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

# First Annual Report

Arbor Research Collaborative for Health
and L&M Policy Research

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**NOTICE**
The statements contained in this report are those of the authors and do not necessarily reflect the policies or views 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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# Acronym List

| Acronym | Term |
|---|---|
| **ACH** | Acute Care Hospitalization |
| **ACO** | Accountable Care Organization |
| **BPCI** | Bundled Payments for Care Improvement |
| **CJR** | Comprehensive Care for Joint Replacement |
| **CMS** | Centers for Medicare and Medicaid Services |
| **COPs** | Conditions of Participation |
| **CY** | Calendar Year |
| **D-in-D** | 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 |
| **LUPA** | Low Utilization Payment Adjustment |
| **OASIS** | Outcome and Assessment Information Set |
| **PEP** | Partial Episode Payment |
| **RQ** | Research Question |
| **QAPI** | Quality Assurance and Performance Improvement |
| **SNF** | Skilled Nursing Facility |
| **SOC** | Start of Care |
| **TPS** | Total Performance Score |

# Executive Summary

## *Overview of HHVBP*

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 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 higher quality care and greater efficiency. All eligible agencies in the nine selected HHVBP states will have their Medicare payments adjusted upward or downward based on their Total Performance Score (TPS), a composite score of an agency's quality achievement/improvement. The Model's financial incentive is provided by an adjustment to Medicare HHA payments based on their TPS values relative to other agencies within a state (or state HHA size cohort). The adjustment redistributes Medicare payments among agencies within a state to reward agencies with relatively higher achieved quality or improved quality to provide a penalty to relatively lower quality agencies.

The HHVBP payment adjustment for any given year is applied to Medicare Home Health Prospective Payment System (HH PPS) payments two years after the performance year. Thus, the first payment adjustment occurs in calendar year (CY) 2018 and is based on CY 2016 data. Based on their performance in CY 2016, agencies may experience an upward or downward adjustment of up to 3% of their Medicare payments in 2018, based on their relative quality performance. The percentage of Medicare payments subject to the adjustment increases over the course of the model and will ultimately result in 8% of an agency's payments being subject to adjustment based on their relative quality performance. The focus of this report is on CY 2016, the first performance year of the HHVBP Model.

The primary goal of this evaluation is to understand how the shift in financial incentives under the HHVBP Model may influence agency behavior and impact quality of care, Medicare expenditures, beneficiary experience, and the utilization of Medicare services. This Annual Report captures the preliminary findings of our evaluation based on data available for CYs 2012 – 2016, which includes both a baseline period prior to HHVBP implementation (CYs 2012 – 2015) and the first performance year for HHVBP (CY 2016). The analyses presented in this report consider initial effects that may result from the introduction of HHVBP performance measure collection and changes the agencies made in preparation for their CY 2016 performance being used to obtain a future year's payment adjustment. Thus, the effects observed in this report occurred prior to the HHAs being notified about their initial HHVBP payment adjustments for CY 2018 (when the initial payment adjustments are applied). Future Annual Reports will address additional research questions, as the evaluation is able to incorporate data for the CYs when the HHVBP payment adjustments are applied (2018 – 2022) as well as for later performance years (CYs 2017 – 2020) as those data become available.

## *Evaluation Approach*

Our evaluation approach intends to both capture changes in the behavior of HHAs that occur in response to HHVBP and identify any effects of HHVBP on the relevant impact measures for this evaluation. To accomplish this, we employ a mixed methods design incorporating both qualitative and quantitative analytic approaches.

For the first year of the evaluation, we interviewed representatives of 67 agencies across the nine HHVBP states to understand how agencies responded during the first performance year (CY 2016). As

another primary aspect of our evaluation, we used quantitative approaches to identify initial effects during the first performance year (CY 2016) on several key impact measures of interest. For this first year of the evaluation, these include the quality and performance measures that are part of the TPS – such as preventing unplanned hospitalizations and promoting the ability of patients to manage daily activities and patient experience of care – and other key indicators of service utilization and Medicare spending.

We employed a difference-in-differences (D-in-D) framework to compare changes in impact measures observed over time in the HHVBP states relative to those observed for comparison groups, as defined using data for beneficiaries and HHAs drawn from the 41 states not participating in HHVBP. The D-in-D framework uses 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. For example, the D-in-D design enables us to control both for changes occurring over time that are common to all beneficiaries as well as for unmeasured differences between intervention and comparison states that do not change over time. It thus assumes that if there was more improvement in quality between the base period and the performance period in the treatment population than occurred in the comparison group, that improvement is associated with the presence of the HHVBP model.

Development and application of our analytic approach presented multiple challenges. First, the numerous and diverse impact measures of interest are measured over different populations and involve different units of analysis and data sources. In addition, broader changes are occurring in the home health landscape related to the relevant impact measures. For the analyses presented in this first-year report, we developed a hybrid comparison group strategy that leverages approaches tailored for three subsets of impact measures:

1. Entropy balancing for measures corresponding to potential home health beneficiaries (e.g., to examine changes in the home health population);
2. Home health beneficiary matching for measures corresponding to home health users (e.g., to examine changes in outcomes among home health patients);
3. HHA reweighting for measures evaluated at the agency level (e.g., to examine changes in overall agency quality of care).

We acknowledge that the hybrid strategy described above is complex. As part of our work for future reports, we will examine alternative approaches to simplify and refine our comparison group methodology.

For this first Annual Report, our analyses focus on impact measures for the initial performance year (CY 2016) for all participating states combined. We note that this year's results are preliminary. In subsequent reports, we will present results for both the first and second HHVBP performance years (i.e., CY 2016 and CY 2017), and also plan to report findings for individual HHVBP states, where feasible, as well as for all HHVBP states combined. As the evaluation proceeds, we will continue to examine our evaluation approach in light of any developments in the HHVBP Model's markets that may motivate adjustments to our approach.

## *Key Findings*

In the following paragraphs, we discuss key findings from quantitative and qualitative analyses reflecting the experience of home health beneficiaries and agencies during the first performance year of the HHVBP Model.

***Early overall improvement in HHA Total Performance Scores*.** The TPS reflects agency performance on 20 measures that correspond to distinct aspects of care and are defined using four different data sources. Functional improvement and process of care measures are obtained from the Outcome and Assessment Information Set (OASIS), the patient assessment tool that agencies are required to complete. Unplanned hospitalization and emergency department (ED) utilization measures are derived from Medicare claims, and patient experience of care measures are obtained from the Home Health Care Consumer Assessment of Healthcare Providers and Systems (HHCAHPS) survey. In addition, agencies self-report three new process measures on vaccinations and advance care planning.

TPS scores increased between 2015 and 2016 in both HHVBP agencies and non-HHVBP agencies. The increase in TPS among the comparison group agencies may be an indication that they may have been also responding to other quality of care initiatives, such as the introduction of the CMS Star Ratings program, which was mentioned during the interviews we conducted with agency representatives.

While we observed indicators of quality improving overall, we observed greater rates of improvement among HHVBP agencies. The TPS score increased by 2.3 points more for HHAs in the HHVBP states relative to the comparison agencies. This represents a 7.4% increase over the average baseline TPS of 30.9 among agencies in the HHVBP states.

***Mixed results for Medicare spending and utilization*.** By design, the HHVBP Model aims to incentivize agencies to deliver higher quality care. There is an expectation that improvements in the provision of home health services may reduce the need for a beneficiary to be hospitalized, discharged from an HHA to a Skilled Nursing Facility (SNF), or admitted to an ED. Thus, we expect utilization and Medicare spending for these services to decline if the Model is successful. We expect other types of utilization to not change in the same manner and do not anticipate inadvertently increasing utilization and Medicare spending for other services. The incentives to change behavior in this first year are weaker because CY 2016 is a performance year rather than a payment year. Therefore, the model's incentives may not be sufficient to result in detectable impacts. Analysis of future years may result in greater impacts on utilization and Medicare spending once Medicare payments to HHVBP agencies are adjusted for quality of care.

Overall, we observed mixed findings regarding changes in measures of Medicare spending and utilization among Medicare Fee-for-Service (FFS) beneficiaries who received home health services. We observed no statistically significant change in unplanned hospitalizations, while the average Medicare payment per unplanned hospitalization decreased relative to the comparison group. The D-in-D estimate of the relative decrease in Medicare spending for unplanned hospitalizations among HHVBP states during CY 2016 was $32, which compares to an average of $2,178 in HHVBP states during CY 2015. Consistent with the theory of action in the Model, we observed early evidence during the first performance year of reductions in both Medicare spending and utilization for SNF services. Based on D-in-D estimates, the relative decrease in SNF utilization among HHVBP states during CY 2016 was 0.09 percentage points, which compares to a 1.7% decrease from the average SNF utilization of 5.2% in HHVBP states during CY 2015.

Among other categories of Medicare utilization, we observed an increase in utilization of ED visits not leading to a hospitalization among Medicare FFS beneficiaries who received home health services, relative to the comparison group. The D-in-D estimate of the relative increase in ED utilization among HHVBP states in CY 2016 was 0.2 percentage points, which represents a 1.8% increase in the average ED utilization of 11.9% in HHVBP states during CY 2015. An increase in ED visits was not an expected effect of the Model, though the estimated effect is not large in either absolute or relative terms and coincides with observed reductions in other areas (e.g., Medicare spending for unplanned hospitalizations and SNF services).

We also looked for changes in either Medicare spending or utilization for home health services among all Medicare FFS beneficiaries in order to examine changes in case-mix that would result in increased Medicare payments or changes in the number of home health episodes. We did not observe any impact for these measures in the first year of the Model.

***Mixed findings on effects for OASIS-based measures*.** The TPS measure used for 2016 includes a total of 10 OASIS-based impact measures. There are seven OASIS-based patient outcome measures, which include six functional improvement measures and one discharge to community measure. The remaining three OASIS-based measures are process measures, which indicate how often an agency gave recommended types of care to its patients.

We observed improvements among the overall population of beneficiaries receiving HH services in HHVBP states relative to similar HHA users for four of the OASIS-based functional improvement quality outcome measures and no differential changes for the other three OASIS quality outcome measures.

It is possible that the observed changes in the functional improvement outcome measures may not necessarily reflect actual quality improvements. For example, examination of specific measures may suggest that increasing rates of improvement over time from the baseline may in part reflect lower scoring of reported patient status at admission, rather than absolute improvement in patient status at discharge. Qualitative data from interviews with a sample of HHAs in HHVBP states suggested that one possible reason for lower scoring at admission was agencies' reaction in part to the incorporation of functional outcomes in the HHVBP. Many agencies said quality improvement initiatives, such as the HHVBP Model, incentivized them to place more emphasis on accurately assessing patients' functional status in OASIS start of care submissions, resulting in patients receiving lower functional scores than they would have otherwise had.[1]

D-in-D results indicate improvements over time in each of the three OASIS-based process measures among all HHVBP agencies combined relative to their comparison group, though levels of performance for each at baseline already tended to be relatively high.

Among the HHAs we interviewed this year, the most commonly reported response to HHVBP was a focus on staff education on assessing patients and correctly completing OASIS documentation.

[1] Lower functional scores for patients may occur when the instructions for scoring functional status for OASIS are specifically followed. Decline in functional scores, thus, may be due to factors other than "downcoding."

Together, our preliminary findings for OASIS-based HHVBP performance measures point to effects on care processes (e.g., we observed larger gains in process measures than outcome measures in the first performance year), but do not yet suggest effects on patient care outcomes.

***No evidence of HHVBP impact on patient experience measures.*** Another component of the TPS is performance on patient experiences measures using information from the HHCAHPS survey.

Overall, measures of patient experience with home health care have been stable over time among agencies in both HHVBP states and their comparison group. For most of the HHCAHPS measures included in the HHVBP TPS, we identified no differential changes in patient experience during CYs 2015 – 2016 among all HHVBP states combined.

***Early changes in HHA operations were relatively focused and similar to ongoing activities.*** In addition to the focus on more accurate OASIS documentation at the start of an HHA episode of care mentioned above, many agencies also noted that in its initial year, their participation in HHVBP encouraged them to continue quality improvement efforts that were already underway. However, HHVBP did not cause the majority of agencies to shift their strategies or increase their staffing in these areas. Existing quality improvement activities were often related to existing CMS initiatives designed to improve HHA performance and public reporting of HHA quality data such as monitoring quality for their Star Ratings.

### *Conclusions*

During the first year of HHVBP, gains in agencies' TPS in HHVBP states exceeded gains occurring in the comparison agencies. Among the 17 HHVBP performance measures observed during the first performance year, we found the largest increases in quality scores among the four OASIS functional improvement outcome measures.

We found early indications, however, that at least some of these improvements may reflect lower scoring of reported patient status at admission over time rather than absolute improvement in patient condition at discharge. These results align with qualitative findings from agencies in HHVBP states that reported that more accurately documenting patient functional impairments on the OASIS intake form was a common focus of agency efforts during the first year of the HHVBP Model. Preliminary findings regarding the effects of Model startup on utilization and Medicare spending were mixed, while measures of patient experience with home health care showed no early effects. Together, these preliminary findings indicate that there has not yet been a detectable impact of HHVBP on home health patient outcomes, utilization, or Medicare spending during the first year.

Further analyses incorporating data for subsequent years of operation will be instrumental in forming conclusions about the effects of the HHVBP Model. We anticipate several reasons to expect changes over time in its impact on quality of care, utilization, beneficiary experience, and Medicare spending. One reason is that the first year of operation represents the initial performance period that will determine Medicare payments to HHAs that take effect in CY 2018. As agencies become aware of their initial payment adjustment during CY 2017 and are subject to payment adjustments starting in CY 2018, agencies may change their behavior more such that HHVBP may begin to have a larger impact.

In addition, CMS designed the financial incentives for quality improvement under HHVBP to become stronger over time, as the range for potential payment adjustments becomes successively larger throughout the Model's five-year span. As the range of payment adjustments increase, more agencies may be prompted to increase their attention to the Model and to undertake new or more intense

quality improvement efforts. Further, we may see a learning effect as agencies gain experience and expertise over time in how to improve their performance.[2] As the HHVBP Model continues, we will focus on both measuring impacts based on the full experience of HHVBP to date and considering the possibility of distinct effects of HHVBP at various stages of its operation.

[2] This type of training is provided by CMS to agencies in HHVBP states through the HHVBP Connect Website.

# 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 were defined based on geographic location, utilization, demographics, and clinical characteristics; each regional grouping contained five to six states (HHS, 2015).

Starting in CY 2018, each eligible HHA in the HHVBP states will have its Medicare payments adjusted upward or downward by up to 3% based on its Total Performance Score (TPS). These adjustments modify the otherwise applicable payment rates for HHAs under the Medicare home health prospective payment system (HH PPS). The initial HHVBP payment adjustments occurring during CY 2018 are based on HHA quality performance levels achieved during CY 2016. As shown below in Table 1, the maximum adjustment range to an agency's Medicare payment amount will increase each year between CY 2018 and CY 2022.

*Table 1. Potential HHVBP Model Payment Adjustment Amounts, by Calendar Year*

| Calendar Year | Payment Adjustment? | Maximum Payment Adjustment |
|---|---|---|
| 2016 | No | -- |
| 2017 | No | -- |
| 2018 | Yes, based on 2016 TPS | +/- 3% |
| 2019 | Yes, based on 2017 TPS | +/- 5% |
| 2020 | Yes, based on 2018 TPS | +/- 6% |
| 2021 | Yes, based on 2019 TPS | +/- 7% |
| 2022 | Yes, based on 2020 TPS | +/- 8% |

## 1.1 Design of the HHVBP Evaluation

CMS has contracted with Arbor Research Collaborative for Health (Arbor Research), in collaboration with our primary partner 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. To achieve this goal, the evaluation of the Model spans an eight-year period that will allow CMS to understand the impact of HHVBP throughout its life cycle. This evaluation intends to understand how impact measures of interest change over time in the HHVBP Model states, and how this compares to changes that would have been observed in the absence of the HHVBP Model. The primary research questions (RQs) to be addressed over the course of this eight-year evaluation are:

- What is the impact of the HHVBP Model on the performance measures used in the HHVBP Model? (RQ1)
- What is the effect of HHVBP on home health utilization, home health quality, Medicare home health costs and payments, and home health beneficiary experience? (RQ2)
- How does HHVBP impact HHA operations, characteristics of HHAs in operation, and fiscal solvency? (RQ3)
- Are there unintended consequences of HHVBP? Do other CMS initiatives, external initiatives, or other policies have implications for the effects of HHVBP? (RQ4)
- What is the impact of HHVBP on Medicare more broadly? (RQ5)
- What is the feasibility of expansion of the HHVBP Model beyond the nine intervention states and its anticipated effect on supporting CMS' Triple Aim of providing better care, lower costs, and improved health? (RQ6)

To address these research questions, we employ a mixed-methods design incorporating both quantitative and qualitative analytic approaches. Ideally, in evaluating the impact of HHVBP, we want to understand the counterfactual: What would have happened in the nine intervention states in the absence of HHVBP? This evaluation employs a difference-in-differences (D-in-D) framework to compare changes in impact measures observed in the nine intervention states with those observed for a comparison group comprising HHAs and beneficiaries in non-HHVBP states. We will use quantitative data on spending, utilization, quality, patient experience, and beneficiary and agency characteristics from administrative sources to compare the changes in Model impacts between HHVBP states and their comparison groups throughout the course of operation of the Model.

This evaluation is also collecting primary data to provide information about the behavior of providers under the HHVBP Model and its potential impact on beneficiaries. Throughout this evaluation, we will collect qualitative data through interviews with HHAs, discharge planners, referring physicians, and other stakeholders to understand aspects of provider and referrer behavior that may be influenced by HHVBP and cannot be observed using administrative data. Analysis of these qualitative data may highlight issues for further quantitative analysis as well as provide context for interpreting quantitative results. We will augment these interviews with surveys of HHAs to further understand the impact of the Model on agency operations. In addition, we plan to field the Home Health Consumer Assessment of Healthcare Providers and Systems (HHCAHPS) survey to a sample of home health beneficiaries receiving care from small HHAs that are exempt from collecting HHCAHPS performance measures (due to serving fewer than 60 patients per year).

