures of unplanned ACH, outpatient ED use, average Medicare spending, and composite measures of improvement in mobility and self-care.

Based on unadjusted analyses, there are strong patterns of FFS beneficiaries in rural areas being more likely to have an unplanned ACH and more likely to use the ED than beneficiaries in urban areas (Exhibit 83). We observed these patterns in HHVBP states and non-HHVBP states, in both the baseline and post-

implementation periods. There were not consistent differences between rural and urban patients in improvements in either self-care or mobility during home health episodes.

*Exhibit 83. Higher Rates of Unadjusted Unplanned Acute Care Hospitalization and Outpatient ED Use among Rural versus Urban Beneficiaries in Both HHVBP States and Non-HHVBP States, 2013-2019*

| HHVBP | | | | Non-HHVBP | | | |
|---|---|---|---|---|---|---|---|
| Baseline (2013-2015) | | Post Period (2016-2019) | | Baseline (2013-2015) | | Post Period (2016-2019) | |
| Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| **Unplanned Acute Care Hospitalization/First FFS HH Episodes** | | | | | | | |
| 17.0% | 15.6% | 16.6% | 15.7% | 16.6% | 16.2% | 16.3% | 15.8% |
| **ED Use (No Hospitalization)/First FFS HH Episodes** | | | | | | | |
| 14.3% | 11.6% | 15.1% | 12.7% | 14.1% | 12.1% | 15.0% | 12.7% |
| **Medicare Spending per Day during and following FFS HH Episodes of Care** | | | | | | | |
| $124.66 | $139.04 | $134.82 | $149.44 | $114.68 | $133.38 | $126.96 | $146.02 |
| **Total Normalized Composite (TNC) Change in Self-Care** | | | | | | | |
| 1.30 | 1.38 | 1.81 | 1.83 | 1.34 | 1.28 | 1.78 | 1.69 |
| **Total Normalized Composite (TNC) Change in Mobility** | | | | | | | |
| 0.40 | 0.44 | 0.65 | 0.66 | 0.42 | 0.41 | 0.63 | 0.60 |

When accounting for differences in beneficiary case-mix and other factors, the percentage of first home health episodes with an unplanned ACH was 0.19 percentage points higher among rural beneficiaries compared with urban beneficiaries during the baseline period (Exhibit 84). Similarly, the percentage of first home health episodes with an ED visit was 1.66 percentage points higher among rural beneficiaries. These differences represent disparities for rural beneficiaries prior to implementation of the model while accounting for demographic, clinical, socioeconomic, and geographic characteristics of beneficiaries, other CMMI models, and agency characteristics.

Average Medicare spending for Part A and Part B services was $0.88 lower per day for rural beneficiaries compared with urban beneficiaries (Exhibit 84). Unlike the patterns observed for the claims-based utilization measures, home health patients in rural areas had slightly better outcomes during the baseline period based on measures of improvement in functioning. Rural patients had slightly higher TNC change scores for self-care and mobility, indicating greater improvements in functioning during HH episodes. We found these results to be similar based on sensitivity analyses that also controlled for each patient's HCC risk score at the start of home health care for the subset of patients with Medicare FFS coverage (see Exhibit C-56 (Page 163) in the Technical Appendix).

*Exhibit 84. Higher Adjusted Unplanned Acute Care Hospitalizations and Outpatient ED Use, Lower Adjusted Medicare Spending, and Larger Adjusted Improvements in Self-Care and Mobility among Rural versus Urban Beneficiaries Prior to HHVBP Implementation, 2013-2015*

| Measure | Subgroup Comparison | Difference Estimate | P-value |
|---|---|---|---|
| Unplanned Acute Care Hospitalization/First FFS HH Episodes** [a] | Rural vs. Urban | 0.19 | <0.01 |
| ED Use (No Hospitalization)/First FFS HH Episodes** [a] | Rural vs. Urban | 1.66 | <0.001 |
| Medicare Spending per Day during and following FFS HH Episodes of Care~ | Rural vs. Urban | -$0.88 | 0.02 |
| Total Normalized Composite (TNC) Change in Self-Care* | Rural vs. Urban | 0.03 | <0.01 |
| Total Normalized Composite (TNC) Change in Mobility* | Rural vs. Urban | 0.008 | <0.01 |

*See Section A.4.1.7 (Page 94) 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.*
*~ Results obtained from linear regression with CBSA 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 by patient rural/urban location. Across the five impact measures, we found no evidence of a differential impact of the model on patients living in rural and urban areas. In particular, D-in-D-in-D estimates were not statistically significant for each of the five measures shown in Exhibit 85 (see last three columns). For all of the measures shown, differences in the magnitudes of the D-in-D estimates for the two patient subgroups were relatively small.

*Exhibit 85. No Evidence of a Differential Impact of HHVBP by Rural/Urban Location, 2013-2019*

| Measure | Rural | | | Urban | | | Rural-Urban | | |
|---|---|---|---|---|---|---|---|---|---|
| | 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] | -0.31 | 0.19 | -1.8% | -0.34 | 0.02 | -2.2% | 0.03 | 0.89 | 0.2% |
| ED Use (No Hospitalization)/First FFS HH Episodes ⇈ [a] | 0.35 | 0.13 | 2.4% | 0.29 | 0.04 | 2.5% | 0.06 | 0.78 | 0.4% |
| Medicare Spending per Day during and following FFS HH Episodes of Care ⇈ | -$1.22 | 0.32 | -1.0% | -$1.45 | 0.02 | -1.0% | $0.23 | 0.84 | 0.2% |
| Total Normalized Composite (TNC) Change in Self-Care † | 0.05 | 0.02 | 3.8% | 0.04 | <0.01 | 2.9% | 0.007 | 0.71 | 0.5% |
| Total Normalized Composite (TNC) Change in Mobility † | 0.02 | <0.01 | 5.0% | 0.02 | 0.01 | 4.5% | 0.005 | 0.45 | 1.3% |

*See Section A.4.1.7 (Page 94) 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.*

