HHVBP Evaluation Final Report
Appendices

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NOTICE

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Acronym List

Acronym	Term
ACH	Acute Care Hospitalization
ACO	Accountable Care Organization
AHRF	Area Health Resource File
AIM	ACO Investment Model
APM	Alternative Payment Model
AT	Achievement Threshold
BETOS	Berenson-Eggers Type of Service
BM	Benchmark
BPCI	Bundled Payment for Care Improvement
CBSA	Core-Based Statistical Area
CCN	CMS Certification Number
CCW	Chronic Conditions Data Warehouse
CJR	Comprehensive Care for Joint Replacement
CMMI	Center for Medicare & Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
CY	Calendar Year
D-in-D	Difference-in-Differences
D-in-D-in-D	Difference-in-Difference-in-Differences
DME	Durable Medical Equipment
ED	Emergency Department
EOC	End of Care
ESRD	End-Stage Renal Disease
FFS	Fee-for-Service
HCC	Hierarchical Condition Category
HCPCS	Healthcare Common Procedure Coding System
HHA	Home Health Agency
HHCAHPS	Home Health Consumer Assessment of Healthcare Providers and Systems
HHVBP	Home Health Value-Based Purchasing
HICN	Health Insurance Claim Number
HMO	Health Maintenance Organization
IPF	Inpatient Psychiatric Facility
iQIES	internet Quality Improvement and Evaluation System
IRF	Inpatient Rehabilitation Facility
LPN	Licensed Practical Nurse
LUPA	Low Utilization Payment Adjustment
MA	Medicare Advantage
MBSF	Master Beneficiary Summary File

Acronym List

Acronym	Term
MDC	Major Diagnostic Category
MDD	Master Data Demonstration
MDS	Minimum Data Set
MedPAR	Medicare Provider Analysis and Review
MMTA	Medication Management, Teaching, and Assessment
MS-DRG	Medicare Severity Diagnosis Related Group
MSSP	Medicare Shared Savings Program
OASIS	Outcome and Assessment Information Set
OCM	Oncology Care Model
PAC	Post-Acute Care
PDGM	Patient-Driven Groupings Model
PECOS	Provider Enrollment, Chain, and Ownership System
PEP	Partial Episode Payment
PHE	Public Health Emergency
POS	Provider of Services
PRN	*pro re nata* or “as needed” nursing staff
QIES	Quality Improvement and Evaluation System
RCD	Review Choice Demonstration
ROC	Resumption of Care
SNF	Skilled Nursing Facility
SOC	Start of Care
SSP	Shared Savings Program
SUD	Substance Use & Substance Use Disorders
TNC	Total Normalized Composite
TPS	Total Performance Score
UAF	Unified Analytic File
VRDC	Virtual Research Data Center

Technical Appendix

This Technical Appendix provides details about the data sources and methods used to conduct the analyses that were conducted as part of the evaluation and are highlighted in this Annual Report.

Analytic Approach

We designed our quantitative analyses to address the overarching question: What was the effect of the original Home Health Value-Based Purchasing (HHVBP) Model on impact measures of interest, such as health care utilization, quality of health care, health outcomes, and health care costs? All Medicare-certified home health agencies (HHAs) in Arizona, Florida, Iowa, Massachusetts, Maryland, Nebraska, North Carolina, Tennessee, and Washington were required to participate in the original HHVBP Model. These states were selected at random from nine state regional groups defined based on geographic location, utilization, demographics, and clinical characteristics, with each regional grouping containing five or six states (Exhibit 1).[1]

Exhibit 1. HHVBP States and their Corresponding Regional Group

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

To evaluate the impact of HHVBP by comparing the experience of beneficiaries and HHAs in HHVBP and non-HHVBP states, our empirical model had to address differing characteristics of beneficiaries and HHAs between HHVBP and non-HHVBP groups. Most of the relevant data elements for this evaluation were available for both HHVBP and non-HHVBP groups before and after the start of the HHVBP Model (i.e., during the evaluation baseline period from 2013-2015 and the post-implementation period starting in 2016). This allowed for comparing outcomes between HHVBP and non-HHVBP populations and assessing whether the relative outcomes for these two groups changed from before to after the start of the original HHVBP Model.

Difference-in-Differences Framework

We used a difference-in-differences (D-in-D) framework to compare changes in impact measures observed over time in the HHVBP states relative to those in non-HHVBP states as the basis for evaluating 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. Our D-in-D analysis compared changes in impact measures observed over time in the combined HHVBP states to corresponding changes in the comparison group. The basic D-in-D estimate was defined as the difference in an outcome of interest over time in the model states, after subtracting the difference, over time, in the comparison group:

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

where $Y_{INT,POST}$ and $Y_{INT,PRE}$ are the post- and pre-intervention outcome levels, respectively, for the HHVBP group, and $Y_{COMP,POST}$ and $Y_{COMP,PRE}$ are the post- and pre-intervention outcome levels, respectively, for the comparison group.

With this model specification, the impact estimate is the differential change in an outcome for the HHVBP states between the baseline and follow-up period(s), relative to that same change for the comparison group. That is, the differential change in the outcome over time for the HHVBP states relative to comparison states represents the estimated effect of HHVBP.

We list out the steps involved in the implementation of the D-in-D framework and then enumerate on the steps in sections below.

1. We assessed patterns and trends among HHVBP states in the characteristics of home health patients and HHAs and in the utilization of home health services in HHVBP and non-HHVBP states for individual years before and after implementation of the HHVBP Model.
2. With the model launching in 2016, three years prior to model implementation (2013-2015) were considered as baseline period.
3. Leveraging the design features of the model, we defined a single comparison population consisting of beneficiaries and agencies in the 41 states not selected for participation in the HHVBP Model (we exclude the District of Columbia and United States (US) territories, as they were not eligible for selection into the HHVBP Model). We used a multivariate linear regression approach to compare observations in the nine HHVBP states with those in the 41 comparison states while adjusting for a set of covariates across measures to account for residual imbalance between the two groups.
4. The validity of inferences that are based on the D-in-D estimator depended on whether the assumption of parallel trends for outcomes between the treatment and comparison groups during the baseline period was satisfied. We assessed parallel trends through falsification models (placebo test) and by plotting unadjusted and adjusted baseline trends in outcomes.
5. In the context of a parametric regression framework, we controlled for observed differences between the HHVBP and comparison groups, we examined adjusted baseline differences to check parallel trend assumption and then estimated the impacts of the model using D-in-D models.

Comparison Group

We designed the quantitative analyses for this report to evaluate the effect of the HHVBP Model on a range of impact measures that included Medicare spending, utilization of services, quality of care, and patient experience. To facilitate the interpretation of findings across measures, we established a common comparison group approach for our analyses. These analyses involved comparisons for beneficiaries and agencies between HHVBP and non-HHVBP states.

The randomized selection of nine HHVBP states and mandatory participation of all HHAs in these selected states helped to guard against selection bias. We also found that the model design achieved reasonably close balance between HHVBP states and the remaining states in many beneficiary and agency characteristics and aspects of home health care.[2] Given the design attributes of randomization and mandatory participation and the degree of balance observed for a range of factors, we defined a single comparison population consisting of beneficiaries and agencies in the 41 states not selected for participation in the HHVBP Model.

There are two general reasons why outcomes may differ across HHVBP and non-HHVBP states: 1) differing observed characteristics of beneficiaries and HHAs studied; and 2) differing unobserved characteristics of beneficiaries and HHAs. Using a single comparison group (to address observed differences) and the use of a D-in-D approach to address unobserved differences, we examined a range of impact measures for this report (Exhibit 2).

Exhibit 2. Impact Measures Used to Evaluate the HHVBP Model

Measure
HHA Total Performance Score (TPS)[a]
Home Health Utilization Measures
Percent of Fee-for-Service (FFS) Beneficiaries with at Least One Home Health Episode
Number of Home Health Days of Care per FFS Beneficiary
FFS Claims-Based and OASIS-Based Case-Mix Measures
FFS Beneficiaries with at Least One Home Health Episode[b]
FFS Claims-Based Measures Examining Post-Acute Care (PAC)
Home Health Care
Any Institutional PAC (i.e., Skilled Nursing Facility (SNF), Inpatient Rehabilitation, or Long-Term Care Hospitalization)
Hospital Outpatient Therapy
Self-Care (i.e., No Formal PAC)
FFS Claims-Based HHA Operations Measures
Frontloading Skilled Nurse Visits
Frontloading Therapy Visits

Exhibit 2. Impact Measures Used to Evaluate the HHVBP Model (continued)

Measure
FFS Claims-Based Utilization Measures
Unplanned Acute Care Hospitalization (ACH)/First FFS Home Health Episodes
Outpatient ED Use (No Hospitalization)/First FFS Home Health Episodes
Emergency Department (ED) Use followed by Inpatient Admission/First FFS Home Health Episodes
Total ED Use (Outpatient or Inpatient Claims)/First FFS Home Health Episodes
Unplanned ACH/All FFS Home Health Episodes
SNF Use/All FFS Home Health Episodes
Medicare Advantage (MA) Utilization Measures
Percent of MA Beneficiaries with at Least One Outcome and Assessment Information Set (OASIS) Home Health Episode[c]
Unplanned ACH/All MA OASIS Home Health Episodes
Unplanned ACH/All FFS OASIS Home Health Episodes[c]
SNF Use/All MA OASIS Home Health Episodes
FFS Claims-Based Spending Measures[d]
Average Medicare Spending per Day during and following FFS Home Health Episodes of Care
Average Medicare Spending per Day during FFS Home Health Episodes of Care
Average Medicare Spending per Day following FFS Home Health Episodes of Care
OASIS-Based Outcome Quality Measures
Discharged to Community
Total Normalized Composite (TNC) Change in Self-Care
TNC Change in Mobility
Improvement in Dyspnea
Improvement in Management of Oral Medications
Home Health Consumer Assessment of Healthcare Providers and Systems (HHCAHPS)- Based Patient Experience Measures
How often the home health team gave care in a professional way (Professional Care)
How well did the home health team communicate with patients (Communication)
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)
How do patients rate the overall care from the home health agency (Overall Care)
Would patients recommend the home health agency to friends and family (Likely to Recommend)

HHVBP measures indicated by italic text. All measures have a baseline period of 2013-2015 except for HHA TPS which has a baseline period of 2015. [a] D-in-D approach is not used for analysis of agency TPS. [b] We analyzed stratified by presence of conditions at risk of limited functional improvement during home health care. [c] We did not conduct a D-in-D analysis on these measures as they were for descriptive analyses only. [d] For each of the three spending measures, we also analyzed their components: Medicare Part B carrier and durable medical equipment (DME) combined, Home Health, Hospice, Inpatient, Outpatient ED and Observation Stays, other Outpatient/Outpatient types combined, and SNF.

Covariate Adjustments

The design attributes of randomization and mandatory participation of the model helped to achieve balance between HHVBP and non-HHVBP states. However, not all factors were balanced between the two groups through randomization alone. Given the extent of diversity in beneficiary and agency characteristics and treatment patterns across states, we observed a degree of imbalance for certain factors and opted for covariate adjustment in the regression model. Covariate adjustments accounted for differential factors across the HHVBP and non-HHVBP states and improved the precision of impact estimates and net out effects of any observed differences in characteristics between the two groups. Key criteria like (a) maintaining a uniform analytical approach across a range of impact measures, (b) strong relationship of the factors with impact measures, (c) degree of imbalance of the factors between treatment and comparison groups, (d) availability of data across multiple population of interest, (e) potential endogeneity, (f) potential sources of confounders merging during intervention period etc. were considered in selecting factors for covariate adjustment.

In the following sections, we list and describe the core set of factors that were used for covariate adjustment as part of our standard model specification (listed in Exhibit 3) and the additional covariates or other refinements that apply to a subset of impact measures.

Exhibit 3. Core Set of Factors for Covariate Adjustment for FFS Claims and OASIS Outcome Measures

Model Covariate	Definition
Beneficiary Characteristics	
Age	Beneficiaries are categorized as under 65, 65-84, or 85+ years of age
Race/Ethnicity	Beneficiaries are categorized as Hispanic (regardless of Black/White/Other Race), Non-Hispanic Black, Non-Hispanic White, Non-Hispanic Other Race, or Non-Hispanic Multiracial
Dual Eligibility	Dual status from Master Beneficiary Summary File (MBSF) at episode start for claim-based episodes, and at episode end for OASIS-based episodes.
Gender	Female indicator defined using OASIS assessment M0069_PAT_GENDER, and if not available, using information from claims.
Rural	Indicator of FFS beneficiaries in beneficiary's county of residence who live in a rural area.
Education	Percent of persons in beneficiary's county of residence who are 25+ years of age and have less than a high school diploma.
Home Health Agency Characteristics	
Ownership	HHAs are categorized as for-profit, non-profit, or government-owned.
Setting	HHAs are categorized as hospital-based or freestanding.
Chain affiliation	HHAs are categorized as chain affiliation, no chain affiliation, missing chain affiliation, or undetermined chain affiliation.
Agency age	HHAs are categorized as under 4, 4-10, or 10+ years of age.
Agency size	HHAs are categorized as 1-59, 60-249, 250-499, 500-999, or 1000+ OASIS episodes.

Exhibit 3. Core Set of Factors for Covariate Adjustment for FFS Claims and OASIS Outcome Measures (continued)

Model Covariate	Definition
Core Clinical Indicators Used for Episode-Level Impact Measures*	
Ambulation and Locomotion	Beneficiaries are assigned indicators for: (1) Able to independently walk with the use of a one-handed device, (2) Requires two-handed device for level ground or human assistance for stairs and uneven ground, (3) Walks only with supervision or assistance from another at all times, or (4) Chairfast to bedfast.
Interaction of HHVBP (treatment) Indicator with each of the Four Levels of Ambulation and Locomotion	N/A
Risk for Hospitalization	Beneficiaries are assigned indicators for: (1) Multiple hospitalizations in past 6 months, (2) History of falls, and (3) Currently taking 5 or more medications.
Pressure Ulcer	Beneficiaries are assigned indicators for pressure ulcer stage 2, stage 3, stage 4, and not stageable.
Other Indicators	Beneficiaries are assigned indicators for: (1) Surgical wound, (2) Requires urinary catheter, (3) Discharged from inpatient facility in last 14 days, and (4) Neoplasm diagnosis.

** Derived from OASIS assessment at start of home health care. Additional detail is available in our 6th Annual Report Technical Appendix.[2]*

In general, given the random selection of the states into the HHVBP Model, the D-in-D approach helps to control for unobserved time-invariant heterogeneity in the treatment model. However, to control for residual time-invariant confounding and to limit selection bias in the estimation of causal effects, we adjusted for a full set of state fixed effects in the D-in-D model specification. By exploiting within-group variation over time, fixed effects regression is a powerful tool for mitigating the risk that omitted variables drive any associations between dependent and independent variables.

Additionally, we augmented the list of covariates with other factors that were deemed important for the specific analyses (Exhibit 4). These additional covariates were not included among the core list of covariates, either because they were obtained from a data source that was not available for the entire population of interest, or the rationale for inclusion only applied to a subset of impact measures.

Exhibit 4. Additional List of Covariates used for Specific Measure Sets

Covariate	Reasoning
FFS Claims-Based Utilization, Spending Measures, HHA Operations Measures	
Oxygen indicator	In addition to the list of covariates in Exhibit 3, adjusted for these factors. They are available only for FFS episodes.
Patient-Driven Groupings Model (PDGM) home health admission source	
PDGM-defined clinical grouping	
% Original End-Stage Renal Disease (ESRD)	
% Original disabled	
% Current ESRD	
% Current disabled	
Frontloading Measures	
ED visits within 2-week frame	In addition to the list of covariates in Exhibit 3, adjusted for these factors to control for potential confounding between ED use and home health visits.
Episode level Hierarchical Condition Category (HCC) score	
OASIS-Based Outcome Quality Measures	
Medicaid coverage	Not available for Medicare FFS population.
Outcome specific start of care indicators of patient status and their interaction term with HHVBP status	To avoid omitted variable bias related to the patient's initial status reported in OASIS. To account for difference in coding of patient status between two groups.
FFS Claims-Based and OASIS-Based Case-Mix Measures	
Agency characteristics listed in Exhibit 3 and their interaction term with HHVBP status	We did not control for beneficiary characteristics or clinical characteristics, as the focus was to evaluate changes in case-mix of home health beneficiaries and controlling for these factors that reflect patient clinical severity could potentially bias estimated effects.
Rural status and its interaction term with HHVBP status	
Education listed in Exhibit 3 and its interaction term with HHVBP status	
Home Health Utilization Measures	
% of FFS Medicare beneficiaries with each characteristic at the county level: age at the end of the year, sex, race and ethnicity, dual eligibility, original Medicare entitlement reason, current Medicare entitlement reason, and ESRD	These measures were adjusted for a subset of covariates.
County level rural status	

Exhibit 4. Additional List of Covariates used for Specific Measure Sets (continued)

Covariate	Reasoning
FFS Claims-Based Measures Examining PAC	
Age	The unit of analyses for these measures were at hospital discharge level and they were adjusted for a subset of covariates.
Rural status	
Education	
Accountable Care Organization (ACO) Shared Savings Program	
ACO Pioneer Alternative Payment Model (APM) Flags	
Percent of persons in deep poverty	
HHCAHPS	
Included all the core beneficiary characteristics (aggregated to the agency level), agency characteristics except for patient age and area education variables	Agency level HHCAHPS measures values are already risk-adjusted and hence adjusted for a subset of covariates.

Exogenous Factors

Events that are exogenous to the model can bias the impact estimates if the events have differentially affected the outcomes in HHVBP and non-HHVBP states. Hence, it is critical to assess the impact of these events and account for potential confounding in the multivariate D-in-D model.

1. COVID-19 Public Health Emergency (PHE):

The onset of the COVID-19 PHE in 2020 and continuing in 2021 was a development that was exogenous to the original HHVBP Model. To explore the potential implications of the COVID-19 PHE for evaluating the effects of the HHVBP Model, we compared the incidence of COVID-19 among FFS home health beneficiaries in HHVBP and non-HHVBP states (Exhibit 4). Overall, we observed relatively similar trends in the percentage of home health episodes for beneficiaries with an initial COVID-19 diagnosis in the two groups of states throughout 2020 and 2021.[2] Nevertheless, to account for potential confounding due to the COVID-19 PHE on home health utilization and the HHVBP Model, we defined two county-level and five episode-level risk-adjustment variables. They are: (1) county-month-level rates of Medicare FFS inpatient stays associated with COVID-19 diagnoses; (2) county-month-level rates of incidence of COVID-19 diagnoses from USAFacts.org; (3) episode-level variables that indicate a COVID-19 diagnosis found in claims data during the episode, following the episode through 30 days or within 90 days prior to the episode start. Wherever feasible (like claims-based impact measures) we adjusted for five COVID-19 risk adjusters, otherwise we included the two county-level COVID-19 diagnoses rates in the regression model.

We also conducted sensitivity analyses on select claims-based measures to better understand the potential impacts of COVID during 2020 and 2021. We estimated the HHVBP impact in 2020 and 2021 for claims-based utilization and Medicare spending measures from a D-in-D model that did not adjust for COVID indicators (other covariates remaining unchanged). This was done to examine if COVID-19 is a large source of confounding and to assess whether unobserved geographic variation due to COVID-19 is similar to observed variation in the COVID indicators that we control for in the D-in-D models.

2. Introduction of PDGM:

In 2020, the PDGM, a revised case-mix adjustment methodology, was implemented, which resulted in a change in the unit of payment from 60-day to 30-day episodes of care. This change from 60-day to 30-day episodes did not affect the two HHVBP measures (Unplanned Hospitalizations and ED Use [No Hospitalization] among First Home Health Episodes), as well as the ED Use Followed by Inpatient Admission and Total ED Use (Outpatient or Inpatient Claims) among First FFS Home Health Episodes measures. The denominator for all these measures is restricted to the first home health episode in the sequence only, and the measure lookout period is 60 days from the start of the episode, regardless of the length of the episode. However, this change in episode length affected other measures, i.e., all home health episodes in a sequence. This included all the measures of Medicare Spending and the other two claims-based utilization measures (e.g., Unplanned Hospitalizations among All Home Health Episodes, SNF Use/All FFS HH Episodes).

For the spending measures, we noted a differential change in the follow-up period between HHVBP and non-HHVBP states. PDGM is likely to be the driver of a differential shift in eligible days for our measure of spending during home health episodes of care and, consequently, in average spending per day between HHVBP and non-HHVBP states. The concern for our evaluation is that based on our D-in-D analyses, we might falsely attribute a change in average spending in HHVBP states relative to non-HHVBP states in 2020 and 2021 to the HHVBP Model instead of attributing it to PDGM. To mitigate this potential source of bias due to PDGM, we opted for an alternative approach to defining Medicare spending measures in 2020 and 2021. For the estimation of impacts in 2020 and 2021, we used a standardized follow-up period (a standard 60-day window following the start of home health care prior to 2020; and a standard 30-day window following the start of home health care during 2020 and afterwards) for measuring spending during home health episodes of care and continued to use the same approach that was followed in the previous Annual Reports for model impacts in 2016-2019.

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

3. Impact of other Centers for Medicare & Medicaid Services (CMS) initiatives:

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

In 2020, CMS commenced or continued implementation of the Review Choice Demonstration (RCD) in five demonstration states (Illinois, Ohio, Texas, North Carolina and Florida). The demonstration began in Illinois in June of 2019. Home health claims in these states with billing periods beginning during a participation cycle are subject to review under the requirements of the choice selected by each HHA. The RCD may impact how HHAs provide care and potentially on the case-mix of patients admitted to home health care in those five states. The RCD was still in its early stages in all five states during the period of our analysis, and its full impact is undetermined at this time. Home health claims in all demonstration states with billing periods beginning on or after August 31, 2020 were subject to review under the requirements of the demonstration. We included covariate adjustments in our claims-based analyses to mitigate any potential confounding threat this may pose for estimation of HHVBP impacts. The risk-adjustment covariates are episode-level variables that indicate one of three situations: (1) the agency was participating in the RCD at the time of the episode start date; (2) the agency had previously participated but was not actively participating in the RCD at the time of the episode start; or (3) the agency was not a participant in the RCD at the time the episode started. Like the APMs discussed above, we incorporated an adjustment for these RCD covariates in our D-in-D regression model for FFS beneficiaries receiving home health care to account for any effect that this initiative may have on HHA performance.

Comparison Group for the State Level Analyses

For the state-specific analyses presented in this report, the choice of an appropriate comparison group for each HHVBP state was largely driven by the extent of balance that exists between the treatment and comparison groups on factors that can potentially impact outcomes of interest. Achieving this balance and reducing observed differences in the two populations was important, as it would otherwise lead us to erroneously infer an effect of HHVBP that was actually a result of differences in the underlying populations. Leveraging the design of the model, the regional groups from which CMS randomly selected the HHVBP states, were used as comparison groups for each state. As specified in the calendar year (CY) 2016 Final Rule,[1] each regional grouping included states that were similar in utilization, demographics, and clinical characteristics, while being geographically located in close proximity to one another. Another motivation for choosing the regional groups as comparison groups was that, collectively, they constituted all the 41 non-HHVBP states, which would help us to reconcile the national-level results with the state-specific results.