## 1.2 Scope of this Annual Report

This is the first Annual Report for the evaluation, presenting the preliminary findings of our evaluation through the first performance year of the HHVBP Model (CY 2016). As reflected in Table 1 above, the

performance of HHAs during CY 2016 will determine the payment adjustments of up to +/-3% that are applied to Medicare home health claims during CY 2018. We may observe early effects of HHVBP during CY 2016, as HHAs may have started to try and improve the likelihood that they would receive a performance incentive that would affect their Medicare payments in CY 2018, by attempting to improve their standing relative to their state peers. As such, the focus of this Annual Report is on the initial HHVBP Model effects that result from agency preparation for potential payment adjustments in a future year. The evaluation of any changes that may result from HHAs being notified about the magnitude of their initial HHVBP payment adjustments (that occurred in November 2017) or from the resulting changes in Medicare payments to HHAs (that began in January 2018) occurred after the period of performance examined in this report.

This report uses available data from CYs 2012 – 2016 that allows for evaluation of changes during the first performance year of the HHVBP Model (CY 2016) relative to a time period prior to implementation (CYs 2012 – 2015).[3] Based on these available data and the extent of the implementation of the Model through 2016, the focus of this first Annual Report is on the following subset of research questions:

- What appear to be early effects of the start-up of the HHVBP Model on the performance measures used in the HHVBP Model? (RQ1)
- What appear to be early effects of the first HHVBP performance year on utilization, quality, Medicare expenditures, and beneficiary experience? (RQ2a)
- How does HHVBP impact HHA operations? (RQ3a)

We addressed research questions RQ1 and RQ2a by conducting quantitative analyses of available data from Medicare claims, Outcome and Assessment Information Set (OASIS) assessments, and other administrative data sources for Medicare beneficiaries and HHAs that will be described in further detail below. For these analyses, we examined the full set of HHVBP performance measures used to calculate the TPS (RQ1) and the key utilization and spending measures expected to be impacted by the model including unplanned hospitalization rates and skilled nursing facility (SNF) use (RQ2a). To address research question RQ3a, we conducted interviews with stakeholders and HHAs during 2017. We utilized these interviews to capture the experience of a sample of HHAs in HHVBP Model states following the first performance year, but before the HHAs were notified about their final payment adjustments for CY 2018. We will address additional research questions in future Annual Reports, as discussed in Section 1.3.

## 1.3 Future Annual Reports

As the HHVBP Model continues, future Annual Reports will address additional research questions and incorporate more impact measures of interest. This will be possible as data become available for later performance years (CYs 2017 through 2020) and for CYs when the HHVBP payment adjustments are applied (2018 through 2022). Future Annual Reports will incorporate findings based on additional primary data collection activities and analyses that are relevant to the ongoing operation of the HHVBP Model. Below, we highlight several key evaluation activities to address expanded research questions in future Annual Reports (with the relevant primary evaluation research question(s) noted in parentheses):

[3] The nine HHVBP states were first proposed in July 2015 and finalized in November 2015 (HHS, 2015).

- Conduct analyses of HHVBP performance measures for subsequent performance years and for CYs when the HHVBP payment adjustments are applied, while considering possible effects of the increasingly larger range of payment adjustments over time (RQ1).
- Evaluate potential impact of HHVBP on the use of possible substitutes for home health care among Medicare beneficiaries (RQ2).
- Assess the experience of beneficiaries receiving care from small HHAs that are exempt from collecting HHCAHPS performance measures by fielding HHCAHPS surveys to these beneficiaries in both HHVBP and non-intervention states (RQ2).
- Examine changes in aspects of the quality of home health care for which there are no direct financial incentives under HHVBP (RQ2).
- Conduct additional interviews with stakeholders and HHAs to identify any future changes in the operations of HHAs as they gain experience under HHVBP and respond to the payment adjustments (RQ3).
- Expand the scope of qualitative interviews to include interviews with discharge planners and referring physicians to gain further perspectives on how provider behavior may be changing in response to HHVBP (RQ3).
- Design and field surveys to HHAs in both HHVBP Model states and non-Model states to gain additional insights about changes in HHA operations occurring in response to HHVBP (RQ3).
- Utilize Medicare HHA cost reports and other HHA-level data to examine potential changes in HHA profitability, the number and characteristics of HHAs in operation, and more generally in home health care markets, as a possible consequence of the application of the HHVBP payment adjustments (RQ3, RQ4).
- Examine possible unintended consequences of HHVBP, including potential effects on disparities in care involving vulnerable populations and on reporting of data on quality of care or patient case-mix (RQ4).

In addition to the evaluation activities summarized above, priorities for upcoming Annual Reports may depend on our evolving findings that can inform further data collection efforts and analyses. We will address other primary research questions (specifically, RQ5 and RQ6) in later stages of this evaluation and corresponding Annual Reports.

# 2. Evaluation Approach

This section summarizes our approach for the evaluation. We begin with 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. Next, we provide further information about the design of the HHVBP Model and discuss our conceptual framework for this evaluation. We then describe our overall analytic approach. (We provide additional details regarding our analytic approach in separate Quantitative and Qualitative Technical Appendices.)

## 2.1 Background: Medicare's Home Health Benefit and Payment System

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 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% of home health episodes) or as a referral from the community (66% of home health episodes) (MedPAC, 2016). Medicare 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, which make ensuring the appropriate use of this benefit challenging. 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).

Medicare's HH PPS pays HHAs a predetermined base amount for each 60-day episode of care that is adjusted for case-mix, service use, and geographic variation in wages. Additionally, other adjustments are designed to account for episodes associated with especially low or high resource use overall.[4] The case-mix adjustment methodology for the HH PPS uses home health resource groups (HHRGs) to distinguish relatively uncomplicated patients from those who have severe medical conditions or functional limitations or need extensive therapy. Each of the 153 HHRGs has a relative weight designed to reflect the average costliness of patients in that group relative to the average Medicare home health patient. CMS assigns patients to HHRGs based on both their reported clinical and functional status and the number of therapy visits during the episode. CMS defines HHRGs using data obtained from OASIS, an instrument used to conduct a comprehensive assessment of adult home care patients.[5] As discussed in the next section, OASIS data are also integral to home health quality measurement and are used in Home Health Compare (HHC), the Star Ratings program (that allows consumers to more easily assess agency quality; see Section 2.2.1 for more detail), and for measuring agency performance in the HHVBP Model.

## 2.2 HHVBP Performance Measures and Scores

### 2.2.1 HHVBP Performance Measures and Data Sources

As noted earlier, the payment adjustments for eligible HHAs under HHVBP are based on their TPS. For performance years (CYs) 2016 – 2018,[6] the HHVBP Model derives an HHA's TPS from its performance on the HHVBP performance measures (see Table 2 below). With the exception of the three new measures that are self-reported by HHAs in the nine HHVBP states via the Secure Web Portal, information on all eligible HHAs across the country is already collected and reported on these measures from Medicare claims, OASIS, or the HHCAHPS, a survey designed to measure the experiences of individuals receiving home health care from Medicare-certified HHAs. Also, the HHC website publicly reports most of these measures, and they are included in the CMS Star Ratings.

[4] The HH PPS has an outlier policy to adjust payment for short-stay and high-cost outliers. If a beneficiary has fewer than five visits, HHAs are paid per-visit, which is referred to as a low-utilization payment adjustment (LUPA). High-cost outlier payments are made for episodes whose imputed cost exceeds a threshold amount for each case-mix group. For each HHA, high cost outlier payments are capped at 10 percent of total home health payments. Medicare also adjusts the national standardized 60-day episode payment rate for certain intervening events that are subject to a partial episode payment (PEP) adjustment (HHS, 2017).

[5] Agencies do not have to complete OASIS for patients receiving services for pre- or post-natal conditions.

[6] For the CY 2019 – 2020 performance years, the TPS will be based on the HHVBP performance measures in effect for that year. The actual number of performance measures may change from year to year.

The different data sources used for the HHVBP performance measures reflect different underlying populations. For example, the Medicare claims-based measures are specific to Medicare Fee-for-Service (FFS) patients, whereas HHCAHPS is administered to Medicaid and both Medicare FFS and Medicare Advantage patients. Similarly, HHAs collect OASIS assessments and submit these data to CMS (by requirement) for all Medicare patients (including both FFS and Medicare Advantage) and Medicaid patients who are 18 years and older and receiving skilled services.[5]

The OASIS-based measures are based on HHA's self-reported data at multiple points in time during a home health episode (CMS, 2017b), including:

- Start of care (SOC)
- Resumption of care following an inpatient stay
- Recertification within the last five days of each 60-day recertification period
- Other follow-up during the home health episode of care
- Transfer to inpatient facility
- Discharge from home care
- Death at home

HHAs do not complete all OASIS items at every assessment. Per CMS guidelines, the comprehensive SOC OASIS assessment should be conducted by a registered nurse or any of the therapists (physical therapists, speech-language pathologists/speech therapists, or occupational therapists). If the patient's treatment involves nursing, the registered nurse must complete the comprehensive SOC assessment. For therapy-only patients, a therapist usually conducts the comprehensive SOC assessment. The discharge assessment is also a comprehensive assessment and must be completed within 48 hours of the agency's discharging the patient or becoming aware of the discharge (such as when the patient dies at home). OASIS data from a completed episode of care, whether from SOC to discharge or transfer to an inpatient facility, are used to calculate the quality measures that are reported on the HHC website and are used in the HHVBP Model.[7]

[7] Transfers-to-inpatient assessments are not used to compute the OASIS-based outcome measures but are included in the OASIS-based process measures.

*Table 2. HHVBP Performance Measures*

| HHVBP Performance Measures | Measure Type | Data Source |
|---|---|---|
| Emergency Department (ED) Use without Hospitalization* | Outcome | Medicare claims |
| Unplanned Acute Care Hospitalization (ACH)** | Outcome | Medicare claims |
| Improvement in Bathing** | Outcome | OASIS |
| Improvement in Bed Transferring** | Outcome | OASIS |
| Improvement in Ambulation-Locomotion** | Outcome | OASIS |
| Improvement in Dyspnea** | Outcome | OASIS |
| Improvement in Management of Oral Medications* | Outcome | OASIS |
| Improvement in Pain Interfering with Activity** | Outcome | OASIS |
| Discharged to Community | Outcome | OASIS |
| Influenza Immunization Received for Current Flu Season** | Process | OASIS |
| Pneumococcal Polysaccharide Vaccine Ever Received* | Process | OASIS |
| Drug Education on Medications Provided to Patient/ Caregiver during Episodes of Care[8]** | Process | OASIS |
| How often the home health team gave care in a professional way [Composite Measure]** | Outcome | HHCAHPS |
| How well did the home health team communicate with patients [Composite Measure]** | Outcome | HHCAHPS |
| Did the home health team discuss medicines, pain, and home safety with patients [Composite Measure]** | Outcome | HHCAHPS |
| How do patients rate the overall care from the home health agency [Global Measure]** | Outcome | HHCAHPS |
| Would patients recommend the home health agency to friends and family [Global Measure]* | Outcome | HHCAHPS |
| Influenza Vaccination Coverage for Home Health Care Personnel | Process | HHA Self-report |
| Herpes Zoster (Shingles) Vaccination for Patient | Process | HHA Self-report |
| Advance Care Plan | Process | HHA Self-report |

*Source: CY 2017 Final Rule (FR) (HHS, 2016), (CMS, 2017a)*
** Publicly reported on HHC*
*** Publicly reported on HHC and included in the CMS Star Ratings*

### 2.2.2 Total Performance Scores

The HHVBP Model calculates the HHA TPS based on agency scores for each of the performance measures for that year. For the three new HHA self-reported measures, HHAs receive points for reporting these measures; the scores on the measures do not affect the TPS. For each of the remaining HHVBP performance measures, HHAs receive points based either on achievement, reflecting their performance relative to a threshold score value, or improvement relative to their performance during the baseline period (CY 2015). The Model determines an HHA's level of achievement on each performance measure relative to baseline benchmarks and achievement thresholds calculated separately for each measure in each intervention state. For states with at least eight small HHAs (i.e.,

[8] This measure is dropped for 2018 and all subsequent years of the HHVBP Model (HHS, 2017).

exempt from collecting HHCAHPS performance measures), the HHVBP Model calculates baseline benchmarks and achievement thresholds separately for large HHAs versus small HHAs. For calculation of the TPS, HHAs receive the maximum points of either their achievement score or improvement score for *each* performance measure. The Model 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 that are in both the baseline and performance period with 20 or more episodes of care (OASIS- and claims-based measures) and/or at least 40 completed HHCAHPS surveys (HHCAHPS-based measures) in both the baseline and performance periods. Agencies must also have a Medicare participation date prior to the baseline year and be currently operating to be included (see the Quantitative Technical Appendix, Section 2.7, page 31 for more detail).

## 2.3 HHVBP Evaluation: Conceptual Framework

The effectiveness of the HHVBP Model depends on the extent to which it incentivizes HHAs to modify their operations and care delivery in ways that improve the quality of home health care and patient outcomes, while controlling or reducing costs to Medicare. Our evaluation emphasizes the collection, analysis, and synthesis of information that is most relevant to how HHAs in each of the nine Model states respond to the HHVBP Model, in comparison to non-Model HHAs throughout the same time period. Our analysis will examine whether the HHVBP Model is achieving its overarching goal—to improve the quality of home health services and efficiency of care—and identify any potential unintended consequences. Below, Figure 1 provides an overview of the conceptual framework that guides our evaluation approach.

The conceptual framework in Figure 1 highlights key pathways for change under the HHVBP Model. This framework informs our approach to addressing the evaluation research questions presented above in Section 1.1. Broadly, the HHVBP Model's financial incentives aim to incentivize agencies to take additional steps to improve their performance or otherwise achieve high levels of performance on the measures that determine their TPS. Depending on the TPS results for each HHA, the corresponding changes in Medicare payments may in turn influence their future behavior. This may include subsequent changes in agency operations designed to raise or bolster performance in certain areas. Alternatively, HHVBP payment adjustments may influence agency decisions regarding market entry/exit or perhaps consolidation.

The response of agencies to HHVBP may have implications for the use of home health services among beneficiaries and corresponding Medicare expenditures. This may include, for example, the frequency, timing, or types of visits during home health episodes or the extent to which agencies seek recertification for an additional episode to meet patient needs. In addition to potentially reflecting changes in practice pattern, changes in the delivery of home health services could also have implications for other forms of utilization. This includes utilization of resource-intensive services that may depend on the quality of home health care being provided, such as hospitalization.

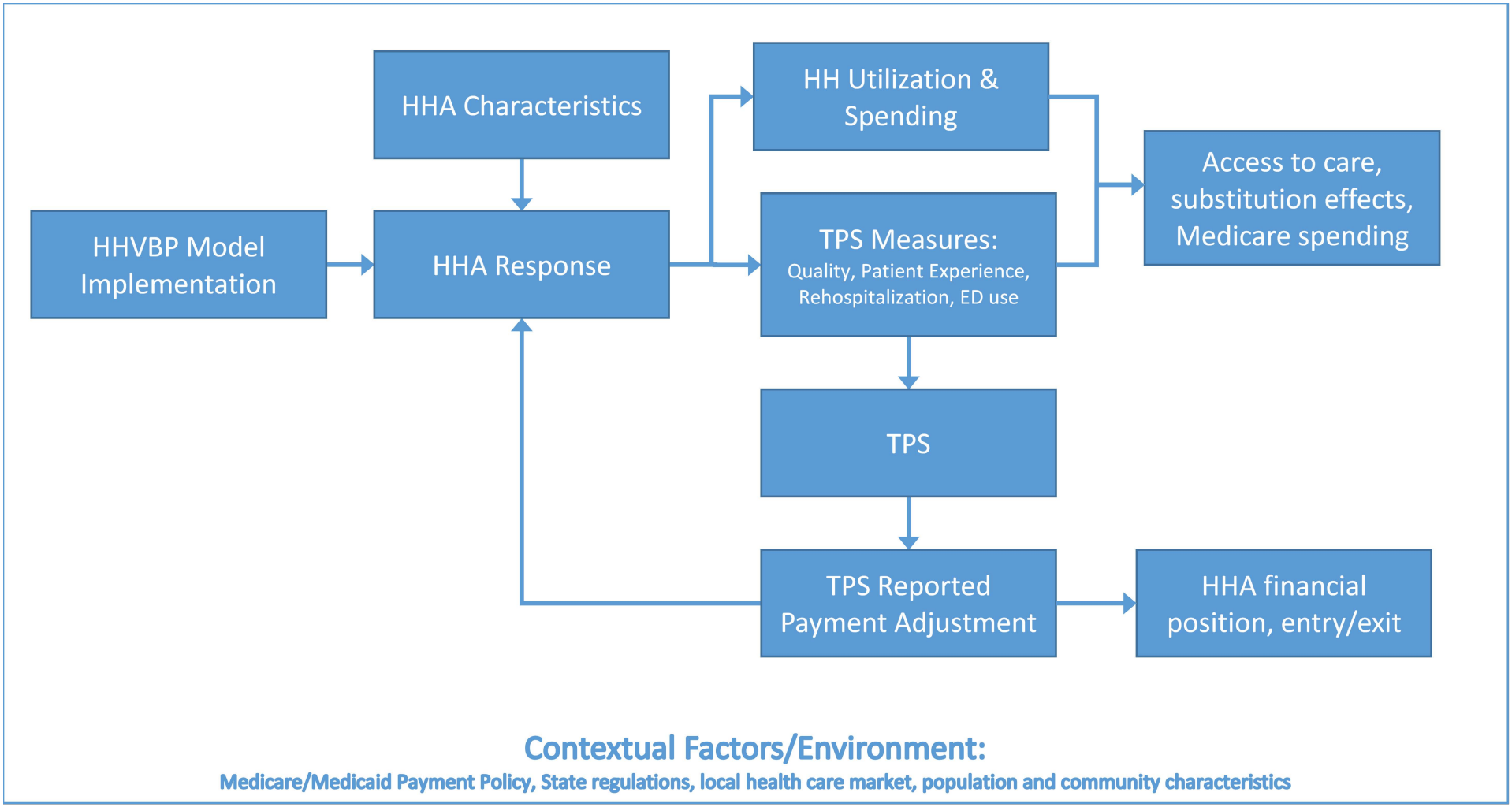
Importantly, HHAs may respond differently to the HHVBP Model. For example, agencies may differ in their perceptions of the financial risks and opportunities related to HHVBP and their readiness to adopt new processes that are designed to improve performance. Some types of agencies may have more limited experience and/or resources to undertake quality improvement initiatives. Depending on factors such as the characteristics of such agencies, their geographic location, and the types of populations they

serve, the HHVBP Model may have an unintended differential impact on certain beneficiary subgroups who tend to receive services from these agencies.