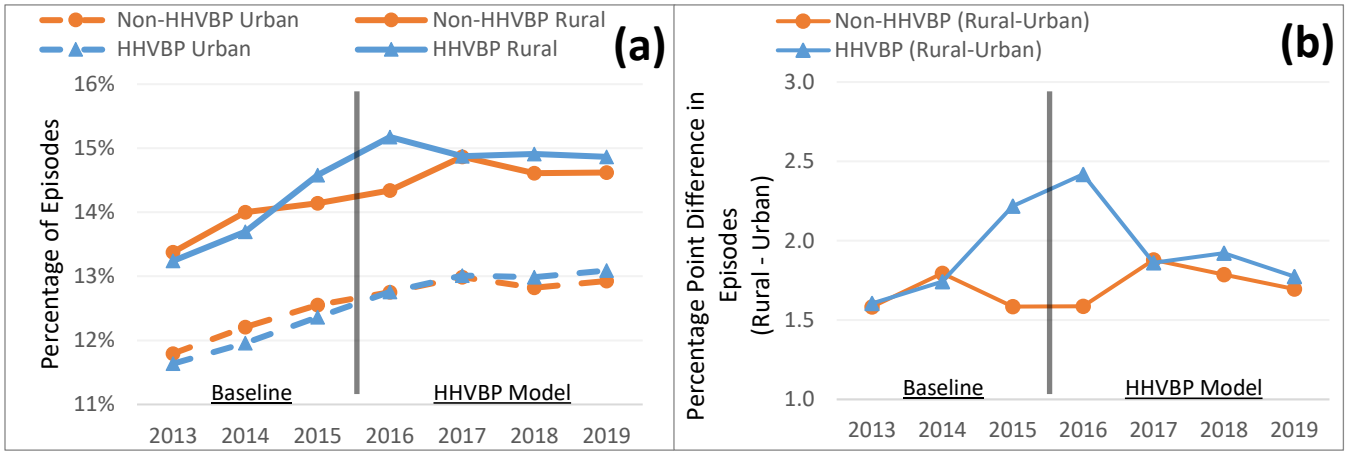
*[a] D-in-D values represent percentage point changes.*

*[b] Calculated by dividing the model estimate by the baseline mean for rural patients in HHVBP states (shown in Exhibit 83).*

*[c] Calculated by dividing the model estimate by the baseline mean for urban patients in HHVBP states (shown in Exhibit 83).*

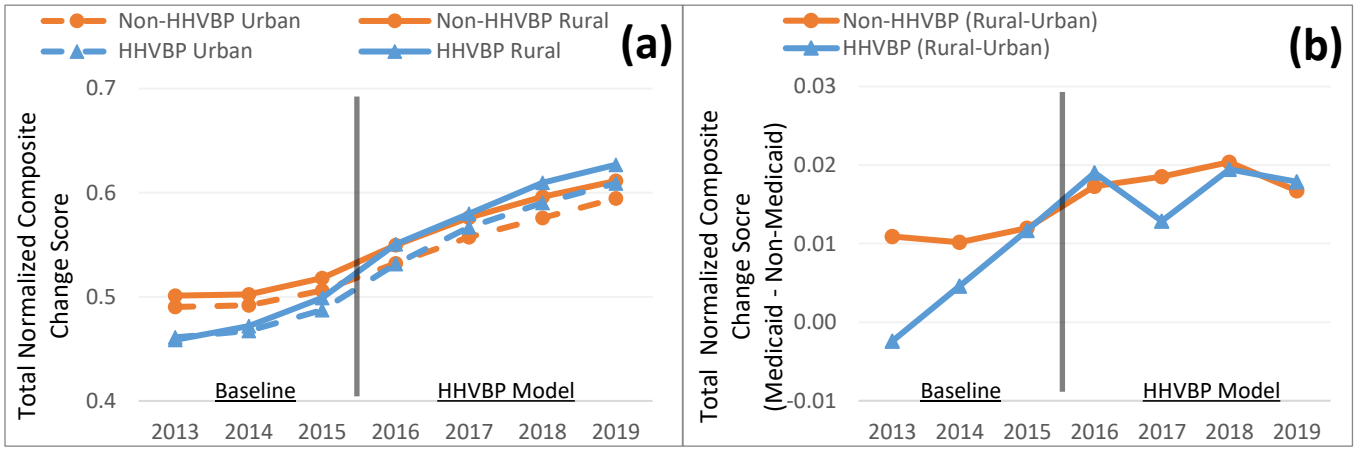
The implications of the HHVBP Model for patients in rural and urban areas is illustrated using plots of adjusted measure rates, for selected measures. As with the trends seen by dual eligible status in the previous section, ED use has been rising over time among all patient subgroups (Exhibit 86 panel a). Beneficiaries receiving home health services in rural areas continued to be more likely to visit the ED than those in urban areas, with no consistent shift in these relative trends during the study period. As a result, the gap in ED use by year remained within 1.5 to 2.5 percentage points higher for beneficiaries in rural areas compared with those in urban areas, in HHVBP and non-HHVBP states (Exhibit 86 panel b). This figure illustrates how the more frequent ED use among rural beneficiaries has continued under the model.

*Exhibit 86. (a) Increase in Adjusted ED Use (No Hospitalization) among Rural and Urban Beneficiaries that Began Prior to HHVBP Implementation and (b) Ongoing Disparities in Adjusted ED Use for Rural Beneficiaries in both HHVBP and Non-HHVBP States, 2013-2019*




Unlike the patterns observed for ED use, home health patients living in rural areas had slightly better outcomes with regard to improvements in functioning before HHVBP was implemented. While rates of improvement in mobility increased over time among all patient subgroups, they remained slightly higher for patients in rural areas compared with those in urban areas, in HHVBP and non-HHVBP states (Exhibit 87 panel a). As a result, the preexisting small advantage for rural patients with regard to improvements in mobility has continued under the Model (Exhibit 87 panel b).

*Exhibit 87. (a) Increase in Adjusted TNC Change in Mobility among Both Rural and Urban Beneficiaries and (b) Larger Improvements in Mobility among Beneficiaries in Rural Counties Relative to Urban Counties in Both HHVBP and Non-HHVBP States, 2013-2019*




For the other outcomes we examined, the baseline differences between rural and urban patients shown above in Exhibit 84 also largely persisted, as we did not find evidence of a differential impact of the Model by rural versus urban location (as reflected in the D-in-D-in-D estimates in Exhibit 85).