Based on our assessment of the degree of balance among a wide range of the characteristics of each HHVBP state and the regional grouping from which it was selected, and a goal of maintaining uniformity with the approach we use for our national-level analyses, we used the regional group as the comparison group for each of the nine HHVBP states.

Cumulative Impacts (D-in-D Estimator)

We included data for all years (2013-2021) to obtain the individual yearly HHVBP estimates in the post-implementation period, and then calculated the cumulative average effect over 2016-2021.

For measuring expenditure per day, we estimated impacts for 2016-2019 from one regression model, and impacts for 2020-2021 from a separate regression model using a modified approach, as explained above.

Defining each episode i in time t, identifying the treatment episodes with an indicator variable Treat_i, identifying the post-implementation year variables t with an indicator variable $I(t = t_k)$, and identifying a vector of covariates as P_{Cov} (Exhibit 3 and Exhibit 4), the D-in-D estimator for outcome Y is implemented as:

$$Y_{i,t} = \alpha_0 + \alpha_1 Treat_i + \sum_{k=1}^{k=6} \beta_k I(t = t_k) + \sum_{k=1}^{k=6} \delta_k Treat_i * I(t = t_k) + \sum_{j=1}^{j=3} \rho_j I(q = j) + \omega \mathrm{P}_{Cov} + \sum_{s=3}^{s=50} \theta_s I(S = s) + \epsilon_{i,t}$$

Where k indexes the HHVBP Model years 1 to 6 (2016-2021).

- Treat$_i$: 1, 0 indicator (1= HHVBP states, 0= Non-HHVBP states)
- $I(t = t_1)$: 1 , 0 indicator (1 when year = 2016, 0 otherwise)
- $I(t = t_2)$: 1 , 0 indicator (1 when year = 2017, 0 otherwise)
- $I(t = t_3)$: 1 , 0 indicator (1 when year = 2018, 0 otherwise)
- $I(t = t_4)$: 1 , 0 indicator (1 when year = 2019, 0 otherwise)
- $I(t = t_5)$: 1 , 0 indicator (1 when year = 2020, 0 otherwise)
- $I(t = t_6)$: 1 , 0 indicator (1 when year = 2021, 0 otherwise)
- α_0 is an intercept
- α_1 is the average difference between the HHVBP and comparison populations over the pre-implementation period
- β_k is the average change from pre- to post-implementation for the HHVBP population, where k = 1 for year 2016, k = 2 for year 2017, k = 3 for year 2018, k = 4 for year 2019, k = 5 for year 2020, k = 6 for year 2021
- δ_k is the yearly D-in-D effect, for k = 1, 2, 3, 4, 5, 6; the difference in the change from pre-implementation to post-implementation for the HHVBP population relative to the comparison population (i.e., to estimate the treatment effect of HHVBP)
- ρ_j coefficients capture seasonal effects associated with the four quarters of the year, where j = 1, 2, 3 (one quarter omitted as reference)
- ω is a vector of coefficients associated with vector of covariates P_{Cov}
- $I(S=s)$: 1, 0 indicator (1 when from state s, 0 otherwise); two states omitted as reference since "treat" is also included in the model
- θ_s coefficients are fixed effects for each state s
- $\epsilon_{i,t}$ episode-specific error term

In the regression equation, we included three estimates (ρ_1, ρ_2, ρ_3) capturing quarterly effects since we included a constant in the equation. Each episode was given an equal weight except for the three average Medicare spending per day measures, which were appropriately weighted by the number of days included in the denominator (see Exhibit 13 for definition).

To obtain the average annual (cumulative) impact estimate over the HHVBP Model years (i.e., 2016, 2017, …, 2021), we calculated a linear combination of the six-year-specific impact estimates to ensure that the cumulative estimate is consistent with the yearly D-in-D estimates. The linear combination incorporates weights for the impact estimate of each year in each of the measure domains as follows:

- For the claims-based utilization measures – the proportion of claims episodes from each year
- For the claims-based Medicare spending measures – the proportion of eligible days from each year. To reiterate, the cumulative estimate for spending measures would be the weighted average of the yearly impact

estimates, with 2016-2019 estimates calculated by one regression model (approach used in previous Annual Reports), and 2020-2021 calculated using the modified regression model as noted above; weighted by the number of eligible days in each year.

- For OASIS-based outcome measures — the proportion of OASIS episodes from each year
- For HHCAHPS-based measures — the proportion of all agency-year observations from each year

Given the phase-in structure of the payment adjustments of the HHVBP Model, we compared the average estimated HHVBP impacts on the measures in 2018-2021, when HHAs received performance-based payment adjustments, to the average impact during HHVBP Model years 2016-2017, prior to payment adjustments. We estimated and tested the equivalence of the following linear combinations of the earlier and later post-implementation years:

$$w_1 \delta_1 + w_2 \delta_2 = w_3 \delta_3 + w_4 \delta_4 + w_5 \delta_5 + w_6 \delta_6$$

where weights are constructed based on the number of episodes (or days for the spending measures or agency for HHCAHPS) in that year and normalized such that $w_1 + w_2 = 1$ *and* $w_3 + w_4 + w_5 + w_6 = 1$.

Computation of standard errors: Standard errors were clustered at the agency-level because implementation of HHVBP directly impacts HHAs. Since home health episodes within the same agency are correlated, accounting for agency clusters protects against the potential underestimation of standard errors, thereby minimizing the risk that we make false positive inferences about the effect of HHVBP. We also stratified at the state level in the model to account for greater homogeneity within states than across states, i.e., the variance of the outcome variable potentially being smaller within the state than in the population as a whole. Given that the HHVBP effect is analyzed at the national level, and all HHA clusters are nested within states, stratification is a method of breaking up the population into different groups and accurately estimating the standard error of the estimates. Stratification exploits this homogeneity within states to produce smaller standard errors for a given overall sample size, thus minimizing the risk of false negative inferences (Type 2 errors) from hypothesis tests.

The derivation of the mean outcome in the HHVBP and comparison group by pre- and post-implementation period is presented below. The D-in-D estimators for 2016, 2017, 2018, 2019, 2020 and 2021 are given by the coefficients δ_1, δ_2, δ_3, δ_4, δ_5, and δ_6 respectively. Between-group differences changed from a_1 in the pre-implementation period to $a_1 + \delta_k$, k = 1, 2, 3, 4, 5, 6 in the post-implementation period. The D-in-D coefficient, δ_k, indicates whether between-group differences increased ($\delta_k > 0, k$ = 1, 2, 3, 4, 5, 6) or decreased ($\delta_k < 0, k$ = 1, 2, 3, 4, 5, 6) after implementation of HHVBP.

Parallel Trends Testing

A key assumption with the D-in-D estimator is that the change in outcomes experienced in the comparison population is an accurate portrayal of the change that would have occurred in HHVBP states in the absence of HHVBP, also known as the parallel trends assumption. While the counterfactual of what would have occurred in the absence of HHVBP cannot be observed, we examined whether the measures of interest moved similarly over the baseline period (2013-2015) in the nine HHVBP states and the 41 comparison states. That is, we compared relative trends in these measures for the HHVBP and comparison groups during the three years prior to the implementation of HHVBP. We examined and tested for parallel trends in two ways:

1. Falsification models (placebo test)

We tested for differential changes in impact measures between the HHVBP and comparison groups between the first two years of the baseline period (i.e., 2013-2014) and the last year of the baseline period (i.e.,

Exhibit 5. Difference-in-Differences Estimators for Individual Post-Implementation Years

Group	Pre-Implementation	Post-Implementation	Pre-Post Difference
2016 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_1 + \delta_1$	$\beta_1 + \delta_1$
Non-HHVBP	α_0	$\alpha_0 + \beta_1$	β_1
Between group	α_1	$\alpha_1 + \delta_1$	δ_1
2017 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_2 + \delta_2$	$\beta_2 + \delta_2$
Non-HHVBP	α_0	$\alpha_0 + \beta_2$	β_2
Between group	α_1	$\alpha_1 + \delta_2$	δ_2
2018 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_3 + \delta_3$	$\beta_3 + \delta_3$
Non-HHVBP	α_0	$\alpha_0 + \beta_3$	β_3
Between group	α_1	$\alpha_1 + \delta_3$	δ_3
2019 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_4 + \delta_4$	$\beta_4 + \delta_4$
Non-HHVBP	α_0	$\alpha_0 + \beta_4$	β_4
Between group	α_1	$\alpha_1 + \delta_4$	δ_4
2020 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_5 + \delta_5$	$\beta_5 + \delta_5$
Non-HHVBP	α_0	$\alpha_0 + \beta_5$	β_5
Between group	α_1	$\alpha_1 + \delta_5$	δ_5
2021 Difference-in-Differences Estimator			
HHVBP	$\alpha_0 + \alpha_1$	$\alpha_0 + \alpha_1 + \beta_6 + \delta_6$	$\beta_6 + \delta_6$
Non-HHVBP	α_0	$\alpha_0 + \beta_6$	β_6
Between group	α_1	$\alpha_1 + \delta_6$	δ_6

2015) as a "placebo test." That is, we applied the exact same D-in-D specification (as described above) while assigning 2013-2014 as the baseline period and falsely assigning 2015 as the post-intervention time period and computed a D-in-D estimate for 2015. Such estimated effects for HHVBP for 2015 should be null since the initial HHVBP performance period did not begin until 2016. D-in-D estimates that are statistically different from zero ($p < 0.10$) means we rejected the parallel trends assumption (i.e., suggesting that there is lack of parallel trends in the outcomes for the two groups over the baseline period). Results of the falsification tests are shown in Exhibit 6.

We found a null effect during 2015 for the two home health utilization measures, five out of six claims-based utilization measures, and for five HHCAHPS measures, implying that the impact measures moved in a parallel manner for the two groups in the baseline period. All other measure sets showed evidence of non-parallel trends in the baseline period.

The validity of inferences that are based on the D-in-D estimator will depend on whether the assumption of parallel trends between the treatment and comparison groups during the baseline period is satisfied.

If baseline trends for the two groups were not found to be parallel, the comparison group would not provide a strong counterfactual for what would have been observed in the post-implementation period in the absence of HHVBP. Instead, the D-in-D estimator would, in part, capture the effects of any pre-existing differential trends between the two groups, where those trends would have otherwise continued in the post-implementation period. This would lead D-in-D estimates to either overestimate or underestimate the true effects of the treatment. Since our falsification tests rejected the null hypothesis of no difference in baseline trends between HHVBP and non-HHVBP states for certain impact measures of interest (i.e., FFS claims-based and OASIS-based case-mix measures, FFS claims-based HHA operations measures, FFS claims-based spending measures, and the OASIS-based outcome quality measures), we explored alternative model specifications for estimating the effects of HHVBP on these impact measures. As described below, for the impact measures that failed to pass the falsification test with a model specification that adjusted for a set of covariates and state fixed effects, we also adjusted for state-specific linear trends to account for any non-parallel linear trends in the baseline period between the states.

Exhibit 6. Results of Falsification Tests for Assessing the Impact of the HHVBP Model on Impact Measures

Measure	D-in-D Falsification[a]
Home Health Utilization	
Percent of FFS Beneficiaries with at Least One Home Health Episode[b]	-0.12
Number of Home Health Days of Care per FFS Beneficiary	0.05
FFS Claims-Based and OASIS-Based Case-Mix Measures	
HCC Score at Start of Care (SOC)	0.03**
Count of HCCs Present at SOC	0.01
TNC Mobility at SOC	0.07**
TNC Self-Care at SOC	0.11**
FFS Claims-Based Measures Examining Post-Acute Care (PAC)[b]	
Home Health Care	-0.03
Any Institutional PAC (i.e., SNF, Inpatient Rehabilitation, or Long-Term Care Hospitalization)	-0.18*
Hospital Outpatient Therapy	0.03
Self-Care	0.17
FFS Claims-Based HHA Operations Measures[b]	
Frontloading Skilled Nurse Visits	-0.73**
Frontloading Therapy Visits	-0.72**
Utilization Measures[b]	
FFS Claims-Based Utilization Measures	
Unplanned ACH/First FFS HH Episodes	0.06
Outpatient ED Use (No Hospitalization)/First FFS HH Episodes	0.06
ED Use followed by Inpatient Admission/First FFS HH Episodes	0.09
Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes	0.11
Unplanned ACH/All FFS HH Episodes	0.10
SNF Use/All FFS HH Episodes	-0.06*
MA Utilization Measures	
Unplanned ACHs/All MA OASIS Episodes (Shadow Claims)	0.07

Exhibit 6. Results of Falsification Tests for Assessing the Impact of the HHVBP Model on Impact Measures (continued)

Measure	D-in-D Falsification[a]
FFS Claims-Based Spending Measures[c]	
Testing validity of inferences for 2016-2019	
Average Medicare Spending per Day during and following FFS HH Episodes of Care	-$0.54
Average Medicare Spending per Day during FFS HH Episodes of Care	-$0.83**
Average Medicare Spending per Day following FFS HH Episodes of Care	-$0.63
Testing validity of inferences for 2020-2021	
Average Medicare Spending per Day during and following FFS HH Episodes of Care	-$0.43
Average Medicare Spending per Day during FFS HH Episodes of Care	-$0.50
Average Medicare Spending per Day following FFS HH Episodes of Care	-$0.36
OASIS-Based Outcome Quality Measures	
Discharged to Community[b]	-0.83**
TNC Change in Self-Care	-0.01
TNC Change in Mobility	0.0003
Improvement in Dyspnea[b]	0.51
Improvement in Management of Oral Medications[b]	0.66*
HHCAHPS-Based Patient Experience Measures[b]	
How often the home health team gave care in a professional way (Professional Care)	-0.06
How well did the home health team communicate with patients (Communication)	-0.23
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)	0.23
How do patients rate the overall care from the home health agency (Overall Care)	-0.15
Would patients recommend the home health agency to friends and family (Likely to Recommend)	-0.29

*[a] Represents the estimated effect of HHVBP in 2015. [b] Values represent percentage point changes. [c] Two falsification tests were conducted for the spending measures: one for assessing the validity of inferences for 2016-2019; and one for the first two years of PDGM (2020-2021), using the alternative post-PDGM definition (discussed above). *p<0.10, **p<0.05.*

2. Comparison of Annual Trends between HHVBP and Non-HHVBP States

To assess parallel trends, we compared annual trends in impact measures between HHVBP and non-HHVBP states. We calculated the difference in means of the adjusted measure values for HHVBP and non-HHVBP states across the individual years of the baseline period (2013-2015) as well as for the implementation period (2016-2021). Similarly, we also calculated the difference in means of the unadjusted measure values for the two groups across the individual years. We assessed parallel trends for two FFS claims-based quality measures, three OASIS-based quality measures, and three measures of FFS claims-based Medicare spending.

For each of these eight impact measures, we plotted the differences in both unadjusted and covariate-adjusted (with state fixed effects) measure values between HHVBP and non-HHVBP states in each year (with the difference calculated as the estimated HHVBP measure value minus the estimated non-HHVBP measure value). We examined the slopes of the plotted lines for each measure during 2013-2015, and compared results based on an unadjusted regression model (i.e., having no beneficiary or agency characteristics as covariates),

with results based on the adjusted model using the core set of covariates (Exhibit 3) and covariate refinement as explained above, along with state fixed effects. Slopes of the plotted lines that were close to zero during 2013-2015 would indicate that impact measures for the two groups moved in a parallel manner over the baseline period.

Upward or downward sloping lines during 2013-2015 indicate a lack of parallel trends, as differences between the HHVBP and comparison groups become larger or smaller during the baseline period. These plots for the eight key impact measures (Exhibit 7) reinforced two facts:

1. As clearly shown by the contrast between the unadjusted and adjusted plots, covariate adjustment tended to result in improvements in both the degree of balance and parallel trends between HHVBP and non-HHVBP groups during the baseline period.
2. Overall, the plotted lines showing trends in the difference in measure values between HHVBP and non-HHVBP populations from the adjusted model (that included state fixed effects) have slopes that tend to be close to zero for some impact measures (e.g., unplanned acute hospitalizations, ED utilization) but not all measures.

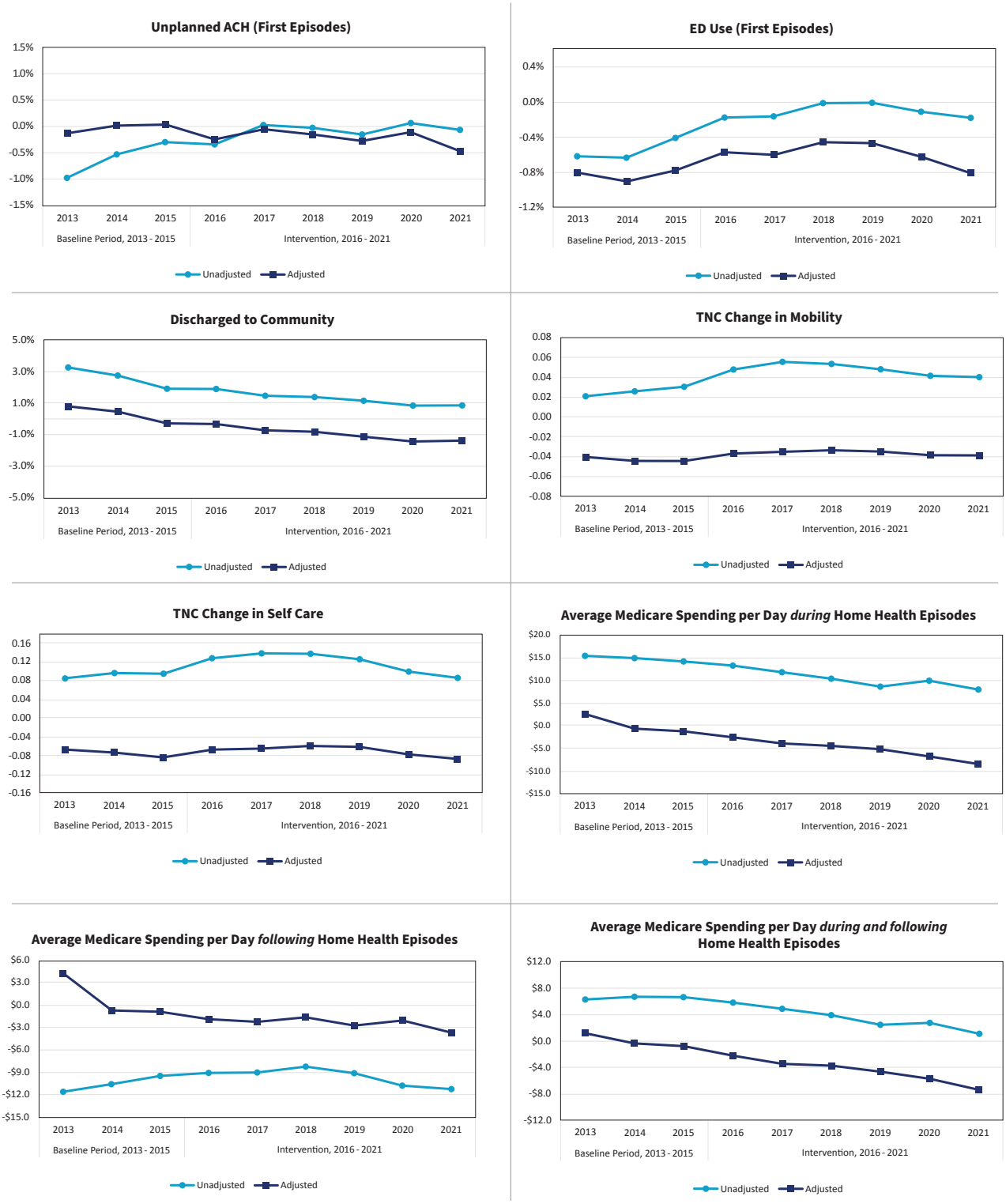
Measures, such as the three Medicare spending per day measures and the three OASIS measures, tended to have downward slopes during the baseline period. This suggests that adjusting for state fixed effects alone is not adequate to account for non-parallel trends in the baseline period for all measures. It also reinforced the need to control for pre-HHVBP differences in trends between HHVBP and comparison states, thereby warranting a model that included both state fixed effects and state-specific linear trends along with other covariates for some impact measures, which are discussed in turn below.

Incorporating State-Specific Linear Time Trends to Account for Non-Parallel Trends during the Baseline Period

Given our findings of non-parallel trends in certain impact measures during the baseline period, we conducted regression analyses using an alternative D-in-D model that incorporated state-specific linear time trends. We added linear time trends interacting with each state indicator along with state fixed effects to the covariate lists discussed above (Exhibit 3 and Exhibit 4), which can be used to account for different linear trends during the baseline period between the states. We included data for all years (2013-2021) to obtain individual yearly HHVBP estimates in the post-implementation period (2016-2021).

Although incorporating state-specific linear time trends in our D-in-D model allows us to account for non-parallel trends in the baseline period between the HHVBP and comparison groups for certain impact measures, it assumes that the average difference in slopes between HHVBP state trends and the comparison state trends observed in the baseline period would have continued to change at the same rate in the absence of HHVBP; keeping in mind that that this is an increasingly strong assumption to make throughout the course of this six-year evaluation. Addition of state linear trends, however, leads to a reduction in the level of precision of the annual D-in-D estimates as we incorporate additional years of data into the analyses.[3] Consequently, it may affect the statistical significance of the cumulative estimate, which is a weighted average of the yearly D-in-D estimates. Nevertheless, this adjustment of state linear trends is a well-motivated method for establishing a valid comparison group and making inferences about the impact of HHVBP. This underscores the importance of checking the practical significance of impact estimates in addition to their statistical significance.[4] It is important to carefully weigh the strength of the evidence in terms of the magnitude of point estimates and consistency of impact findings over multiple years along with other criteria such as qualitative findings to facilitate interpretation of results. It is also possible for there to be residual non-linear, non-parallel trends based on a model that adjusts for state fixed effects and state-specific linear trends. We continue to analyze the influence of such potential deviations from model assumptions on impact estimates throughout the course of this evaluation.

Exhibit 7. Assessing Parallel Trends for Key Impact Measures based on Unadjusted vs. Adjusted Models



The trend lines from the adjusted model (which includes an interaction term of the treatment indicator with each of the three levels of Ambulation and Locomotion along with other covariates and state fixed effects) are plotted on the assumption that the net effect of HHVBP on different levels of ambulation at the SOC is zero.

Consistent with our approach that was implemented in prior Annual Reports, we therefore incorporated state-specific linear time trends for the following measure sets that failed the falsification test: FFS claims-based and OASIS-based **case-mix measures**, FFS claims-based **HHA operations measures**, FFS claims-based **spending measures**, and the **OASIS-based outcome** quality measures. Though not all measures in each of the measure sets rejected the null hypothesis of parallel trends in the baseline period (for example, two out of five OASIS outcome measures,) we used state-specific linear time trends for all measures within these measure sets. In contrast, only one of the six utilization measures (SNF Use/All FFS home health episodes) failed falsification with state fixed effects at 0.1 level of significance. However, the D-in-D estimates of SNF Use measure were very similar between a model that adjusted for state linear trends versus not, hence, we used state fixed effects for all FFS claims-based utilization measures. Again, for the Home Health Utilization measures, we adjusted for both state fixed effects and state linear trends as it was failing falsification tests for state-specific models (HHVBP states vs. regional comparison groups; results not shown) and we aimed for consistency between national and state level results. All these efforts were made to facilitate interpretation of results among strongly related impact measures and to maintain a uniform analytic approach where possible. Similarly, for HHCAHPS-based quality measures, we employed the simpler D-in-D model specification given the findings for the falsification test for these measures.