As reflected in Figure 1, the incentives introduced under the HHVBP Model could potentially lead HHAs to affect the rate of use of referrals or discharges following home health care, such as care in a SNF or in an inpatient rehabilitation facility (IRF). For example, HHAs might consider avoiding initiating episodes for beneficiaries for whom higher quality outcomes in the home health setting may be seen as especially difficult to achieve. Changes in the volume or mix of services used by beneficiaries may in turn result in changes in overall Medicare expenditures.

As noted earlier, our focus in this Annual Report is to understand any initial effects of HHVBP during CY 2016. Most pertinent aspects of the evaluation framework (Figure 1) for this Annual Report include the initial response of agencies to the introduction of performance incentives as well as effects of the Model on agency performance on the impact measures that comprise the TPS and on select key indicators of utilization and Medicare spending for home health services. We describe our analytic approach for addressing these questions in the following section (2.4). In later years of the evaluation, as the HHVBP Model progresses, we will explore other pathways for change under the Model (Figure 1).

*Figure 1. HHVBP Evaluation Conceptual Framework*



## 2.4 Analytic Approach

### 2.4.1 Quantitative Analytic Approach

#### Overview

We designed our quantitative analysis to address the question: What was the effect of the HHVBP Model on impact measures of interest such as health care utilization, quality of health care, health outcomes, and health care costs? To evaluate the impact of HHVBP by comparing the experience of beneficiaries and HHAs in both Model and non-Model states, our empirical model must address differing characteristics of beneficiaries and HHAs between Model state and non-Model state groups. We can achieve this by establishing appropriate comparison groups (to address *observed* differences) and using a D-in-D framework (to address *unobserved* differences that are constant over time). [9]

A key strength of this approach is the ability to account for the potential influence of external factors, including changes over time to the home health landscape related to relevant impact measures. First, CMS has refined the Medicare HH PPS a number of times since its implementation in CY 2000. Payment system refinements have included re-calculation of the base rate and recalibration of the case-mix weights, and adjustments for case-mix growth (see Table 3 below). Annual analyses performed since CY 2001 consistently indicate that the proportion of case-mix change due to nominal, rather than real, change in case-mix is increasing over time (HHS, 2007).

While CMS has publicly reported home health quality measures on its HHC website since 2005, CMS also developed two Star Ratings systems to enhance its public reporting process. The intention of the Star Ratings is to make it easier for consumers to assess differences in agency quality and make informed health care decisions. In turn, this can motivate agencies to improve their performance on the measures that comprise the Star Ratings. The introduction of Star Ratings on HHC is relatively recent, with the Quality of Patient Care Star Ratings first published on HHC in July 2015. The star rating reflects composite scores of nine measures based on OASIS assessments and Medicare claims, and all but one of the nine measures (i.e., the OASIS-based process measure that reflects how often the agency initiated patient care in a timely manner) are also HHVBP performance measures. Six months later, CMS debuted Patient Survey Star Ratings based on HHCAHPS data. All four of the HHCAHPS-based measures comprising the Patient Survey Star Ratings are HHVBP performance measures.[10]

Additionally, factors specific to the design of the HHVBP Model have implications for our empirical approach, including the presence of numerous diverse impact measures that are measured over different populations (e.g., Medicare FFS patients for claims-based measures, versus Medicaid and Medicare patients for HHCAHPS measures) and derived from different data sources (e.g., OASIS assessments, FFS claims, and HHCAHPS; see Table 2). First, given the quality performance incentives established under HHVBP, one goal of the evaluation is to assess whether the Model affects Medicare spending and outcomes among beneficiaries who live in the Model states, including but not limited to,

[9] We are unable to use the D-in-D framework for the three new measures that are self-reported by HHAs via the Secure Web Portal (i.e., shown in the last three rows of Table 2) since these data are only available for HHAs in the HHVBP states. As such, we instead focus on reporting rates among HHAs in the nine HHVBP states.
[10] See Table 2 for the HHVBP measures that are used to calculate the Quality of Patient Care Star Ratings and the Patient Survey Star Ratings.

those who actually receive home health care. This goal requires evaluation of impact measures among all Medicare FFS beneficiaries as a general population of interest, rather than only home health users.

Second, for impact measures that are specifically applicable to home health beneficiaries, we can define the treatment population and accompanying comparison population either at the HHA level or at the beneficiary level. Some impact measures, such as the TPS, we can only define at the HHA level. For impact measures that can be evaluated at the beneficiary level or aggregated to the HHA level, defining the treatment population and an accompanying comparison population as the population of beneficiaries receiving home health care alleviates endogeneity concerns related to entry and exit of HHAs during the post-intervention period.

In addition, the different home health populations reflected in the HHVBP performance measures (see Table 2 above) have important implications for the evaluation. For instance, if impact measures (and changes in impact measures) vary with the mix of populations defined by payer source, then we may expect to find inconsistencies in OASIS-based and claims-based impact measures. Additionally, changes made by other payer sources (e.g., state Medicaid funding or Medicare Advantage activity) may directly influence impact measures for the OASIS population (since these patients are included in the OASIS-based impact measures), but not Medicare claims-based impact measures. The mix of patients by payer source, and its resulting influence, will vary from agency to agency and state to state. Changes by payer source and changes in the mix of patients by payer source that occur during the evaluation period can weaken our ability to capture time-varying changes necessary to meet the assumptions of our D-in-D estimator (see the discussion of assumptions on page 24 below).

Given these demands on the empirical model, the evaluation must manage competing priorities: to examine effects of the HHVBP Model on both the general Medicare FFS population as well as on users of home health care (that for some impact measures also includes Medicare managed care, Medicaid FFS, and Medicaid managed care HH users). For this report, the distinct populations and administrative data associated with each led us to use a hybrid approach, within which a three-comparison group framework was used, depending on the population and type of impact measure being examined:

- For episode-level impact measures, we relied on available CMS administrative data at the episode level to match non-intervention episodes to HHVBP episodes using risk adjustment factors that correspond to the specific outcomes of interest.
- For HHA-level and county-level impact measures, we used reweighting strategies as summarized below:
    - For HHA-level measures, we reweighted the HHAs in non-intervention states to achieve equivalent distributions of overall HHA baseline quality performance and other key HHA characteristics in the intervention and comparison groups.
    - For county-level measures, we reweighted counties in non-intervention states to achieve equivalent distributions of baseline outcomes measured over the national Medicare FFS population.

We provide additional information about our comparison group methodologies in the sections that follow. In the Quantitative Technical Appendix (Section 1.3, page 3), we provide further discussion of the factors that informed the hybrid comparison group framework as well as additional details regarding our analytic approach, including the comparison groups, D-in-D model specification, and falsification testing.

We acknowledge that the hybrid approach used in this report is complex. Because of its complexity, for future reports we will be exploring strategies for unifying our comparison group methodologies in pursuit of a simpler approach. The results in this report should be considered preliminary pending implementation in future reports of a more unified comparison group methodology.

*Table 3. Recent Changes to Medicare's Home Health Payment System and Related Requirements*

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| **Payments** | 2.75% payment reduction to the national standardized 60-day episode rate for nominal case-mix growth<br><br>April: 3% rural add-on payment implemented<br>Cap on outlier payments implemented | 3.79% payment reduction to the national standardized 60-day episode rate for nominal case-mix growth | 3.79% payment reduction to the national standardized 60-day episode rate for nominal case-mix growth.<br><br>Changes to relative weights for episodes with therapy visits | 1.32% payment reduction to the national standardized 60-day episode rate for nominal case-mix growth | Begin 4-year (CYs 2014 to 2017) rebasing adjustments to national standardized 60-day episode payment amount, national per-visit rates, and non-routine supplies (NRS) conversion factor. | | Begin 3-year phase-in (CYs 2016 to 2018) of payment reduction for nominal case-mix growth of 0.97% per year. | |
| **OASIS** | OASIS-C effective | | | | | OASIS-C1/ICD-9 effective<br><br>OASIS-C1/ICD-10 effective (October) | | OASIS-C2 effective |
| **Quality and Patient Experience** | | | | | CMS announces Star Ratings program for HHAs (December) | Quality of Patient Care Star Ratings (based on OASIS and claims) debuts (July)<br><br>HHVBP Proposed Rule (July) and Final Rule (November) | Patient Survey Star Ratings (based on HHCAHPS) debuts<br><br>HHVBP Model begins | |
| **Program Integrity** | | Added requirement for tighter supervision of therapy services<br>Added face-to-face requirement implemented (April) | | Moratorium on new agencies in Miami-Dade and Chicago metro areas (August) | Moratorium expanded to new agencies in Fort Lauderdale, Detroit, Houston, and Dallas metro areas (February) | | Moratorium expanded to be statewide in Florida, Illinois, Michigan, and Texas (August) | Updated Conditions of Participation (COPs) announced Final Rule (January) and interpretive guidelines (October) |

*Notes: Changes were implemented in January of each year unless otherwise noted. Rebasing adjustment entails a reduction of the national standardized 60-day episode payment amount in each year from CYs 2014 – 2017 by $80.95 (3.5% of the national standardized 60-day episode payment amount as of the date of Affordable Care Act enactment: $2,312.94 in CY 2010), an increase in the national per-visit payment amounts by 3.5% of the national per-visit payment amounts in CY 2010, and a reduction in the NRS conversion factor in each year from CYs 2014 – 2017 by 2.82%. Total intended reduction of 2.88% for nominal case-mix growth is phased in over 3 years (CYs 2016, 2017, 2018). The updated COPs are effective January 13, 2018.*

## Defining Comparison Groups for this Report

### County-Level Reweighting via Entropy Balancing for Measures Corresponding to Potential Home Health Beneficiaries

One possible effect of HHVBP is that it can lead to changes in the population of Medicare beneficiaries receiving home health or substitute types of care. To explore this possibility, we look to establish a counterfactual of FFS beneficiaries seeking care in similar health care markets in non-HHVBP states. In this context, the defined comparison groups should be able to capture changes over time in the beneficiaries receiving home health care from the overall Medicare population.

For measures that examine the effect of HHVBP on potential home health beneficiaries, we use a weighted comparison population. Specifically, we used an entropy balancing procedure to identify weights for counties in comparison states. Entropy balancing (Hainmueller, 2012) is a procedure designed to find weights that allow the comparison population to *exactly* match the treatment population on the mean values of selected variables when weighted.[11] We chose to use this procedure to reweight comparisons based on data for the baseline period to create a suitable comparison. That is, we reweighted the comparison group so that the selected measures of the Model and comparison populations are the same over the baseline period and assume that the relationship holds in the post-treatment periods with the entropy weights still in place, barring an impact from the Model. The D-in-D framework uses a similar parallel-trend assumption to control for unobserved differences between the Model and comparison populations that do not vary over time. We make use of falsification tests to examine the performance of this approach, in the absence of HHVBP policy (see the Quantitative Technical Appendix, Section 5.1, page 48 for a summary of results).

We use counties rather than a larger geographic region (i.e., state) to provide more variation in the comparison observations and achieve the goal of finding suitable weights for the comparison population to match the markets where home health care was being provided in each HHVBP state (see the Quantitative Technical Appendix, Section 1.4, page 8 for further details).

We used the following three measures from HHVBP counties to reweight county-level observations from non-HHVBP states via entropy balancing:

- Average Number of FFS Home Health (HH) Episodes per 1,000 FFS Beneficiaries
- Average Medicare HH Spending per FFS Beneficiary
- Average Medicare HH Spending per FFS HH Episode

When employing this county-level reweighting approach, the HHVBP states and their comparison group are relatively similar with regard to many beneficiary characteristics (see Table 24, page 52 in the Quantitative Technical Appendix), in addition to having equivalent outcomes over the baseline period.

### Home Health Episode Matching for Measures Corresponding to Home Health Users

For measures that examine the effect of HHVBP on beneficiaries who used home health, this comparison group approach controls for changes in the population receiving and providing home health care in a number of ways. For OASIS-based outcome measures, we matched comparison episodes for beneficiaries who share the same degree of risk in experiencing an outcome as the HHVBP episodes. For

[11] The procedure may also aim to match the treatment and comparison populations on other moments of the distribution of covariates (e.g., the first and second moments).

each outcome, we matched an HHVBP episode to a comparison episode with the same predicted probability[12] of experiencing the outcome event based on the model used for risk adjustment under HHVBP, derived from OASIS assessment at the start of care. Additionally, we controlled for the following HHA-level characteristics through multivariate regression: ownership type, setting, and HHA size (see the Quantitative Technical Appendix, Section 1.5, page 9 for further detail).

For claims-based utilization and spending measures, we matched home health 60-day payment episodes on several risk-adjustment factors to form a comparison population for each home health episode that is conditional on the case-mix of home health users. Since the predicted probabilities used in risk adjustment (i.e., reflecting all relevant risk adjustment factors) were not available for the claims-based measures, we instead matched home health episodes using available data that reflected a partial set of factors used for risk adjustment of unplanned acute care hospitalizations and ED visits (see the Quantitative Technical Appendix, Section 1.5, page 9 for further details).

Therefore, we define the comparison group for analyzing the following impact measures to ensure that certain measured characteristics of the served beneficiaries are the balanced in the intervention and comparison group:

- ED Use (no Hospitalization) per First FFS HH Episodes
  - This measure is similar to the HHVBP measure, “Emergency Department Use without Hospitalization” that is publicly reported on HHC, except it is not risk-adjusted
- Unplanned ACH per First FFS HH Episodes
  - This measure is similar to the HHVBP measure, “Acute Care Hospitalization” that is publicly reported on HHC, except it is not risk-adjusted
- Unplanned ACH per All FFS HH Episodes
- SNF Use per All FFS HH Episodes
- Average Medicare Spending for SNF Stays per All FFS HH Episodes
- Average Medicare Spending for Unplanned ACH per All FFS HH Episodes
- Improvement in Bathing
- Improvement in Bed Transferring
- Improvement in Ambulation-Locomotion
- Improvement in Dyspnea
- Improvement in Management of Oral Medications
- Improvement in Pain Interfering with Activity
- Discharged to Community

When employing this episode-matching approach, the HHVBP treatment and comparison groups are relatively similar with regard to many beneficiary characteristics, beyond those explicitly used as part of the matching process (see Tables 25 – 28, pages 53-56 in the Quantitative Technical Appendix).

### Home Health Agency Reweighting for Measures Evaluated at the Agency Level

We designed our final comparison group approach to support analyses of impact measures that are of interest at the agency level, including the agencies’ total performance scores, OASIS process measures, and HHCAHPS patient experience scores. This approach balances key agency characteristics between

[12] These predicted probabilities (obtained from CMS) integrate all risk-adjustment factors to obtain a single probability score for each episode.

HHAs in the HHVBP states and those included in the resulting comparison group. We accomplished this by applying weights to HHAs in the 41 non-HHVBP states so that they have a similar distribution of baseline agency level quality performance data and several agency characteristics as HHVBP HHAs. With this approach, we are able to control for changes over time in the characteristics of active HHAs that are correlated with HHA-level impact measures under the Model:

- TPS
- OASIS-based process measures:
    - Influenza Immunization Received for Current Flu Season
    - Pneumococcal Polysaccharide Vaccine Ever Received
    - Drug Education on Medications Provided to Patient/Caregiver during Episodes of Care
- HHCAHPS agency performance on patient experience scores:
    - How often the home health team gave care in a professional way
    - How well did the home health team communicate with patients
    - Did the home health team discuss medicines, pain, and home safety with patients
    - How do patients rate the overall care from the home health agency
    - Would patients recommend the home health agency to friends and family

This approach allows us to evaluate the impact of HHVBP on HHA quality performance levels while accounting for any changes over time in the mix of agencies operating in HHVBP states relative to those operating in non-HHVBP states. As discussed in Section 1, analyses in future Annual Reports will consider the impact of HHVBP on HHA entry and exit decisions as the initial HHVBP payment adjustments are imminent and as they take effect. We will use these analyses to assess whether HHVBP may be affecting the number and types of HHAs in operation.

For all agencies that were in operation in 2014 and 2015 and were active for at least part of 2016, we applied a weighting mechanism that balances the joint distribution of the following agency characteristics between HHVBP and non-HHVBP HHAs: ownership, setting, size, age, chain ownership, and CY 2015 TPS quintiles (as an overall measure of quality of care at baseline and was fixed at the baseline value going forward). We created strata based on the combinations of these characteristics and derived weights such that the reweighted proportion of non-HHVBP HHAs matches the proportion of HHVBP HHAs in each stratum. At this time, measures of beneficiary case-mix in agencies are not included in the matching approach but their addition may be considered in future analyses. The weights applied to non-Model HHAs are different for the three groups of impact measures (OASIS-based process impact measures, HHCAHPS-based impact measures, and 2016 TPS) to reflect the different HHA cohorts corresponding to each outcome. See Section 1.6, page 11 of the Quantitative Technical Appendix for additional detail.

We applied this reweighting for all HHAs in the 41 non-Model states and within each measurement period to account for the effects of agencies that exit the industry over time. To ignore this might lead to an imbalance in the characteristics of the HHVBP agencies that remain in operation in Model states and

their respective comparison groups due to differences in HHAs in each group who exit.[13] The results of these analyses reflect the history of HHAs that were in operation prior to the implementation of HHVBP and control for changes in the characteristics of HHAs in operation during the first performance year of the Model.

When employing this agency-level reweighting approach, the HHAs in the HHVBP states and their comparison group are relatively similar with regard to the mix of many beneficiary characteristics, in addition to being equivalent with regard to the distribution of overall HHA baseline quality performance and several other HHA characteristics (see Tables 29 and 30, pages 57 – 58 in the Quantitative Technical Appendix).