## 10.5 Discussion

While VBP programs are designed to promote quality of care generally, they may not necessarily achieve this goal for all patient populations. In this section, we examined whether there have potentially been unintended consequences of HHVBP for certain vulnerable populations who may be predisposed to

having worse outcomes. To the extent that any benefits of quality improvement due to HHVBP differ across different subgroups of patients, there is a risk that the Model may contribute to health disparities. We note that this risk is not unique to the home health care setting; rather, it is common to programs that use provider financial incentives to promote quality of care. We consider this possibility in the context of the growing payment implications of HHVBP for HHAs.

Our analyses through the fourth year of the HHVBP Model do not yield consistent findings regarding a differential impact of HHVBP on outcomes for vulnerable populations. For some measures where there was a favorable overall impact of HHVBP, we also found favorable impacts across patient subgroups. For example, HHVBP was associated with improvements in functioning for both patients in urban areas and patients in rural areas. However, HHVBP was not associated with a decline in hospitalization among Medicaid patients. Instead, the overall reduction in hospitalization attributed to the HHVBP Model occurred among patients without Medicaid. Because of these changes, we observe modest growth in certain disparities for Medicaid patients under the model. In contrast, we found no evidence of a differential impact of HHVBP on patients in rural areas, for any of the outcomes that we examined.

One possible explanation for our findings by Medicaid status is that there may be greater challenges with quality improvement among patients covered by Medicaid. Home health patients with Medicaid coverage had somewhat worse outcomes across a range of key measures before model implementation, and then lagged slightly further behind other patients in those same outcomes under the model. We 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. Such 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.

Our findings highlight a potential need to target quality improvements among patients with Medicaid coverage. Further research is needed to understand the drivers of their worse outcomes. As the financial incentives under the Model become stronger over time, and as agencies continue to gain experience responding to VBP incentives and other quality initiatives, there is potential for disparities involving Medicaid patients to either worsen or improve in the future. It will be important to continue to examine the impact of HHVBP on Medicaid patients and other vulnerable populations as the HHVBP Model evolves.

# 11. Results: Putting the Impact of the HHVBP Model in Context

## 11.1 Introduction

This section presents findings from qualitative analyses of 63 HHA interviews conducted to assess model effects over time on agency operational changes; internal and external factors that shape HHA operations under HHVBP; and patient selection and care experience. These qualitative data provide important context about broader payment and other policies that HHAs are navigating contemporaneous with HHVBP, and how those policies may affect agency performance on and response to the HHVBP Model. In addition to interview summaries, we discuss the use of HHVBP Connect by HHVBP agencies and conclude with a discussion of agencies' reporting rates of the three HHVBP measures via the Secure Web Portal.

## 11.2 Interviews with HHAs

### 11.2.1 Data Collection and Analysis

Between July and September of 2020, we conducted 63 interviews with key informants from HHAs across the nine HHVBP states. To provide a longitudinal perspective on the impact of the model on HHA operations, we contacted HHAs that participated in the initial round of interviews in 2017 that remained in operation (64 of 67 HHAs) and invited them to participate in a follow-up interview. Of these, 44 agreed to participate. We then supplemented this group with 19 HHAs interviewed in 2018, selecting them based upon characteristics that approximate the distributions present in 2017, to yield a final interview sample of 63 HHAs.

The research team conducted the interviews using a semi-structured interview guide developed in collaboration with CMS. We then summarized findings for the core interview topics and identified common themes across interviews. Of note, we conducted this year's interviews during the COVID-19 Public Health Emergency, and in order to minimize burden on agencies during this difficult time, CMS requested limits on the number and length of interviews. To the extent possible, we asked interviewees to focus on their experiences with HHVBP, specifically if and how their response to the model may have changed since early on in the implementation period. We provide a more detailed description of these methods, including the composition of our sample population, in Section B.1 (Page 108) of the Technical Appendix.

### 11.2.2 Results

In exploring current agency perspectives compared to those of agency interviewees during the earlier years of the HHVBP Model (i.e., 2017 and 2018), we found that:

- ***Overall, agency participants had more positive impressions of the model than in previous years***. Most HHA representatives were less preoccupied with meeting model requirements and less concerned about the model's potential financial impact than in previous years. Few agencies reported experiencing noticeable impacts of the financial incentives.
- ***Multiple internal and external factors drove agency operations in addition to the HHVBP Model.*** Agencies frequently described the model as complementing and aligning with other contemporaneous initiatives and pressures to improve documentation, performance, and the quality of care delivery. In addition to Star Ratings, interviewees pointed to multiple other powerful drivers of operational changes including Conditions of Participation (CoP), avoidable readmission programs, the introduction of PDGM, changing OASIS documentation

requirements, ongoing auditing activity (such as Targeted Probe and Educate (TPE) and Review Choice) and COVID-19.

- ***Agencies continued to focus on staff recruitment and training, quality and performance, and data analytics in response to multiple drivers that include the model.*** Agencies described designing quality assurance and performance improvement (QAPI) activities and developing a QAPI plan as an integral part of ongoing HHA operations that also aligns with model goals rather than being motivated by the model alone. Agencies continued to experience challenges in retaining staff and focused on ongoing staff training to improve OASIS documentation and care delivery.
- ***Many agencies strove to improve patient engagement; agencies did not mention the model's impact on patient selection.*** As in previous years, many agency representatives reported about ongoing efforts to improve patient engagement and focusing on patient-driven goals. Unlike in previous years, few interviewees mentioned concern about other agencies accepting only those patients who would show the most improvement.

We provide additional detail about these findings below.

*Have agencies' impressions of HHVBP changed since the model's inception?*

Many interviewees from both large and small agencies shared positive impressions of the model with the majority noting how HHVBP overlapped with or complemented patient-centered care and other QI initiatives, such as Star Ratings, CoP, and QAPI requirements. Interviewees' perceptions this year differed from the unease interviewees frequently reported during the earlier years of the model, when they anticipated the model would usher in considerable regulatory and payment changes to the industry.

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*"The Star Ratings, the TPE [Targeted Probe and Educate], HHVBP, all happened around the same time. Sometimes, in the beginning, it was a little bit of tug-of-war. Until we figured out that there was much overlap."*

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As in the early years of the model, many interviewees reported that HHVBP prompted continued focus on QI efforts that were already underway in response to existing CMS initiatives. While interviewees in the early years made initial adjustments in reporting processes and introduced staff to the goals of the model, few reported recent changes in response to the model. Instead, most agency representatives reported that HHVBP had a limited impact on day-to-day operations beyond increasing the attention paid to staff training and documentation. Nonetheless, nearly half of those interviewed this year, when asked, reported that the model contributed to or was somewhat effective in improving patient outcomes. Notably, one participant who previously spoke negatively about HHVBP had changed perspective and now thinks positively about it.