Analytical Approach for Subtopics

Agency Total Performance Scores

The TPS represents a broad measure of agency performance that is incentivized under HHVBP. We examined the impact of the HHVBP Model on overall agency performance by comparing TPS values in model states with those in non-model states. We used multivariate linear regression to examine agency TPS in each year from 2016-2021 while accounting for differences in certain characteristics of HHAs between HHVBP and non-HHVBP states. These factors included agency size, chain status, ownership type, age, and freestanding versus hospital-based, as well as indicators of patient demographic characteristics, and insurance. We also included the regional COVID-19 adjustors, which were included in the D-in-D analyses of claims-based measures in this report.

Our primary analytic approach, a D-in-D methodology, was not optimal for TPS because the measure set (that comprise the TPS) and the methodology (like measure weights) for computing TPS calculation changes over time. Hence, TPS values from different payment years are less comparable, as changes in TPS across payment years may in part reflect changes in the components of the TPS rather than changes in agency performance. Furthermore, TPS already inherently captures change in agency performance over time. For each measure, the performance of individual HHAs is measured based on a combination of: (a) their levels of achievement on the measure relative to their state cohort's performance during the baseline period; and (b) their improvement over time relative to their own previous performance levels.

As a test of whether the HHA measure scores (which comprise the TPS) reflect improvement relative to an HHA's own baseline as well as its state cohort's baseline, we examined correlations between average measure scores among HHAs in each state and each of the following:

- The average difference between the measure rate for each HHA during the performance period and its state-level achievement threshold (AT).[1]
- The average difference between the measure rate for each HHA during the performance period and its own baseline performance measure rate.

We generally found correlations of between 0.6 and 0.9, meaning higher measure scores tend to indicate greater improvement relative to both the state cohort and the HHA's own baseline performance.

A limitation of comparing TPS across states is that each agency's achievement on a measure is determined relative to the baseline performance for that agency's specific state cohort. The ATs and benchmarks (BMs) that were used to determine agency achievement scores were calculated separately for each state. HHA achievement scores are therefore calculated relative to baseline performance levels that can vary across states. Large differences across states in baseline performance levels used to calculate measure scores could theoretically have implications for comparisons of measure scores and, in turn, TPS across states or groups of states. Therefore, we examined relative performance in HHVBP and non-HHVBP states to rule out the possibility of higher average achievement scores among agencies in HHVBP states being due to a lower baseline level of performance among agencies in those states. This scenario would indicate greater room for improvement at the time the HHVBP Model was implemented. Our examinations rejected the possibility that differences in baseline performance levels between agencies in HHVBP and non-HHVBP states might have implications for comparisons of TPS between these groups. Further comparisons of average AT and average BM values for HHVBP performance measures did not suggest systematic, large differences between the HHVBP and non-HHVBP groups in baseline performance levels.

Case-Mix

To determine if case-mix at the start of care among beneficiaries receiving home health care have changed over time between HHVBP states and non-HHVBP states, we defined five measures of case-mix: HCC score (first episode), home health utilization (defined as an indicator for at least one home health episode experienced by a beneficiary during a given CY) among all Medicare FFS beneficiaries at risk of limited functional improvement (and those not at risk, for comparison), TNC measure of mobility at SOC, TNC measure of self-care at SOC, and count of HCC conditions present at SOC. We considered a beneficiary to be at risk of limited functional improvement if they had at least one of 20 particular HCC present during a given year. To identify the presence of HCC conditions for a beneficiary, we checked all diagnosis codes from Part B carrier, inpatient, and outpatient claims. Only professional carrier claims were eligible to be included based on Healthcare Common Procedure Coding System (HCPCS) codes provided by CMS. We excluded any carrier claims for which line item Berenson-Eggers Type of Service (BETOS) code variable equals D1A, D1B, D1C, D1D, D1E, D1F, D1G (which is durable medical equipment [DME]), or O1A (which is ambulance services). The intent of the algorithm was to exclude claims where the services do not require a licensed health care professional. In addition, we also excluded any outpatient claims that only included lab testing, based on revenue center files.

We examined trends in the mean values of these measures and computed yearly and cumulative D-in-D estimates for each of the case-mix measures, adjusting for agency characteristics, rural status, education, COVID-19 indicators, state fixed effects, and state-specific linear trends in the regression model (with the exception of the home health utilization among those at risk of limited functional improvement, where we did not add state-specific linear trends).

HHA Operations: Frontloading

To determine the frequency, timing, and discipline of home health visits within home health episodes, we examined skilled nurse (SN) and therapist visit frontloading (an Arbor Research-defined measure) outcomes. We defined two separate versions of frontloading: one related to SN visits and one for therapy visits. For the first home health episode in a sequence, if more SN or therapy visits occurred during the first week (the first seven days) than during the second week (days 8-14), we considered that episode frontloaded for the corresponding visit type. Later episodes in a sequence were assigned the same frontloading status as the first episode in the sequence. Frontloading regression analyses only included post-institutional episodes that lasted at least two weeks and did not have a hospitalization in that two-week timeframe to ensure a "baseline" period of time in which frontloading could occur.

We evaluated frontloading using our standard multivariable D-in-D model to estimate the relative impact of the HHVBP Model on agency frontloading practices. We also evaluated the impact of frontloading on ACHs, ED visits, and SNF use with regression models. Subgroup analyses were conducted to further evaluate the effect of frontloading on adverse patient outcomes and the relationship between HHVBP and frontloading practices, stratified by the risk of limited functional improvement, dual eligibility status for Medicare and Medicaid, or the race/ethnicity of beneficiaries. We also conducted a mediation analysis to examine frontloading as a potential driver of quality improvement in claims-based utilization measures under the HHVBP Model.

For analyses of frontloading among subgroups, we divided post-institutional episodes into four sets of subgroups. The subgroups include (1) index discharges among FFS beneficiaries considered high risk of limited functional improvement based on their HCCs observed during the year prior to the start of home health versus all other index discharges (see Exhibit 8 for definition), (2) Dually Eligible versus Non-Dually Eligible, (3) Black non-Hispanic versus White non-Hispanic and (4) Hispanic versus White non-Hispanic. Stratified regression analyses of the impacts of frontloading on claims-based utilization outcomes and stratified D-in-D analyses of the HHVBP impact on episode-level frontloading were conducted for each of these four subcategories. We also used a difference-in-difference-in-differences (D-in-D-in-D) approach to evaluate differential impacts of the HHVBP Model within each subgroup for post-institutional, first-in-sequence episodes.

Low/High Performers based on TPS and Social Risk Factors

To examine the association between HHA TPS and patient mix based on social risk factors, we classified agencies into three groups based on TPS quartiles by state. The top 25% of agencies was defined as the "higher TPS" cohort, the bottom 25% of agencies was defined as the "lower TPS" cohort, and the middle 50% of agencies was defined as the "middle TPS" cohort. We compared patients' age, race, ethnicity, rural location, dual eligibility, and poverty area between low- and high-performing agencies.

Home Health Utilization and Access to Care

To assess whether utilization of home health services and beneficiary access to care were affected by HHVBP, we carried out descriptive analyses at the beneficiary-year level and regression modeling at the county-year level. Medicare beneficiaries with at least one month of FFS coverage in a given year were included in the analysis. Beneficiaries residing in US territories or Washington DC were excluded. Beneficiary-year level data were aggregated to the county-year level and merged with Area Health Resource File (AHRF) county-level data and county-level regional COVID-19 indicator data to obtain county-level rural status and county-level COVID-19 rates and COVID-19 hospitalization rates. Modeling was performed at the county-year level weighting on the total number of FFS beneficiaries per county-year clustering standard errors on state and county. Since state-level models failed falsification tests, to be consistent between state and national findings, the D-in-D models at the national level were adjusted for state-specific linear time trends.

Underserved Populations to Support Health Equity Analyses

To understand the potential implications of HHVBP for underserved populations and for health equity, we compared the impact of HHVBP on beneficiaries in different racial, ethnic, health insurance, and geographic subgroups.

Analyses were carried out at the home health episode level for both the Medicare FFS and OASIS populations with a focus on subgroups of home health beneficiaries for whom there was evidence of poorer outcomes prior to the implementation of HHVBP. These beneficiary subgroups included: (1) home health beneficiaries enrolled in Medicaid; (2) Hispanic and Non-Hispanic Black home health beneficiaries; and (3) beneficiaries in rural areas. These subgroups were compared to reference populations consisting of non-Medicaid, Non-Hispanic White, and urban beneficiaries, respectively. Analyses restricted to the Medicare FFS population

compared home health beneficiaries with dual eligibility in Medicaid and Medicare FFS to other Medicare FFS home health beneficiaries.

We examined potential disparities prior to the implementation of HHVBP (2013-2015) by Medicaid status, race/ethnicity, and rural/urban location using linear regression models with HHA clustered standard errors and covariate adjustments for beneficiary, agency, and clinical factors in the standard D-in-D models for the main comparison group approach. We also used an extension of the standard D-in-D model (using D-in-D-in-D models) to examine the differential impact of HHVBP by home health beneficiary subgroup on a subset of four outcomes that reflected a mix of claims-based and OASIS-based measures. These included two FFS claims-based HHVBP utilization measures (Unplanned ACH/First FFS HH Episodes and Outpatient ED Use [No Hospitalization]/First FFS HH Episodes), and two OASIS-based improvement in functional status measures (TNC Change in Self-Care and TNC Change in Mobility). We used D-in-D-in-D models to assess whether the effect of HHVBP differs (is heterogeneous) among beneficiary subgroups and tested for differences in subgroup D-in-Ds by including two- and three-way interactions for treatment, post-HHVBP, and subgroup indicators adjusting for beneficiary, agency, and clinical characteristics.

We also tested for potential disparities in frontloading of SN and therapy visits involving underserved populations, and whether HHVBP had a differential impact on frontloading of home health visits during home health episodes among beneficiary subgroups. We investigated potential baseline period (2013-2015) differences by subgroup using linear regression analyses of FFS episode-level data, and examined whether HHVBP effects differed based on beneficiary dual eligible status and race/ethnicity using D-in-D-in-D models.

Substitution among Post-Acute Care Alternatives

To examine changes in use of alternative forms of PAC following HHVBP implementation (which may be considered substitutes for home health care), we carried out analyses at the short-term acute hospital discharge level. We examined selection of alternative forms of PAC within 14 days of acute hospital discharge. The alternative forms of PAC included (1) SNFs, (2) inpatient rehabilitation facilities, (3) long-term care hospitals, and (4) discharges to home with no PAC or only outpatient therapy service. The analytic sample was restricted to beneficiaries based on the following criteria: (1) enrollment in Medicare FFS Parts A and B during 12 consecutive months prior to the index discharge date; (2) alive at discharge with continued enrollment in FFS Parts A and B for at least 14 days following the index discharge date; (3) the Medicare Severity Diagnosis Related Group (MS-DRG) reported on the index discharge inpatient claim was among the top 10 Major Diagnostic Categories (MDCs) among beneficiaries who are discharged to the care of an HHA. We looked out 14 days from each index discharge date to determine the PAC type, then calculated distributions of PAC types and used D-in-D models to estimate the effect of HHVBP on the selection of PAC type. We additionally used the D-in-D-in-D approach to examine this effect by two sets of subgroups: (1) whether the discharge was associated with ACOs, and (2) whether the discharged beneficiary was considered high risk for limited functional improvement based on their HCCs.

Medicare Advantage

To examine the "spillover" impact of the HHVBP model on the MA beneficiary population, we used OASIS episode data to examine beneficiary characteristics and home health utilization among all MA beneficiaries. We also utilized D-in-D models with Medicare Provider Analysis and Review (MedPAR) data, a measure of SNF use based on Minimum Dataset 3.0 assessment data and MA inpatient encounters to determine what effect, if any, HHVBP has had on measures of unplanned ACH (measured as a binary indicator) for the MA beneficiary population.

Analyses were carried out at the OASIS episode level for measures of unplanned ACH. We constructed an analytic file using OASIS episodes starting in 2013-2020 for all home health beneficiaries enrolled in Medicare FFS (Parts

A and B) or Medicare Advantage (Part C). This included linkage to inpatient data to construct the numerators for measures with 60-day look out periods from the start of the OASIS episodes. The file also included variables for patient and agency characteristics as well as OASIS SOC clinical indicators.

To construct the ACH numerator for the MA home health beneficiaries we used zero-dollar inpatient shadow claims corresponding to hospital admissions between 2013-2020 pulled from the MedPAR file. OASIS episodes were excluded from Nov-Dec 2020 due to insufficient inpatient data needed for the 60-day look out period. For sensitivity analyses we also used an alternate method of measuring unplanned ACH using inpatient MA encounters and ED visit encounters that did not result in an inpatient stay. These encounters corresponded to inpatient admissions and ED visits between 2015-2020. Additional detail is available in our 6th Annual Report Technical Appendix.[2]

Variable and Impact Measure Definitions

Below, we describe how we specified and defined descriptive variables and impact measures that were used in this Annual Report.

Descriptive Variables

Exhibit 8. Data Source and Definition of Beneficiary Characteristics

Variable	Source/Definition
Total Number of Beneficiaries Receiving Home Health Care	Unique beneficiaries with at least one home health claim or OASIS episode in a specified time period.
Age	Calculated at first available of OASIS assessment start date or claims-based episode start date. MBSF AGE_AT_END_REF_YR always used for home health utilization analyses.
Gender	OASIS item M0069, or MBSF if OASIS unavailable. MBSF always used for home health utilization analyses.
Race/Ethnicity	OASIS item M0140, or MBSF if OASIS unavailable. MBSF always used for home health utilization analyses. Values recoded into mutually exclusive groups.
Dual Eligibility	MBSF indicator from claims-based episode start month or OASIS- based episode end month. Aggregated to beneficiary-year level for home health utilization analyses.
Medicaid Only (either Health Maintenance Organization (HMO) or FFS without dual)	MBSF and OASIS item M0150.
Rural/Urban	Urban counties have a Core-Based Statistical Area (CBSA) code from Area Health Resource File (AHRF); rural counties do not. Assigned to beneficiaries by county of residence.
Health Conditions	Annual flags for chronic kidney disease, congestive heart failure, diabetes, ulcers, Alzheimer's disease or related senile dementia, ischemic heart disease, and anemia, pulled from MBSF.
Reason for Medicare Entitlement available only FFS episodes	Original and current reasons, from episode start year in MBSF. Beneficiaries are categorized as Original ESRD, Original Disabled, Current ESRD, or Current Disabled.

Exhibit 8. Data Source and Definition of Beneficiary Characteristics (continued)

Variable	Source/Definition
Percentage of Persons aged 25 years or older with less than a high school diploma 2011-2015	County-level, from AHRF. Assigned to beneficiaries by county of residence.
COVID-19 Infection and Hospitalization	Presence of U071 or B9729 diagnosis code in any claims ending after 12/31/2019.
HCC indicators and HCC risk scores for all FFS beneficiaries	Annual scores for all beneficiaries in MBSF for CY 2012-2021, using same methods used to calculate episode-level scores.

Exhibit 9. Data Source and Definition of OASIS Clinical Factors

Variable	Source/Definition
Ambulation and Locomotion	OASIS item M1860.
Inpatient Discharge within 14 Days	OASIS item M1000, or MBSF monthly indicators if OASIS unavailable.
Risk for Hospitalization	OASIS item M1032 (version C) or M1033 (C1 and later versions).
Requires Urinary Catheter	OASIS item M1610. Populated only when discharged from inpatient community (M1000) or received diagnosis requiring medical/treatment regimen change (M1016 on C1, M1017 on C2).
Surgical Wound	OASIS item M1340.
Oxygen Therapy	OASIS item M1410 until discontinued with version D. OASIS items 1021 and 1023, combined with diagnoses for supplemental oxygen reported in claims, starting with version D.
Home Care Diagnosis: Neoplasms	OASIS items M1020, M1022, and M1024.[5]
Stages of Pressure Ulcer	M1308 (version C1) or M1311 (version C2).
Oral Medications	OASIS item M2020.
Dyspnea	OASIS item M1400.
OASIS TNC Measure Values at SOC	
Mobility at SOC	Sum of OASIS items M1840 – Toilet Transferring, M1850 – Bed Transferring, and M1860 – Ambulation/Locomotion.
Self-Care at SOC	Sum of OASIS items M1800 – Grooming, M1810 – Ability to Dress Upper Body, M1820 – Ability to Dress Lower Body, M1830 - Bathing, M1845 – Toileting Hygiene, and M1870 – Feeding or Eating.

Exhibit 10. Data Source and Definition of Home Health Episode Characteristics

Variable	Source/Definition
Episode Type	Episodes with outlier payment adjustments: claim value code = 17. Low Utilization Payment Adjustment (LUPA): CLM_HHA_LUPA_IND_CD. Partial Episode Payment (PEP): PTNT_DSCHRG_STUS_CD = '06'.
Episodes within a Sequence	Gap of at least 60 days between episodes indicates start of new sequence.
Visits in an Episode	Sum of visits with revenue center codes 042x, 043x, 044x, 055x, 056x, or 057x.
Visits in an Episode by Type of Visit	Revenue center codes given above for Visits in an Episode.
HCC Indicators and HCC Risk Scores	Episode-level, calculated using claims data and software (Version 21, published in 2014 and 2019) provided by CMS[6], for the first episode in the sequence only. Excluded claims where services do not require licensed health care professional. Software created 87 HCCs and three HCC scores (new enrollees, institutional, community). ESRD HCC risk score based on Version 21 ESRD software published by CMS[7] calculated for beneficiaries with ESRD status at episode start. OASIS items M1020/M1021 and M1022/M1023[7] used in calculation for OASIS-based episodes.
Conditions at Risk of Limited Functional Improvement Indicator	Episode at risk of limited improvement if at least one of 20 OASIS-based HCCs associated with limited improvement (defined as HCCs in bottom quartile of change in TNC measures during baseline) was present at SOC. Expert home health clinical care manager validated list of 20 HCC conditions.
Count of HCCs Present at the SOC	Sum of OASIS-based HCC indicators at start of episode.
ESRD Indicator	Functioning kidney transplant at start of episode or dialysis claim during 365 days prior to episode start. Defined for first episode in a sequence only. MBSF ESRD_IND always used for home health utilization analyses.
FFS 12 Months Before Home Health Episode Start Date	Enrolled in Parts A and B and not concurrently enrolled in an HMO (MBSF) for all 12 months prior to episode start (including month of episode start date).
PDGM[8] Case-Mix Group of an Episode	Using PDGM, episodes are placed into subgroups for each category: (1) admission source (CMS PDGM rule), admission source (Arbor Research-defined, for frontloading analysis), (3) timing, (4) clinical grouping), (5) functional impairment level, and (6) comorbidity adjustment. Arbor Research-definition of admission source counts episode as institutional if PDGM rule designates it institutional, or if institutional claim linked to episode contains discharge status code[9] of "06" or "86." For all PDGM-defined categories, determination was done for first episode in a sequence only.
PDGM Home Health Admission Source	Institutional facility type retained from first episode in the sequence with 5 categories: Skilled Nursing Facility (SNF), Inpatient Psychiatric Facility (IPF), Inpatient Rehabilitation Facility (IRF), Acute Inpatient Stays, and Long-Term Care Hospitals.
PDGM-Defined Clinical Grouping	PDGM 2nd digit clinical group retained from first episode in the sequence. There are 12 subgroups that include: musculoskeletal rehabilitation; neuro/stroke rehabilitation; wounds; medication management, teaching, and assessment (MMTA) - surgical aftercare; MMTA - cardiac and circulatory; MMTA - endocrine; MMTA - gastrointestinal tract and genitourinary system; MMTA - infectious disease, neoplasms, and blood-forming diseases; MMTA - respiratory; MMTA- other; behavioral health; or complex nursing interventions.

Exhibit 10. Data Source and Definition of Home Health Episode Characteristics (continued)

Variable	Source/Definition
APMs (only available for FFS claims-based episodes)	BPCI (Model 2, Model 3, Advanced); CJR; MSSP; Next Generation ACO; OCM; Pioneer ACO.
Oxygen Indicator	Claim-based acute oxygen flag as a substitute for OASIS assessment variable.
RCD Indicators	RCD Active; RCD Participant; RCD Non-participant.

Exhibit 11. Data Source and Definition of COVID-19 Indicators

Variable	Source/Definition
COVID-19 Risk-Adjustment Indicator	Using earliest claim from date with a COVID-19 diagnosis, diagnoses categorized into five 30-day periods around episode start date for episodes ending in 2020 and 2021. Episodes are categorized as having initial COVID-19 diagnosis 61-90 days before start of episode, 31-60 days before start of episode, 1-30 days before start of episode, during episode, 1-30 days after end of episode, or none of these.
Regional Rates of COVID-19 Hospitalizations	County-level monthly rates of inpatient claims with COVID-19 diagnosis divided by total number of FFS beneficiaries (Parts A and B, or Part A only), multiplied by 10,000. Linked to episodes based on episode end month and beneficiary county of residence.
Regional Rates of COVID-19 Obtained from USAFacts.org	County-level monthly COVID-19 incidence rates per 100,000 population, derived from publicly available cumulative daily case counts on USAFacts.org. Rates categorized as less than 25th percentile, 25th to less than 75th percentile, or greater than or equal to 75th percentile.

Exhibit 12. Data Source and Definition of HHA Characteristics

Variable	Source/Definition
Total Number of HHAs	All unique HHAs with at least one home health claim or OASIS episode in a specified time period.
Ownership	From CMS Provider of Services (POS) data.
Setting: Hospital-Based vs. Freestanding	From CMS POS data.
HHA Age	Floored year difference between HHA original participation date and episode start date (claims-based) or end date (OASIS-based).
Chain Membership	Determined using Provider Enrollment, Chain, and Ownership System (PECOS) and HHA Cost Report data. HHAs considered part of chain if at least one data source indicated chain for given year. Indicator for years prior to 2021 held constant from prior Annual Report.
HHA Size	Based on number of OASIS episodes that end within given year.
Profitability	Profit margin: Difference between total Medicare payments and total cost of Medicare services, divided by total Medicare payments. Data from Medicare HHA and Hospital Cost Reports. Used trimming methodology employed by CMS to account for extreme, missing, aberrant, and implausible cost report values.[10] Trimmed sample restricted to freestanding HHAs (vast majority of HHAs in HHVBP states).