### Difference-in-Differences Approach

Having established comparison groups, we used a D-in-D framework to compare changes in impact measures observed over time in the HHVBP states relative to those in the comparison groups to evaluate the effects 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. For example, as discussed further below, the D-in-D design enables us to control both for changes occurring over time that are common to all beneficiaries as well as for unmeasured differences between intervention and comparison states that do not change over time.

The D-in-D analysis compared changes in impact measures observed over time in the HHVBP Model states to those in the comparison groups. The basic D-in-D estimate is defined as the difference in an impact measure of interest over time in the Model states, and subtracting the difference, over time, in the comparison groups:

$$D\text{-}in\text{-}D = [Y_{INT,POST} - Y_{INT,PRE}] - [Y_{COMP,POST} - Y_{COMP,PRE}]$$

With this model specification, the impact estimate is the differential change in an impact measure for an HHVBP state between the baseline and follow-up period(s), relative to that same change for the comparison group. Positive (or negative) D-in-D estimates can be interpreted to mean that the treatment group has measure values that are higher (or lower) than what it is estimated they would have been in the absence of HHVBP (i.e., the counterfactual). For additional information regarding the D-in-D approach, please reference the Quantitative Technical Appendix (Section 1.2.1, page 2).[14]

As with any quasi-experimental design, however, other inherent threats to validity are present. In the context of this evaluation, the mandatory requirement for all HHAs to participate in the HHVBP Model in the nine intervention states helps to minimize potential selection bias, because individual HHAs are not self-selected into the intervention in ways that could lead estimates of the impact of HHVBP to be biased. Our construction of comparison groups considered important factors that may differ between HHVBP and non-HHVBP states prior to model implementation and tested the parallel trends assumption

[13] HHAs in operation contribute to the strata weights that are applied across each measure and measurement period, regardless of whether they contribute a value to the measure calculation. This allows us to include all HHAs that would be eligible to contribute to a measure, even if they do not have a calculated measure value for a specific measurement period. See Section 4.4 of the Quantitative Technical Appendix for additional detail.
[14] Additionally, see Section 1.5.1 of the Quantitative Technical Appendix for the HHA and beneficiary characteristics included as covariates in the D-in-D model for the impact measures that were matched on home health episodes.

of our D-in-D design by examining pre-intervention trends in impact measures in the HHVBP and non-HHVBP states (results discussed below). Even in the context of similar pre-intervention trends, a remaining threat is the potential for a concurrent change in impact measures in the HHVBP states that occurs during the intervention but is not attributable to the Model, which we will explore using our qualitative data collection activities.

#### Robustness of Approach

To facilitate interpretation of the findings, we conducted a number of tests of the robustness of our model and performance of our comparison group approaches. Our primary investigations of comparison group and model performance leveraged available information for non-HHVBP states and time periods to test whether consistent differences (i.e., parallel trends) existed throughout the four-year baseline period (CYs 2012 – 2015) in HHVBP states. We also conducted falsification tests for the impact measures, estimating the effects of HHVBP in for each of the four quarters in CY 2016 for the 41 comparison states, where the effect should be null. Performing the falsification tests allowed us to examine the performance of the estimator and comparison group construction, knowing that the effect of HHVBP should be zero in non-HHVBP states. We examined the results of the falsification tests to determine if the average estimated effect was different from zero and how frequently the computed standard errors rejected a true null hypothesis (that is, how frequently Type I errors occurred; see the Quantitative Technical Appendix, Section 5.1, page 48 for more detail). The information gained from these tests is important for understanding the appropriate level of confidence when inferring effects of the model for the HHVBP results.

Results from our model robustness tests suggest that the adjusted impact measures generally move in a parallel manner over the baseline period between the HHVBP states and the comparison group, and that our estimates are generally unbiased. However, Type I errors (that is, falsely rejecting a true null hypothesis) occurred more frequently than expected based on our falsification tests (that is, the HHVBP effect is non-zero in non-HHVBP states), which suggests that our calculation of the standard errors (e.g., clustering at the agency- or county-level) may need further refinement for some measures (see the Quantitative Technical Appendix, 5.1, page 48 for more detail). For the analyses presented in this report, we recommend caution in interpreting the D-in-D results, since as discussed below, statistically significant results for some impact measures may not necessarily indicate effects that can be attributed to HHVBP.

### 2.4.2 Qualitative Analytic Approach

To support integration of results across the evaluation, we used a structured approach to analyzing qualitative data, whereby the core quantitative results serve as the framework, and the qualitative data are used to examine the intervention and mechanisms through which the HHVBP Model affects impact measures (Wisdom & Cresswell, 2013). Initially, we will use qualitative data collection to document and understand HHAs' plans and approaches to quality improvement and the context in which they are implemented. Later, we will use qualitative data collection to identify any evidence of success and any challenges and identify priority areas for further analysis.

In this first year of the evaluation, we interviewed key informants at 67 HHAs via telephone (see Table 4 below) in the nine HHVBP states from late May to early September 2017 to understand how HHAs are responding to incentives in the HHVBP Model in its earliest phase. To capture experiences of a variety of agencies, interviews with HHAs included a mix of type (freestanding versus hospital-based agencies), ownership, chain ownership status, rurality, and size (measured by the number of Medicare episodes).

We used a semi-structured discussion guide to ask agencies about: (1) challenges facing the agencies, (2) changes in agency structure and operations in response to HHVBP, and (3) current and anticipated impacts on patients and agencies as a result of HHVBP.

We did not intend these interviews to be representative of all agencies in HHVBP states, nor did we transform the data collected to into quantitative data. Rather, we used this information to understand and provide context for evaluation results presented in later chapters and to generate hypotheses for additional primary data collection activities and future analyses. We provide more information on primary data collection and analysis in the Qualitative Technical Appendix (page 3).

*Table 4. Count of Agencies Interviewed by State and Ownership Status*

| State | For-Profit | Not-For-Profit | Government | Total |
|---|---|---|---|---|
| Arizona (AZ) | 6 | 2 | 0 | 8 |
| Florida (FL) | 10 | 4 | 0 | 14 |
| Iowa (IA) | 2 | 5* | 0 | 7 |
| Maryland (MD) | 6 | 0 | 0 | 6 |
| Massachusetts (MA) | 3 | 1 | 1 | 5 |
| North Carolina (NC) | 4 | 1 | 3 | 8 |
| Nebraska (NE) | 1 | 4* | 1* | 6 |
| Tennessee (TN) | 5 | 2 | 0 | 7 |
| Washington (WA) | 6 | 0 | 0 | 6 |
| **Total** | **43** | **19** | **5** | **67** |

*Note: All agencies were freestanding, except for two not-for-profit hospital-based agencies in Iowa and two not-for-profit hospital-based agencies and one government hospital-based agency in Nebraska. Thirty-one agencies were part of a chain.

# 3. Results

This section presents key findings based on the first year of the HHVBP Model. We begin by providing an overview of the characteristics of HHAs and beneficiaries in HHVBP states in the year before HHVBP Model implementation. We then present the results of analyses of the early effects observed in the first performance year on Medicare spending, utilization of services, quality of care, and patient experience using a D-in-D framework and our comparison group approach as described above. Our presentation of quantitative findings below focuses on results for all HHVBP states combined. Additional detail on descriptive information for the individual HHVBP states are provided in the Appendix of Supplemental Tables and Results. This section concludes with a summary of findings based on our interviews with representatives of HHAs inquiring about the context in which HHVBP was implemented and any operational changes they have made in response to the HHVBP Model.

## 3.1 Key Findings

***Early overall improvement in HHA Total Performance Scores.*** While we observed improvements in agency TPS values as composite indicators of quality of care among both HHVBP agencies and their reweighted comparison agencies between 2015 and 2016, we found the improvements to be larger among HHVBP agencies. The increase in agency TPS values over time occurring among both HHVBP and comparison agencies may be an indication that agencies were also responding to other quality of care initiatives, such as the introduction of the CMS Star Ratings program.

***Mixed findings on effects for OASIS-based measures.*** We observed larger gains in four of the OASIS-based functional improvement quality outcome HHVBP performance measures (Bathing, Bed

Transferring, Dyspnea, Management of Oral Medications) for HHVBP states relative to their comparison group, but no differential changes for the other three OASIS quality outcome HHVBP performance measures (Improvement in Ambulation-Locomotion, Improvement in Pain Interfering with Activity, and Discharge to Community). Our findings may not necessarily reflect actual quality improvements since we also found that increasing rates of improvement over time may partly reflect lower scoring of reported patient status at admission (rather than an absolute improvement over time in patient status at discharge). We observed improvements over time in each of the three OASIS-based process HHVBP performance measures among all HHVBP agencies combined relative to their comparison group, though levels of performance for each group at baseline already tended to be relatively high. Together, our preliminary findings for OASIS-based HHVBP performance measures point to an effect on care processes (e.g., we observed larger gains in process measure rates than outcome measure rates in the first performance year), but do not yet suggest effects on home health patient outcomes.

***No evidence of HHVBP impact on patient experience measures*.** Performance scores for the five patient experience measures derived from the HHCAHPS survey remained relatively stable over time in both HHVBP states and non-HHVBP states. We did not identify differential changes over time among the HHVBP states relative to their comparison group for most of the HHCAHPS-derived HHVBP performance measures, suggesting no evidence of HHVBP on patient experience in the first performance year.

***Mixed results for Medicare spending and utilization*.** We observed mixed findings for measures of Medicare spending and utilization among Medicare FFS beneficiaries receiving home health services that did not indicate a strong overall impact of the Model at this early stage. In summary, when comparing HH FFS users in HHVBP states relative to the comparison group, we found early, preliminary evidence of reductions in both Medicare spending and utilization for SNF services; an increase in the frequency of ED visits; and a decrease in Medicare spending for unplanned hospitalizations without a change in the frequency of unplanned hospitalizations. We observed no change in either Medicare spending or utilization for home health services among all FFS beneficiaries in HHVBP states relative to the comparison group.

***Early changes in HHA operations were relatively focused and similar to ongoing activities*.** Through our interviews with HHAs in the HHVBP states, we found that the most common response to HHVBP was staff education around correctly assessing patients and completing OASIS documentation. We also learned that in the first performance year, HHVBP prompted many agencies to continue quality improvement efforts that were already underway in response to (existing CMS initiatives designed to improve HHA quality (e.g., Star Ratings).

## 3.2 Quantitative Findings

### 3.2.1 Characteristics of Medicare Home Health Agencies and Beneficiaries in HHVBP States

Below, we provide summary statistics for several key home health provider, beneficiary, and episode characteristics during the year prior to implementation of HHVBP (Table 5-7). We focus our discussion on findings for the nine HHVBP states, and also refer to trends for several factors. For further consideration of pre-HHVBP trends, we provide additional summary statistics for each year from CYs 2012 – 2016 in the Appendix of Supplemental Tables and Results, separately for each of the nine HHVBP states, for all HHVBP states combined, and all non-HHVBP states combined (pages 1 – 11).

We note a number of instructive patterns and trends among the HHVBP state populations for this evaluation. First, the results of pooled analyses for all HHVBP states will be strongly influenced by the

experience of HHAs and beneficiaries in Florida that accounts for approximately 54% and 40% of agencies and beneficiaries, respectively, in the HHVBP states overall. In a similar way, effects among other much smaller states that represent the experience of distinct populations may not be evident at all from the pooled analysis. For example, the three HHVBP states with the most pronounced rural populations (Iowa, Nebraska, and Tennessee) together account for only 17% of agencies and 14% of beneficiaries overall in the HHVBP states.

Second, we observe substantial variation across the nine HHVBP states for several agency characteristics (e.g., ownership, setting, and age), beneficiaries treated (e.g., dual eligibility and rurality), and episodes of care (e.g., number and types of visits and community referrals) (see Appendix of Supplemental Tables and Results, pages 1 – 9, for state-level results by year starting in 2012). This variation will provide an opportunity to evaluate the impact of the Model in different populations and different contexts. At the same time, we recognize that the extent of the variation across states is more limited for other factors, such as with average beneficiary age and most indicators of chronic conditions.

Additionally, a review of pre-HHVBP trends suggests many characteristics of HHAs, beneficiaries, and episodes that are either relatively stable during the four years immediately preceding HHVBP or share relatively similar overall trends between HHVBP and non-HHVBP states (see Appendix of Supplemental Tables and Results, pages 10 – 11). At the same time, certain pre-HHVBP trends may reflect the presence of distinct phenomena in specific states. For example, among the nine HHVBP states combined, we observed a 12% total decrease in the number of HHAs between 2012 and 2015, and an additional 4% decrease in the first year of HHVBP (see Table 5).[15] Florida largely drives these overall trends; Florida continues to experience a decline in the number of HHAs since 2012 (see Appendix of Supplemental Tables and Results, page 2). In contrast, the number of HHAs has been increasing each year since 2012 in Massachusetts (Appendix of Supplemental Tables and Results, page 4), which will therefore include a relatively larger proportion of new entrants. These opposing state-specific trends provide an illustration of the different contexts in which the HHVBP Model was implemented, such that it will be important to allow for the possibility of variation in the effects of the Model across HHVBP states.

Finally, before presenting our D-in-D findings, we present descriptive information on the impact measures examined in this report. Specifically, Table 8 (below) shows that pre-HHVBP (CY 2015) unadjusted performance levels for the impact measures are relatively similar overall between the pooled HHVBP states and their comparison group (see Appendix of Supplemental Tables and Results, pages 12 – 13, for unadjusted annual means for 2012-2016 for the two groups). While the results of our robustness testing summarized above (page 25) warrant caution with regard to the interpretation of specific findings as necessarily indicating changes that are attributable to HHVBP, these overall similarities between the Model population and its defined comparison group suggest a plausibly valid representation of the counterfactual.

[15] Declines in the number of HHAs may reflect HHAs exiting the market or mergers between existing HHAs.

*Table 5. HHA Characteristics in 2015, by HHVBP State, All HHVBP States, and All Non-HHVBP States*

| | AZ | FL | IA | MA | MD | NC | NE | TN | WA | All HHVBP states | All 41 non-HHVBP states |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of HHAs | 149 | 1121 | 153 | 179 | 53 | 172 | 73 | 132 | 62 | 2094 | 9281 |
| Number (%) that received a 2016 TPS | 114 (78%) | 787 (77%) | 125 (82%) | 140 (73%) | 51 (98%) | 163 (95%) | 61 (82%) | 124 (95%) | 57 (92%) | 1622 (81%) | N/A |
| **Ownership** | | | | | | | | | | | |
| % For-profit | 89.3 | 92.5 | 30.7 | 71.0 | 60.4 | 51.2 | 42.5 | 78.8 | 58.1 | 78.1 | 79.8 |
| % Non-profit | 10.7 | 6.4 | 32.0 | 27.9 | 34.0 | 26.2 | 38.4 | 16.7 | 29.0 | 15.2 | 15.6 |
| % Government-owned | 0.0 | 1.1 | 37.3 | 1.1 | 5.7 | 22.7 | 19.2 | 4.6 | 12.9 | 6.7 | 4.6 |
| **Setting** | | | | | | | | | | | |
| % Hospital-based | 4.7 | 1.9 | 33.3 | 5.0 | 15.1 | 15.1 | 43.8 | 10.6 | 27.4 | 8.8 | 8.9 |
| % Freestanding | 95.3 | 98.1 | 66.7 | 95.0 | 84.9 | 84.9 | 56.2 | 89.4 | 72.6 | 91.2 | 91.2 |
| % Chain affiliation | 30.3 | 21.3 | 29.1 | 21.8 | 65.3 | 60.2 | 22.5 | 59.8 | 61.3 | 30.8 | 20.6 |
| Average agency years in operation | 10.7 | 9.6 | 28.0 | 17.0 | 25.1 | 28.9 | 21.4 | 28.3 | 26.5 | 15.7 | 15.3 |
| **Entry/Exit*** | | | | | | | | | | | |
| Number of new HHAs that entered in 2015 | 11 | 60 | 7 | 24 | 0 | 1 | 3 | 1 | 2 | 109 | 294 |
| Number of HHAs that exited in 2015 | 12 | 179 | 9 | 10 | 1 | 3 | 2 | 5 | 2 | 223 | 458 |
| HHAs per 10,000 Medicare beneficiaries | 2.3 | 4.7 | 3.2 | 2.0 | 0.7 | 1.4 | 2.7 | 1.7 | 0.8 | 2.5 | 3.4 |
| **% Change in number of HHAs** | | | | | | | | | | | |
| 2012 to 2015 | 12.0 | -21.1 | -6.7 | 17.0 | -3.6 | -1.7 | 0.0 | -7.0 | 6.9 | -11.8 | 0.6 |
| 2015 to 2016 | -2.0 | -8.3 | 0.0 | 6.7 | -1.9 | 0.0 | 1.4 | -1.5 | 0.0 | -4.1 | -2.0 |

*These numbers reflect all HHAs in 2015, regardless if the HHA received a TPS in 2016.*