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*HHA participant in 2017: "To be perfectly honest with you, I don't really see where [HHVBP] has enhanced our care or improved the life of my patients."*

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*Same HHA participant in 2020: "I think we've become a better agency…it's forced us to focus on the things that are important."*

Several interviewees affiliated with large chains overseeing QI activities across multiple states indicated they would like to see the model roll out to the whole country. While many interviewees generally reported being positive about the model, some of these same individuals also had reservations around documentation and reporting requirements. For example, several participants said less reputable agencies could too easily adjust documenting practices without actually improving quality of care and supported the shift to more objective measures of quality, such as claims based measures.

For those providing positive feedback, many noted that their agency continued HHVBP reporting during COVID-19 since the processes were already running smoothly. In addition, many noted that although they were concerned during the early years, they eventually found ways to incorporate model requirements into regular activities. In addition, interviewees observed that, especially after the reweighting of the measures, the model metrics were generally consistent with those in Star Ratings, allowing for HHAs to address both initiatives concurrently.

*"I don't know that anyone has paid much attention to it [HHVBP]. I hate to say that, but I think it's been back-burnered. I think that everybody really watches the Star measures. They really watch what is publicly reported."*

### *What internal and external factors impacted how HHAs operate under HHVBP?*

Agency representatives described internal and external factors that impact agency operations under the model including relationships with referral sources, TPS scores and payment, and contemporaneous initiatives. We describe the relative impact of each factor and how it relates to the model below.

#### Referral sources remained similar while some agency-referrer relationships were more collaborative

The majority of HHA representatives indicated that there were no substantive changes in their general patient referral stream. However, some noted increased Medicare Advantage (MA) and ACO penetration rates in their respective markets and, as a result, experienced an increase in MA and ACO referrals. This year, fewer interviewees expressed concerns about MA plan delays in authorization and visit limits than last year (Arbor Research, 2020); several noted MA plans now directly link them to a clinical representative or coordinator at the plan to facilitate the process. As in previous years, some agency representatives indicated Medicare FFS referrals continue to be preferred, but at the same time agencies admit a mix of patients and payers from preferred referral sources in order to maintain referral relationships.

*Referral sources identified preferred home health providers*

Some interviewees mentioned that referral sources are more often identifying preferred home health providers as they pay increasing attention to post-acute care costs and quality. One administrator noted:

> *"[Our] health system has moved into a preferred provider kind of concept that includes Tier 1, 2 and 3 – with the high quality and low-cost providers being in Tier 1. They say to patients: 'Here is your choice, and this one is considered a Tier One provider…' [When the] health system addresses [the HHA tiers] with the providers, they talk about their readmission scores, their Star Ratings, claims-based evaluation of cost of care per claim, length of stay… but if [an agency's] Star Ratings go up [but its] costs are out of line, it is a contributing factor that is rating them lower."*

Our interviews with agencies over the past several years suggest that as ACOs, health systems and other referrers pay more attention to the post-acute care arena, Star Ratings, and HHVBP, these and other quality initiatives may be increasingly considered in the referral process for post-acute patients.

A number of agency representatives described increasing interaction and dialogue with larger referrers such as hospitals and ACOs. These agencies typically developed health system affiliations focused on a shared goal of reducing rehospitalizations by increasing communications and streamlining transitions between care settings at opportune points of discharge and start of care. Many agencies reported on the importance of being able to demonstrate high performance in order to ensure ongoing referrals. Some agencies engaged in more robust exchanges of information with health systems and ACOs than in previous years due to other drivers such as PDGM, which requires documentation to provide a comprehensive picture of the patient that ensures reimbursement.

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*"We have actually had a couple of hospital systems that want to look at the Medicare clients with the high acuity diagnoses for re-hospitalizations… and they're doing their own chart review. Then, we're coming together monthly to review what was potentially avoidable, what else we could have done, and what we could do in the future. It's been really good [to have] intense conversations surrounding those [patients]."*

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### Agencies were less concerned about TPS and the model's financial impact than in previous years

While a number of agency representatives took their TPS into consideration as they revised performance improvement plans, few reported experiencing a noticeable impact from the model's financial incentives. Generally, representatives of larger agencies (those with over 500 episodes) reported making more changes in response to the model (e.g., changes in payment with a greater frequency) than smaller agencies.

A number of interviewees, more often from smaller agencies, were unaware of any changes in their payment due to HHVBP. Those with negative perspectives of the model often observed that the increase in documentation and reporting efforts did not yield a corresponding improvement in care delivery or financial reward commensurate with the agency's effort.

> *"When we first started [HHVBP], like anything, you are more enthusiastic, but as time has passed and the overall climate of the home health and the COVID and then the PDGM has just made it a horrendous burden with very little reward. … One year we did fairly well, I think we got $500 back after spending thousands of dollars of getting it implemented."*

Representatives from both large and small agencies noted that there is a significant time delay between performance improvement activities put in place and the release of TPS performance reports. As a result, agencies indicated that internally generated reports, such as those available from home health analytics vendors and linked to electronic health records (EHRs), were more useful in evaluating whether an improvement activity had a positive impact. Furthermore, such internal data analytics allowed agencies to more easily review data at the agency, team or individual clinical level and thereby better target improvement efforts.

A smaller group of interviewees did not review their TPS or related data at all since those scores are not public facing and referrers pay attention to their Star Ratings, not HHVBP Model performance. Several interviewees this year, as in previous years, did not understand CMS's calculation methodology and how it correlated (or did not correlate) with that agency's Star Rating.

### Competing priorities and external pressures drew attention away from HHVBP

Most agency administrators indicated the model does not occupy their foremost attention because they must also respond to multiple other pressing initiatives and regulatory changes. In particular, the COVID-19 Public Health Emergency undoubtedly impacted HHAs and other health care providers in early 2020. For example, one agency representative noted that they had to closely manage the crisis and spent a lot of time procuring personal protective equipment (PPE) and ensuring that staff were safe. While we asked interviewees to focus as much as possible on the impact of HHVBP, they also commented on PDGM (see text box) in addition to COVID-19 and other competing priorities.