Claims-Based Measures

The Exhibit below summarizes the FFS claims-based measures analyzed in this report.[2]

Exhibit 13. Definitions of Claims-Based Measures

Measure	Definition
Quality Measures	
Average Number of Home Health Days of Care per FFS Beneficiary	Number of claims based home health days of care in a given year per FFS beneficiary alive at the beginning of the year.
Percent of FFS Beneficiaries with at Least One Home Health Episode	Percent of Medicare-eligible FFS beneficiaries with at least one claims-based home health episode in a given year indicating the beneficiary used home health services.
Outpatient ED Use (No Hospitalization)/First FFS Home Health Episodes	Percentage of home health stays in which patients used the ED but were not admitted to the hospital during the 60 days following the start of the home health stay.
Inpatient ED Use/First FFS Home Health Episodes	Percentage of home health stays in which patients used the inpatient ED services during the 60 days following the start of the home health stay.
Outpatient and Inpatient ED Use/First FFS Home Health Episodes	Percentage of home health stays in which patients used either the outpatient ED services or the inpatient ED services during the 60 days following the start of the home health stay.
Outpatient ED and Observation Stay Use (No Hospitalization)/First FFS Home Health Episodes	Percentage of home health stays in which patients used the ED or observation stays but were not admitted to the hospital during the 60 days following the start of the home health stay.
Unplanned Acute Care Hospitalization/First FFS Home Health Episodes	Percentage of home health stays in which patients were admitted to an acute care hospital during the 60 days following the start of the home health stay.
Unplanned Acute Care Hospitalizations/All FFS Home Health Episodes	Percentage of home health episodes with at least one unplanned admission to an acute care hospital within 60 days of the start of the episode or until the start of the next home health episode that begins on or before the 60th day.
Skilled Nursing Facility Use/All FFS Home Health Episodes	Percentage of home health episodes with at least one admission to a SNF within 60 days of the start of the home health episode or until the start of the next home health episode that begins on or before the 60th day.
Unplanned Acute Care Hospitalization/All Medicare Advantage OASIS Home Health Episodes	Percentage of Medicare Advantage home health episodes with at least one unplanned admission to an acute care hospital within 60 days of the start of the OASIS episode or until the start of the next OASIS-based home health episode that begins on or before the 60th day.
Unplanned Acute Care Hospitalization/All FFS OASIS Home Health Episodes	Percentage of home health episodes with at least one unplanned admission to an acute care hospital within 60 days of the start of the OASIS episode or until the start of the next OASIS-based home health episode that begins on or before the 60th day.
Percent of Medicare Advantage beneficiaries with at Least One OASIS Home Health Episode	Medicare Advantage: Percent of Medicare-eligible MA beneficiaries with at least one OASIS-based home health episode in a given year indicating the beneficiary used home health services.

Exhibit 13. Definitions of Claims-Based Measures (continued)

Measure	Definition
Spending Measures	
Average Medicare Spending per Day during and following FFS Home Health Episodes of Care	Pre-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day during and up to 37 days following home health episodes of care. This measure includes payments that occur between the start of the home health episode (SOC) and a 37-day look-out period following the last home health visit (end of care) or until the start of the next home health episode that begins on or before the 37th day or until death, or loss of FFS Part A eligibility; whichever comes earlier. The length of the look-out period (37-day) is composed of seven days post last home health visit and additional 30 days thereafter or until the start of the next home health episode that begins on or before the 37th day or until death or loss of FFS Part A eligibility; whichever comes earlier. Post-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day during and up to 30 days following home health episodes of care. This measure includes payments that occur between the start of the home health episode (SOC) and the 59th day after the SOC, the start of the next home health episode, death, or loss of FFS Part A eligibility; whichever comes earlier.
Average Medicare Spending per Day during FFS Home Health Episodes of Care	Pre-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day during home health episodes of care. This measure includes payments that occur between the SOC and a seven day look-out period following the last home health visit (end of care) or until the start of the next home health episode that begins on or before the seventh day or until death or loss of FFS Part A eligibility; whichever comes earlier. Post-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day during home health episodes of care. This measure includes payments that occur between the SOC and the 29th day after the SOC, the start of the next home health episode, death, or loss of FFS Part A eligibility; whichever comes earlier.
Average Medicare Spending per Day following FFS Home Health Episodes of Care	Pre-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day that occur after the seventh day following the last home health visit (end of care) and over the subsequent 30 days or until the start of the next home health episode that begins on or before the 30th day or until death or loss of FFS Part A eligibility; whichever comes earlier. Post-PDGM: Average Medicare Part A and Part B payments (or "Expenditure Components" listed below) per day that occur after the 29th day following the SOC and over the subsequent 30 days or until the start of the next home health episode, death, or loss of FFS Part A eligibility; whichever comes earlier.
COVID-19 Measures	
Home Health episodes with an Initial COVID-19 Diagnosis (%)	Percentage of home health episodes with an initial COVID-19 diagnosis during or within 30 days (before or after) of the episode.

OASIS-Based Outcome Measures

The Exhibit below summarizes the OASIS-based measures analyzed in this report.[11]

Exhibit 14. Definitions of OASIS-Based Measures

OASIS Outcome Measures	Definition
Discharged to Community	Percentage of home health episodes after which patients remained at home.
Improvement in Dyspnea	Percentage of home health quality episodes during which the patient became less short of breath or dyspneic.
Improvement in Management of Oral Medications	Percentage of home health quality episodes during which the patient improved in ability to take their medicines correctly (by mouth).
OASIS Composite Outcome Measures	
Total Normalized Composite Change in Mobility	This measure captures the change in home health patients' mobility between start or resumption of care (SOC/ROC) and the end of care (EOC). It is a composite of three OASIS items related to mobility (i.e., toilet transferring M1840, bed transferring M1850, and ambulation/locomotion, M1860).
Total Normalized Composite Change in Self-Care	This measure captures the change in home health patients' self-care between start or resumption of care (SOC/ROC) and the end of care (EOC). It is a composite of six OASIS items related to self-care (i.e., M1800 grooming, M1810 upper body dressing, M1820 lower body dressing, M1830 bathing, M1845 toilet Hygiene, and M1870 eating).

HHCAHPS-Based Measures

The Exhibit below summarizes the HHCAHPS-based measures used in this report to examine patient experience.[12]

Exhibit 15. Definitions of HHCAHPS-Based Measures

HHCAHPS-Based Patient Experience Measure	Definition
Professional Care	Comprised of four HHCAHPS questions, this measure reflects patients who reported that their home health team gave care in a professional way.
Communication	Comprised of six HHCAHPS questions, this measure reflects "patients who reported that their home health team communicated well with them.
Discussion of Care	Comprised of seven HHCAHPS questions, this measure reflects patients who reported that their home health team discussed medicines, pain, and home safety with them.
Overall Care	This measure reflects the percentage of respondents who gave a rating of 9 or 10 (out of 10) to rate the overall care from the home health agency.
Likely to Recommend	This measure reflects the percentage of respondents who answered "definitely yes" that they would recommend the home health agency.

Alternative Payment Models (APM)

The APMs that were active anytime between 2013-2021 and for which data were available are the BPCI Initiative, CJR, OCM, and three ACO initiatives:

Bundled Payments for Care Improvement (BPCI) Initiative: Participating ACHs and PACs received bundled payments, as opposed to individual service-based payments, for all services rendered during a defined episode of care. BPCI providers were offered incentives based on lowering expenditures and improving quality of care.

Comprehensive Care for Joint Replacement (CJR) Model: Designed to facilitate better quality and more efficient care for Medicare beneficiaries undergoing hip and knee replacements. CJR hospital total expenditures (Parts A and B) are compared annually to performance-adjusted target episode prices.

Oncology Care Model (OCM): Promotes higher-quality, coordinated care to FFS beneficiaries undergoing chemotherapy at a lower cost. Participating oncology care providers receive monthly payments for each aligned beneficiary, as well as retrospective performance-based payments based on the quality of care provided and reduced spending relative to a target price.

Accountable Care Organizations (ACO): ACOs are multi-disciplinary provider groups who come together voluntarily to provide consistent, efficient, and cost-effective care. The CMS ACO initiatives for which we have data include:

- **Medicare Shared Savings Program (MSSP)** – For providers serving FFS beneficiaries. The SSP model facilitates coordinated care among providers and suppliers to promote higher quality and more efficient care. MSSP offers multiple options where participating providers may select the level of financial risk they are willing to incur.[13]
- Two additional Center for Medicare & Medicaid Innovation (CMMI) models were designed to shepherd ACO-based care into rural and/or underserved areas:
    - **Advanced Payment ACO Model** – Incentivized rural and physician-based providers to form ACOs (which were commonly smaller and lacking the resources necessary for MSSP participation) by giving both upfront and monthly payments to invest in patient care and infrastructure.
    - **ACO Investment Model** – Tests the use of pre-paid shared savings to encourage previously- and newly-established ACOs to expand to rural and underserved areas.[14]
- **Pioneer ACO Model** – Designed to more quickly transition health care organizations and providers already experienced in coordinating care across settings into ACO-based care. These organizations were expected to take on a slightly higher level of financial risk than SSP ACOs and consequently stood to receive greater shared savings.[15]
- **Next Generation ACO Model** – Designed to test the effect of strong financial incentives and increased resources for ACOs experienced in managing care for populations of patients. **Participating ACOs assumed greater financial risk than those participating in the SSP model, with the possibility fro greater financial rewards.**[16]

Exhibit 16. Active Dates and Data Availability for Alternative Payment Models

Alternative Payment Model	2013	2014	2015	2016	2017	2018	2019	2020	2021
BPCI	✔	✔	✔	✔	✔	✔			
BPCI Advanced						✔	✔	✔	✔
CJR				✔	✔	✔	✔	✔	✔**
OCM				✔	✔	✔		✔	✔**
ACO Initiatives									
Pioneer ACO	✔	✔	✔	✔					
MSSP*	✔	✔	✔	✔	✔	✔	✔	✔	✔
Next Generation ACO				✔	✔	✔	✔	✔	✔

** Included the Advanced Payment ACO and ACO Investment Model (AIM) for respective active model years.*
*** Model data only available for partial year.*

Total Performance Score

For all eligible HHAs, we calculated TPS as an aggregate performance metric, guided by parameters established by CMS that differed slightly across calendar years (see Exhibit 17). Eligibility criteria are shown in Exhibit 18. Using episode counts as weights, HHAs were given 12-month weighted average rates for each eligible measure, which were then compared to baseline year rates (or prior year rates, for pre-implementation years) as well as state-level performance standards. HHAs received the higher of an Achievement Score or an Improvement Score for each measure; these were summed across measures and then weighted using the weights shown in Exhibit 17.

We validated our 2016-2020 TPS calculations in the HHVBP group against those calculated by the HHVBP Implementation Contractor and reported in the Annual TPS and Payment Adjustment Reports (2021 TPS was not calculated by the HHVBP Implementation Contractor). The correlation coefficient between our TPS and the HHVBP Implementation Contractor's TPS was 0.999 for CYs 2016-2018, 0.998 for CY 2019, and 0.997 for CY 2020.

Exhibit 17. HHVBP Measures and Weights used in TPS Calculation

Calendar Year	Measures Used in TPS Calculation	Measure Weights
2016-2017 [1,17]	17 HHVBP measures: seven OASIS-based outcomes, three OASIS-based processes, two claims-based measures, and five HHCAHPS measures.	Eligible measures are equally weighted
2018 [18]	16 HHVBP measures: 2013-2017 measures, excluding the Drug Education OASIS-based process.	Same as 2016-2017
2019-2020 [8,19]	13 HHVBP measures: six OASIS-based outcomes, two claims-based measures, and five HHCAHPS measures. The remaining two OASIS-based processes (Influenza immunization and Penumococcal vaccine) were dropped, and three OASIS-based outcome measures (Improvement in Bathing, Bed, and Ambulation) were replaced by two composite measures: TNC Change in Self-Care and TNC Change in Mobility.	(1) OASIS-based measures: 35%, (2) Claims-based measures: 35%, (3) HHCAPHS-based measures: 30%
2021	12 HHVBP measures: 2019-2020 measures, excluding the Improvement in Pain OASIS -based measure, for which data was unavailable due to non-mandatory reporting.	Same as 2019-2020

Exhibit 18. HHVBP Measure Eligibility and HHA Eligibility Criteria for TPS Calculation

HHVBP Measure Eligibility
OASIS and claims-based measures: HHA must have at least 20 episodes of care.
HHCAHPS-based measures: HHA must have at least 40 completed patient surveys.
HHA Eligibility
Non-missing data for at least five same measures in both the baseline year and the performance year.
Must be in operation as of the beginning of baseline year based on HHA's participation date extracted from the POS file.
Must be in operation as of the end of the performance year based on HHA's termination date extracted from the POS file.
HHA is not Medicaid-certified only.

Relative Change

The relative change provides context for interpreting model estimates and indicates the magnitude by which the impact measures have changed due to HHVBP in the post-implementation period relative to the baseline period values. We calculated the relative change by dividing the respective D-in-D estimate by its measure's corresponding baseline average value in HHVBP states and expressing it as a percentage.

Annual Savings Calculations

We estimated savings (annual or total) to the Medicare program by multiplying the relevant D-in-D estimate for the Medicare spending per day measures by the total number of eligible days (in the respective year for annual, or during 2016-2021 for total) in the HHVBP states. To obtain estimates of average annual savings, we divided the calculated total savings estimate by the number of years in the post-implementation period (six). Average annual savings corresponding to Medicare component expenditure estimates are calculated in exactly the same way.

Data Sources

For this Annual Report, we used a variety of data sources to create the analytic files necessary to conduct the analyses included in this Annual Report (Exhibit 19).

Exhibit 19. Data Sources Used for the HHVBP Evaluation

Data Source	Usage
1999-2021 Home Health Claims (Virtual Research Data Center (VRDC))	Define home health care episodes for claims-based impact measures
2010-2022 Inpatient, Outpatient, and SNF Claims (VRDC)	Create impact measures for utilization of services outside of home health care, and determine a beneficiary's care setting immediately prior to a sequence of home health episodes
2011-2022 Part B, Durable Medical Equipment (DME), Home Health, Hospice, SNF, Inpatient, and Outpatient Revenue Files (VRDC)	To define impact measures of post-acute care, spending, and utilization

Exhibit 19. Data Sources Used for the HHVBP Evaluation (continued)

Data Source	Usage
2013-2021 Master Beneficiary Summary Files (VRDC)	Determine beneficiary eligibility in impact measures based on FFS or Medicare Advantage enrollment status, beneficiary demographics, and chronic condition status
2013-2021 HCC Files (VRDC)	Determine beneficiary HCC scores to be used as risk adjusters or as strata in evaluation of impact measures
2013-2021 Centers for Medicare & Medicaid Services (CMS) Provider of Services Files	Control for a variety of agency characteristics in construction of comparison groups and D-in-D modeling
2020 Area Health Resource File	Inform comparison group construction based on key county-level demographic information
2020-2021 County-Level COVID-19 Case Counts and Population (USAFacts.org)	Used as risk-adjusters in the analytic models
2010-2021 OASIS Assessment and OASIS Facility/Provider Data (VRDC)	Provide covariates for analytic models and support OASIS impact measure analyses
2013-2021 Beneficiary ID – Health Insurance Claim Number (HICN) Crosswalk (VRDC)	Populate missing CCW beneficiary IDs in OASIS assessments
2011-2021 Minimum Data Set (MDS) 3.0 Data (VRDC)	Identify institutional beneficiaries for HCC scores and obtain information on skilled nursing facility use of Medicare Advantage beneficiaries
2013-2021 Home Health CAHPS (HHCAHPS) Data (Home Health Care (HHC) website)	Analyze the five patient experience impact measures
2013-2021 Provider Enrollment, Chain and Ownership System (PECOS) Data (Integrated Data Repository)	Determine HHA chain information
2012-2021 CMS Cost Report Files	Determine HHA chain information
2013-2021 Master Data Demonstration (MDD) Files (VRDC)	Identify Medicare FFS beneficiaries who were aligned with MSSP ACO, the Next Generation ACO Model, and the Pioneer ACO Model during their home health episode
2013-2021 CMMI Model Data (provided by CMMI)	Identify Medicare FFS beneficiaries who were aligned with other CMMI models during their home health episode, including the BPCI Model (Model 2 or Model 3), the BPCI Advanced Model, the CJR model or the OCM
2019-2022 Review Choice Demonstration (RCD) Data (provided by CMMI)	Identify Medicare FFS beneficiaries who were aligned with the Review Choice Demonstration
2013-2020 Medicare Provider Analysis and Review (MedPAR) Files (VRDC)	Evaluate spillover effects of the HHVBP Model on home health care recipients covered by a Medicare Advantage plan
2013-2021 OASIS-Based Episode-Level Outcome Impact Measure Data (Quality Improvement and Evaluation System (QIES) and internet QIES (iQIES)	Support OASIS-based outcome impact measure calculation and analysis
2013-2021 HHA-Month-Level Outcome Impact Measure Data (QIES/iQIES)	Calculate and analyze TPS scores for all HHAs, regardless of participation in HHVBP

Analytic File Creation

Claims- and OASIS-based episodes include information about the episode, HHA, measures, and beneficiary enrollment and chronic conditions. We compiled claims-based episodes, OASIS-based episodes, and OASIS assessment-level data into a unified analytic file (UAF). After removing overlaps between OASIS-based episodes for the same patient, we merged claims-based and OASIS-based episodes based on Chronic Conditions Data Warehouse (CCW) beneficiary ID and whether the episodes overlap in time. We then linked OASIS assessments to episodes by assessment identifier, except for episodes that ended prior to 01/01/2015; due to an issue in the source assessment data, linking assessments to these episodes required alternate fields such as QIES identifiers, claim authorization and occurrence codes, and assessment completion dates. To ensure each record uniquely represented a home health episode, we maintained only one record in cases where a claims-based episode linked to multiple OASIS-based episodes (or vice versa); to do this, we prioritized the earliest linked OASIS-based episode and the latest linked claims-based episode by start date. We used OASIS assessment zip codes (claims zip codes when no assessment could be linked) to determine the beneficiary's county of residence, added data elements from various sources (agency-level data were merged to episode-level data by CMS Certification Number [CCN]-year), and excluded all records in which the patient was treated by an HHA that operates in one of the US territories or the District of Columbia (as determined by first two digits of CCN). The resulting UAF was used for all analysis reported in this report.[2]

Supplemental Findings

Exhibit 20. Unadjusted Annual Means (and Standard Errors) for FFS Claims-Based Quality Measures 2013-2021, by HHVBP and Non-HHVBP States

Measure	2013	2014	2015	2016	2017	2018	2019	2020	2021
Unplanned ACH/First FFS HH Episodes									
HHVBP	15.3% (0.0417)	15.6% (0.0427)	16.1% (0.0433)	16.3% (0.0439)	15.9% (0.0436)	15.6% (0.0434)	15.5% (0.0436)	14.1% (0.0445)	13.8% (0.0448)
Non-HHVBP	16.2% (0.0258)	16.2% (0.0258)	16.3% (0.0258)	16.5% (0.0257)	15.8% (0.0253)	15.6% (0.0254)	15.6% (0.0256)	14.0% (0.0261)	13.8% (0.0263)
Outpatient ED Use (no Hospitalization)/First FFS HH Episodes									
HHVBP	11.3% (0.0367)	11.7% (0.0378)	12.2% (0.0386)	12.6% (0.0395)	12.9% (0.0400)	12.9% (0.0400)	13.0% (0.0406)	11.0% (0.0400)	11.7% (0.0418)
Non-HHVBP	11.9% (0.0226)	12.4% (0.0230)	12.6% (0.0231)	12.7% (0.0231)	13.0% (0.0234)	12.9% (0.0234)	13.0% (0.0238)	11.1% (0.0236)	11.9% (0.0246)
ED Use followed by Inpatient Admission/First FFS HH Episodes									
HHVBP	13.8% (0.0399)	14.3% (0.0410)	14.5% (0.0414)	14.4% (0.0416)	14.8% (0.0423)	14.7% (0.0422)	14.6% (0.0425)	13.8% (0.0439)	13.6% (0.0442)
Non-HHVBP	14.2% (0.0243)	14.3% (0.0244)	14.2% (0.0242)	14.2% (0.0240)	14.3% (0.0242)	14.2% (0.0243)	14.2% (0.0246)	13.3% (0.0254)	13.2% (0.0257)
Total ED Use (Outpatient or Inpatient Claims)/First FFS HH Episodes									
HHVBP	25.8% (0.0506)	26.7% (0.0518)	27.4% (0.0524)	27.8% (0.0530)	28.3% (0.0537)	28.1% (0.0536)	28.2% (0.0541)	25.2% (0.0553)	25.7% (0.0564)
Non-HHVBP	27.2% (0.0310)	27.7% (0.0312)	27.9% (0.0311)	28.1% (0.0310)	28.3% (0.0312)	28.0% (0.0313)	28.1% (0.0317)	25.2% (0.0325)	25.8% (0.0331)
Outpatient ED Use and Observation Stay (no Hospitalization)/ First FFS HH Episode									
HHVBP	13.8% (0.0399)	14.1% (0.0407)	14.5% (0.0414)	15.1% (0.0424)	15.4% (0.0430)	15.4% (0.0430)	15.5% (0.0435)	13.4% (0.0434)	14.1% (0.0450)
Non-HHVBP	13.7% (0.0239)	14.1% (0.0243)	14.5% (0.0245)	14.8% (0.0245)	15.0% (0.0247)	15.0% (0.0249)	15.2% (0.0253)	13.3% (0.0254)	14.2% (0.0264)
Unplanned ACH/All FFS HH Episodes									
HHVBP	16.8% (0.0332)	17.2% (0.0339)	17.0% (0.0338)	16.8% (0.0340)	17.2% (0.0346)	16.9% (0.0343)	16.9% (0.0346)	11.2% (0.0237)	11.1% (0.0234)
Non-HHVBP	15.9% (0.0176)	15.9% (0.0177)	15.7% (0.0177)	15.6% (0.0177)	15.9% (0.0181)	15.8% (0.0183)	16.0% (0.0187)	10.3% (0.0126)	10.3% (0.0125)
SNF Use/All FFS HH Episodes									
HHVBP	4.7% (0.0189)	5.0% (0.0195)	5.0% (0.0196)	5.0% (0.0197)	5.1% (0.0201)	4.9% (0.0198)	4.9% (0.0199)	2.8% (0.0125)	3.1% (0.0130)
Non-HHVBP	3.9% (0.0093)	4.0% (0.0095)	4.1% (0.0097)	4.2% (0.0097)	4.2% (0.0100)	4.2% (0.0101)	4.2% (0.0103)	2.4% (0.0063)	2.7% (0.0066)

Exhibit 21. Cumulative Impact of the HHVBP Model on Frontloading of Skilled Nurse or Therapist Visits During the First Two Weeks of Home Health Care for Post-Institutional Episodes

Measure	Model Estimates				Average in HHVBP States, Baseline (2013-2015)	% Relative Change
	D-in-D[a]	p-value	Lower 90% CI[a]	Upper 90% CI[a]		
Frontloading Skilled Nursing Visits[b]						
Cumulative	1.39	0.04	0.26	2.52	58.7%	2.4%
Frontloading Therapy Visits[b]						
Cumulative	2.64	<0.001	1.56	3.72	30.7%	8.6%

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

Exhibit 22. Impact of the HHVBP Model on Unplanned Hospitalizations Between Agencies with High versus Low Medicare Advantage Share, 2013-2020

Measure	High Medicare Advantage Share			Low Medicare Advantage Share			High-Low Medicare Advantage Share		
	D-in-D	p-value	% Relative Change[b]	D-in-D	p-value	% Relative Change[c]	D-in-D-in-D	p-value	% Relative Change[b]
Unplanned Acute Care Hospitalization/All MA HH Episodes[a]	-1.02	0.04	-5.0%	-0.63	0.16	-3.5%	-0.39	0.37	-1.9%

D-in-D and D-in-D-in-D values represent percentage point changes. High Medicare Advantage share defined as greater than or equal to 50 percent of all Medicare OASIS episodes in a year (see the Technical Appendix for details regarding model specifications). [a]Results obtained from linear regression with state linear trends. [b]Calculated by dividing the model estimate by 20.3%, the baseline mean for patients in High Medicare Advantage share agencies in HHVBP states. [c]Calculated by dividing the model estimate by 18.0%, the baseline mean for Low Medicare Advantage share agencies in HHVBP states.