**Entry/Exit values are derived from a different data source (OASIS assessments).*

*Table 6. Beneficiary Characteristics in 2015, by HHVBP State, All HHVBP States, and All Non-HHVBP States*

| | AZ | FL | IA | MA | MD | NC | NE | TN | WA | All HHVBP states | All non-HHVBP states |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total number of beneficiaries receiving HH care | 42,826 | 324,907 | 26,164 | 111,082 | 68,872 | 105,600 | 15,839 | 74,196 | 44,264 | 813,750 | 2,643,714 |
| Average age | 78.1 | 77.9 | 78.2 | 78.1 | 77.3 | 75.7 | 78.6 | 77.0 | 79.1 | 77.6 | 76.8 |
| % Female | 59.9 | 60.8 | 62.9 | 61.4 | 62.0 | 62.6 | 63.6 | 64.1 | 62.2 | 61.7 | 62.2 |
| **Race/Ethnicity** | | | | | | | | | | | |
| % White | 90.1 | 82.3 | 95.8 | 91.2 | 70.2 | 77.2 | 93.5 | 87.4 | 90.7 | 83.8 | 79.8 |
| % Black | 2.9 | 8.4 | 2.5 | 4.6 | 25.9 | 20.4 | 4.0 | 11.6 | 2.5 | 10.3 | 13.2 |
| % Hispanic | 2.9 | 7.1 | 0.4 | 1.1 | 0.7 | 0.4 | 0.7 | 0.2 | 0.9 | 3.4 | 2.7 |
| % Other | 1.0 | 0.9 | 0.4 | 1.2 | 1.1 | 0.6 | 0.5 | 0.3 | 1.4 | 0.9 | 1.2 |
| % Rural | 0.8 | 1.9 | 24.1 | 0.1 | 1.9 | 8.7 | 17.4 | 16.1 | 3.5 | 4.9 | 8.5 |
| % Dual eligible | 16.5 | 29.8 | 20.0 | 27.3 | 18.9 | 31.1 | 19.9 | 30.8 | 24.3 | 27.3 | 31.1 |
| **Chronic Conditions** | | | | | | | | | | | |
| % Chronic kidney disease | 51.2 | 47.4 | 47.7 | 49.8 | 50.5 | 50.6 | 46.6 | 51.5 | 48.1 | 48.9 | 48.4 |
| % Congestive heart failure | 38.1 | 41.9 | 43.4 | 44.1 | 43.1 | 41.4 | 39.3 | 49.2 | 41.3 | 42.8 | 46.2 |
| % Diabetes | 41.2 | 48.9 | 40.8 | 39.8 | 47.3 | 47.3 | 38.8 | 47.1 | 38.6 | 46.0 | 48.9 |
| % Pressure ulcers and chronic ulcers | 25.4 | 24.4 | 20.5 | 23.0 | 27.2 | 26.4 | 22.6 | 25.7 | 28.3 | 24.9 | 23.6 |
| % Alzheimer's disease and related disorders or senile dementia | 33.5 | 41.8 | 23.3 | 31.0 | 34.0 | 33.9 | 29.9 | 39.2 | 36.8 | 37.4 | 33.9 |
| % Ischemic heart disease | 53.1 | 62.9 | 50.8 | 52.9 | 55.8 | 48.6 | 47.4 | 56.4 | 43.7 | 56.8 | 57.6 |
| % Anemia | 60.2 | 64.7 | 55.9 | 56.2 | 64.4 | 59.2 | 53.5 | 58.2 | 51.6 | 61.0 | 51.8 |
| **% Change in Number of HH Beneficiaries** | | | | | | | | | | | |
| CYs 2012 to 2015 | 16.0 | -4.7 | 4.3 | 4.9 | 14.7 | -1.2 | 6.4 | -9.1 | 9.0 | 0.1 | 1.2 |
| CYs 2015 to 2016 | 3.0 | -3.6 | -7.8 | -0.9 | 2.2 | -0.1 | 0.5 | -1.9 | 3.8 | -1.4 | -0.3 |

*These numbers reflect all beneficiaries receiving HH care in 2015, regardless if their HHA received a TPS in 2016.*

*Table 7. Episode Characteristics in 2015, by HHVBP State, All HHVBP States, and All Non-HHVBP States*

| | AZ | FL | IA | MA | MD | NC | NE | TN | WA | All HHVBP states | All non HHVBP states |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Number of Episodes** | 68,077 | 643,197 | 37,259 | 190,881 | 102,045 | 169,621 | 25,661 | 157,775 | 68,822 | 1,463,338 | 5,136,192 |
| **Episodes Type*** | | | | | | | | | | | |
| % Normal | 84.0 | 83.8 | 84.8 | 82.1 | 86.3 | 84.5 | 85.3 | 88.9 | 83.4 | 84.4 | 86.7 |
| % LUPA | 11.1 | 6.6 | 9.8 | 11.1 | 10.8 | 12.5 | 9.7 | 8.4 | 14.3 | 9.1 | 8.7 |
| % High cost outlier | 1.6 | 6.7 | 3.4 | 4.2 | 0.9 | 1.0 | 2.8 | 0.8 | 0.8 | 4.0 | 2.6 |
| % PEP | 4.7 | 4.1 | 2.6 | 3.9 | 3.0 | 2.8 | 2.9 | 2.6 | 2.3 | 3.6 | 2.9 |
| **Episodes within a Sequence** | | | | | | | | | | | |
| % 1st in sequence | 67.5 | 55.3 | 69.2 | 61.6 | 72.1 | 64.2 | 65.8 | 44.5 | 66.5 | 58.7 | 49.5 |
| % 2nd in sequence | 14.6 | 15.8 | 12.6 | 16.5 | 14.4 | 15.2 | 14.6 | 17.7 | 15.6 | 15.8 | 15.4 |
| % 3rd+ in sequence | 17.9 | 28.9 | 18.2 | 21.9 | 13.5 | 20.5 | 19.7 | 37.8 | 17.9 | 25.5 | 35.2 |
| Average Number of visits in an episode | 15.1 | 20.5 | 17.0 | 17.1 | 15.3 | 14.8 | 17.0 | 16.4 | 14.5 | 17.9 | 16.2 |
| **Visits by Type** | | | | | | | | | | | |
| % Therapy | 47.1 | 42.5 | 34.4 | 37.0 | 50.4 | 49.3 | 47.7 | 47.4 | 53.3 | 43.9 | 37.1 |
| % Skilled nurse | 44.7 | 49.4 | 43.2 | 51.3 | 41.8 | 43.2 | 40.6 | 43.0 | 39.1 | 47.1 | 50.4 |
| % HH aide | 7.1 | 7.6 | 21.8 | 10.7 | 6.8 | 6.6 | 11.2 | 8.4 | 6.0 | 8.2 | 11.7 |
| % Medical social services | 1.1 | 0.5 | 0.6 | 1.0 | 0.9 | 0.9 | 0.5 | 1.2 | 1.5 | 0.7 | 0.8 |

**PEP (Partial Episode Payment) is not mutually exclusive with LUPA (Low-Utilization Payment Adjustment) and Outlier, so percentages may sum to > 100%. A PEP occurs when a beneficiary changes HHAs or is discharged and readmitted within a 60-day episode and results in an adjusted, partial payment to the HHA to reflect the time the beneficiary received care.*

*These numbers reflect all HH episodes in 2015, regardless if their HHA received a TPS in 2016.*

*Table 8. 2015 and 2016 Annual Means and Standard Deviations (SD) for Impact Measures, All HHVBP States and Comparison Group*

| Measure | All HHVBP States 2015 | Comparison 2015 | All HHVBP States 2016 | Comparison 2016 | Comparison Group Approach |
|---|---|---|---|---|---|
| **Average TPS** | 30.9 (SD = 14.9)* | 31.2 (15.0) | 37.4 (16.5) | 35.4 (16.0) | HHA Reweighting |
| **Spending** | | | | | |
| Medicare HH Spending/FFS HH Episode | $2,945.75 ($388.38) | $2,934.62 ($597.16) | $2,946.15 ($357.35) | $2,937.51 ($615.54) | County-Level Reweighting |
| Medicare HH Spending/FFS Beneficiary | $138.84 ($90.03) | $138.47 ($178.59) | $133.12 ($77.44) | $136.44 ($151.54) | County-Level Reweighting |
| Medicare Spending for Unplanned ACH/all FFS HH Episodes | $2,177.72 ($7,454.40) | $2,082.41 ($7,359.23) | $1,943.58 ($6,479.94) | $1,884.09 ($6,874.10) | Episode Matching |
| Medicare Spending for SNF Stays/all FFS HH Episodes | $654.50 ($3,502.57) | $599.10 ($3,509.43) | $616.81 ($3,361.39) | $575.55 ($3,453.80) | Episode Matching |
| **Utilization** | | | | | |
| Average Number of FFS HH Episodes/1,000 FFS Beneficiaries | 47.13 (25.18) | 47.16 (60.81) | 45.19 (23.24) | 46.40 (52.23) | County-Level Reweighting |
| Unplanned ACH/First FFS HH Episodes | 16.7% (37.3%) | 16.6% (37.2%) | 15.7% (36.4%) | 15.6% (36.3%) | Episode Matching |
| Emergency Department Use (no Hospitalization)/First FFS HH Episodes | 11.9% (32.4%) | 12.1% (32.7%) | 12.4% (32.9%) | 12.4% (33.0%) | Episode Matching |
| Unplanned ACH/All FFS HH Episodes | 17.5% (38.0%) | 16.3% (37.0%) | 16.7% (37.3%) | 15.7% (36.34%) | Episode Matching |
| SNF Use/All FFS HH Episodes | 5.2% (22.2%) | 4.6% (20.9%) | 4.9% (21.7%) | 4.4% (20.5%) | Episode Matching |
| **OASIS Outcome Measures** | | | | | |
| Improvement in Ambulation-Locomotion | 68.3% (46.5%) | 66.6% (47.1%) | 74.0% (43.8%) | 71.7% (45.0%) | Episode Matching |
| Improvement in Bathing | 72.2% (44.8%) | 70.1% (45.8%) | 76.4% (42.4%) | 73.5% (44.2%) | Episode Matching |
| Improvement in Bed Transferring | 64.7% (47.8%) | 62.5% (48.4%) | 71.8% (45.0%) | 68.6% (46.4%) | Episode Matching |
| Improvement in Dyspnea | 70.1% (45.8%) | 68.6% (46.4%) | 74.9% (43.3%) | 72.2% (44.8%) | Episode Matching |

| Measure | All HHVBP States 2015 | Comparison 2015 | All HHVBP States 2016 | Comparison 2016 | Comparison Group Approach |
|---|---|---|---|---|---|
| Improvement in Management of Oral Medications | 55.0% (49.8%) | 54.4% (49.8%) | 61.6% (48.6%) | 59.7% (49.1%) | Episode Matching |
| Improvement in Pain Interfering with Activity | 71.9% (45.0%) | 69.7% (46.0%) | 76.7% (42.3%) | 73.9% (43.9%) | Episode Matching |
| Discharged to Community | 72.4% (44.7%) | 70.9% (45.4%) | 72.9% (44.4%) | 70.9% (45.4%) | Episode Matching |
| **OASIS Process Measures** | | | | | |
| Influenza Immunization Received for Current Flu Season | 58.7% (28.6%) | 61.7% (26.2%) | 67.7% (26.6%) | 68.8% (25.6%) | HHA Reweighting |
| Pneumococcal Polysaccharide Vaccine Ever Received | 67.0% (25.9%) | 70.0% (23.4%) | 75.6% (22.0%) | 76.9% (21.1%) | HHA Reweighting |
| Drug Education on Medications Provided to Patient/Caregiver during Episodes of Care | 94.5% (9.6%) | 95.2% (8.5%) | 96.4% (8.2%) | 96.5% (7.8%) | HHA Reweighting |
| **HHCAHPS Measures** | | | | | |
| How often the home health team gave care in a professional way | 88.8% (5.3%) | 88.3% (5.1%) | 88.6% (4.9%) | 88.3% (4.9%) | HHA Reweighting |
| How well did the home health team communicate with patients | 85.8% (6.0%) | 85.5% (5.8%) | 85.8% (5.6%) | 85.6% (5.8%) | HHA Reweighting |
| Did the home health team discuss medicines, pain, and home safety with patients | 82.9% (7.0%) | 83.3% (6.7%) | 82.5% (7.0%) | 83.6% (6.5%) | HHA Reweighting |
| How do patients rate the overall care from the home health agency | 84.4% (8.4%) | 83.9% (8.0%) | 84.5% (7.5%) | 84.0% (8.0%) | HHA Reweighting |
| Would patients recommend the home health agency to friends and family | 79.4% (10.1%) | 78.7% (10.0%) | 79.5% (9.6%) | 78.9% (9.7%) | HHA Reweighting |

*See Table 8n in Appendix of Supplemental Tables and Results for each measure's sample size.*
**Values in parentheses represent standard deviation (SD).*

### 3.2.2 Difference-in-Differences Models

*HHVBP States Show Improvement in TPS in First Performance Year*

In evaluating the potential quality effects during the first performance year, we examined the TPS as an overall index of the quality of care provided by HHAs. As noted earlier, the HHVBP Model calculates a TPS for each agency that meets the HHVBP eligibility criteria starting in CY 2016, the first performance year under the Model. To establish baseline levels of performance that reflect a combination of recent HHA quality achievement and improvement immediately prior to the implementation of the Model, we used a similar methodology to calculate a TPS for CY 2015. This simulated CY 2015 TPS reflects agency levels of quality achievement as of CY 2015 and quality improvement from CYs 2014 – 2015, based on the same 17 performance measures included in the CY 2016 TPS (but excluding the three new reporting measures).

We then conducted D-in-D analyses to assess changes in the TPS values during CYs 2015 – 2016 among HHAs in the HHVBP states relative to the comparison group HHAs. This approach uses each agency's past experience as its own control, so that we examine changes in the performance over time among HHAs in the nine HHVBP states relative to their own performance immediately before the Model was implemented. The goal of these analyses is to determine whether the early effects of Model indicate improving overall performance among HHAs. These analyses include HHAs with a TPS available for both CYs 2015 and 2016 and include 1,666 HHAs in the nine HHVBP states and 7,028 HHAs in the remaining 41 states.

The D-in-D analysis for all HHVBP states (using HHA reweighting for the comparison group approach) indicates a change in TPS of 2.3 points among HHAs in all HHVBP states relative to the comparison group (see Table 9). This effect size compares to an average TPS of 30.9 among HHVBP Model HHAs in 2015, representing an approximate 7.4% improvement in TPS in the HHVBP Model states (2.3/30.9).

*Table 9. D-in-D Results for HHA TPS, 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| **TPS** | 2.338 | <.0001 | 30.9 | 7.4% |

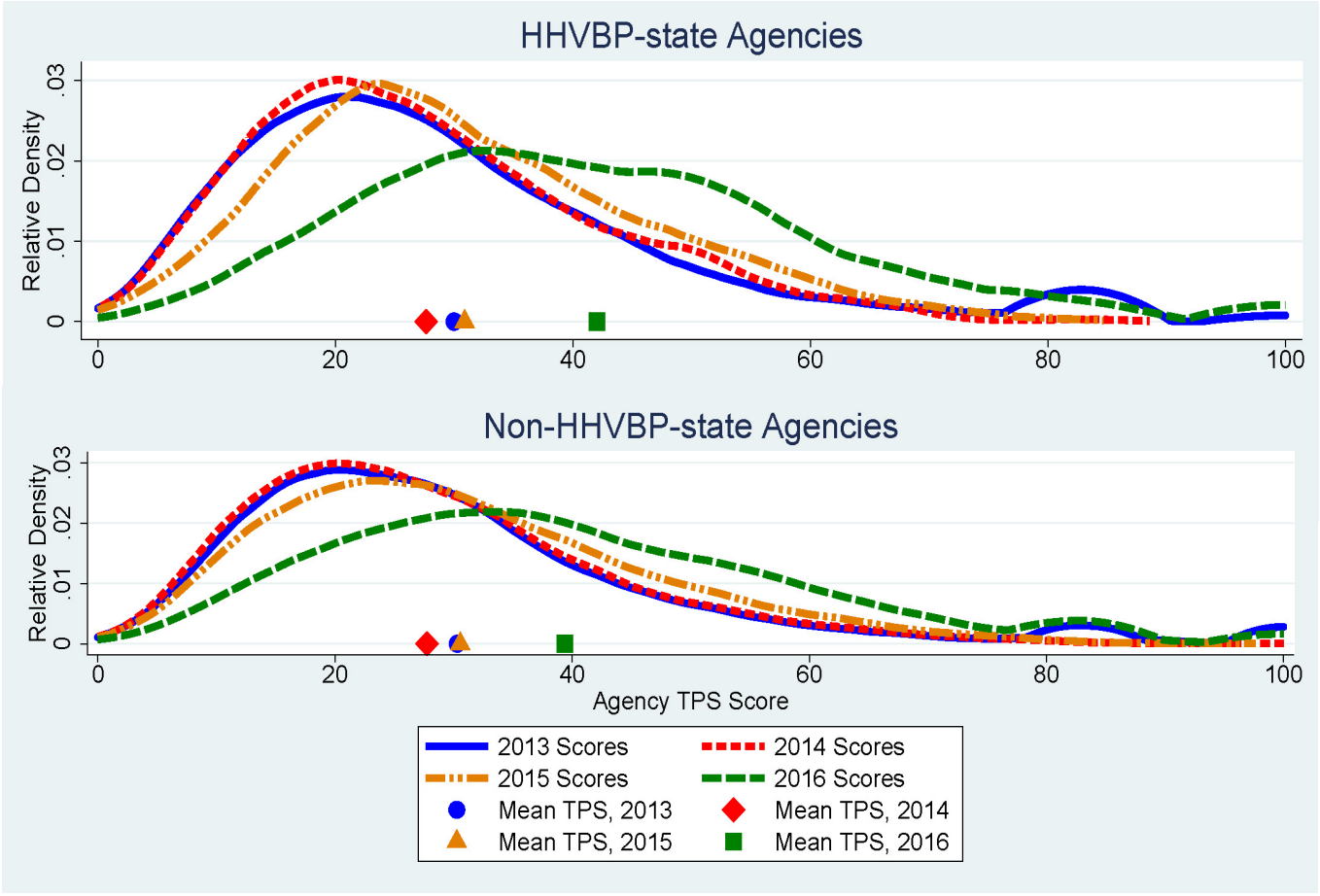
*See Table 9n in Appendix of Supplemental Tables and Results for sample size.*

Because the TPS encompasses quality performance across a wide range of process and outcome measures, we also examined changes over time in individual measure scores, for each of the 17 performance measures. These analyses suggest that the TPS improvement over time in the HHVBP states overall relative to their comparison group can largely be attributed to contemporaneous improvement in most of the OASIS-based outcome measure scores (see Appendix of Supplemental Tables and Results, page 17).

The results of our D-in-D analyses of TPS need to be interpreted in the context of pre-existing trends in this summary quality index. Below, Figure 2 shows the unadjusted density plots for CY 2013 – CY 2016 TPS values separately for the pooled HHVBP states and non-HHVBP states. These plots are akin to smoothed histograms. Conceptually, the plots show the frequency of HHA TPS values, with higher peaks (i.e., greater relative density) indicating where more HHAs have TPS values along the X-axis. These plots illustrate a rightward shift in the distribution (and mean values) in CYs 2015 and 2016 among the nine HHVBP states.