*Perspectives on PDGM*

Comments on PDGM varied. Some HHAs noted that PDGM would not have a significant impact, while others felt it would fundamentally impact operations and would take some of the focus away from HHVBP:

> *"... Last fall, we knew PDGM was coming to home health, and we had a corporate committee work on how we would incorporate all of that, monitoring of episodes and incorporating those changes into our operations…"*

Some of those discussing the challenges related to PDGM indicated that with shorter episodes and a corresponding reduction in the number of visits, opportunities to improve patient outcomes were more limited, especially for patients with multiple comorbidities. Others felt that PDGM affected financial reporting and documentation requirements rather than clinical care:

> *"[PDGM] didn't really affect any clinical care, to my knowledge, nobody was laid-off…we didn't even change the breakdown of the nursing visits to therapy visits even though you don't get an extra payment for therapy visits. But I do know that the finance team is running different reports as a result of PDGM."*

Agencies also mentioned other federal initiatives that had a significant impact on their operations, including changes in CoPs, an ever-increasing focus on avoidable hospitalizations and performance improvement, TPE, and the introduction of Review Choice. Keeping up with changing requirements, including administration, staff training, documentation, compliance and billing procedures of multiple initiatives, reduced the level of attention paid to HHVBP.

Finally, in previous years we heard concerns regarding the growth of Medicaid managed care and the impact of reduced payments and increased constraints related to obtaining visit authorizations from such plans. However, interviewees did not mention these concerns this year.

> *"We have had CoP changes, PDGM changes and Review Choice changes…this does not mean that HHVBP drops off the radar, but it does not take precedence with all of these other things we have had to deal with and get implemented."*

### *What changes did agencies make to their operations in response to the HHVBP Model?*

During the interviews, agency representatives provided updates on three key areas of agency operations where they made changes: staff recruitment, training and retention; quality assurance and performance improvement efforts; and data collection and analyses. The extent to which the HHVBP Model impacted these key areas varied and is discussed in detail below.

#### Agencies focus on staff recruitment, training and retention; all continue to be a challenge

Most agency representatives mentioned a continued focus on staff training for more accurate patient assessment and documentation as both a key challenge and an ongoing priority. However, many interviewees reported the model is not the sole motivating factor driving this ongoing activity. Agencies designed training to help staff understand the intent of OASIS questions and ensure that the clinicians accurately describe the patient's functional status. These interviewees reported training clinicians to base their assessment on their actual observation of patient's functioning rather than documenting what the patient reports. Several agency respondents since 2017, including one from a large national

chain, reported hiring more OASIS-certified nurses to review start of care assessment plans and/or help train clinicians on proper assessment and documentation. Other strategies included developing an internal OASIS training program that all clinicians must complete before documenting in OASIS; hiring only OASIS-certified quality review specialists to conduct chart review; and increasing compensation for nurses with OASIS certification in an effort to develop a career ladder and improve retention.

A few interviewees mentioned the challenge of treating patients unlikely to see improvement in functioning such as those with advanced terminal illness or dementia, or patients with severe disability. In order to overcome these challenges, several agencies provided supplemental OASIS training to provide accurate responses that could potentially improve scoring for these types of patients.

Beyond OASIS training, agency representatives often mentioned staffing recruitment and retention when we asked about their biggest challenges, similar to 2017 interviewees. This year, many agencies reported struggling to maintain staffing levels and retain nurses in particular, making continuous training even more of a priority. One chain administrator noted that his agencies with lower model performance scores typically experienced higher turnover. Others noted the importance of training staff to make sure that clinicians have the skill set to take care of increasingly complex patients being cared for at home. Some agency representatives recruited mostly new graduates or those without recent direct patient care experience and spent considerable time on training newly hired nurses to provide home health care.

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*"Our biggest challenge is ongoing staff training because it is constant. To get them to understand how [HHVBP] works because I am adding staff [all the time]. This is not a conversation you are having with them in the first 60 or 90 days. They have to become home care knowledgeable enough to even understand why we would even have the conversation."*

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### QAPI plans aligned agency clinical strategies and improvement efforts with HHVBP Model goals

In the early years of the HHVBP Model, we described the increasing amount of staff time and new hires among agencies to enhance quality and performance improvement activities and address the increasing clinical complexity of home health patients (Arbor Research, 2018). We reported that experience with the model and reviewing HHVBP performance reports helped some agencies learn how to better focus on what to include in newly mandated QAPI plans (Arbor Research, 2018). More than two years following the January 2018 CMS QAPI plan mandate, HHA representatives continue their efforts to integrate quality and performance improvement activities with patient care strategies and making QI an integral part of ongoing agency operations.

Agency representatives made changes in their performance improvement priorities in response not only to the model, but also to additional changes in CoP, their Star Ratings and performance expectations and requirements of referring entities (e.g., health systems, ACOs and PAC management companies). For some agencies, the HHVBP metrics influence decisions regarding identifying improvement areas; others reported minimal model impact. Many routinely discussed using data analytics and records review to identify the root causes related to poor scores or areas meriting further improvement in quality metrics.

*"… QAPI has transitioned from a 'check-box' item in our organization. [From] 'I have to get it done, because that's what I'm supposed to do' to, 'Let's put all of these pieces together and actually understand that QAPI is not just a meeting that you have every quarter'… that's kind of the mindset that has transitioned especially over the last year."*

Agencies' overarching emphasis on quality led HHAs to continue to refine their QI strategies. Many agencies, as in previous years, focused on improving strategies to avoid unnecessary hospitalizations. The reportedly ever-increasing acuity of patients further complicates this effort. Some agencies use systems to identify high-risk patients, and some use clinical protocol or pathways for certain high-risk conditions.

Unlike in previous years, few agency interviewees mentioned frontloading as a strategy, and fewer mentioned a goal of assigning the same clinician to the patient over the course of a patient's care to ensure continuity. Several agencies enhanced team communication about care plans and changing patient needs, and offered encrypted texting platforms to facilitate team communication while clinicians are in field. A regional executive of a large national chain indicated that practices put into place in her state by the chain is probably no different than those in chain-affiliated agencies in non-HHVBP states as the goal is the same – "to improve quality metrics and decrease avoidable hospitalizations."