Exhibit 23. Unadjusted Annual Means (and Standard Errors) for OASIS-Based Outcome Quality Measures 2013-2021, by HHVBP and Non-HHVBP States

Measure	2013	2014	2015	2016	2017	2018	2019	2020	2021
Discharged to Community									
HHVBP	73.0% (0.0366)	72.8% (0.0367)	72.4% (0.0365)	72.9% (0.0358)	72.8% (0.0354)	73.2% (0.0345)	73.5% (0.0341)	73.2% (0.0353)	73.5% (0.0343)
Non-HHVBP	69.8% (0.0212)	70.1% (0.0209)	70.5% (0.0205)	71.0% (0.0200)	71.3% (0.0195)	71.8% (0.0192)	72.3% (0.0189)	72.4% (0.0197)	72.6% (0.0192)
Improvement in Dyspnea									
HHVBP	64.5% (0.0546)	65.2% (0.0541)	70.1% (0.0511)	74.9% (0.0464)	79.5% (0.0419)	81.9% (0.0383)	84.7% (0.0353)	85.1% (0.0356)	86.5% (0.0331)
Non-HHVBP	64.4% (0.0315)	65.1% (0.0309)	68.7% (0.0291)	72.2% (0.0270)	76.2% (0.0248)	79.0% (0.0228)	82.2% (0.0210)	83.4% (0.0209)	84.9% (0.0196)
Improvement in Management of Oral Medications									
HHVBP	48.8% (0.0569)	50.5% (0.0559)	55.0% (0.0538)	61.6% (0.0498)	67.5% (0.0460)	71.3% (0.0427)	76.5% (0.0394)	78.8% (0.0391)	81.0% (0.0364)
Non-HHVBP	51.6% (0.0323)	53.2% (0.0314)	56.5% (0.0300)	60.8% (0.0281)	65.3% (0.0260)	69.0% (0.0244)	74.7% (0.0224)	77.8% (0.0221)	80.1% (0.0206)
TNC Change in Self-Care									
HHVBP	1.29 (0.0010)	1.37 (0.0011)	1.46 (0.0011)	1.65 (0.0011)	1.79 (0.0011)	1.88 (0.0011)	1.98 (0.0010)	2.10 (0.0011)	2.18 (0.0011)
Non-HHVBP	1.20 (0.0006)	1.27 (0.0006)	1.37 (0.0006)	1.52 (0.0006)	1.65 (0.0006)	1.75 (0.0006)	1.85 (0.0006)	2.00 (0.0006)	2.09 (0.0006)
TNC Change in Mobility									
HHVBP	0.39 (0.0004)	0.43 (0.0004)	0.48 (0.0004)	0.57 (0.0004)	0.64 (0.0004)	0.69 (0.0004)	0.72 (0.0004)	0.75 (0.0004)	0.78 (0.0004)
Non-HHVBP	0.37 (0.0002)	0.40 (0.0002)	0.45 (0.0002)	0.52 (0.0002)	0.59 (0.0002)	0.63 (0.0002)	0.67 (0.0002)	0.71 (0.0003)	0.74 (0.0002)

Exhibit 24. Unadjusted Rates of Select Performance Measures by Dual Eligibility or Medicaid Status in HHVBP and Non-HHVBP States, 2013-2021

Measure	Baseline (2013-2015)		Post Period (2016-2021)	
	Dually Eligible or Medicaid	Non-Dually Eligible FFS or Non-Medicaid	Dually Eligible or Medicaid	Non-Dually Eligible FFS or Non-Medicaid
Unplanned Acute Care Hospitalization/First HH Episodes (%)				
HHVBP	16.1	15.8	17.2	14.7
Non-HHVBP	16.9	16.0	15.9	15.1
ED Use (No Hospitalization)/First FFS HH Episodes (%)				
HHVBP	13.5	11.5	14.5	11.8
Non-HHVBP	14.6	11.7	14.1	12.0
Total Normalized Composite (TNC) Change in Self-Care				
HHVBP	1.3	1.5	1.7	2.0
Non-HHVBP	1.2	1.4	1.6	1.9
Total Normalized Composite (TNC) Change in Mobility				
HHVBP	0.4	0.5	0.6	0.7
Non-HHVBP	0.4	0.5	0.6	0.7

For the first two measures which are based on Medicare claims for FFS beneficiaries, we compared beneficiaries who are dually eligible for Medicare and Medicaid with those who are not dually eligible. For the last two measures which are based on OASIS data, the analysis includes all patients with either Medicare coverage (FFS or Medicare Advantage) or Medicaid coverage, and we compared patients covered by Medicaid with those not covered by Medicaid.

Exhibit 25. Unadjusted Rates of Select Performance Measures by Patient Race and Ethnicity in HHVBP and Non-HHVBP States, 2013-2021

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

Exhibit 26. Unadjusted Annual Means (and Standard Errors) for HHCHAPS-Based Patient Experience Measures 2013 – 2021, by HHVBP and Non-HHVBP States

Measure	2013	2014	2015	2016	2017	2018	2019	2020	2021
How often the home health team gave care in a professional way (Professional Care)									
HHVBP	89.0% (0.1245)	88.7% (0.1412)	88.7% (0.1416)	88.5% (0.1298)	88.4% (0.1377)	88.4% (0.1383)	88.2% (0.1439)	88.2% (0.1611)	87.8% (0.1729)
Non-HHVBP	88.2% (0.0709)	88.2% (0.0702)	88.2% (0.0749)	88.0% (0.0763)	87.9% (0.0798)	88.0% (0.0755)	88.0% (0.0826)	88.2% (0.0886)	87.9% (0.0899)
How well did the home health team communicate with patients (Communication)									
HHVBP	86.2% (0.1467)	85.9% (0.1664)	85.7% (0.1583)	85.5% (0.1530)	85.5% (0.1541)	85.4% (0.1639)	85.3% (0.1721)	85.5% (0.1767)	84.9% (0.1889)
Non-HHVBP	85.4% (0.0761)	85.3% (0.0788)	85.2% (0.0832)	85.2% (0.0857)	85.1% (0.0876)	85.2% (0.0860)	85.2% (0.0894)	85.2% (0.0993)	85.1% (0.0988)
Did the home health team discuss medicines, pain, and home safety with patients (Discussion of Care)									
HHVBP	82.9% (0.1828)	82.8% (0.1835)	82.8% (0.1839)	82.3% (0.1902)	82.6% (0.1849)	82.2% (0.1998)	81.9% (0.2114)	80.8% (0.2186)	79.7% (0.2433)
Non-HHVBP	83.8% (0.0881)	83.9% (0.0875)	83.6% (0.0914)	83.6% (0.0932)	83.3% (0.0975)	83.4% (0.0965)	83.5% (0.0977)	82.5% (0.1131)	82.1% (0.1158)
How do patients rate the overall care from the home health agency (Overall Care)									
HHVBP	84.6% (0.1993)	84.3% (0.2245)	84.3% (0.2187)	84.3% (0.2086)	84.1% (0.2062)	84.3% (0.2014)	84.2% (0.2204)	84.4% (0.2320)	83.8% (0.2687)
Non-HHVBP	83.6% (0.1110)	83.7% (0.1127)	83.7% (0.1200)	83.7% (0.1215)	83.5% (0.1248)	83.4% (0.1246)	83.7% (0.1280)	83.9% (0.1412)	83.7% (0.1453)
Would patients recommend the home health agency to friends and family (Likely to Recommend)									
HHVBP	79.8% (0.2382)	79.8% (0.2735)	79.4% (0.2639)	79.2% (0.2578)	78.9% (0.2497)	78.8% (0.2687)	78.5% (0.2659)	78.1% (0.2931)	77.7% (0.3054)
Non-HHVBP	78.5% (0.1364)	78.5% (0.1378)	78.3% (0.1428)	78.1% (0.1427)	77.6% (0.1479)	77.4% (0.1483)	77.5% (0.1534)	77.8% (0.1692)	77.2% (0.1751)

Exhibit 27. Unadjusted Annual Means (and Standard Errors) for FFS Claims-Based Spending Measures 2013-2021, by HHVBP and Non-HHVBP States

Measure	2013	2014	2015	2016	2017	2018	2019	2020	2021
Pre-PDGM approach									
Average Medicare Spending per Day during and following FFS HH Episodes of Care									
HHVBP	$135.41 (0.1471)	$138.65 (0.1522)	$140.99 (0.1546)	$143.18 (0.1594)	$146.65 (0.1644)	$150.65 (0.1688)	$155.13 (0.1759)	$154.69 (0.1675)	$157.52 (0.1671)
Non-HHVBP	$128.79 (0.0816)	$131.80 (0.0834)	$134.25 (0.0844)	$137.36 (0.0867)	$141.84 (0.0904)	$146.56 (0.0939)	$152.59 (0.0995)	$154.96 (0.0945)	$159.33 (0.0955)
Average Medicare Spending per Day during FFS HH Episodes of Care									
HHVBP	$148.31 (0.1546)	$150.69 (0.1596)	$152.83 (0.1621)	$155.47 (0.1675)	$159.21 (0.1735)	$163.53 (0.1784)	$168.76 (0.1862)	$163.62 (0.1789)	$165.65 (0.1787)
Non-HHVBP	$132.49 (0.0832)	$135.31 (0.0850)	$138.26 (0.0861)	$142.17 (0.0889)	$147.43 (0.0931)	$152.99 (0.0970)	$159.90 (0.1030)	$159.83 (0.0988)	$163.75 (0.1000)
Average Medicare Spending per Day following FFS HH Episodes of Care									
HHVBP	$102.03 (0.2393)	$106.79 (0.2496)	$109.25 (0.2542)	$110.68 (0.2578)	$113.46 (0.2654)	$116.31 (0.2710)	$119.37 (0.2782)	$128.46 (0.3265)	$133.82 (0.3225)
Non-HHVBP	$113.66 (0.1569)	$117.45 (0.1610)	$118.51 (0.1612)	$119.47 (0.1607)	$122.06 (0.1650)	$124.34 (0.1690)	$128.38 (0.1754)	$136.88 (0.2042)	$142.58 (0.2021)
Post-PDGM approach									
Average Medicare Spending per Day during and following FFS HH Episodes of Care									
HHVBP	$127.78 (0.1408)	$131.23 (0.1457)	$133.63 (0.1480)	$135.50 (0.1524)	$138.89 (0.1574)	$142.77 (0.1617)	$146.96 (0.1686)	$153.29 (0.1652)	$156.43 (0.1649)
Non-HHVBP	$124.94 (0.0790)	$127.97 (0.0808)	$130.19 (0.0817)	$132.89 (0.0838)	$136.98 (0.0873)	$141.43 (0.0908)	$147.09 (0.0962)	$154.40 (0.0936)	$159.00 (0.0945)
Average Medicare Spending per Day during FFS HH Episodes of Care									
HHVBP	$141.24 (0.1488)	$144.42 (0.1538)	$147.17 (0.1565)	$149.40 (0.1613)	$152.94 (0.1667)	$156.85 (0.1709)	$161.72 (0.1785)	$165.59 (0.1748)	$168.41 (0.1750)
Non-HHVBP	$132.82 (0.0821)	$135.89 (0.0839)	$138.69 (0.0850)	$142.06 (0.0874)	$146.78 (0.0911)	$151.77 (0.0948)	$158.24 (0.1005)	$162.97 (0.0972)	$167.56 (0.0986)
Average Medicare Spending per Day following FFS HH Episodes of Care									
HHVBP	$79.25 (0.2069)	$83.24 (0.2170)	$84.37 (0.2189)	$85.48 (0.2229)	$88.08 (0.2310)	$91.51 (0.2394)	$94.09 (0.2458)	$113.45 (0.3179)	$118.84 (0.3135)
Non-HHVBP	$87.21 (0.1348)	$90.27 (0.1383)	$90.66 (0.1378)	$91.75 (0.1384)	$93.98 (0.1426)	$96.70 (0.1473)	$100.23 (0.1531)	$120.62 (0.1996)	$126.34 (0.1969)

Exhibit 28. Cumulative Impact of the HHVBP Model on Medicare Spending Measures for Average Medicare Spending per Day during, following, and during and following FFS HH Episodes of Care

Measure	Baseline (2013-2015)				Average in HHVBP States, Baseline (2013-2015)*	% Relative Change
	D-in-D	p-value	Lower 90% CI	Upper 90% CI		
Average Medicare Spending per Day during FFS HH Episodes of Care						
Cumulative (2016-2021)	-$2.63	<0.01	-$4.22	-$1.04	$148.54	-1.8%
Average Medicare Spending per Day following FFS HH Episodes of Care						
Cumulative (2016-2021)	-$0.25	0.82	-$2.05	$1.55	$98.99	-0.3%
Average Medicare Spending per Day during and following FFS HH Episodes of Care						
Cumulative (2016-2021)	-$2.63	<0.01	-$4.03	-$1.23	$135.96	-1.9%

*CI= Confidence Interval. | These models include state-specific linear time trends. | Average is based on capped expenditure measures.*Cumulative estimate corresponds to a weighted Average Baseline Spending for HHVBP states during 2016-2021 that is calculated by weighting the pre-PDGM baseline average and post-PDGM baseline average by the number of eligible home health days in HHVBP states in 2016-2019 and 2020-2021, respectively. Baseline average in HHVBP states for 2016-2019 corresponds to measures defined by pre-PDGM method and that for 2020-2021 corresponds to measures defined by post-PDGM method.*

Exhibit 29. Baseline and Intervention Period Means for Medicare Spending per Day during and following FFS Home Health Episodes of Care, Total and by Components Using Pre-PDGM and Post-PDGM Approach, HHVBP States and Non-HHVBP States

	HHVBP States				Non-HHVBP States			
	Baseline (2013-2015)		Intervention Period†		Baseline (2013-2015)		Intervention Period†	
	Mean	Percent	Mean	Percent	Mean	Percent	Mean	Percent
Pre-PDGM approach								
Total	$138.33	100.0%	$148.86	100.0%	$131.61	100.0%	$144.41	100.0%
Home health	$44.87	31.8%	$45.44	29.9%	$41.07	30.5%	$43.38	29.3%
Inpatient	$45.60	32.8%	$50.19	33.6%	$46.70	35.2%	$50.91	35.1%
Outpatient institutional	$10.95	8.2%	$13.52	9.4%	$11.62	9.0%	$14.23	10.1%
ED and Observation Stays	$3.14	2.3%	$4.03	2.8%	$2.81	2.2%	$3.57	2.5%
Other	$7.72	5.9%	$9.37	6.6%	$8.73	6.9%	$10.55	7.6%
SNF	$11.36	8.1%	$11.69	7.7%	$9.93	7.4%	$10.84	7.4%
Hospice	$2.81	2.0%	$3.45	2.3%	$2.19	1.6%	$2.86	1.9%
Part B non-institutional*	$23.32	17.1%	$25.08	17.1%	$21.20	16.2%	$22.99	16.1%
Post-PDGM Approach								
Total	$130.85	100.0%	$154.88	100.0%	$127.69	100.0%	$156.73	100.0%
Home health	$38.44	28.9%	$44.18	27.7%	$36.38	27.9%	$46.22	28.5%
Inpatient	$43.93	33.4%	$53.99	34.3%	$45.97	35.7%	$56.12	35.2%
Outpatient institutional	$10.81	8.6%	$14.60	9.7%	$11.56	9.3%	$15.77	10.3%
ED and Observation Stays	$3.01	2.4%	$4.13	2.7%	$2.73	2.2%	$3.79	2.4%
Other	$7.71	6.2%	$10.37	7.0%	$8.75	7.1%	$11.89	7.9%
SNF	$12.15	9.1%	$11.21	7.1%	$11.13	8.6%	$11.08	6.9%
Hospice	$3.20	2.4%	$4.23	2.7%	$2.60	2.0%	$3.72	2.3%
Part B non-institutional*	$22.79	17.6%	$27.94	18.5%	$21.02	16.6%	$25.91	16.9%

**Includes Part B carrier and DME claims. †2016-2019 for pre-PDGM approach; 2020-2021 for post-PDGM approach. Average is based on capped expenditure measures. Capping was done separately for total and for each component such that component means do not add up to the total mean. Percent column is based on uncapped expenditure measure values.*

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Overview of Case Studies to Explore Existing Inequities in Use of Higher Quality Home Health Agencies Pre- and Post-HHVBP

Prior studies have found racial, ethnic and socioeconomic disparities in access to high quality care across long-term care settings, including in home health care.[1] As discussed in the main report, the HHVBP Model is associated with improvements in home health quality, but the model was not designed explicitly to address health inequities, and it is unclear whether such improvements accrue equitably to all patients. Our previous evaluation analyses document racial and ethnic access inequities that not only pre-date implementation of the model, but persist across the demonstration period.[2] Specifically, racial and ethnic minority home health patients were more likely to use lower quality agencies both before and after implementation of the HHVBP Model, even when higher quality agencies were available in the area. These inequities are not uniform across geography: access inequities narrowed in some counties, whereas access to higher quality home health agencies was persistently favorable for racial and ethnic minority home health patients in other counties, relative to their White counterparts. Given the model's national expansion, understanding what is happening in these counties can help inform policymakers of the potential for HHVBP to impact existing inequities. Namely, are there factors associated with these counties that position them for improved equity under HHVBP in ways that may otherwise stagnate equity in other counties?

Taking a closer look at local communities offers the opportunity to view the HHVBP Model within a more nuanced context and observe what factors may mitigate access inequities. To this end, looking at data between 2014–15 and 2018–19, the evaluation team identified several HHVBP and non-HHVBP counties where racial and ethnic minority Medicare fee-for-service (FFS) patients experienced equitable use of higher-quality home health, relative to other counties, as case study candidates. The team then selected four counties where access inequities narrowed or were not present, and one county where inequities were persistent. For each of these counties, the evaluation team conducted a detailed assessment through environmental scanning, data analysis, and home health agency interviews conducted in early 2023.

The main research objective was to better understand whether there was an impact of HHVBP on "high performing" counties and to highlight the community, market, home health agency, or other characteristics that may have played a role. The results of this analysis are summarized across the individual case studies focused on each of the selected counties, as well as a cross-county discussion.

Case Study Methods

Our case study assessment focused on five counties. Four were purposefully-selected HHVBP and non-HHVBP counties that performed well, relative to other counties, in terms of more equitable use of higher-quality home health agencies[a] among racial and ethnic minority Medicare FFS patients, relative to White patients, between 2014–15 and 2018–19.[2] For comparison, we also examined one "lower performing" HHVBP county, where there were more racial and ethnic gaps in use of higher-quality agencies. Despite some variation, many of the high performing counties were primarily urban. Further, in our efforts to understand perspectives from home health agencies (as detailed below), more agencies from HHVBP counties responded to our requests for interviews,

[a] Based on Quality of Patient Care Star Ratings, claims-based unplanned hospitalization and emergency department use measures, and patient experience ratings.

compared to non-HHVBP counties. It is worth noting that the pool of high performing counties was predominantly non-Hispanic White, many with a higher proportion of White residents than their respective states and the nation. Thus, while the counties purposefully selected for these profiles reflect a mix of HHVBP Model state status, census region (Northeast, South, Midwest) and urbanicity/rurality, they tend towards being predominantly urban, non-Hispanic White and from HHVBP counties. Information on the five counties is summarized below in Exhibit 30.

To compile case studies for each county, we drew on data from three sources: an environmental scan; quantitative analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW); and key informant interviews with home health agency staff.

- **Environmental scan:** We conducted scans to characterize the landscape of each county, developing a county-level profile with state and national benchmarks that includes overall population health, urbanicity and rurality, population sociodemographic characteristics, health insurance coverage, and major health system or providers. We synthesized data from tables, data briefs, white papers and other relevant online information using multiple sources, including: the Census Bureau, County Health Rankings, U.S. News Healthiest Community rankings, Kaiser Family Foundation, and local area agency on aging, health department, health system or organization sites to include county-level and regional community health needs assessments.
- **Quantitative analysis:** We leveraged prior evaluation analyses and a county-level descriptive analysis of 2021 data to assess and benchmark home health quality patterns and agency characteristics for each case study county. For each county and state, we calculated: the number of agencies serving the area (defined as delivering at least 10 episodes in the county or in the state in 2021); the total number of episodes delivered by all agencies (relaxing the 10-episode threshold); the population and patient distribution by race and ethnicity and dual eligibility; and the health status of patients receiving these episodes as measured by average Hierarchical Condition Category (HCC) scores and average chronic condition counts. Additionally, we calculated the share of total episodes in each county that were delivered by agencies with a Quality of Patient Care Star Rating of 4 or higher, the share delivered by chain-affiliated agencies, and the share delivered by for-profit agencies.

  Within each county, we examined access inequities by looking at the proportions of Medicare FFS home health patients — by racial and ethnic subgroups, dual eligibility status, and health status — who received home health in 2021 delivered through higher-quality agencies (Star Rating of 4 or higher). For these within-county analyses, we included data from all agencies that provided any episodes in the county (again relaxing the 10-episode threshold).
- **Qualitative interviews and analysis:** To complement the county profile information noted above, we also conducted primary data collection and qualitative analysis, based on interviews with home health agencies in the selected counties. The goal of these interviews was to learn more about agencies' efforts to provide quality, equitable care, and to better understand issues that may affect use of quality home health care, particularly among racial and ethnic minority Medicare FFS patients. We developed a semi-structured interview guide to address these topics and invited home health agency clinical directors and administrators to participate. Our research team conducted one-hour interviews over Zoom between January and April 2023. Interviews were recorded and transcribed with participant consent.

  We aimed to speak to two to three home health agencies per county, spanning a range of Quality of Patient Care Star Ratings. Exhibit 30 summarizes the number of agencies interviewed in each county and their Star Ratings. For the purposes of home health agency interviews, we relaxed the threshold for distinguishing higher quality home health agencies to a 2019 Quality of Patient Care Star Rating of 3.5 or higher (rather than 4 or higher, as is used elsewhere in this analysis). This decision helped address recruitment challenges by enlarging the eligible pool of higher quality agencies. Two members of the research team independently reviewed interview transcripts and conducted a thematic analysis. Key concepts were identified and organized into main thematic categories and any inconsistencies were resolved through discussion.