Importantly, we also see a rightward shift in TPS values in both CYs 2015 and 2016 for HHAs in the non-HHVBP states, although to a lesser extent. Together, these plots demonstrate a general rightward shift in the TPS distribution over time; that is, a greater proportion of agencies had higher TPS values in CY 2015, relative to CYs 2013 and 2014. The increase in average TPS values across HHAs continued in CY 2016 in both HHVBP and non-HHVBP states. There is also increased variance, or greater dispersion, across HHA TPS values in CYs 2015 and 2016. These trends began prior to implementation of the Model and, to an extent, occurred in both HHVBP and non-HHVBP states. In summary, we find that, in both HHVBP and non-HHVBP states, TPS values are, on average, increasing over time, and are also increasing in variance across HHAs in the final two years observed (2015-2016). Increased variance over time in TPS results is indicative of growing variation across agencies in overall measured quality performance, reflecting results for all HHVBP performance measures combined. These trends suggest differential changes over time among HHAs, such that some HHAs are achieving larger improvements than others.

*Figure 2. Density Plots for CYs 2013-2016 TPS Values*




As important context for interpretation of our D-in-D findings, we note that while the positive D-in-D estimates point to improvement in TPS values among HHVBP states relative to their comparison group during CYs 2015 – 2016, we also observed gains in our simulated TPS occurring nationally during this time period that may be the result of changes in practice that were unrelated to HHVBP and instead may have occurred in response to other factors, such as the introduction of the Star Ratings program or other non-federal initiatives. Future analyses of data for subsequent performance years can determine

whether there continue to be differential trends in TPS among the HHAs in the HHVBP states and to reassess the sources of any differential trends.

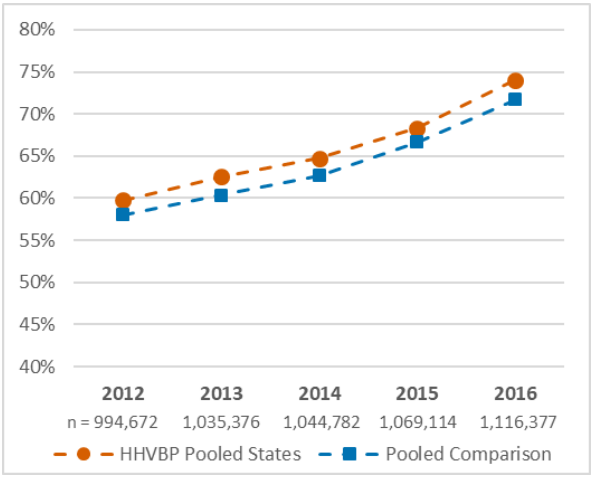
Next, we examine possible HHVBP effects on each of the performance measures included in the TPS.

### *Mixed Findings on Early Effects for OASIS-Based Outcome Measures*

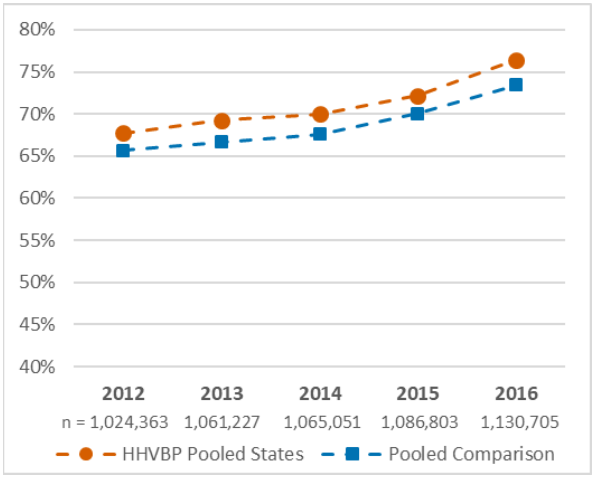
To better understand underlying trends in the OASIS-based outcome measures both prior to and during implementation of the HHVBP Model, we examined the 2012 – 2016 annual means for each of the six HHVBP OASIS-based outcome impact measures that assess improvement over time in patient status. Figure 3 shows that the average annual score values are generally increasing across the six measures throughout the 2012 – 2016 period, for all patients receiving HHA services in the HHVBP states as well as the matched comparison group of clinically similar patients in non-HHVBP states. In addition, the increase in improvement accelerates starting in 2015 for some measures. The timing of this acceleration aligns with the announcement of the Quality of Patient Care Star Rating for public reporting (Table 3), and also mirrors what agencies indicated in the HHA interviews they are focusing on with respect to the OASIS measures (e.g., where they can impact measures, how patients are assessed; discussed below). These trends toward increasing scores in the six OASIS-based measures of improvement in patient status beginning before implementation of the HHVBP Model were occurring for patients in both HHVBP states and the comparison states.

*Figure 3. Annual Means for the Six OASIS-Based Measures that Assess Improvement, for Patients with an OASIS Home Health Episode in HHVBP Pooled States and Pooled Comparison Group, 2012-2016*

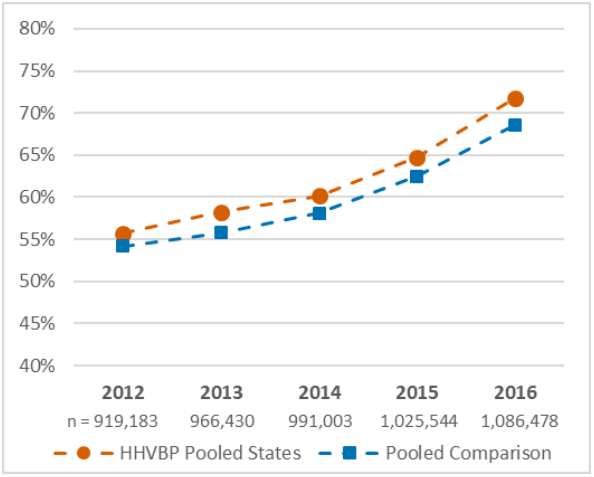
***Improvement in Ambulation – Locomotion***



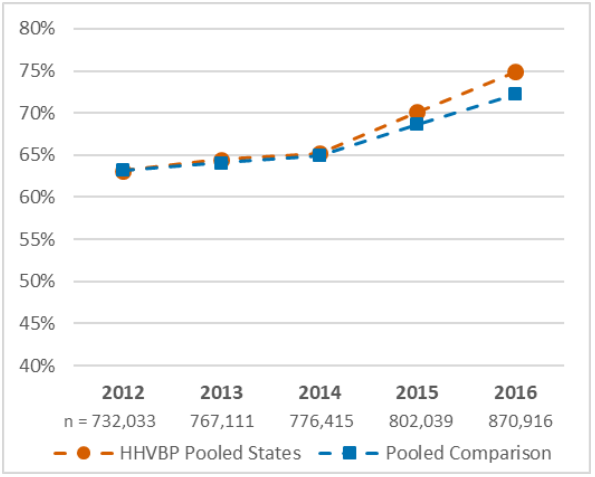

***Improvement in Bathing***



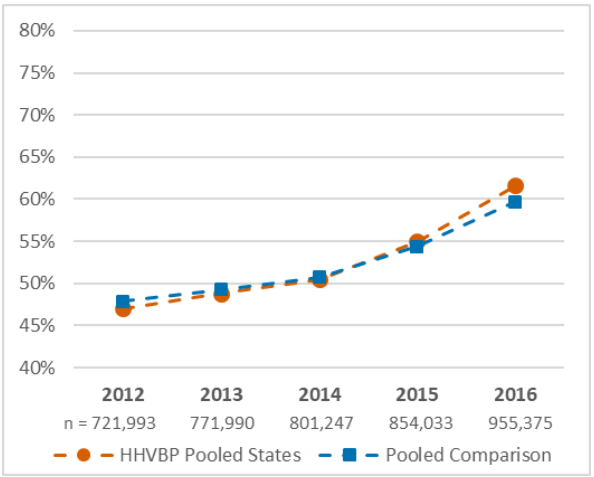

***Improvement in Bed Transferring***



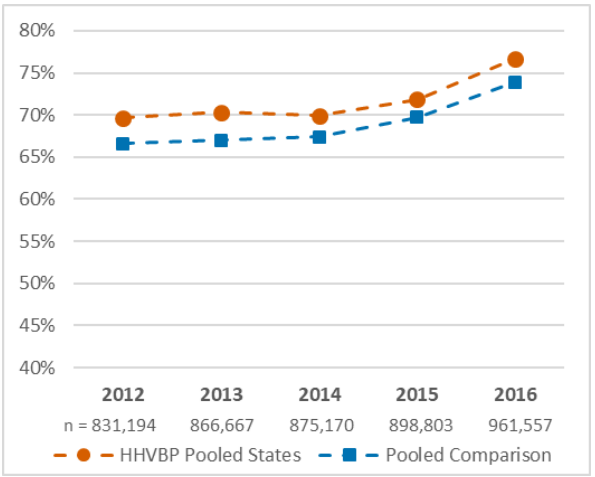

***Improvement in Dyspnea***




***Improvement in Management of Oral Medications***




***Improvement in Pain Interfering with Activity***




Within each measure, the annual sample size for the HHVBP pooled states and their pooled comparison were equal. Annual means were not regression-adjusted for HHA characteristics.

Table 10 below summarizes findings of our D-in-D analyses for the seven HHVBP OASIS-based outcome measures, using episode matching for the comparison group approach. We observed no early evidence of substantive change in the rate at which patients in HHVBP states are discharged to the community relative to patients in the comparison group. Unlike the OASIS outcome measures that assess improvement over the HHA episode in patient status, the rate of discharge to the community—a relatively objective measure of patient outcomes—has been relatively stable over time for all HHAs. For four of the six OASIS-based outcome measures that assess improvement (bathing, bed transfer, dyspnea, and management of oral medications), we observed trends demonstrating larger early improvement occurring in the nine HHVBP states combined relative to the comparison group (Table 10).

*Table 10. D-in-D Results for OASIS-Based Outcome Measures, 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| Improvement in Ambulation-Locomotion | 0.47 | 0.24 | 68.3% | 0.7% |
| Improvement in Bathing | 0.85 | 0.03 | 72.2% | 1.2% |
| Improvement in Bed Transferring | 1.13 | 0.01 | 64.7% | 1.7% |
| Improvement in Dyspnea | 1.86 | 0.0001 | 70.1% | 2.7% |
| Improvement in Management of Oral Medications | 2.03 | 0.0001 | 55.0% | 3.7% |
| Improvement in Pain Interfering with Activity | 0.39 | 0.29 | 71.9% | 0.5% |
| Discharged to Community | 0.11 | 0.56 | 72.4% | 0.2% |

*See Table 10n in Appendix of Supplemental Tables and Results for each measure's sample size.*

In the context of established trends showing increasing rates of improvement in many OASIS-based outcome measures (Figure 3), we note that the D-in-D estimates presented should be understood as representing changes that are likely smaller in magnitude relative to larger raw changes occurring over time in both HHVBP states and their comparison group.[16] That is, HHVBP may have had the effect of augmenting already existing efforts among agencies to increase rates of improvement. Given the subjectivity of the underlying OASIS assessments used to construct these measures and the incentives in HHVBP, we note that the D-in-D results also may be evidence of changes over time in how HHVBP agencies assess and record patient status and may not necessarily indicate the actual levels of improvements in quality of care. Such changes may reflect improvements in the accuracy of coding (e.g., due to increased training), but could also reflect "downcoding" of patient status at admission.[17]

Since the OASIS improvement measures capture elements of the patient's status at the initial assessment, increasing rates of improvement over time may reflect improvements in the status of patients at discharge, lower patient status at admission, or both. We examined the data for evidence of lower patient status at admission, selecting two measures for which initial OASIS assessment data were available for the same sample of treatment and comparison episodes included in the D-in-D analysis: *Bed Transferring* and *Management of Oral Medications*. For the Bed Transferring item, the percentage

[16] For example, the D-in-D estimate of 0.85% for improvement in bathing in Table 10 compares to an increase of 3.4% in the average value for the comparison group between 2015 and 2016 (i.e., from 70.1% to 73.5% in Table 8).
[17] Lower functional scores for patients may occur when the instructions for scoring functional status for OASIS are specifically followed. Decline in functional scores, thus, may be due to factors other than "downcoding."

of episodes in all states (HHVBP and comparison) for which the home health beneficiary was determined to be able to independently transfer at their initial OASIS assessment dropped from 13.9% in 2012 to 7.8% in 2015 and 5.7% in 2016. Similarly, for the Management of Oral Medications item, the percentage of episodes for which home health beneficiaries was determined to be able to take the correct oral medication(s) and proper dosage(s) at the correct time at their initial OASIS assessment dropped from 31.7% in 2012 to 22.5% in 2015 and 16.3% in 2016, while the percentage of episodes for which home health beneficiaries were determined to be unable to take medication unless administered by another person increased from 24.8% in 2012 to 33.6% in 2015 and 41.8% in 2016. We also observed similar trends in start of care values for OASIS items that are not HHVBP Model outcome measures, such as *Toilet Transferring* and *Grooming*.

In contrast, we did not observe trends indicating changes in the prevalence of many of the home health beneficiary health conditions that are reported in Medicare claims histories and used as part of the risk adjustment methodology for the HHVBP-claims based measures. These conditions include diabetes, pressure and chronic ulcers, anemia, Alzheimer's disease and related disorders or senile dementia, ischemic heart disease, and congestive heart failure (e.g., see Appendix of Supplemental Tables and Results, page 10). Overall, the prevalence of these claims-based conditions tended to remain relatively stable over time. Unlike the OASIS items, the claims-based conditions are based on data reported across a range of providers and care settings. As a result, the discordance in trends between OASIS indicators of functional status and claims-based conditions further supports the possibility that the D-in-D results for OASIS outcome improvement measures may at least in part reflect changes in the coding practices of HHAs.

### *Larger Improvements in OASIS-Based Process Measures for HHVBP States*

Similar to the OASIS-based outcome measures, there was also an ongoing trend of generally increasing performance scores for all three HHVBP OASIS-based process measures during the 2012 – 2015 period, in both HHVBP states and the comparison states.[18] The results of our D-in-D analyses (using HHA reweighting for the comparison group approach) indicate larger early improvements in 2016 for the nine HHVBP states relative to their comparison group for all three of the OASIS-based process measures (Table 11 below). Similar to the OASIS-based outcome measures, the observed increases over time in OASIS-based process measure scores among HHVBP states exceed the increases occurring during that time for the comparison group. As such, HHVBP may have had the effect of augmenting already existing HHA efforts to improve performance in some processes of care.

[18] We note that there was a small decrease in 2015 for both the "Influenza Immunization Received for Current Flu Season" and "Pneumococcal Polysaccharide Vaccine Ever Received" measures, which is also consistent with what is found on HHC. Specific to the Influenza measure, 2014 – 2015 was a "moderately severe" flu season, but the flu vaccine for that season was a poor match for the circulating strains (CDC, 2016). The confluence of these factors may have impacted the flu vaccination rates for 2015.

*Table 11. D-in-D Results for OASIS-Based Process Measures, 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| Influenza Immunization Received for Current Flu Season | 1.88 | <.0001 | 58.7% | 3.2% |
| Pneumococcal Polysaccharide Vaccine Ever Received | 1.76 | <.0001 | 67.0% | 2.6% |
| Drug Education on Medications Provided to Patient/Caregiver during Episodes of Care | 0.57 | 0.002 | 94.5% | 0.6% |

*See Table 11n in the Appendix of Supplemental Tables and Results for each measure's sample size.*

### *No Effects on Patient Experience with Care*

Most of the five HHCAHPS-based measures included in HHVBP showed no changes over time among all HHVBP states combined relative to their comparison group (Table 12). Underlying the overall D-in-D findings (using HHA reweighting for the comparison group approach), performance scores for the five patient experience measures remained relatively stable over the five-year period, in both the HHVBP states and their comparison group (see Appendix of Supplemental Tables and Results, pages 12 – 13). Together, patterns in the D-in-D findings and underlying trends in the HHCAHPS measures do not provide evidence of early effects in the first performance year.

*Table 12. D-in-D Results for HHCAHPS-Based Measures, 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| How often the home health team gave care in a professional way | -0.28 | 0.07 | 88.8% | -0.3% |
| How well did the home health team communicate with patients | -0.14 | 0.44 | 85.8% | -0.2% |
| Did the home health team discuss medicines, pain, and home safety with patients | -0.62 | 0.002 | 82.9% | -0.7% |
| How do patients rate the overall care from the home health agency | -0.02 | 0.93 | 84.4% | 0.0% |
| Would patients recommend the home health agency to friends and family | -0.09 | 0.76 | 79.4% | -0.1% |

*See Table 12n in Appendix of Supplemental Tables and Results for each measure's sample size.*

### *Most HHVBP Agencies Reported the New Measures*

As part of our quantitative analyses, we also examined the reporting rates of the three HHVBP new measures by the HHAs in the nine 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.[19] Overall, reporting rates were similar across the three new measures, ranging from three-quarters for both herpes zoster vaccination status of patients and advance care plan, to over four-fifths for influenza vaccination status of HHA personnel. Across all HHAs, most (73.6%) HHAs reported all

[19] 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).

three measures, and only 17.3% reported none of the measures. Reporting rates tended to be lower among freestanding, for-profit, small, and newer agencies (see Appendix of Supplemental Tables and Results, page 18). These findings align with the experience reported by some small and for-profit agencies in the interviews describing navigating the HHVBP Secure Web Portal as challenging and noting that data submission was not user-friendly.

### *Overall Mixed Spending and Utilization Impacts*

By design, the HHVBP Model aims to incentivize higher quality of care at the HHA level, with an expectation that improvements within home health will not inadvertently increase spending for other services such as skilled nursing. In fact, it is an assumption of the Model that utilization associated with poor quality such as preventable hospital admissions should be reduced in response to the HHVBP incentives. Examining Medicare expenditures and utilization for these services offers an initial, high-level view of whether the HHVBP Model is successful in its aims. Table 13 presents the D-in-D point estimates and associated p-values for Medicare spending and utilization for skilled nursing and unplanned ACH per FFS HH episode in 2016, as well as ED utilization per FFS HH episode in 2016, using episode matching for the comparison group approach. For these measures, we conducted analyses at the home health episode level among FFS home health beneficiaries.