### Agencies relied on data analytics and technology to support timely, data-driven decision-making

Again this year, most agency participants reported taking time to analyze as much data as are available on an ongoing basis to identify opportunities for improvement, often supported by multiple software vendors and information systems. About half of the interviewees reported that their agency changed some aspect of how they used technology and/or data analytics software since we first spoke to them in 2017 or 2018. During the 2020 interviews, agency representatives more frequently described broader performance measurement and documentation demands than model requirements. A few agencies reported shifting to more widely adopted EHR and data analytics systems in order to make it easier to recruit and onboard new staff who were already familiar with commonly used software systems.

*"We just recently switched to EMRs, a lot of that was driven around making our clinicians stronger with technology. It's not just rooted in VBP."*

Agencies frequently noted that industry software provides much needed and more accurate, real-time measurement of processes and performance and benchmarking than what is available through the HHVBP Model performance reports. Again this year interviewees reported that agencies rely on software and in some cases vendor support to identify areas for improvement at multiple levels, including individual agencies within larger organizations, multi-disciplinary teams, and individual clinicians. The data analytics work supports targeting areas where staff need additional training and education to enhance assessment and care planning skills as well as improve OASIS documentation. Agencies made additional upgrades in data analytics, EHR and point of care systems and remote communication platforms to support a data-driven process. Several agencies upgraded technology to aid communication and decision making between clinicians and staff while in the field or in patients'

homes (mobile technology, tablets, TigerText). These upgrades aimed to increase efficiency of electronic charting at the point of care.

Organizations lacking strong analytic capabilities in the initial stages of HHVBP that added new software platforms (and in some cases, hired vendors) reported gaining additional data analytics capabilities, improving OASIS documentation, and increasing monitoring of measures that are used in the HHVBP Model Star Ratings. Interviewees also reported large software vendors improved their systems over time, including HHVBP-specific modules as well as additional features of interest to facilitate identification of problem areas requiring improved training and more accurate documentation and coding.

### *Did the HHVBP Model influence agencies' patient engagement efforts and patient selection?*

In this most recent round of discussions, agency representatives described introducing new patient engagement activities over the past several years. Agency representatives generally reported that the model itself had not materially impacted the type of patients they choose to serve. We discuss each of these topics in detail below.

#### Agencies reported no significant changes in patient selection

While in previous years some interviewees expressed concern about being penalized for taking care of patients who may show little improvement and concerns that other agencies cherry-picked patients, interviewees rarely mentioned such concerns this year. This may be in part due to the smaller financial impact agencies experienced from the HHVBP payment adjustments compared to expected adjustments; several noted that their good standing with referrers requires accepting all referred patients regardless of their ability to show improvement.

Most interviewees reported focusing on caring for any referred patients for whom they felt capable of providing the needed services. As noted in the staff training section above, a few interviewees mentioned the challenge of treating patients unlikely to see improvement in functioning such as those with advanced terminal illness or dementia, or patients with severe disability. Several participants mentioned that their agencies are not equipped to work with patients with significant mental illness, and one noted they do not admit such patients because they do not have a psychiatric nurse on staff. Still, other representatives mentioned sometimes receiving inappropriate referrals due to premature hospital discharge or home being an inappropriate care setting.

#### Agencies focus on patient engagement to improve clinical outcomes and patient-reported experience

To enhance and improve patient experiences, agencies continued to implement a variety of strategies, including: ensuring consistent staffing (providing continuity of care within the patient experience, ensuring consistent assessment at start of care and discharge); increasing 'touches' by clinical staff to decrease rehospitalization rates (particularly for high-risk patients); and incorporating teaching methods supporting active patient participation in the plan of care (patient-centered goal-setting, condition-specific education, motivational interviewing techniques).

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*"We literally talk with the patient [about] how often you go [to the hospital], why you go, and the symptoms you have when you normally have to go. We write those symptoms down, so they are identifiable to that patient. We get into a lot more detail in how we are going to manage the patient, not only with the staff, but with the*

*patient themselves and the caregiver... We are talking about patient care with a specific focus on outcomes achievement."*

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Interviewees reported that their agencies use educational tools and materials, including materials newly developed to help ease patient transitions home and help staff foster better patient understanding and expectations of home health care. Several participants reported that their agencies provide patients with patient-driven tools to encourage self-management. Another agency representative mentioned developing "care kits" for each patient that include a section for journaling and space for the spouse or caregiver to note things to discuss at the next home health visit. Interviewees also mentioned educating patients about medication management to help patients understand how to use their medication. Interviewees frequently made these references when speaking about agency efforts to reduce rehospitalization rates. In particular, an interviewee representing agencies in multiple states made the connection between patient experience and the HHVBP Model:

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*"I think patient engagement and patient satisfaction remain the largest opportunity from a VBP perspective for us to shift our strategies. For 2020, VBP has driven different committees and teams to be formed to drive improvement in patient satisfaction where we have been stagnant."*

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As mentioned in previous years, many agencies sought to reinforce HHCAHPS survey responses as part of patient education activities. For example, when teaching about fall prevention, nurses might reinforce the patient engagement message by saying, *"now we have talked about how to set up your home and move about safely,"* reminding patients that this HHCAHPS element has been discussed. This is another example of the reinforcing aspects of various programs, allowing Star Ratings, HHCAHPS, and HHVBP to become integrated initiatives.

*Did agencies use available CMS resources to support the transition to HHVBP?*

Finally, when asked about CMS resources, most interviewees reported using them in the past—especially during the initial stages of the HHVBP Model—but not currently using them as much as they did in prior years. A third of the HHA representatives this year indicated that the CMS resources were more valuable at the beginning of the HHVBP initiative, when agencies were still getting oriented. Interviewees most frequently cited CMS webinars as the resource they or their staff used this year. This information aligns with the results of our HHVBP Connect analyses (Section 11.3), which show agencies used HHVBP Connect less in 2019 as compared to the first three years of the model. Additionally, webinars continue to be among the most frequently accessed resources.

### 11.2.3 Discussion

Most interviewees this year perceived that the HHVBP Model complemented other existing CMS initiatives to improve agency quality and performance. Agencies most frequently mentioned Star Ratings as a key driver of their improvement strategies, but also mentioned changes in CoPs, efforts to reduce avoidable readmissions and refine QAPI plans, and activities related to PDGM, OASIS updates, audits, TPE, and, in some states, Review Choice. Agency strategies to address this multitude of initiatives included focusing agency operations on continuously improving data analytics, quality, and performance

and working to recruit and retain staff to support these efforts. The combination of these forces, even before the COVID-19 Public Health Emergency, reduced the focus on HHVBP-specific activities over time.