Case Study Cross-Cutting Highlights

Exhibit 30. Counties Selected for the Analysis and Home Health Agencies Interviewed

County	High or Low Performer	HHVBP Model Status	Census Region	Urbanicity / Rurality	Home Health Agencies Interviewed*
Bristol County, MA	High	HHVBP	Northeast	Urban	3 total: 2 with Star Rating >3.5
Ingham County, MI	High	Non-HHVBP	Midwest	Urban, surrounded by rural areas	3 total: 2 with Star Rating >3.5
Pasco County, FL	High	HHVBP	South	Fast growing urban	2 total: 1 with Star Rating >3.5
Polk County, IA	High	HHVBP	Midwest	Urban	3 total: 2 with Star Rating >3.5
Worcester County, MA	Low	HHVBP	Northeast	Mostly urban, but with twice the rural area as other selected counties	3 total: 1 with Star Rating >3.5

** Based on 2019 Quality of Patient Care Star Ratings.*

Across all data collection and analysis activities, no "magic bullet" finding emerged to distinguish or explain why certain HHVBP and non-HHVBP counties performed well during the original HHVBP Model along both quality (based on Star Ratings and other metrics) and equity dimensions. However, two characteristics were consistently present in the four higher performing counties, and far less so in the lower performing comparison county:

- A "critical mass" (of approximately one-quarter or more) of home health agencies with Quality of Patient Care Star Ratings of 4 or more serve the county. In contrast, only 1 in 10 agencies serving the lower performing county had a Star Rating of 4 or more. This suggests a threshold effect, as we discuss in further detail below;
- A primarily urban (approximately 90% urban and 10% rural) geographic landscape. In contrast, the lower performing county was approximately 20% rural, twice as rural as the higher performing counties; it also happened to be the largest county by area in its state.

There were otherwise no consistent, observable, differences between higher and lower performing counties in the other characteristics we assessed, including overall population health (relative to the state or nation), distributions of racial and ethnic groups, Medicare Advantage penetration, rates of uninsured residents, dominance (or lack thereof) in the county by a health care system, or shares of Medicare FFS home health episodes affiliated with chain or for-profit agencies.

Despite their differences and variations, all case study counties, both higher and lower performing counties, shared two county-level similarities:

- As mentioned, a population that was predominantly non-Hispanic White, with higher shares of White residents on average compared to the nation and to their respective states;
- Community resources that provided "wrap around" services to support the diverse social needs of home health patients (for example, assistance with accessing and paying for transportation and groceries).

Beyond county-level attributes, some consistent patterns also emerged among the home health agencies that we interviewed:

- Regardless of county or agencies' Quality of Patient Care Star Ratings, all agencies reported using similar, patient-centered, care strategies that — notably — did not focus on patients' race and ethnicity, but on patients' cultural, social or language needs (for example, matching patients to providers on language, or assisting patients with accessing and paying for transportation). Agencies did not rely on race and ethnicity data, even when it was available, to inform or drive quality improvement activities. Agencies relied on the above-mentioned community resources to help meet patients' diverse needs.
- The differences between higher and lower star-rated agencies, both within and across counties, were also consistently related to several factors: patient case-mix, number of episodes delivered, and retention of experienced staff. Lower star-rated agencies tended to have patients with more social or health needs (for example, higher-than-county average HCC scores, as mentioned by interviewees and confirmed by our analysis of Medicare data); deliver more home health episodes in a county; and struggle more to retain experienced staff — something that agencies felt affected their documentation and Star Ratings.

Several of these findings are especially notable with respect to health inequities. First, the case study counties had higher shares of White residents compared to the nation overall and to their respective states overall. For the high performing counties, this demographic makeup may dilute the ability to observe the deleterious effects of minority stress and weathering on measurable health-related outcomes. Such effects have been well-documented in racial, ethnic, and other minorities[3,4] and are the result of the "constant stress of living within a racist society…lead[ing] to poor health for marginalized groups"[4] — including, potentially, outcomes related to inequities in use of higher quality home health agencies.[1] However, for the lower performing county in our sample, this predominantly White demographic makeup may not have been enough to overcome the two other key features that set this county apart from the higher performing counties: its lack of high quality agencies and its rurality.

A second finding is that approximately one-quarter or more of agencies in higher performing counties had a Quality of Patient Care Star Rating of 4 or more, while the lower performing county's share of such agencies was much smaller (10 percent), suggesting a potential threshold effect that may be differentiating higher and lower performing counties. That is, shares of high quality agencies beyond a certain "threshold" (e.g., a quarter or more of county agencies) can start to yield impacts on access or protect against access inequities to high quality agencies. However, for areas with shares of higher rated agencies below a certain threshold, incremental changes in shares of high quality agencies (e.g., 8% versus 9% of county agencies) are insufficient to make an observable impact until, perhaps, the share reaches a threshold level. Threshold effects are not uncommon, and from a policy perspective, small differences in the share of high quality agencies serving a county are unlikely to warrant concern (unless it is a very small county with few agencies). However, the difference between counties whose share of high quality agencies falls below a certain threshold (e.g., below one-quarter) and those that surpass that threshold (e.g., above one quarter) may be more important. The lower performing counties that do not reach this "critical mass" in the number of episodes delivered by higher quality agencies are likely the ones at greatest risk for access, health, or cost challenges with respect to their Medicare patients,[b] as is suggested elsewhere in the literature.[5,6] Our findings may suggest that a "critical mass" of high quality agencies beyond a certain threshold has an effect on county-level equities in use of high quality home health care.

A third finding is that the lower performing county was more rural than higher performing counties, suggesting that rurality may play a role in observed inequities. More rural counties (especially those encompassing a larger geographic footprint, as was the case with the lower performing county in our study) may face greater challenges in agencies' or community organizations' ability to readily access transportation, reduce driving distances, and hence provide more timely home health or other supports to meet patient needs—further contributing to access issues that disproportionately affect racial and ethnic minorities in home health care.[1,7] In addition, recruitment of home health staff who are willing to travel longer distances to get to patients is more challenging in more rural areas.

Importantly, these findings are consistent with emerging evidence of racial and ethnic inequities in the use of high quality home health agencies,[1,7] and suggest that issues in access to high quality care may play a larger role in observed county-level equity differences than the individualized, patient-centered care that every interviewed home health agency said they provided. While the case studies did not specifically examine all underlying mechanisms for the observed inequities, prior studies suggest that disparities in use of high quality home health agencies may be related to provider factors, such as providers' preferences to serve certain "desirable" patients who they perceive to be less costly. A patients' race, ethnicity and socioeconomic status can affect providers' perceptions of whether the patient may be more desirable within the context of VBP programs.[1] It is possible that in counties where the presence of higher quality home health agencies reached a certain threshold and thus are more pervasive, the chances of higher quality care being "within reach" of racial and ethnic minorities and other at-risk Medicare home health patients[1] improved enough to counter putative provider-related factors, at least to some extent.

Although we spoke with only a small purposefully selected sample of home health agencies, the finding that all interviewed agencies emphasized individualized, patient-centered care may have broader implications with respect to quality measurement in VBP programs. First, this finding suggests that providing what seemed a similar level of patient-centered care, focused on meeting individual patient needs, did not necessarily translate into higher Quality of Patient Care Star Ratings. In turn, this also affects county-level shares of agencies with higher or lower Quality of Patient Care Star Ratings, one of the consistent features distinguishing higher and lower performing counties among our five case studies.

Further, this finding suggests a potential gap between what the HHVBP performance measures are capturing and the quality of care that home health agencies we interviewed indicated they were providing. It is possible, as mentioned by some home health agencies, that challenges in retaining trained staff meant that care was not adequately documented, which affected the Quality of Patient Care Star Ratings. It is also possible that what the Centers for Medicare & Medicaid (CMS) captures in its Quality of Patient Care Star Ratings does not align with, or fully capture, what home health agencies consider to be patient-centered care. Under the Meaningful Measures initiative, CMS previously identified "Care is personalized and aligned with patient's goals" as a priority area, and also currently identifies equity as another measurement priority.[8,9,10] To improve quality measurement and outcomes, greater alignment between CMS' Meaningful Measures goals and existing measures in VBP programs may be needed.[11] For example, to address Meaningful Measures goals around equity measures, existing tools can be leveraged to fill this measurement gap in VBP programs, including HHVBP.[12]

Finally, as the HHVBP Model is expanded to all 50 states, initiatives that improve access to higher quality home health care among racial and ethnic minorities or other at-risk Medicare and Medicaid patients could be a pathway to ameliorate pre-existing inequities. Studies have suggested that "colorblind" market-based reforms, such as HHVBP, may exacerbate health inequities in home health.[1] A recent 2023 study found that after five-star ratings in home health were introduced, "patients in predominantly White neighborhoods had a significant increase in high quality home health agency use," while those in predominantly Hispanic/Latino neighborhoods had a significant decrease.[8] Approaches that account for the effort needed to serve more at-risk Medicare and Medicaid home health patients may help reduce the risk of exacerbating pre-existing inequities.

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[b] This is consistent with studies focusing on the worst-off 10%, 20% or 30% of a sample — whether it is of patients or counties — consuming a disproportionate share of health expenditures or disproportionately facing the inequalities.

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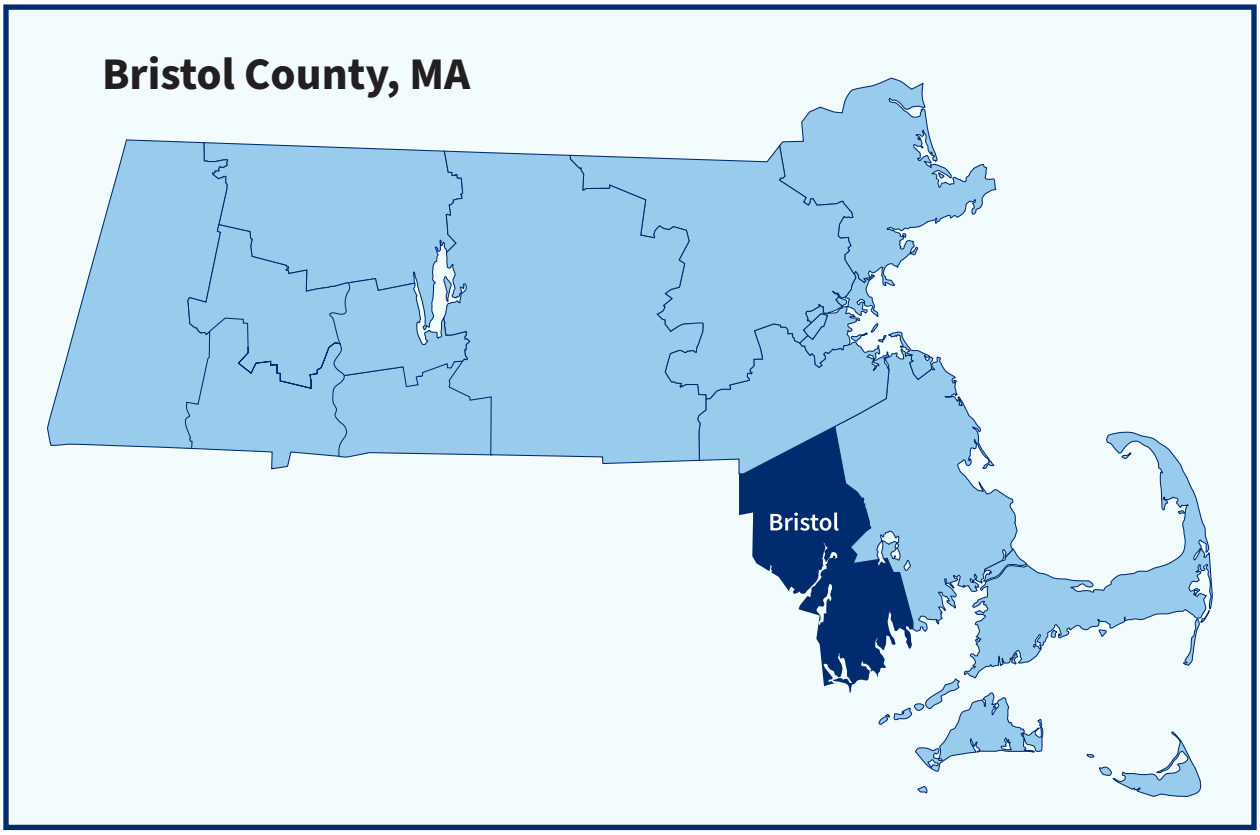
Case Study: Bristol County, Massachusetts

Introduction

Through previous analyses to support our evaluation of the original Home Health Value-Based Purchasing (HHVBP) Model, we identified Bristol County as one of the HHVBP counties that performed well in terms of equitable use of higher quality home health agencies among racial and ethnic minority fee-for-service (FFS) Medicare patients. That is, use of higher quality agencies serving Bristol County was higher among most racial or ethnic minority patient groups, relative to White patients, between 2014-15 and 2018-19.[1] To help contextualize patterns of differential use of higher quality agencies, we conducted an environmental scan and analysis of FFS Medicare home health data for Bristol County and interviewed three home health agencies serving the county in early 2023. Our findings of this case study are summarized below.



Overall Description

Bristol County, a primarily urban county[2] in southeastern Massachusetts, is home to a population of about 580,00 residents (2021).[3] Bristol County's largest industries center on health care and social assistance, and retail trade.[4] The vast majority (80.1%) of county residents are non-Hispanic White.[5] The population is also similar culturally, with a majority being Catholic[6] and about a quarter (23.0% in 2021) being of Portuguese ancestry[7] — reflecting one of the highest concentrations of residents with Portuguese ancestry in a given U.S. county.[8] The sociodemographic characteristics of Bristol County's population (e.g., proportions of those age 65 and above, or in poverty) are similar to the rest of its state and nation, with differences of less than 1-2 percentage points.[9,10] The notable exception is race/ethnicity: Bristol County has a higher share of non-Hispanic White residents (80.1%) than Massachusetts (70.1%) or the nation (59.3%).[9,10]

Overall, Bristol County's population health compared favorably to that of the nation — but not to that of the state — based on U.S. News Healthiest Community rankings[11] and County Health Rankings.[12] Bristol County is in the least healthy quartile of Massachusetts counties based on worse health (e.g., smoking rates) and social determinants of health indicators (e.g., unemployment, violent crime rates).[12] Yet, it performed better than the state or nation on other metrics (e.g., ratio of population to mental health providers),[12] including — notably — health equity indicators showing smaller racial/ethnic gaps in toxic air exposure, low birth weight and premature death.[11]

Health Care Market Context

Bristol County — and Massachusetts more generally — have some of the lowest uninsurance rates in the country: only 2.8% of Bristol County[4] and 2.5% of Massachusetts residents lacked health insurance in 2021,[13] compared to 8.3% of U.S. residents.[14] Among insured Bristol County residents, about one-tenth are covered by Medicare (11.4%), one-quarter by Medicaid (23.0%) and half by employee-sponsored plans (49.8%).[4] Medicare Advantage (MA) penetration — reflecting the share of eligible Medicare patients enrolled in an MA plan — in the county is approximately one-third (33.4%, March 2023)[15] — comparable to the rest of the state (31.0%), though lower than the national rate of approximately one-half (48.0%).[16]

Health care delivery in Bristol County does not appear to be dominated by any one health system. Of the dozen or so hospitals serving the area, Southcoast Health System owns four;[17] the five largest hospitals range from 120 to 293 beds.[18,19,20,21,22]

With respect to home health care, 61 home health agencies delivered 26,965 FFS Medicare home health episodes in Bristol County in 2021. Of the 61 agencies, 44 delivered at least 10 FFS Medicare home health episodes in the county in 2021.[a] Shares of episodes delivered by chain-affiliated agencies or for-profit agencies were greater in the county than the state (Exhibit 31).

Bristol County has supportive "wrap-around" services via Bristol Elder Services — the area agency on aging cited by interviewees (see "**Perspectives from Home Health Agencies**" below) as integral in offering transportation, meals, and other services[23] — and via the state Medicaid program, MassHealth. MassHealth works with Bristol County to provide behavioral health and long-term services and supports through a Community Partners program.[24]

[a] Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

Quality, Equity, and Home Health Care

Recent Quality of Patient Care Star Ratings data indicate that Bristol County continues providing quality care to its patients, including at-risk patients. Collectively, a little less than half (41.0%) of all FFS Medicare episodes delivered in Bristol County were affiliated with 4+ star-rated agencies in 2021 — slightly higher than the state's share of FFS Medicare episodes affiliated with a 4+ star-rated agency (37.6%) (Exhibit 31). Of the 44 Bristol County agencies with at least 10 FFS Medicare home health care episodes delivered in the county in 2021, about one-third (31.8%) had a Star Rating of 4 or above in 2021.[a]

Compared to the state, a slightly larger share of FFS Medicare home health episodes in Bristol County were delivered to dually eligible patients (29.3% county versus 24.4% state) or White patients (90.5% county versus 88.8% state) in 2021 (Exhibit 31). Otherwise, episodes in both the county and the state were delivered to patients with similar average Hierarchical Condition Category (HCC) scores and chronic condition counts (differences of <0.2).

Within Bristol County, patients who received FFS Medicare home health episodes from 4+ star-rated agencies were similar to those receiving episodes from all Bristol County agencies (with percentage point or average score/count differences of <1% or <0.2) in terms of race/ethnicity, average HCC scores and chronic condition counts (Exhibit 31). However, a smaller share of dually eligible patients received episodes from 4+ star-rated agencies serving Bristol County (24.7%) than from all home health agencies serving Bristol County (29.3%) (Exhibit 31).

Perspectives from Home Health Agencies

The three Bristol County agencies that we spoke with spanned a range of Star Ratings. Two of the agencies had a Star Rating of 3.5 or higher in 2019, although at the time of the interview, one agency considered itself to be a lower star-rated agency because its Star Rating had dropped below 3.5 stars by 2021 (the lower star-rated agency was non-profit; the other agency was for-profit). The third agency has had a persistently lower Star Rating (under 3.5 stars) and was a non-profit agency.[b]

> "Respect their cultures... Sometimes patients want staff to remove their shoes in their homes. While we can't remove them due to infection risks, we can cover them, so we provide that for staff... [M]eet them where they are — that's the most important thing."

During interviews, home health agency staff discussed multiple approaches to providing quality care that met the diverse needs of their patients. Notably, none of the agencies we spoke with said that they tracked race and ethnicity data or considered it in care delivery, even if these data were available. Instead, they highlighted other critical success factors in their ability to respond to patient needs, including language and cultural needs:

- **A patient-centered approach to care.** Interviewees cited the importance of staff training that emphasized awareness related to cultural sensitivity — for example, bringing shoe covers if patients prefer that staff remove their shoes, matching patients to staff based on language needs (including Haitian Creole, Mandarin, Portuguese and Swahili). Even the consistently lower star-rated agency mentioned that they provide cultural sensitivity training tailored for home health staff.

[b] Unlike the metrics used to distinguish Bristol County from other counties, which relied in part on a Quality of Patient Care Star Rating of 4 or higher, we "relaxed" the threshold for distinguishing quality home health agencies for our interviews to a Star Rating of 3.5 or higher. This decision helped address recruitment challenges by enlarging the eligible pool of quality agencies for recruitment.

Exhibit 31. Key Characteristics of the Home Health Landscape in 2021

Characteristics	Bristol County		Massachusetts
	FFS Medicare Home Health Episodes		
	All Agencies	4+ Star-Rated Agencies Only	All Agencies
Number of Home Health Episodes*	26,965	11,067	261,041
Proportion of Episodes Provided by an Agency with a Quality of Patient Care Star Rating of 4 or Higher**	41.0%	-	37.6%
Select Sociodemographic Characteristics of Patients Receiving Home Health Episodes			
Proportion of Patients from Racial and Ethnic Subgroups:			
Hispanic or Latino (of any race)	5.0%	4.7%	3.4%
Not Hispanic or Latino:			
White	90.5%	91.1%	88.8%
Black or African American	2.0%	1.8%	4.3%
Asian American or Pacific Islander	0.4%	0.3%	1.1%
American Indian or Alaska Native	0.03%	0.01%	0.05%
Proportion of Dually Eligible Patients	29.3%	24.7%	24.4%
Select Health Characteristics of Patients Receiving Home Health Episodes			
Average HCC Scores among Home Health Patients***	3.4	3.2	3.3
Average Number of Chronic Conditions among Home Health Patients	6.0	6.0	5.8
Select Characteristics of Agencies Delivering Home Health Episodes			
Proportion of Episodes Affiliated with a Chain Agency	44.5%	-	29.0%
Proportion of Episodes Affiliated with a For-Profit Agency	47.7%	-	40.9%

Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

** Based on all Medicare FFS home health episodes delivered in the county/state in CY 2021.*

*** Denominators for proportions capture all episodes of care provided by all agencies serving the county (or state), including episodes/agencies that are missing a value for the given measure of interest (e.g., Star Rating). For example, the proportion of episodes affiliated with an agency with a CMS Star Rating of 4 or higher is based on a denominator of all episodes provided by all agencies serving the county/state, regardless of whether or not that agency has a Star Rating.*

**** Denominators for averages capture only episodes that have a non-missing value for the measure of interest (e.g., HCC Score).*

- **Training and retention of experienced staff.** The longevity of staff and staff retention contributed to the continuity and quality of care, allowing the same staff to visit and see the same patients throughout the course of care. The consistently lower star-rated agency found that the lack of staffing continuity since COVID exacerbated the challenges associated with training and what the agency considered onerous documentation requirements. Relatedly, staff also cited "intergenerational" mentorship between more experienced staff and younger staff as a critical success factor, which was in turn facilitated by the longevity of staff and staff retention.

> "We use Bristol Elder Services. It's a huge resource for us. They provide many services for our patients…They can…put in home health aides, housekeeping, shopping, lot of resources. Those resources are priceless for us."

- **Communication.** All three agencies relied on timely communication among staff and providers. For example, one of the agencies affiliated with a home health chain and one affiliated with a health system mentioned being able to communicate between agency and primary care providers via shared electronic record systems. The other agency affiliated with a health system also noted their staff communicated regularly across internal service lines using chat-based collaboration software. These timely communications helped the agencies better monitor and respond to patient conditions and changes in care.
- **Organizational resources and governance.** Two agencies noted that being part of large, well-resourced organizations meant that they have strong support for measure tracking, quality improvement efforts and access to data analytics software, as well as strong training programs and resources (the third agency did not mention this as an advantage). Two of the agencies also cited the importance of having psychiatric nurses on staff to help address patients' behavioral health or social needs.
- **Community resources.** All three agencies reported serving an important liaison role for patients with social needs – such as support in accessing and paying for hot water or heating and cooling, transportation, and addressing multiple floors that limit patient mobility — with social workers on staff that could connect patients to community resources. One agency identified Bristol Elder Services as a particularly important community partner in supporting patients' social needs (See "**Health Care Market Context**," above). Consistent with this theme, our separate environmental scan found varied resources that supported Bristol County home health patients.

The Bristol County agencies we spoke with reported facing critical barriers in providing patient care, with each agency noting important differences in these challenges. One agency felt that these differences may have played a role in their recent lower Star Rating, despite deploying care strategies similar to the consistently higher star-rated agency in the county that we interviewed.

- **Patient social needs.** The agency that considered itself to be a lower star-rated agency from recent Star Ratings indicated that it must address patients' many varied social needs and that it had cultivated a close relationship with Bristol Elder Services, the local area agency on aging, to address these issues. Left unaddressed, these needs can become hazards that exacerbate patient health and the risk of adverse outcomes (e.g., rehospitalization).

  Other agencies did not mention the same extent of social needs in their patients, although one mentioned the challenge of keeping up with changing language needs for their patient education materials. All other agencies acknowledged the importance of addressing patient social needs, and that there were community resources to support this.