*Table 13. D-in-D Aggregate Medicare Spending and Utilization Results for FFS HH Episodes, CY 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| Medicare SNF Spending/all FFS HH Episodes | -$18.68 | .0003 | $655 | -2.9% |
| SNF Use/all FFS HH Episodes | -0.09 | .03 | 5.2% | -1.7% |
| Medicare Unplanned ACH Spending/all FFS HH Episodes | -$32.18 | .03 | $2,178 | -1.5% |
| Unplanned ACH/First FFS HH Episodes | 0.07 | .46 | 16.7% | 0.4% |
| Unplanned ACH/All FFS HH Episodes | -0.01 | .94 | 17.5% | -0.1% |
| ED Use (no Hospitalization)/First FFS HH Episodes | 0.21 | .01 | 11.9% | 1.8% |
| Medicare HH Spending/FFS HH Episode | -$1.80 | .98 | $2,946 | -0.1% |

*See Table 13n in Appendix of Supplemental Tables and Results for each measure's sample size.*

As shown in Table 13, we estimated a reduction in SNF spending of $19 per FFS home health episode in HHVBP states during the first performance year of the Model, relative to the comparison group. Given that average CY 2015 SNF spending among HHVBP states was $655 per home health episode, the D-in-D estimate corresponds to approximately a 2.9% reduction in SNF spending. Our analyses also indicated an overall reduction in SNF use per FFS HH episode; there was a reduction of 0.09 percentage points overall in the HHVBP states, relative to the comparison group. This D-in-D estimate compares to a 1.7% decrease from the average SNF use of 5.2% across the HHVBP states in 2015.

For unplanned hospitalization, our analyses also indicated a decline in unplanned ACH spending per home health episode in the HHVBP states relative to the comparison group. The D-in-D estimate of $-32 (Table 13) corresponds to a 1.5% reduction compared to 2015 levels (based on average spending of $2,178). In contrast, our analyses of the frequency of unplanned ACH per home health episodes indicated no significant change in the HHVBP states relative to the comparison group. This finding applies to both the unplanned ACH utilization measure for first episodes in a sequence, and the

unplanned ACH utilization measure for all episodes in a sequence and, thus, might be indicative of any effects of HHVBP on unplanned hospitalizations over the longer term.

Results for the ED measure (Table 13) show an increase in utilization of 0.21 percentage points relative to the comparison group. This estimate compares to a 1.8% increase from the average ED use of 11.9% across the HHVBP states in 2015.

In addition to spending and utilization for Medicare FFS beneficiaries who used HH services, we also examined home health spending and utilization among the broader Medicare FFS population to address the impact of the HHVBP Model on the entire Medicare FFS population in an area who could potentially use HH services (Table 14). For these measures, we conducted analyses at the county level (i.e., among all FFS beneficiaries), using County-Level Reweighting for the comparison group approach. Based on our analyses of both Medicare spending and utilization of home health services among all FFS beneficiaries, there was no statistically significant change overall among HHVBP states relative to the comparison group.

*Table 14. D-in-D Aggregate Medicare Spending and Utilization Results for All FFS Beneficiaries, CY 2016*

| Measure | Total Effect | | Average in HHVBP States, 2015 | % Relative Change |
|---|---|---|---|---|
| | D in D | p value | | |
| Medicare HH Spending/FFS Beneficiary | -3.81 | .69 | $138.84 | -2.7% |
| HH Episodes/1,000 FFS Beneficiaries | -1.18 | .60 | 47.13 | -2.5% |

*See Table 14n in Appendix of Supplemental Tables and Results for each measure's sample size.*

Together, the results of our analyses of the spending and utilization measures suggest mixed early impacts during the HHVBP initial performance year. We found early evidence of reductions in spending for certain types of services (SNF and unplanned ACH) and an increase in ED utilization among FFS beneficiaries who received home health services, and no change in spending or utilization for home health among all FFS beneficiaries. However, as discussed above, we recommend a degree of caution in interpreting the statistical significance of certain D-in-D results as necessarily demonstrating an impact of HHVBP, given the results of certain model robustness tests (see page 25). Further, for unplanned ACH, we found no early evidence of a decline in the frequency of unplanned hospitalizations that would explain the reduction in spending for unplanned hospitalizations among FFS beneficiaries who received home health services in the HHVBP states relative to FFS beneficiaries who received home health services in the comparison group. The relative reduction in spending for unplanned ACH among FFS beneficiaries who received home health services may instead reflect other factors, such as changes in the mix of different types of hospitalizations which vary in resource intensity or in unmeasured changes in the population being served. As discussed above, there may be larger effects of HHVBP in 2018 and later years when the Medicare payments to HHAs are affected by their performance under the Model. In addition, CMS designed the financial incentives for quality improvement under HHVBP to become stronger over the Model's five-year span (Table 1). As a result, agency efforts to improve their quality performance under the Model may accelerate over time and result in a larger impact in later years.

## 3.3 Qualitative Findings

### 3.3.1 HHAs' Initial Responses to HHVBP and Factors Influencing their Operations

In this first year, interviews with representatives of 67 HHAs explored HHAs' early thinking and initial reactions to the HHVBP Model and how that shaped their agencies' activities in the first year of the Model. Many interviewees described feeling worried and concerned when they initially learned about HHVBP, and some also expressed concerns about multiple regulatory and payment changes as well as the strain on limited staff resources. For example:

> *"Nationally, overwhelmingly, the biggest challenges for home health agencies stem out of regulatory reform. We have had 8, we expect 9, straight years of reimbursement cuts in the home health setting. At the same time, we have seen increased pressures from regulatory reform – HHVBP, Star Ratings, CJR, BPCI, the growth and expansion of MA, ACOs, Next Gen ACOs, upending significant change in requirements for home health COPs, the survey process has been reformed as well. Each of these changes has caused really intense regulatory and financial pressures on us and at the same time we're having reimbursement cuts. And then at the same time, because of the risk-taking and pressure on hospitals to bend the cost curve, while we're getting less money with more regulatory pressure, the expectations in terms of quality of care and complexity of patients have continually increased."*
>
> *— Freestanding, chain, for-profit HHA*

However, HHA representatives typically characterized their response to the HHVBP Model in its first performance year as an incremental addition to activities that their agency was already doing (e.g., monitoring quality for their Star Ratings, making changes to quality improvement processes to comply with anticipated changes to Medicare's COPs). Many agencies said that seeking more information about the HHVBP Model was one of the first things they did when HHVBP was announced. Agencies described taking advantage of online and in-person HHVBP training offered by consultants, corporate offices (in the case of chain agencies), or their state associations. Once administrators and key decision makers had sought more information about HHVBP, many agencies of all types in all states described disseminating information about HHVBP to their staff, as discussed in more detail below.

To understand the extent to which HHVBP and other factors are affecting HHA operations, we asked interviewees to describe their agencies' "biggest challenges." Because agencies must integrate HHVBP into their operations while also navigating market conditions and regulations, these questions were intended to capture the broader context in which agencies operate and give them an opportunity to define their most pressing operational challenges. While agencies outlined a variety of challenges shaping their operations, agencies in multiple states most frequently cited staffing and changing Medicare reimbursement and regulatory requirements as their biggest challenges. Several agencies in two states, Iowa and Nebraska, discussed the challenges presented by their states' shift to Medicaid managed care. These self-identified challenges are important because they provide information about other external factors that may contribute to agencies' changes in operations and how agencies are allocating their efforts and resources, which also may influence agencies' responses to HHVBP.

- ***Staffing:*** The majority of HHAs interviewed expressed that staffing—specifically the shortage and retention of qualified nursing, behavioral health staff, and therapists—is their biggest challenge. Some non-profit HHAs cited their inability to pay higher wages and lack of job security

as drivers of staffing shortages and retention. HHAs also cited difficulties hiring nurses with the skills/expertise to care for patients with complex health care needs and to complete necessary documentation (e.g., OASIS). Consequently, many HHAs noted that it can take extensive amounts of time to train nurses to navigate the home care needs of patients needing specialized care and to accurately complete required documentation. Some agencies located in rural communities described difficulty recruiting key staff that are licensed in particular disciplines because these pools of individuals tend to be small and agencies compete for the best available employees.

- ***Medicare Program, Regulation and Payment Changes:*** HHAs reported increased pressure in trying to manage regulatory requirements, payment system refinements, and evolving payment models including HHVBP, Star Ratings, Comprehensive Care for Joint Replacement (CJR) model, Bundled Payments for Care Improvement (BPCI), Medicare Advantage expansion, and Accountable Care Organizations (ACOs). In addition, many agencies noted that adjusting operations to comply with Medicare's new COPs (effective January 13, 2018) is time consuming and resource intensive. Trying to manage all of the regulatory requirements of these various programs has been a challenge for both small and large organizations, several of which contended that Medicare payment rates are leading to lower profits.

- ***Medicaid Payment:*** While not an issue noted by agencies in all states, agencies in Iowa and Nebraska said that Medicaid coverage and payment rules in their states have created significant challenges to providing adequate and timely care to their Medicaid clients. Several agencies in Iowa cited recent changes to the state's Medicaid program, which shifted all patients to managed care starting in 2016 and has reduced coverage of and payments for home health care for their Medicaid patients. They claimed that the difficulty obtaining pre-authorization of Medicaid services has led to financial losses, delays in payment, delays in care, and the need to discontinue care without notice. Similarly, several HHAs in Nebraska reported that the Managed Care Organizations that are also managing Medicaid services are reducing reimbursement rates and are reported as failing to reimburse agencies for services.

### 3.3.2 HHA Operation Changes: Agencies Report OASIS-focused Staff Education

To understand how HHVBP affected agency operations, we asked interviewees to describe what, if anything, they changed about their operations in response to HHVBP. In addition to providing information about the effects of HHVBP on agencies at this early phase of implementation, the responses to this question provide insight into what measures agencies were most focused on trying to affect and the nature of their activities, e.g., changes to care delivery or documentation.

While most agencies we interviewed described making some changes, around ten percent reported that they had made no changes in response to HHVBP. The reasons agencies gave for no or limited response varied. Some explained that they did not need to make changes because they were already doing what they needed to do to deliver quality care. Others had not yet determined what changes to make in response to HHVBP, or they did not have resources to make changes, such as hiring additional staff, to address identified needs.

Most agencies we interviewed, however, described making some changes in response to HHVBP. While agencies we interviewed described a number of activities designed to inform staff about HHVBP in

general or to improve scores on claims-based or HHCAHPS measures, by far, the most commonly discussed response to HHVBP was education for staff on assessing patients and correctly completing OASIS documentation.

### *OASIS Documentation Efforts*

Across all interviews, staff education about HHVBP OASIS measures was the most commonly reported activity in response to HHVBP. Half of all agencies interviewed noted that they focused on educating their clinical staff about OASIS in response to implementation of HHVBP, with several more agencies reporting education activities about all HHVBP measures generally. In discussing their focus on OASIS training for staff, agencies typically framed their efforts as helping clinicians understand and appropriately document each patient's status; this task was also the most frequently cited challenge agencies noted in responding to HHVBP. For example:

> *"I felt like the staff didn't understand how to complete the OASIS in a way that truly painted a picture of what the patient looked like at the beginning and what progress we made at the end."*
>
> *—Freestanding, independent, for-profit HHA*

While some agencies said they focused on OASIS training in response to HHVBP, some noted that it was not an entirely new activity, nor was it the sole reason for OASIS education. Rather, their OASIS-education efforts in response to HHVBP were a refinement to or an intensification of activities that were already underway because of Star Ratings, new COPs, staff hiring and turnover, or periodic OASIS changes.

> *I do an OASIS review and competency test annually for my clinicians…the questions really focus on things that are important for [HH]VBP and the Star Ratings and Home Health Compare.*
>
> *—Freestanding, independent, for-profit HHA*

> *I don't know if I would say we changed anything. I think it's more a matter of helping the clinicians understand as they're completing an OASIS: 'what does this mean?' A lot of clinicians when they're new to this, they don't understand it, so that's part of the training process. We don't want them randomly going through and selecting answers. It has to be specific to the patient and you have to understand what the intent is behind the question. But that hasn't changed because of value-based purchasing. We've been watching our outcomes since Home Health Compare came around.*
>
> *—Hospital-based, non-profit HHA*

> *It [training on OASIS] was started before [HHVBP], and that was the intent to roll that out from our education department, but we certainly made sure we layered in information about the Star Ratings, information about value-based [purchasing]. There are course assignments related to accurate OASIS and capturing all of that. So, I would say it [training on OASIS] did not come about because of it [HHVBP], but we made sure the content then included and was beefed up related to [HH]VBP.*
>
> *—Freestanding, chain, for-profit HHA*

Agencies reported using training provided by external organizations and consultants, as well as on-going education provided by agency or, for agencies that were part of a chain, by corporate staff. OASIS education activities for staff ranged from general education about OASIS targeted to all staff (e.g., in newsletters and emails to staff and in staff meetings) to one-on-one instruction for individual clinicians that focused on specific measures.

> *I actually have people on my team that ride with the clinicians while they're doing an OASIS and then come back and sit down with them and review everything that just happened at the visit and how the documentation is going to look. So, we use a variety of adult learning practices in our trainings.*
>
> *—Freestanding, chain, for-profit HHA*

The type of education was related, in part, to agencies' capacity to analyze or have access to data at the clinician level. Some interviewees reported having software or consultants to analyze data at the clinician level or having staff review all OASIS assessments, while others relied on data at the agency-level, such as Star Ratings and HHVBP Interim Performance Reports (IPRs). For some agencies, staff education efforts also entailed changes to staffing such as hiring new staff, restructuring departments, or adding educational responsibilities to existing staff duties. A few agencies noted limits on resources to do trainings they would like to do, and that staffing shortages and retention issues compound difficulties with staff training. For example:

> *"Being down staff right now makes it hard to implement improvement projects because people are just trying to do what they can to provide the care they're supposed to provide. And then I think we do have a lack of resources. We can't afford to send our nurses to these big boot camps for OASIS training. We can't afford to have someone come in to work with us on improving our scores."*
>
> *—Freestanding, independent, government HHA*

### *Focus on Start of Care and Discharge*

Several of the agencies interviewed noted the importance of focusing their OASIS education for staff on Start of Care (SOC), with some agencies also reporting changes to their SOC and discharge processes to improve accuracy of OASIS. For example,

> *"To have an accurate OASIS and to really show those outcomes at the end when you're discharging them, you have to really score them correctly during the start of care. So, we're doing some education on that. And I think the training we have coming up will help greatly with them understanding the questions better."*
>
> *—Freestanding, independent, non-profit HHA*

> *"The whole start of care OASIS assessment, we found, is really critical to setting the stage for the patient in capturing all their areas needing improvement as well as all their underlying conditions. And we found that it was also really important that we have the patient demonstrate those things with the home health nurse on that start of care assessment. And that often the patients were reluctant to do that, or the staff was maybe perhaps willing to take...the patient's narrative description of how they functioned, rather than having the patient actually demonstrate [how they function]. So, that's been an area of focus."*

*—Hospital-based, independent, non-profit HHA*

*What we found, with many of our indicators, is that we were giving our patients too much credit for what they were doing, and not accurately scoring them to begin with so they didn't have any room to improve. That goes for things like pain interfering with activity. A lot of those measures are just looking at, thinking about the patient from their best aspect and not their worst. During the assessment, what you need to look at for the admission is their worst.*[20]

*—Hospital-based, independent, non-profit HHA*

Changes to the SOC process included adding review of SOC, switching to reviewing all SOC assessments, using software to monitor SOC OASIS coding, and having nurses and therapists do SOC visits. A few agencies also described changes to their discharge processes.

*Clinicians get alerts after they've done a start of care or a recertification, and in that alert it tells them a variety of things. One is, "This doesn't make sense. Is this really how you wanted to answer this question?" Now that they're able to self-monitor that, the offices are reporting that there's less intervention that has to come through from the patient care coordinators.*

*—Freestanding, chain, for-profit HHA*

*"We've started really looking at the OASIS questions specifically, and looking at the guidance to say, 'are we answering these questions correctly?' or 'do we need to reevaluate how we're assessing these patients?' So, we've started doing co-visits with therapy and nursing because we find that the therapy staff are a little bit stronger at answering some of those questions appropriately. So, we have nursing and therapy go out together so that they can kind of learn from each other."*

*—Freestanding, independent, non-profit HHA*

*We did do some OASIS training related to the things that are covered by [HH]VBP, taking a look at how you code your ADLs at the start of care versus transfer or discharge so they understand how that comparison works. And things surrounding dyspnea if they're not getting better, what do we need to do?*

*—Freestanding, chain, non-profit HHA*

[20] OASIS instructions specify that the "usual" status or performance should be recorded, noting that "the patient's ability may change as the patient's condition improves or declines, as medical restrictions are imposed or lifted, or as the environment is modified. The clinician must consider what the patient is able to do on the day of the assessment. If ability varies over time, choose the response describing the patient's ability more than 50% of the time period under consideration." (CMS, 2017b) Participants in the stakeholder discussions sometimes reported perspectives that do not accurately interpret policy. We describe these perspectives without correction because they convey stakeholders' understanding of policy, which may in turn affect their response.

#### *OASIS-Related Concerns from Some Agencies*

While over half of agencies interviewed discussed undertaking OASIS education in response to HHVBP or in response to HHVBP plus other factors, a few also expressed concern about basing payments on OASIS measures, while being supportive of the concept of value-based payments, in general.