These interviews provide additional evidence that agencies across the country are experiencing a multitude of internal and external pressures from national initiatives related to improving operations and care delivery and we should expect some effects of the model in HHVBP states to be similar to those in non-HHVBP states. In addition, findings from this years' interviews continue to suggest a possible "spillover" effect of HHVBP in chain-affiliated agencies also operating in non-HHVBP states which may weaken the estimates of the model when comparing HHVBP to non-HHVBP states.

## 11.3 HHVBP Connect

As part of our quantitative analyses, we examined the use of HHVBP Connect by HHAs in HHVBP states during the fourth performance year of the model (2019). HHVBP Connect is an interactive web-based platform for HHAs in HHVBP states designed to facilitate learning and collaboration on topics related to the HHVBP Model.

Similar to previous years, we found that use of HHVBP Connect in 2019 by HHAs continued to decline from the first three years of the model, including a lower number of unique logins and webinar participants and fewer downloads and online posts. This lower utilization may reflect agencies' increased familiarity with the HHVBP Model, translating to less need for technical assistance.

Content related to quality improvement activities and updates to the HHVBP Model continued to be the most frequently accessed (e.g., downloads and webinar participation) resources. Similar to prior years, the most frequently used HHVBP Connect resource type in 2019 was downloading resources, with 4,497 downloads of the 105 resources created in 2019. This reflects a continued decrease in downloads from the first three years of the model (i.e., 61 percent, 40 percent, and 24 percent fewer downloads than in 2016, 2017 and 2018, respectively). The second most frequently used HHVBP Connect resource in 2019 was attending live webinars, with 963 cumulative attendees participating in 13 different webinars; this is comparable to 2018 (963 cumulative attendees participating in 14 different webinars), but like downloads, reflects a decrease from previous years (i.e., 85 and 60 percent decrease from webinar attendees in 2016 and 2017, respectively). We provide further details of our analyses of HHVBP Connect in Section C.13.2 (Page 178) in the Technical Appendix.

## 11.4 HHVBP Self-Reported Measures

As part of our quantitative analyses through the fourth performance year of the HHVBP Model, we examined the reporting rates of the three HHVBP measures among HHAs in the HHVBP states via the Secure Web Portal:

- Influenza Vaccination Coverage for Home Health Care Personnel;
- Herpes Zoster (Shingles) Vaccination for Patient; and
- Advance Care Plan.[24]

[24] The "Advance Care Plan" measure reflects the "Percentage of patients aged 65 years and older who have an advance care plan or surrogate decision maker documented in the medical record or documentation in the medical record that an advance care plan was discussed but the patient did not wish or was not able to name a surrogate decision maker or provide an advance care plan." (HHVBP Connect, 2016).

In 2019, 90.8 percent of all agencies in HHVBP states reported herpes zoster vaccination status of patients, and the same percent of agencies reported whether an advance care plan was present. A smaller share of agencies (80.9 percent) reported the influenza vaccination status of their personnel. Among agencies that reported influenza vaccination status, all but one also reported the other two measures. As such, the agency reporting rate for all three measures (80.8 percent) was nearly the same as the rate at which agencies reported influenza vaccination. The 2019 reporting rate for all three measures was slightly higher than in 2018 (79.6 percent) but lower than in 2017 (83.4 percent). Only 9.0 percent of agencies reported none of the three measures in 2019, which was a slight decline from 2018 and 2017 (9.7 percent and 9.1 percent, respectively). As we found in previous years, reporting rates were lower among small, freestanding, for-profit, newer, and non-chain agencies. Low TPS scores and negative payment adjustments were also associated with lower reporting rates (see Exhibit C-66 [Page 177] in the Technical Appendix).

# 12. Future Activities

This Annual Report presents findings of our evaluation for the first four performance years of the HHVBP Model. Moving forward, we will continue to address the goals and research questions identified for this evaluation (see Section 1). In doing so, our future evaluation activities will build on our findings from these first four years. Below, we conclude with an overview of some of the further analyses and data collection activities that are being considered and represent priorities for further evaluation of the impact of HHVBP.

***Evaluate the effects of applying larger payment adjustments and adopting stronger incentives related to the HHVBP claims-based measures.*** In this report, we conducted analyses of the impact of the HHVBP Model on measures of quality of care, utilization, and Medicare spending through the first two years of quality incentive payments to home health agencies. For future reports, we will assess whether the observed effects of HHVBP intensify in response to the application of a wider range of payment adjustments (i.e., of up to ±6 percent in CY 2020) and to the greater financial implications in future payment years (i.e., with agency performance in 2020 determining payment adjustments of up to ±8 percent in CY 2022). We will also ascertain whether the shift in incentives towards the claims-based quality measures through adjustments to the measure weights that began in 2019 leads to a longer-term impact on claims-based outcomes for Medicare FFS beneficiaries, notably forms of utilization and Medicare spending.

***Continue to explore potential implications of HHVBP for the utilization of home health services and beneficiary access to home health care.*** While there is no strong evidence to date of a substantial impact of HHVBP on the utilization of home health services or of an adverse impact on access to home health care among Medicare FFS beneficiaries, the potential for such impacts has grown as the financial incentives under the model become stronger over time. As we show in this report, there are counties in which utilization of home health care is relatively low and access may be limited. Given the extent of the geographic variation we have observed in both measures of HH utilization and other potential indicators of access to home health care, it will be important to continue to consider whether HHVBP has unintended consequences for beneficiary access to care in some geographic areas, especially where there was more limited access prior to HHVBP implementation. In future reports, we will continue to conduct analyses of potential impacts of HHVBP not only nationally but also at the state and county level.