- **Culturally-related conceptualizations around care.** The agency that considered itself a lower star-rated agency indicated that patients did not always think to seek care until they were already sick. This is a barrier to ensuring patient needs are met in a timely manner. The agency indicated that it tries to address this barrier via patient education, but this challenge is an important one for their diverse patient population (e.g., reflecting Portuguese, Guatemalan, and other cultures). Other agencies did not highlight this issue.
- **Patient case mix.** The agency that considered itself a lower star-rated agency because of lower 2021 Star Ratings reported that it "takes all comers" — this was consistent with our internal analysis of Medicare data, which found that this agency delivered far more FFS Medicare home health episodes in the county (over eight times the county average in 2021) than other agencies serving the county. Their patients had higher-than-county-average HCC scores and chronic condition counts (a finding consistent with our internal analysis).[a]

  In contrast, the consistently higher star-rated agency did not discuss serving as many at-risk patients. However, two of the three agencies pointed out that shortages of behavioral health providers were a barrier in the provision of quality, equitable care.

Discussion

Bristol County was identified through our internal analysis of equity metrics as performing well, relative to other counties across the nation, in terms of equitable use of high-quality home health agencies among racial/ethnic minority FFS Medicare patients. Despite being worse off than the rest of the state across a variety of health and social needs measures, Bristol County fared better than the national average across these same indicators and — notably — fared better than both the state and nation on select publicly-available racial/ethnic health equity indicators.[10,11]

Across all data collection and analysis activities, no "magic bullet" finding emerged to help distinguish or explain why Bristol County performed well during the original HHVBP Model along both quality and equity dimensions. However, several notable themes arose:

- **Differences among interviewed home health agencies:** Within Bristol County, there were key differences between the three agencies we spoke with. Compared to the agency that was consistently higher than 3.5 stars, the lower star-rated agencies:
  - Were non-profit, while the consistently higher star-rated agency was for-profit.
  - Had patients with higher social or health needs — for example, higher-than-county-average HCC scores (as mentioned by interviewees and confirmed by our internal analysis of Medicare data) and/or clinical acuity (e.g., wound care patients).
  - Delivered vastly more home health episodes in the county in 2021[a] — for example, in 2021, the consistently higher star-rated, for-profit agency delivered only 75 episodes in Bristol County, while the other non-profit agencies with lower Star Ratings delivered upwards of 500 episodes in Bristol County, with one delivering over 7,000 episodes in the county (the agency that "takes all comers"). With far more patient encounters, the lower rated, non-profit agencies were more exposed to processes of care, challenging patient situations, and outcomes that may adversely affect their Star Ratings.
- **Similarities among interviewed home health agencies:** We found that, regardless of their Star Ratings, the three Bristol County agencies we interviewed deployed similar patient-centered care strategies — namely, not focusing on race/ethnicity data but rather on cultural, language, and social needs.
- **County-level attributes:** Beyond strategies deployed by agencies to provide care, Bristol County had other potential advantages that may have contributed to their stronger performance, relative to other counties across the nation, in their more equitable use of quality home health agencies:

- Having about a third of agencies with a Star Rating of 4 or above.
- Community resources and strong relationships between community partners and home health agencies to help address the diverse social needs of patients.
- Being a primarily urban county (90% urban, 10% rural),[2] which may have facilitated the ability of home health agencies or community organizations to access transportation, reduce driving distances, and hence provide more timely home health or other supports to meet patient needs.
- A population that, despite having social needs, was mostly White and more homogeneous in their cultural makeup (for example, >80% non-Hispanic White — a higher share than either Massachusetts state or the nation, majority Catholic, and about a quarter with Portuguese ancestry).[8] This may have reduced and/or diluted the deleterious effects of minority stress on health outcomes — effects that have been well-documented in non-White or other minority populations[25] — including, potentially, outcomes related to inequities in use of higher quality agencies.[26]

In sum, several factors may have been at play in placing Bristol County in a higher performing category in terms of providing more equitable, high-quality home health care to racial/ethnic minorities, with many efforts focused on addressing patient's non-clinical needs — particularly social, cultural and language needs. Additionally, Bristol County may have benefitted by having a third of its agencies being rated 4+ stars, strong community resources, being primarily urban, and having a more non-Hispanic White population than other counties in the state or nation.

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CASE STUDY: Ingham County, Michigan

Introduction

Through previous analyses to support our evaluation of the original HHVBP Model, we identified Ingham County as one of the non-HHVBP counties that performed well in terms of equitable use of higher quality home health agencies among racial and ethnic minority fee-for-service (FFS) Medicare patients. That is, use of higher quality agencies in Ingham County was higher among most racial or ethnic minority patient groups, relative to White patients, between 2014-15 and 2018-19.[1] To help contextualize patterns of differential use of higher quality agencies, we conducted an environmental scan and analysis of FFS Medicare home health data for Ingham County and interviewed three home health agencies serving the county in early 2023. Our findings of this case study are summarized below.

Overall Description

Located in the Lansing/East Lansing Metropolitan area, Ingham County is a primarily urban county[2] that houses the Michigan State Capitol and is home to nearly 285,000 residents.[3] The majority of residents are non-Hispanic White (69.1%), which is lower than the proportion found at the state level (74.2%) but higher than that found at the national level (59.3%).[5] Its leading industries are educational services, and health care, and social assistance.[6] Ingham County has a lower proportion of population aged 65 and over than the rest of the state (14.4% county versus 18.1% state), but a slightly higher proportion of those in poverty (15.8%) compared to the state (13.1%).[4]

Overall, Ingham County performed better than its state or the nation on several health and social determinant of health indicators based on U.S. News Healthiest Community rankings[7] and County Health Rankings.[8] The county performed better than the nation on several health indicators including life expectancy, availability of primary care doctors and mental health providers, rates of smoking and — notably — on several health equity measures, with smaller racial/ethnic gaps in air toxic exposure, low birth weight and premature death.[7] Yet, the county fared worse than the rest of the state on those same equity measures.[8]

Health Care Market Context

Ninety-five percent of residents in Ingham County are covered by health insurance,[6] a rate comparable to the state but higher than that of the nation.[9,10] Approximately 1 in 10 insured residents are covered by Medicare (10.6%), almost one-fifth by Medicaid (17.9%) and half by employee-sponsored plans (53.5%).[6] The Medicare Advantage (MA) penetration rate — reflecting the share of eligible Medicare patients enrolled in an MA plan — is high, with 62.6% (March 2023) of eligible patients enrolled in a MA plan,[11] which is higher than the national rate of approximately one-half (48.0%).[12]

Ingham County's health care delivery system includes nine hospitals, of which four are specialty hospitals, and several appear affiliated with large health systems: two with the McLaren system, four with the University of Michigan Health (reflecting a recent integration between U-M Health and Sparrow systems), and one with the Michigan Health and Hospital Association.[13,14]

With respect to home health care, 29 home health agencies delivered 217,555 FFS Medicare home health episodes in Ingham County in 2021. Of the 29 agencies, 18 delivered at least 10 FFS Medicare episodes in the county in 2021.[a] The share of episodes delivered by chain-affiliated agencies were far smaller in Ingham County (4.9%) than in the state (23.6%), although proportions of episodes affiliated with for-profit agencies were similar for the county and state (Exhibit 32).

Alongside its hospitals and health care systems, Ingham County has an established local health department that provides abundant resources, including community health centers, programs, services, and assistance accessing specialty care.[15] Ingham County Health Department has a *Home Visiting* initiative that emphasizes improving health outcomes among prenatal and maternal patients, Native American populations, and Medicaid-eligible adults.[14]

[a] Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

Quality, Equity, and Home Health Care

Recent Quality of Patient Care Star Ratings data indicate that Ingham County continues providing quality care to its patients, including at-risk patients. Collectively, about one-quarter (22.5%) of all Medicare FFS episodes delivered in Ingham County were affiliated with 4+ star-rated agencies in 2021 — lower than the state's share of FFS Medicare episodes affiliated with a 4+ star-rated agency (29.1%) (Exhibit 32). Of the 18 Ingham County agencies with at least 10 FFS Medicare home health care episodes delivered in the county in 2021, about one-quarter (22.2%) had a Star Rating of 4 or above in 2021.[a]

Compared to the state, a slightly lower share of episodes in Ingham County were delivered to Black patients (13.6% county versus 15.9% state), while a notably higher share of episodes was delivered to dually eligible patients (45.5% county versus 30.9% state) (Exhibit 32). Otherwise, episodes delivered in both the county and the state were delivered to similar patients in terms of share of White patients (difference of <1%), Hierarchical Condition Category (HCC) scores (average difference of <0.2 points) and chronic condition counts (average difference of <0.2) (Exhibit 32).

Within Ingham County, patients who received FFS Medicare home health episodes from 4+ star-rated agencies were similar to those receiving episodes from all Ingham County agencies (with percentage point or average score/count differences of <1% or <0.2) in terms of non-White race/ethnicity, dual eligibility, average HCC scores and chronic condition counts (Exhibit 32). But a slightly smaller share of White patients received episodes from 4+ star-rated agencies in Ingham County (76.5%) than from all home health agencies in Ingham County (79.5%) (Exhibit 32).

Perspectives from Home Health Agencies

The three Ingham County agencies that we spoke with spanned a range of Star Ratings. Two of the agencies had a Star Rating of 3.5 or above in 2019, while one agency has had a persistently lower Star Rating below 3.5.[b] Two of the agencies (one with a higher Star Rating and one with a lower Star Rating) were non-profit organizations. The two agencies with higher Star Ratings were part of larger organizations. Each of the three agencies delivered over 1,000 episodes in 2021 and served between 10% to 25% of racial/ethnic minority Medicare FFS patients in their respective patient populations (countywide average 17%). Notably, the agency with the lower Star Rating served a larger proportion of dually eligible patients than the two higher-rated agencies (41.9% versus 33.8% and 23.2%, respectively).[a]

Through our interviews, we identified several common themes in agency approaches to care, quality, operational practices, perceived facilitators, and barriers to delivering quality services. None of the agencies tracked or used racial/ethnic data to inform strategic or care planning. Instead, agencies emphasized other critical success factors:

- **A patient-centered approach to care.** When asked about their approach to providing quality and equitable care, all three agencies mentioned that care needs were unique to each patient and emphasized the importance of tailoring health and care services to meet individual needs. All three agencies also highlighted the importance of addressing patients' social needs as part of the care process to achieve desired clinical outcomes (e.g., assuring wounds do not exacerbate due to insufficient nutrition). Their reports reflected a patient-centered approach to quality care (e.g., enhancing language access for patients with limited English proficiency) as opposed to a population-level approach.

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[b] Unlike the metrics used to distinguish Ingham County from other counties, which relied in part on a Quality of Patient Care Star Rating of 4 or higher, we "relaxed" the threshold for distinguishing quality home health agencies for our interviews to a Star Rating of 3.5 or higher. This decision helped address recruitment challenges by enlarging the eligible pool of quality agencies for recruitment.

Exhibit 32. Key Characteristics of the Home Health Landscape in 2021

Characteristics	Ingham County		Michigan
	FFS Medicare Home Health Episodes		
	All Agencies	4+ Star-Rated Agencies Only	All Agencies
Number of Home Health Episodes*	4,276	960	217,555
Proportion of Episodes Provided by an Agency with a Quality of Patient Care Star Rating of 4 or Higher**	22.5%	-	29.1%
Select Sociodemographic Characteristics of Patients Receiving Home Health Episodes			
Proportion of Patients from Racial and Ethnic Subgroups:			
Hispanic or Latino (of any race)	3.0%	4.0%	1.6%
Not Hispanic or Latino:			
White	79.5%	76.5%	78.5%
Black or African American	13.6%	14.6%	15.9%
Asian American or Pacific Islander	1.4%	2.4%	1.2%
American Indian or Alaska Native	0.6%	0.0%	0.3%
Proportion of Dually Eligible Patients	45.5%	44.6%	30.9%
Select Health Characteristics of Patients Receiving Home Health Episodes			
Average HCC Scores among Home Health Patients***	3.8	3.8	3.6
Average Number of Chronic Conditions among Home Health Patients	6.6	6.4	6.4
Select Characteristics of Agencies Delivering Home Health Episodes			
Proportion of Episodes Affiliated with a Chain Agency	4.9%	-	23.6%
Proportion of Episodes Affiliated with a For-Profit Agency	65.9%	-	67.8%

Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

** Based on all Medicare FFS home health episodes delivered in the county/state in CY 2021.*

*** Denominators for proportions capture all episodes of care provided by all agencies serving the county (or state), including episodes/agencies that are missing a value for the given measure of interest (e.g., Star Rating). For example, the proportion of episodes affiliated with an agency with a CMS Star Rating of 4 or higher is based on a denominator of all episodes provided by all agencies serving the county/state, regardless of whether or not that agency has a Star Rating.*

**** Denominators for averages capture only episodes that have a non-missing value for the measure of interest (e.g., HCC Score).*

- **Training and retention of experienced staff.** All three agencies emphasized the importance of having a capable workforce as a critical facilitator to ensuring quality care is delivered. Each agency reported providing on-the-job training and educational opportunities to support staff development. Additionally, the two higher-rated agencies told us they benefited from having a stable workforce with substantial tenure and valuable experience in home care.
- **Organizational resources and governance.** All three agencies reported having social workers with a good understanding of local resources who provide agency staff assistance in assessing and addressing patient social needs (e.g., connecting patients with local services — income-based housing, transportation, Meals on Wheels, and medical supplies; applying for Medicaid and veterans benefits for assistance and supplies for day-to-day living). The two agencies that are part of larger organizations mentioned that being part of a larger organization also facilitated established relationships with local providers, community organizations, specialty care centers, and medical supply vendors.

  The two higher-rated agencies indicated having competent leaders with extensive knowledge and experience in home health care, local communities, and payment models is critical to their success. These two agencies provided leadership training to help supervisors effectively communicate organizational vision and goals and guide staff toward achieving the goals.

> "We [use data] to educate staff… not only looking at improving patient outcomes, but also ways to improve staff delivery of care to develop some best practices…we use data across the board to look at processes – so it's just not clinically focused, it's operationally focused plus clinically focused."

- **Community resources.** All three agencies described Ingham County as a "resourceful" region, reporting that obtaining medical supplies and social resources was relatively easier than other areas in the state (e.g., rural or hard-to-reach regions). These relationships were critical to meeting complex patient needs.
- **Use of data for quality assurance and performance improvement.** While all three agencies incorporated some level of data analytics in their care planning and clinical review (e.g., reviewing Outcome and Assessment Information Set (OASIS) documentation), the two higher-rated agencies also used data to strategically develop and implement quality goals, intervention programs, and staff training.

The three agencies interviewed also reported facing critical challenges in providing quality, equitable care to patients:

- **Patient social needs.** The two non-profit agencies reported treating all patients regardless of clinical conditions, level of unmet social need, insurance coverage, and geographic location. Nevertheless, one agency reported that they sometimes have difficulty locating patients by the address or phone number from referral data, underscoring that these difficult-to-contact patients are often also the most vulnerable individuals with high levels of social and medical needs.
- **Challenges in staff recruitment and retention.** All three agencies discussed staff shortages, particularly the challenge of recruiting nurses, which limits their capacity to admit patients and makes scheduling staff training and taking the time to deliver it difficult.
- **Operational burdens on staff.** All three agencies referenced having insurance and reimbursement rules limit their ability to meet patient needs. One higher-rated agency reported being selective in admitting patients. In contrast, the other two — both non-profit organizations — talked about how certain necessary services or supplies (e.g., tubes for colostomies) were unbillable. Both said they would provide uncompensated care in patients' best interests when possible, and they saw limits on billable therapy visits as a barrier to providing quality care.
- **Treatment/care hesitancy.** Two agencies pointed out that since the onset of the pandemic, they have encountered some degree of patient hesitancy and refusal of visits. This can result in delays in care, aggravated conditions, and an increased risk of rehospitalization.

Discussion

Ingham County was identified through our internal analysis of inequity metrics as performing well, relative to other counties across the nation, in terms of equitable use of high-quality home health agencies among racial/ethnic minority Medicare FFS patients. Despite being worse off than the rest of the nation on a few publicly available health and social needs measures (e.g., poverty rate, alcohol-impaired driving deaths),[2,6,7] Ingham County fared better than the state and national average on many indicators.

> "We're not going to let everybody in our community be without service just because we're not going to make money off of them. We end up getting the large portion of those patients, because organizations that are for-profit aren't going to pick those patients up. That's a difference for us, being able to provide the supplies they need."

Across all data collection and analysis activities, no "magic bullet" finding emerged to help distinguish or explain why Ingham County performed well during the era in which HHVBP was not yet implemented in Michigan. However, several themes were notable:

- **Differences among interviewed home health agencies:** Compared to the lower star-rated agency, the two higher-rated agencies that we interviewed had a healthier patient case mix (higher average HCC scores and chronic condition counts, confirmed by our internal analysis of Medicare data), delivered more episodes in Ingham County (based on internal analysis of Medicare data), analyzed and integrated data-informed quality goals (as opposed to not yet being at the stage of analyzing and integrating such data), and hired only experienced clinicians (as opposed to being willing to hire newly graduated clinicians).[a]
- **Similarities among interviewed home health agencies:** Regardless of their Star Ratings, the agencies we interviewed deployed similar patient-centered care strategies, namely, not focusing on race/ethnicity data but rather on needs beyond clinical care — including cultural and language needs (e.g., engaging interpretation services when needed), and other social needs (e.g., meal and transportation services).
- **County-level attributes.** Beyond strategies deployed by agencies to provide care, Ingham County had other potential advantages that may have contributed to their stronger performance relative to other counties across the nation, in equitable use of quality home health agencies:
  - Having about one-quarter of agencies with a Star Rating of 4 or above.
  - Community resources and corporate support to help address patients' social needs.
  - Being a primarily urban county (87% urban, 13% rural),[2] which may have facilitated the ability of home health agencies or community organizations to access transportation, reduce driving distances, and hence provide more timely home health or other supports to meet patient needs.
  - A population that was majority White, at a higher share than that of the nation. This may have reduced and/or diluted the deleterious effects of minority stress on health outcomes — effects that have been well-documented in non-White or other minority populations[16] — including, potentially, outcomes related to inequities in use of higher-quality agencies.[17]

In sum, several factors may have been at play in placing Ingham County in a higher-performing category in terms of providing more equitable, high-quality home health care to racial/ethnic minorities. Ingham County may benefit from having supportive community resources, a quarter of agencies with Star Ratings of 4 or higher, being primarily urban, and a larger share of a non-Hispanic White population than counterparts nationwide.

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CASE STUDY: Pasco County, Florida

Introduction

Through previous analyses to support our evaluation of the original HHVBP Model, we identified Pasco County as one of the HHVBP counties that performed well in terms of equitable use of higher quality home health agencies among racial and ethnic minority fee-for-service (FFS) Medicare patients. That is, use of higher quality agencies in Pasco County was higher among most racial or ethnic minority patient groups, relative to White patients, between 2014-15 and 2018-19.[1] To help contextualize patterns of differential use of higher quality agencies, we conducted an environmental scan and analysis of FFS Medicare home health data for Pasco County and interviewed two home health agencies serving the county in early 2023. Our findings of this case study are summarized below.

Overall Description

Pasco County, a primarily urban county[2] established in 1887, is located on the west coast of Central Florida, just north of the Tampa Bay Area. Pasco County is primarily residential and is home to a population of nearly 585,000 residents (2021).[3] The race/ethnicity characteristics of Pasco County's population are divergent when compared to the state of Florida, as Pasco's population exhibits notably lower proportions of Hispanic residents (18.1% versus 26.8%) and Black or African American residents (7.4% versus 17.0%).[3] While Pasco County's proportion of aged (65+) population (22.1%) aligns closely with the state of Florida overall (21.1%), both the state and county exhibit a higher proportion of aged individuals compared to the national proportion (16.8%).[3]

Overall, the health of Pasco County's population compared unfavorably to that of the nation — but favorably to Florida — based on U.S. News Healthiest Communities rankings[4] and County Health Rankings.[5] In 2023, Pasco County ranks in the higher middle range of counties in Florida (higher 50%–75%) in terms of health outcomes and modifiable health factors.[5] Pasco County performed worse than Florida and the nation on certain health indicators (e.g., adult smoking, excessive drinking rates).[5] However, it performed better than the state and nation on other metrics (e.g., lower rates of alcohol-impaired driving deaths), including — notably — a health equity measure indicating smaller racial/ethnic gaps in low birth weights.[4]

Health Care Market Context

Both Pasco County (11.8%)[6] and Florida overall (12.7%)[7] had a higher proportion of uninsured individuals compared to the U.S. (8.3%).[8] Among insured Pasco County residents, about 15% have either Medicaid or Medicare, and little more than one-third of Pasco County residents have coverage through employee plans (39.0%).[6] The Medicare Advantage (MA) penetration rate — reflecting the share of eligible Medicare patients enrolled in an MA plan — in Pasco County is 65.7% (March 2023),[9] which is higher than the national rate of approximately one-half (48.0%).[10]

Health care delivery in Pasco County does not appear to be dominated by any one health system. Hospital care is provided by multiple large health systems including AdventHealth, BayCare, and HCA Florida, with nearly 1,500 beds across these health systems and other hospitals in Pasco County in 2021.[11] The three largest hospitals range from 222 to 330 staffed beds.[12]

With respect to home health care, 61 home health agencies delivered 17,677 FFS Medicare home health episodes in Pasco County in 2021. Of the 61 agencies, 39 delivered at least 10 episodes of FFS Medicare home health care in the county in 2021.[a] Shares of episodes delivered by chain-affiliated agencies were greater in Pasco County compared to the state, whereas shares of episodes affiliated with for-profit agencies were lower in the county compared to the state (Exhibit 33).

Quality, Equity, and Home Health Care

Recent Quality of Patient Care Star Ratings data indicate that Pasco County continues providing quality care to its patients, including at-risk patients. Collectively, half (50.0%) of all FFS Medicare episodes delivered in Pasco County were affiliated with a 4+ star-rated agencies in 2021 — slightly lower than the state's share (54.8%) of FFS Medicare episodes affiliated with a 4+ star-rated agency (Exhibit 33). Of the 39 Pasco County agencies with at least 10 FFS Medicare home health care episodes delivered in the county in 2021, a little under half (41%) had a Star Rating of 4 or above in 2021.[a]

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[a] Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

Compared to the state, a larger share of FFS Medicare home health episodes in Pasco County were delivered to dually eligible patients (27.8% county versus 24.1% state) and a notably larger share were delivered to White patients (89.9% county versus 80.0% state) in 2021 (Exhibit 33). Compared to the state, episodes in Pasco County were delivered to patients with similar average Hierarchical Condition Category (HCC) scores and slightly higher chronic condition counts (differences of <0.1). Within Pasco County, patients who received FFS Medicare home health episodes from 4+ star-rated agencies were similar to those receiving episodes from all Pasco County agencies in terms of race/ethnicity or dual eligibility (<1% difference), HCC scores (average difference of <0.1 points) and chronic condition counts (average difference of <0.1) (Exhibit 33).

Perspectives from Home Health Agencies

The two Pasco County agencies that we spoke with spanned a range of Star Ratings: one was rated 3.5 stars or above, and the other rated below 3.5 stars.[b] Both agencies were associated with for-profit chains, and approximately 10 percent of the patients served by each agency was non-White. Of the non-White patients they care for, one administrator reported having a higher proportion of African Americans and some Vietnamese, and the other agency administrator said that they cared for more Spanish- and Portuguese-speaking patients. The interviewees described multiple approaches to identifying priorities and providing quality care to meet the diverse needs of their patients. The interviewees highlighted other critical success factors in their ability to respond to individual patient needs.