> *We were lobbying for there to be more claims-based measures in the [HH]VBP because we believe that satisfaction and claims-based measures are more objective and independently verifiable. It is concerning that so many of the measures, much like Star Ratings, are driven based off OASIS responses because it is fairly easy and fairly well-known that agencies can manipulate OASIS responses. If you look at the trends for quality over the last two years with Star Ratings and VBP, you'll find that all the OASIS-based measures have improved rapidly, all over but especially in Florida, yet the claims-based measures for emergent care and hospitalization have somehow gotten worse.*
>
> *—Freestanding, chain, for-profit HHA*

### 3.3.3 Other Activities

Though less common than OASIS-oriented activities, agencies reported activities targeted at other HHVBP measures and other changes to agency operations in response to HHVBP. These include:

- ***Documenting vaccinations and advance directives:*** Several interviewees reported efforts to improve their documentation of vaccination measures, both those reported on OASIS and new measures, in response to HHVBP. They most frequently reported making changes to their documentation practices, with some noting they had made changes to their software to collect and report new measure data. Other changes noted by a few agencies included staff training on vaccination and advance directive documentation and changes to their intake process to make sure they are capturing all available information on vaccines and advance directives.

- ***HHCAHPS:*** A few interviewees discussed changes in response to HHVBP designed to improve HHCAHPS measures, but HHCAHPS did not seem to be a common focus among the agencies we interviewed. A few interviewees reported training staff on HHCAHPS measures and how to improve their interactions with patients. A few interviewees said that their agencies changed workflow in ways they felt would improve patient satisfaction, including: more timely initiation of care and greater consistency in the clinicians seeing a patient. Two interviewees said they changed their HHCAHPS vendor to have access to employee-level results, rather than results aggregated at the agency-level, or improve their response rate.

- ***Claims-based measures:*** Several agencies reported that they have started front-loading visits for patients—providing more visits earlier in the episode—with the goal of keeping them out of the hospital, in response to HHVBP. A few noted that they had adopted this practice for patients with congestive heart failure, chronic obstructive pulmonary disease, and for coronary artery bypass grafting patients. Other efforts to affect claims-based measures included greater patient education about when to go to the ED and the use of patient education materials for specific conditions to help patients monitor and manage their conditions and know when to seek care.

### 3.3.4 Marketing

Though not frequently cited, a few agencies in Florida and Massachusetts noted that HHVBP had changed their marketing strategies with referral sources, which can be particularly important to agencies in highly competitive markets or markets with a greater share of alternative payment models. One agency noted that they were using their process changes as a result of HHVBP to market themselves to referral sources, particularly those participating in bundling models. Similarly, another interviewee described sharing their agency's HHVBP performance measure results with referring physicians and ACOs who want to see agency data on their re-hospitalization performance and other metrics:

> *We have seen an opportunity—as we looked at some of the measure items—to really market some of our stronger performing areas, which has positively impacted referrals. We've looked at a lot of metrics, like timeliness of care, patient satisfaction, and we see them as feathers in our caps. So, we take that data to the referral sources and we participate in the readmission reduction meetings at the hospitals and that's where we are really talking about HHVBP and transitions of care and what sort of information we need from them at the time of referral to ensure a good transition of care.*
>
> *—Freestanding, independent, non-profit HHA*

### 3.3.5 HHAs Use a Variety of Sources to Inform their Educational Activities and Track Performance

The information that agencies marshaled to guide their efforts to respond to HHVBP incentives varied. Some agencies already had software or consultant services to produce reports for them on their performance on OASIS measures using much more recent information than they can get from CMS sources. While some agencies viewed HHVBP as an impetus for re-evaluating and even changing their data management tools or electronic medical records, in general, agencies we interviewed did not mention purchasing or making major software changes in response to HHVBP, although, as discussed above, several mentioned relatively minor changes to capture data on new measures.

Approximately half of HHAs used the Interim Performance Report (IPR) data from CMS to help guide agency activities. The most common use of the reports was to inform Quality Assurance and Performance Improvement (QAPI) efforts, as interviewees cited IPRs as useful tools in helping to identify focal points and opportunities for improvement. For example, interviewees stated: "We have decided to focus our education on three measures at a time, which we picked based on areas that needed the biggest improvement according to our IPR;" "It has allowed us to focus better on where we should really tackle our performance improvement plans in QAPI;" and "It has impacted our QAPI and what we focus on." Additional HHA uses of IPR data included staff education and using it for monitoring quality from quarter to quarter. A small number of agencies did not use the IPR data to inform agency activities. Reasons for this included still determining how to use IPR data, needing to understand it more before using it, not using it because data are old, and not using it because agencies have alternative information.

As part of our quantitative analyses, we examined intervention HHAs' use of HHVBP Connect, an interactive web-based platform for HHAs in intervention states designed to facilitate learning and collaboration on topics related to the HHVBP Model. Registration to use the site was relatively high in

the first month of 2016 (1,070) and grew slowly but steadily throughout the remainder of the year; at the end of 2016, HHVBP Connect had 1,863 registered HHA users.[21] Nearly all of the HHAs that participated in our interviews were aware of HHVBP Connect and had experience using its resources. Downloading files was the most frequently used resource (11,510 downloads). Resources for improvement of HHVBP quality measures were downloaded most frequently; this topic also had the most number of documents available for download (see Appendix of Supplemental Tables and Results, page 24). Agency interviewee responses indicated that HHAs perceived HHVBP Connect resources as being helpful; however, few stated that the resources had an impact on their agency's activities.

# 4. Discussion

As described in the sections above, this Annual Report presents the preliminary findings of our evaluation based on data available for the first performance year of the HHVBP Model. Moving forward, we will continue to address the goals and research questions identified for this evaluation (see Section 1). At the same time, our upcoming activities will build on our findings during this first year. Below, we note several limitations to our analyses for this Annual Report, followed by a brief discussion of our primary findings. We conclude with a discussion of further analyses and activities that we are planning as part of this evaluation.

## 4.1 Limitations

We note certain limitations to consider when interpreting the overall results presented in this report. First, the results presented in this report should be regarded as preliminary. As discussed earlier, the hybrid approach used to create comparison groups for this report is complex. Going forward, we anticipate using strategies to move towards a more unified approach to the comparison group methodology that will reduce complexity. Future reports will detail revisions to comparison groups and include results for the first performance year under the revised approach.

Second, although our estimates are generally unbiased, our robustness tests suggest that our calculation of the standard errors may need further refinement for some measures (see page 25). As such, we recommend caution in interpreting the D-in-D results, since statistically significant results may not necessarily indicate effects that can be attributed to HHVBP.

We also note some characteristics of our impact measures and their corresponding data sources that may affect the interpretation of results. For example, all OASIS assessment data are self-reported by HHAs, such that OASIS-based patient outcomes are more subjective than claims-based outcomes (e.g., hospitalization). As such, consistency of reporting—both across agencies (cross-sectional) and within agencies (longitudinal)—is more variable with many of the OASIS-based measures than for the claims-based measures and may be a reflection of changes over time in how HHVBP agencies record and assess patient status, rather than an unbiased measure of improvements in quality of care. Additionally, changes over time in some items used to calculate the OASIS measures and in the OASIS assessment itself (Table 3) may be a source of inconsistency in risk-adjustment of the OASIS measures over time.

[21] We cannot determine the proportion of HHAs represented since user registration data did not include HHA's CMS Certification Numbers (CCNs), and HHAs could have multiple users. However, given that just over half (53%) of HHVBP HHAs participated in at least one HHVBP Connect Webinar during 2016 (see Appendix of Supplemental Tables and Results, page 26), we know at least 53% of HHAs were registered HHVBP Connect users.

## 4.2 Summary of Findings

***Early overall improvement in HHA Total Performance Scores.*** We observed early gains in this overall index of the quality of care. Based on analysis of HHA scores for individual performance measures, much of the overall gains in TPS over time can be attributed to improvements in the OASIS-based process and outcome measure scores for the first performance year. As discussed above, HHA gains in TPS values during 2015 – 2016 also occurred in the comparison group, which may indicate that comparison agencies were responding to factors other than the HHVBP Model. Data for additional performance years will help us determine whether there continue to be differential trends in TPS between HHVBP HHAs and non-HHVBP HHAs.

***Mixed findings on effects for OASIS-based measures***. For four of the six OASIS measures of improvement in patient status, the current D-in-D results indicate larger gains in CY 2016 for HHVBP states relative to their comparison group. Readers should consider several factors when interpreting these results. First, gains during the first performance year occurred in the context of other quality of care improvements that were occurring at that time among both HHVBP states and their comparison group. These overall trends may in part reflect the response of agencies to other initiatives. Second, our analyses during the first performance year indicate that the gains over time in OASIS measures of improvement in patient status may in part reflect lower scoring of reported patient status at admission over time, rather than an absolute increase over time in patient status at discharge. These findings may reflect the increased attention of agencies on OASIS reporting and documentation, as suggested during our initial interviews with HHA representatives. The results of our analyses of OASIS-based outcome measures do not conclusively point to an early effect on the outcomes of patients receiving HH care.

Analyses of the three OASIS process measures indicate larger early improvements overall relative to the comparison group. However, levels of performance for each measure already tended to be high, and one measure was determined to be topped out (Drug Education on Medications Provided to Patient/Caregiver during Episodes of Care[8]). Together, the results are consistent with HHVBP effects on certain OASIS assessment care processes (e.g., based on larger gains in OASIS process measure rates in performance year 1), but do not yet suggest an impact on the outcomes of patients receiving HH care.

***No evidence of HHVBP impact on patient experience measures.*** Overall, measures of patient experience have been relatively stable over time among agencies in both HHVBP states and their comparison group. For most of the HHCAHPS measures included in HHVBP, we identified no differential trends among all HHVBP states.

***Mixed results for Medicare spending and utilization.*** We found early, preliminary evidence of reductions in both Medicare spending and utilization for SNF services and an increase in ED visit utilization among HH FFS users. When interpreting these results, it may be helpful to consider how the magnitude of these D-in-D estimates compare to baseline measure rates. For example, there was a 0.09% decrease in SNF utilization over time among HHVBP states relative to the comparison group, based on the D-in-D estimate. This estimate compares to average SNF utilization of 5.2% in HHVBP states during CY 2015. In a similar way, we observed a 0.2% increase in ED utilization over time among HHVBP states relative to the comparison group, which compares to average ED utilization of 11.9% in HHVBP states during CY 2015. Although we found preliminary evidence of reductions in Medicare spending for unplanned hospitalizations among FFS beneficiaries who used home health services, we

found no evidence of a change in the frequency of unplanned hospitalizations. We also found no overall change in either spending or utilization for home health services among all FFS beneficiaries.

***Early changes in HHA operations were relatively focused and similar to ongoing activities.*** Through our interviews with HHAs in the HHVBP states, we consistently heard that staff education on assessing patients and correctly completing OASIS documentation was the most common response to HHVBP. Many agencies also noted that in its initial year, HHVBP encouraged HHAs to continue quality improvement efforts that were already underway in part due to existing CMS initiatives designed to improve HHA performance and public reporting.

## 4.3 Future Activities

Motivated in part by our preliminary findings presented in this report, the following paragraphs discuss several priorities that will guide our analytic and data collection activities during the upcoming year of the evaluation.

***Investigate a more unified comparison group methodology.*** The hybrid strategy we used to create comparison groups for this report is complex. We will be examining potential strategies for simplifying the comparison group methodology for future reports.

***Evaluate potential changes in the case-mix of beneficiaries receiving HH services.*** In addition to having a potential impact on the utilization of HH services and of potential substitutes for HH among FFS beneficiaries, HHVBP may affect the case-mix of beneficiaries receiving HH services. In future reports, we will examine potential changes over time in HH patient case-mix. In addition to informing conclusions regarding the effects of the HHVBP Model on utilization of services and access to care, the results of such analyses could inform certain refinements to our analytic approach for other impact measures of interest. For example, such analyses may motivate changes in the case-mix indicators that are included as risk adjustment variables in certain D-in-D analyses of Medicare spending and quality of care. Our examination of case-mix may also be informed by preliminary findings using the Home Health Groupings Model (HHGM)—CMS' recently enacted (but not yet implemented) refinement to the HH PPS—which was developed to address vulnerabilities in the current system (HHS, 2017). For example, the 13 comorbidity categories and differential resource use associated with the six HHGM clinical groups is instructive as we consider how best to refine our models to accurately adjust for case-mix (Abt Associates, 2016).

***Use other approaches to understand early patterns and trends in total spending and utilization.*** There is substantial interest in whether HHVBP produces savings to Medicare. One approach to answer this is to examine differences in total Medicare Part A and Part B expenditures. In this report, we examined trends in unplanned hospital expenditures and SNF expenditures among Medicare FFS beneficiaries who received home health services primarily to examine potential service substitution. In future reports, we will examine differences between HHVBP and comparison states in total Medicare expenditures among FFS beneficiaries who received home health services using a D-in-D model to assess whether HHVBP resulted in Medicare savings relative to the comparison group. For this and other D-in-D models estimated for all HHVBP states combined, we also will consider state-specific analyses.

We also will consider analyses of impact measures for subgroups of beneficiaries for whom there may be earlier opportunities for the Model to generate efficiencies for the Medicare program. To the extent possible, we will use early qualitative input from agencies on recent initiatives to prevent unplanned

hospitalizations or ED visits to inform the design of these analyses. For example, as noted above in our findings, some agencies reported front-loading visits during episodes for patients with certain chronic conditions. Such analyses may eventually contribute to our understanding of patterns observed across spending and utilization measure results, which, so far, have been mixed.

We also plan to interview hospital discharge planners and community physicians, as sources of home health referrals, to gather information on perceptions of changes in HHA operations, changes in admissions practices, and the potential impact of HHVBP and publicly reported quality measures on referral patterns. We anticipate that these different perspectives regarding referral and practice changes—coupled with HHA representative interviews—will prompt additional analysis of secondary data for potential trends in utilization that we have not yet examined.

In addition, for future analyses that use data for CY 2018 and later years, it will be of interest to consider whether larger changes in Medicare spending and utilization are observed once HHVBP agencies receive Medicare HH PPS payments that adjust for quality of care starting in CY 2018 and, furthermore, as the adjustment percent range increases in each subsequent year.

***Continue to examine sources of reported improvements in OASIS-based outcome measures.*** There is a need to further assess whether the observed changes for four of the six OASIS-based impact measures that assess improvement reflect real improvements in patient status at discharge, as distinguished from nominal changes in reported patient status from initial assessment to discharge assessment. We will consider multiple analytic strategies, such as using claims-based risk adjustment for Medicare FFS beneficiaries—which may be relatively more stable over time—and examining non-HHVBP impact measures that also use OASIS data. We also are considering a number of robustness checks to examine support for our current OASIS-based outcomes findings. Strategies under consideration include estimating the model on a subset of Medicare FFS beneficiaries and using claims-based risk adjustment; estimating effects of HHVBP on non-HHVBP OASIS-based impact measures; and estimating effects of HHVBP on claims-based outcomes that would be likely to reflect functional improvement, such as hospitalization for falls.

***Explore possible heterogeneity across types of HHAs in the early Model impact.*** Differences are likely in how well-positioned agencies are to respond to the incentives under HHVBP. Furthermore, heterogeneity in HHVBP Model effects could have future implications for patterns in HHA market entry and exit and potential disparities in beneficiary access to and quality of care. We will conduct separate analyses to assess the impact of HHVBP on the types of HHAs in operation. In subsequent years of this evaluation, we will use the extended follow-up period that encompasses HHVBP payment years (CYs 2018 – 2022) and subsequent HHVBP performance years (CYs 2017 – 2020) to assess the impact of the Model on the entry and exit of HHAs and on the characteristics of HHAs operating in home health markets.

***Assess the impact of HHVBP payment reductions on vulnerable populations.*** Once the payment adjustments are applied to HH PPS payments starting in CY 2018, we will assess potential risks to vulnerable populations for whom there may be unintended consequences of the Model for beneficiary access to care and quality of care. This might occur, for example, if providers perceive they are disadvantaged under HHVBP for treating vulnerable beneficiaries for whom it often is more difficult to achieve high quality/improved performance levels and seek to limit services to these types of patients. For example, we will examine the association of provider characteristics and indicators of patient mix

with the HHVBP payment adjustments. To the extent that patterns emerge in the types of HHAs that are observed receiving a payment adjustment upward or downward, we will assess changes in case-mix, agency staffing, and quality measure performance among HHAs with payment reductions, as well as changes in market entry/exit that could have implications for beneficiary access to care in certain geographic areas (e.g., for rural populations). We will also examine the association of provider characteristics and indicators of patient mix for agencies with high HHVBP payment adjustments to determine factors associated with their success.

***Extend follow-up to incorporate more recent agency perspectives and quantitative data*.** Future analyses will benefit from additional HHA and beneficiary experience during the second performance year of the HHVBP Model (CY 2017). In part, this will allow consideration of whether initial trends under the Model are sustained, and also whether there are consistent trends at the state level that might be otherwise muted in the pooled HHVBP state analyses. The extended follow-up will allow us to describe any further changes in operations identified during agency staff interviews, concurrent with the initial payment adjustments being applied under the Model starting in CY 2018. In addition, we will have the opportunity to consider any early evidence of learning or increased success among HHAs in improving aspects of quality that are incentivized by the Model, to the extent HHAs may increasingly gain insights about how to modify practices or address any initial barriers they may encounter.

***Expand evaluation activities to better capture the experience of agencies and beneficiaries under the Model.*** To facilitate our assessment of the impact of HHVBP on agency operations and complement our agency staff interviews, we also plan to field a survey to HHAs in both HHVBP and non-intervention states to gain quantifiable information about key structural and operational characteristics. Additionally, we plan to field the HHCAHPS survey to beneficiaries who receive care at small HHAs to assess the impact of the HHVBP Model on these potentially vulnerable patients.

***Assess other CMS initiatives that may affect Model impact.*** There are several ongoing CMS initiatives and other policy changes that may have an impact on HHA operations and the care of beneficiaries using home health services and have the potential to affect inferences that are made about the impact of the HHVBP Model. We will examine how other related CMS initiatives that incentivize episode-based payment and care coordination (e.g., BPCI, CJR) may affect inferences about the impact of the HHVBP Model and, where feasible, account for such external factors in our analyses.

***Continue to monitor and assess other external factors that may affect Model impact.*** We will continue to prioritize efforts to understand the potential role of external factors that may affect HHAs' response to HHVBP (e.g., shift to Medicaid managed care in Iowa and Nebraska) and, more generally, any emerging barriers or facilitators to HHVBP Model effects revealed by our ongoing primary data collection activities. These qualitative findings will also inform our quantitative work that examines the impact of other CMS initiatives on the HHVBP Model.

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