***Evaluate potential changes over time in HHVBP impacts on hospitalization and other forms of utilization.*** In this report, we showed that the favorable impacts of HHVBP in reducing unplanned hospitalizations applies across a broad range of conditions. However, we also found that these impacts are more likely to involve medical rather than surgical hospitalizations, and are also more pronounced for medical rehospitalizations following a clinically related index hospitalization. Our analyses in this report reflect the experience of HHAs and beneficiaries through the second year in which HHVBP payment adjustments were applied and through the first year in which the claims-based measures were weighted more heavily in calculating each agency's TPS. So far, the growing financial implications for agencies have not generally led to more pronounced impacts of the model. A possible exception is evidence of a larger decline in SNF utilization that emerged over the most recent two years of the model. We will continue to explore the potential for such changes over time in impacts on the types of hospitalizations most affected as well as on other forms of utilization as the model evolves. We will also

examine whether the larger weights for the claims-based measures may have effects over the longer term, as agencies have additional time to adapt to the resulting change in incentives.

***Further examine changes in agency frontloading practices.*** We provide evidence in this report that HHVBP led to both an increase in the number of skilled nursing and therapy visits occurring during the first two weeks of home health care following an institutional stay as well as to a shift in more of those visits occurring during the first week. Change in such frontloading practices represents one possible mechanism for the improvements in outcomes observed under HHVBP. In future reports, we will explore potential heterogeneous use and impacts of frontloading for patients with differing clinical reasons for home health as well as for patients who entered home health based on referral from a community physician rather than after an institutional stay. We hypothesize that agencies make use of frontloading by skilled nursing and therapy visits to differing degrees depending on clinical conditions and the severity of functional impairments and comorbidities. We expect that differences in the use of frontloading under different circumstances will reflect variation in the marginal benefit to quality from additional visits by each home health care profession type for each clinical category. We will also examine variation in the use of frontloading practices by agency characteristics (e.g. chain membership and size), which could contribute to differential impacts of the HHVBP Model across types of agencies or beneficiary subgroups.

***Continue to evaluate the impacts on vulnerable populations.*** One of our findings in this report is a pattern of differential impacts of the HHVBP Model among home health patients with Medicaid coverage. The impacts of the model in leading to fewer unplanned hospitalizations and greater improvements in functioning were not observed among Medicaid patients. Just as the progressively larger quality-based payment adjustments may lead to larger impacts that are aligned with the goals of the HHVBP Model, these increasing payment adjustments also could produce larger unintended impacts. Potential unintended consequences include risks to both access to care and quality of care for vulnerable populations for whom higher quality performance levels may be more difficult or costly to achieve. In future reports, we will continue to examine potential impacts of the model on home health utilization and quality of care for vulnerable subgroups of beneficiaries. We will expand our analyses to examine impacts on other beneficiary subgroups such as those with other social risk factors, having high health needs, or living in geographic areas with limited access to home health care. We will also investigate possible sources of the differential impacts observed for Medicaid patients, as well as the use of potential strategies by agencies to mitigate the risks for these populations (e.g., frontloading).

***Examine possible spillover effects of HHVBP into non-HHVBP states.*** Effects of the HHVBP Model may spill over into non-HHVBP states due to the affiliation of many HHAs with regional or national chains that operate in both HHVBP and non-HHVBP states. The HHA surveys that we fielded in 2018 found evidence of similar overall quality improvement initiatives between HHAs in HHVBP and non-HHVBP states. In 2019, we learned through our interviews with representatives from home health chain organizations that their approach to quality improvement did not vary by an agency's location in an HHVBP versus non-HHVBP state. In the presence of such spillover, our analyses may understate the positive impact of HHVBP. We will conduct analyses involving subgroups of HHAs defined based on their affiliation with a chain, involving comparisons such as (1) HHVBP versus non-HHVBP HHAs affiliated with a chain that operates in both HHVBP and non-HHVBP states; or (2) non-HHVBP HHAs affiliated with a chain having a strong presence in HHVBP states versus non-HHVBP HHAs affiliated with a chain having a weak or no presence in HHVBP states.

These analyses require accurate information about the identity of the specific home health chain with which each agency is affiliated. However, the chain names reported in OASIS and Medicare Cost Reports may include self-reporting errors. In particular, this information may not reflect the results of mergers or acquisitions. To improve the accuracy of the information we use in determining agency affiliations with the largest for-profit home health chains, we will supplement our existing data with financial data reported in their annual Form 10-K filings with the U.S. Securities and Exchange Commission.

***Continue to examine impacts on the use of potential substitutes for home health care.*** Given a degree of discretion over whether and how home health care is provided as well as the availability of alternative forms of care that may be considered as substitutes for some beneficiaries (e.g., SNF or outpatient therapy services), there is potential for home health utilization patterns to change in response to the increasing payment incentives under the model. In this report, we found that HHVBP led to modest increases in admissions to home health care during the most recent two years of the model for patients transitioning from acute inpatient settings within the past 14 days. As data for future years become available, we will examine whether this recent impact persists or perhaps becomes more pronounced as the quality incentives under the model become stronger.

***Explore possible interactions between HHVBP and other CMS initiatives.*** In analyses for this annual report, we adjusted for the impact of beneficiary alignment to the Innovation Center's APMs on HHVBP measures of interest. Since APMs may influence the use or quality of home health care among Medicare beneficiaries, they may have implications for the extent of quality improvement in response to HHVBP incentives. For example, in the Third Annual Report, (Arbor Research, 2020) we reported our findings from agency interviews that APM requirements presented challenges to agency operations. As a result, there is potential for the impact of HHVBP on utilization and spending to differ depending on whether home health patients are aligned with an APM. As the share of APM-aligned home health episodes has continued to increase, we will explore potential interactions between HHVBP and APMs. To complement our quantitative analyses, we plan to interview ACO or other APM conveners to provide evidence about how ACOs and other APMs use HHAs and other PAC settings in the continuum of care; how this has changed over time; and how these changes affect findings from the HHVBP evaluation.

***Evaluate whether recent changes to the HH PPS modify the impacts of HHVBP.*** Recent changes in the HH PPS may have implications for how agencies respond to the HHVBP Model. The shift from 60-day episodes to 30-day episodes under the HH PPS may affect agency incentives regarding the timing of visits during episodes, including the use of frontloading practices which may have contributed to the observed gains under HHVBP. In addition, the implementation of the Home Health Patient-Driven Groupings Model (PDGM), which eliminates the use of counts of therapy services in determining case-mix adjusted payments, may lead to fewer therapist visits per episode and may have financial implications for agency quality improvement activities. In future reports, we will explore whether the observed impacts of HHVBP are modified by the HH PPS reform.

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