- **A patient-centered approach to care.** Interviewees from both agencies indicated rather than focusing on race and ethnicity, the agencies focus on individual patients, one patient at a time, to determine patient needs and do their very best to meet them. Both agency administrators emphasized the importance of cultural competence.
- **Communication.** In addition to having well-trained staff, one of the agencies emphasized the importance of careful coordination and communication between the office and field staff. Both agencies emphasized the importance of educating staff, as well as patients and their families.
- **Training and retention of experienced staff.** Both agencies mentioned it is important to have well-trained, highly qualified and diverse staff that function as a multidisciplinary team.

  The agency that serves a higher proportion of patients for whom English is a second language has some bilingual staff and is recruiting more to better meet the needs of the Spanish-speaking population in the eastern part of the county.

> “You have got to look at what the patient believes in for medicine, or what their restrictions are due to their religion… so you’ve to think outside the box, and see what will match up with their beliefs… that’s with any ethnicity that may have a different cultural background — you have to be an advocate for the patient… We do a lot of education throughout the year, and these are types of things that we’ll go over and make sure that we’re touching base on year after year.”

[b] Unlike the metrics used to distinguish Pasco County from other counties, which relied in part on a Quality of Patient Care Star Rating of 4 or higher, we “relaxed” the threshold for distinguishing quality home health agencies for our interviews to a Star Rating of 3.5 or higher. This decision helped address recruitment challenges by enlarging the eligible pool of quality agencies for recruitment.

Exhibit 33. Key Characteristics of the Home Health Landscape in 2021

Characteristics	Pasco County		Florida
	FFS Medicare Home Health Episodes		
	All Agencies	4+ Star-Rated Agencies Only	All Agencies
Number of Home Health Episodes*	17,677	8,842	737,344
Proportion of Episodes Provided by an Agency with a Quality of Patient Care Star Rating of 4 or Higher**	50.0%	-	54.8%
Select Sociodemographic Characteristics of Patients Receiving Home Health Episodes			
Proportion of Patients from Racial and Ethnic Subgroups:			
Hispanic or Latino (of any race)	5.3%	5.1%	10.7%
Not Hispanic or Latino:			
White	89.9%	90.6%	80.0%
Black or African American	2.7%	2.60%	7.0%
Asian American or Pacific Islander	0.7%	0.7%	0.8%
American Indian or Alaska Native	0.1%	0.01%	0.1%
Proportion of Dually Eligible Patients	27.8%	26.1%	24.1%
Select Health Characteristics of Patients Receiving Home Health Episodes			
Average HCC Scores among Home Health Patients***	3.7	3.8	3.4
Average Number of Chronic Conditions among Home Health Patients	6.8	6.9	6.3
Select Characteristics of Agencies Delivering Home Health Episodes			
Proportion of Episodes Affiliated with a Chain Agency	58.9%	-	52.0%
Proportion of Episodes Affiliated with a For-Profit Agency	74.8%	-	88.0%

Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

** Based on all Medicare FFS home health episodes delivered in the county/state in CY 2021.*

*** Denominators for proportions capture all episodes of care provided by all agencies serving the county (or state), including episodes/agencies that are missing a value for the given measure of interest (e.g., Star Rating). For example, the proportion of episodes affiliated with an agency with a CMS Star Rating of 4 or higher is based on a denominator of all episodes provided by all agencies serving the county/state, regardless of whether or not that agency has a Star Rating.*

**** Denominators for averages capture only episodes that have a non-missing value for the measure of interest (e.g., HCC Score).*

- **Community resources.** While neither agency accepts Medicaid patients, both administrators noted that they serve many poorer patients who have social needs. Both agencies have social workers who are keenly aware of available community resources and help connect staff and patients with local resources as needed.

  One agency mentioned working closely with a local provider group that visits homebound patients, one that provides telehealth services, and another that specializes in wound care treatment at home. The other agency works with Neighborly, a non-profit organization that provides home and community-based services for the elderly, and partners with a local food bank. Both agencies have partnered with local pharmacies to help not only with costs but also with items such as pill boxes and packs, non-childproof bottles, etc.

Both interviewed agencies also reported facing critical barriers in providing patient care with each agency reporting different challenges:

- **Challenges in staff recruitment and retention.** The interviewee from the agency with a lower Star Rating indicated that the agency faces significant challenges due to staff burnout rates and has been focusing on staff retention. When asked what she believes most contributed to the agency's below 3.5-star rating, she mentioned challenges in educating staff about errors in documentation.
- **Operational burdens on staff.** The 4+ star agency administrator mentioned that getting thorough documentation from physicians is especially challenging, and other agencies hold the referrals until they get what they need from the providers before providing patients needed care. She also reported that managed care authorization requirements hinder their ability to provide care in the timeframe they feel is appropriate.
- **Patient case mix.** This same interviewee from the lower star-rated agency noted that as they try to build up their hospital referral base, they have faced significant challenges with rehospitalizations. She maintained that a number of patients are simply being discharged too early.
- **Non-compliance issues, especially with patients that have substance use disorders (SUD).** The 4+ star-rated agency administrator said working with SUD patients is especially challenging.

> "Employees feel camaraderie, everyone is working together for a common goal. Having someone clinical in the administrative position is more beneficial with someone than a master's degree or a business-related degree."

> "We open the refrigerator, and the cabinets — and if they don't have food, or they've had a lot of weight loss lately and we can determine that they're not eating right, they don't have someone to help them cook, or the stove doesn't work, or they're a hoarder, or there's poop on the floor, roaches on the walls. We see those things, and we think they need some more help… We don't ask our nurses to do that, we have the social workers go in who will help complete the paperwork, they know about all the resources in the county, and they can help the patient get set up. They help them with that paperwork."

Discussion

Pasco County was identified through our own internal analysis and inequity metrics as performing well, relative to other counties across the nation, in terms of equitable use of high-quality home health agencies among racial/ethnic minority patients. Despite being worse off than the rest of the nation across a variety of publicly available health and social needs measures, Pasco County fared better than the state average across these same indicators.[7,8]

> "Hospitals are so overwhelmed and full right now that they're discharging patients home without a safety net, without a plan, without communication."

Across all data collection and analysis activities, no "magic bullet" finding emerged to help distinguish or explain why Pasco County performed well during the original HHVBP Model along both quality and equity dimensions. However, several themes were notable:

- **Differences among interviewed home health agencies:** Compared to the agency that was consistently 3.5 stars or above, the lower star-rated agency struggled to retain staff and ensure consistent Outcome and Assessment Information Set (OASIS) documentation.
- **Similarities among interviewed home health agencies:** The Pasco County agencies we interviewed deployed similar patient-centered care strategies, namely, not focusing on race/ethnicity data but rather on both individual clinical and social needs (e.g., assessing whether patients were in need of additional services including transportation and meal-delivery services as well as social services support), and language needs (e.g., matching patients to providers based on language — whether it is Portuguese, Spanish or another language).
- **County-level attributes.** Beyond strategies deployed by agencies to provide care, Pasco County had other potential advantages that may have contributed to their stronger performance, relative to other counties across the nation, in equitable use of quality home health agencies:
  - Having just under half of agencies with a Star Rating of 4 or above.
  - Having significant community resources available to meet the diverse needs of patients in the county.
  - Being a primarily urban county (91% urban, 9% rural)[2], which may have facilitated more timely and ready access to home health, transportation, and other social supports to meet patient needs.
  - A population that was mostly White, and more homogeneous in both their cultural makeup (for example, 86.2% non-Hispanic White — a higher share than either Florida (76.9%) or the nation (75.8%)).[3] This may have reduced and/or diluted the deleterious effects of minority stress on health outcomes — effects that have been well-documented in non-White or other minority populations[13] — including, potentially, outcomes related to inequities in use of higher quality agencies.[14]

> "We look at [patients with SUD] really hard, and make sure that they are on board and they are gearing in the right track before we say we think we can help you here, which is really sad because those are probably two of the big groups that really need assistance, but unfortunately you help but you can't help someone if they can't help themselves."

In sum, several factors may have been at play in placing Pasco County in a higher-performing category in terms of providing more equitable, high-quality home health care to racial/ethnic minorities. Pasco County may benefit from being primarily urban and having a more non-Hispanic White population than other counties in the state or nation and having relatively strong community resources to support patients.

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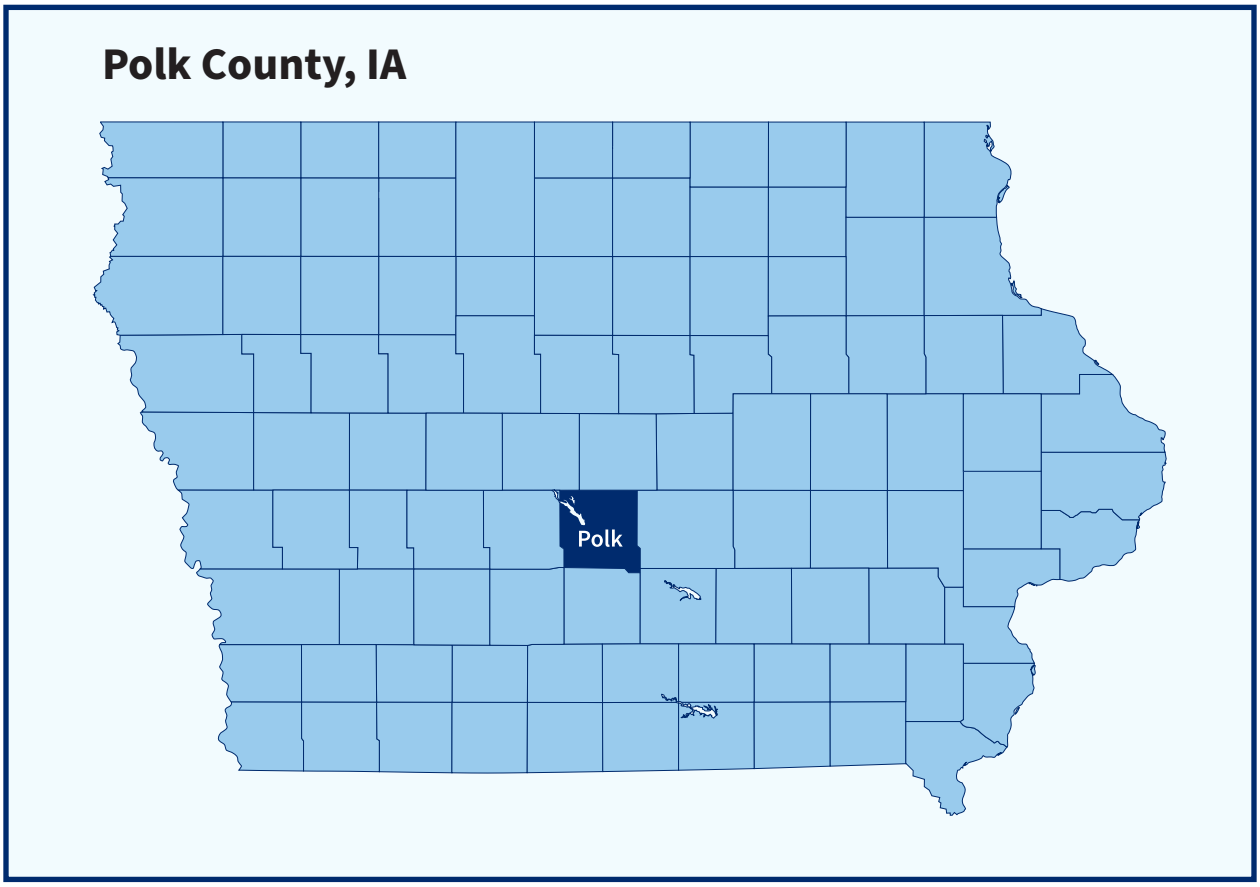
CASE STUDY: Polk County, Iowa

Introduction

Through previous analyses to support our evaluation of the original HHVBP Model, we identified Polk County as one of the HHVBP counties that performed well in terms of equitable use of higher quality home health agencies among racial and ethnic minority fee-for-service (FFS) Medicare patients. That is, use of higher quality agencies serving Polk County was higher among most racial or ethnic minority patient groups, relative to White patients, between 2014-15 and 2018-19.[1] To help contextualize patterns of differential use of higher quality agencies, we conducted an environmental scan and analysis of FFS Medicare home health data for Polk County and interviewed two home health agencies serving the county in early 2023. Our findings of this case study are summarized below.



Overall Description

Polk County, located in central Iowa and encompassing the state capital, Des Moines, is Iowa's most densely populated county in an otherwise rural state.[2] Most of Polk County's population resides in the more urban areas concentrated around Des Moines, where major employers in the insurance, financial, and healthcare industries are located.[3,4] The majority (75.7%) of county residents are non-Hispanic White.[5] Compared to its state, the sociodemographic characteristics of Polk County's population is similar in some respects (e.g., proportions of those in poverty, female) — with county-state differences of less than 1-2 percentage points, but differs in others (e.g., Polk County has a slightly higher proportion of those age 65 and above, or those who are non-Hispanic White, than the state) — with county-state differences of 4–6 percentage points.[5]

Overall, Polk County's population health compared favorably to that of the state and the nation, based on U.S. News Healthiest Community rankings[6] and County Health Rankings.[7] For example, County Health Rankings placed Polk County in the upper middle half of all counties in Iowa and counties in the U.S., based on clinical care indicators (e.g., ratio of patients to primary care physicians and mental health providers, preventable hospitalization rate). Polk County struggled in some areas of health equity, with larger racial/ethnic gaps in premature death than the state or U.S., but also performed better in other areas, with smaller racial/ethnic gaps in toxic air exposure than the state.[6]

Health Care Market Context

Polk County — and Iowa more generally — had a lower rate of uninsured individuals (4.6% and 4.7% respectively),[8,9] compared to the nation (8.3% of U.S. residents).[10] Among insured Polk County residents, about one tenth are covered by Medicare (9.7%), one sixth by Medicaid (16.6%), and over half by employee-sponsored plans (56.8%).[8] Medicare Advantage (MA) penetration — reflecting the share of eligible Medicare patients enrolled in an MA plan — in the county is approximately 41.4% (March 2023),[11] higher than the average in Iowa (30.0%) although lower than the national rate (48.0%).[12]

Health care delivery in Polk County is mainly dominated by two health systems: MercyOne and UnityPoint Health, both of which own and operate home health agencies. MercyOne and UnityPoint Health each operate two hospitals in Polk County, including the county's three largest hospitals, which range from 200 to 656 beds.[13,14]

With respect to home health care, 16 home health agencies delivered 8,098 FFS Medicare home health episodes in Polk County in 2021. Of the 16 agencies, 12 delivered at least 10 episodes of FFS Medicare home health care in the county in 2021.[a] Shares of episodes delivered by chain-affiliated agencies were higher in Polk County compared to the state, but shares of episodes affiliated with for-profit agencies were lower in the county compared to the state (Exhibit 34).

Beyond home health agencies, Polk County home health patients have supportive services via Aging Resources of Central Iowa — the area agency on aging cited by interviewees (see "**Perspectives from Home Health Agencies**") to connect patients with resources such as meals and other services.

[a] Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

Quality, Equity, and Home Health Care

Recent Quality of Patient Care Star Ratings data indicate that Polk County continues providing quality care to its patients, including at-risk patients. Collectively, a little under a quarter (22.1%) of all FFS Medicare home health episodes delivered in Polk County were affiliated with 4+ star-rated agencies in 2021 — comparable to the state's share of FFS Medicare home health episodes affiliated with a 4+ star-rated agency (21.2%) (Exhibit 34). Of the 12 Polk County agencies with at least 10 FFS Medicare home health care episodes delivered in the county in 2021, one-quarter (25.0%) had a Star Rating of 4 or above in 2021.[a]

Compared to the state, a slightly smaller share of FFS Medicare home health episodes in Polk County were delivered to dually eligible patients (11.9% county versus 14.3% state) or White patients (93.0% county versus 95.9% state) in 2021 (Exhibit 34). Conversely, compared to the state, a slightly larger share of FFS Medicare home health episodes were delivered to Black patients (3.3% county versus 1.4% state). Otherwise, episodes in both the county and the state were delivered to patients with similar average Hierarchical Condition Category (HCC) scores and chronic condition counts (differences of <0.1).

Within Polk County, a slightly smaller share of Black patients (2.1%) received episodes from 4+ star-rated agencies than from all agencies serving Polk County (3.3%) (Exhibit 34). Conversely, a slightly higher share of White patients (94.7%) received episodes from 4+ star-rated agencies than from all agencies serving the county (93.0%). Otherwise, episodes from both 4+ star-rated and all agencies serving Polk County were delivered to similar shares of other racial/ethnic minority patients (differences of <1%). In addition, slightly healthier patients (average HCC score of 2.8) received episodes from 4+ star-rated agencies compared to patients receiving episodes from all Polk County agencies (HCC score of 3.3). This pattern is also observed in the relatively lower share of episodes delivered by 4+ star-rated agencies to dually eligible patients (8.7%) compared to the share of episodes delivered to the county's dually eligible patients by all county agencies (11.9%) (Exhibit 34).

> "When we receive referrals, we don't look at race as a factor if we're going to accept the patient or not. We're going to accept them, take care of them. And then, if there are things that we need to learn in the home, we address that, teach our team members."

Perspectives from Home Health Agencies

The three Polk County agencies that we spoke with spanned a range of Star Ratings. Two for-profit agencies had a Star Rating of 3.5 or higher in 2019; one non-profit agency has had a persistently lower Star Rating (under 3.5 stars).[b]

Through our interviews, we identified several common themes in agency approaches to care, quality, operational practices, perceived facilitators, and barriers to delivering quality services. Notably, none of the agencies interviewed reported tracking race and ethnicity data, nor using it to inform agency activities. While the lower star-rated agency held a company-wide cultural sensitivity training in 2020, neither of the higher star-rated agencies mentioned specific efforts, formal or informal, around cultural sensitivity training for staff.

[b] Unlike the metrics used to distinguish Polk County from other counties, which relied in part on a Quality of Patient Care Star Rating of 4 or higher, we "relaxed" the threshold for distinguishing quality home health agencies for our interviews to a Star Rating of 3.5 or higher. This decision helped address recruitment challenges by enlarging the eligible pool of quality agencies for recruitment.

Exhibit 34. Key Characteristics of the Home Health Landscape in 2021

Characteristics	Polk County		Iowa
	FFS Medicare Home Health Episodes		
	All Agencies	4+ Star-Rated Agencies Only	All Agencies
Number of Home Health Episodes*	8,098	1,789	50,864
Proportion of Episodes Provided by an Agency with a Quality of Patient Care Star Rating of 4 or Higher**	22.1%	-	21.2%
Select Sociodemographic Characteristics of Patients Receiving Home Health Episodes			
Proportion of Patients from Racial and Ethnic Subgroups:			
Hispanic or Latino (of any race)	1.6%	1.4%	1.1%
Not Hispanic or Latino:			
White	93.0%	94.7%	95.9%
Black or African American	3.3%	2.1%	1.4%
Asian American or Pacific Islander	0.7%	0.9%	0.4%
American Indian or Alaska Native	0.1%	0.0%	0.1%
Proportion of Dually Eligible Patients	11.9%	8.7%	14.3%
Select Health Characteristics of Patients Receiving Home Health Episodes			
Average HCC Scores among Home Health Patients***	3.3	2.8	3.3
Average Number of Chronic Conditions among Home Health Patients	5.5	5.5	5.6
Select Characteristics of Agencies Delivering Home Health Episodes			
Proportion of Episodes Affiliated with a Chain Agency	76.5%	-	59.0%
Proportion of Episodes Affiliated with a For-Profit Agency	31.1%	-	38.2%

Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

** Based on all Medicare FFS home health episodes delivered in the county/state in CY 2021.*

*** Denominators for proportions capture all episodes of care provided by all agencies serving the county (or state), including episodes/agencies that are missing a value for the given measure of interest (e.g., Star Rating). For example, the proportion of episodes affiliated with an agency with a CMS Star Rating of 4 or higher is based on a denominator of all episodes provided by all agencies serving the county/state, regardless of whether or not that agency has a Star Rating.*

**** Denominators for averages capture only episodes that have a non-missing value for the measure of interest (e.g., HCC Score).*

Instead, agencies emphasized other critical success factors behind their ability to meet these needs with quality care. These factors were similar across the three agencies, and in fact, similar to most other agencies interviewed as part of the broader HHVBP evaluation. Notably, the two higher star-rated agencies, which are both for-profit and chain-affiliated, had more in common with one another than with the lower star-rated, non-profit agency, as described below.

> "Our start-of-care clinicians are trained to make sure they cover all the bases … to see if there's anything that…maybe they were discharged from the hospital and they don't have the right equipment … or they can't afford it. We train our start-of-care clinicians to try to cover all that…."

- **A patient-centered approach to care.** All three agencies emphasized the importance of creating an individualized care plan for their patients that is informed through conversations with patients. These conversations are intended to identify and discuss a patient's needs, both for home health care and in other areas. However, the ability of an agency to meet some of these needs can depend upon the expertise of the home health agency staff. All three agencies described efforts to provide needed services to their patients, including interpretation services for patients with language barriers. The higher star-rated agencies said that for social needs that go beyond home health care, they refer patients to community resources.

  The lower star-rated agency, on the other hand, described trying to meet patients' social needs through other resources available within their larger organization, which provides a broader set of social services through its contract with the county public health department.[c] For example, with their dually eligible patients that are no longer receiving home health care through Medicare, the agency will do a "payer flip" and continue to provide nursing help for needs like medication setup and monitoring under Medicaid. Unlike the two higher star-rated agencies, this agency employs social workers who are skilled at connecting patients with resources both within and outside its organization.

- **Training and retention of experienced staff.** The two higher star-rated agencies highlighted their strong staff training processes and ability to retain skilled staff as key factors that enable them to provide quality care to patients. In addition to individualized training for new staff, both agencies described prioritizing ongoing education of staff as well as employee satisfaction to encourage retention. Their training programs include education around Outcome and Assessment Information Set (OASIS) documentation to accurately assess patients' status and needs to develop strong care plans. One of the higher star-rated agencies noted they designate specific roles for two start-of-care nurses who conduct the majority of start-of-care assessments and serve as the agency's experts on OASIS.

  While the lower star-rated agency also emphasized the importance of staff education, they mentioned challenges with staff adherence to OASIS documentation guidelines. They felt that these challenges, further exacerbated during the pandemic, results in the high quality of their care not fully reflected in their documentation.

- **Community resources.** All agencies reported playing an important role in connecting patients with appropriate community resources and organizations to meet their social needs, though did so through slightly different pathways. While the higher star-rated agencies we spoke with did not have social workers on staff, those agencies felt they could accommodate patient social needs through existing staff or referrals to community resources. One higher star-rated agency assists patients with choosing non-skilled services and helping them

[c] The agency noted that its county health department is one of very few in Iowa that provided for home and community-based services and gave the research team permission to mention this detail in the Iowa case study.

access the services and assess the out-of-pocket costs. The other higher star-rated agency mentioned relying on Aging Resources of Central Iowa to help patients qualify for additional assistance or to find other assistance for unqualified patients. However, both higher star-rated agencies noted that the majority of their patients did not require additional assistance.

The lower star-rated agency was part of a larger organization offering a robust complement of services and support to home health patients and others in need throughout the county. It maintains a contract with the health department and can therefore more proactively offer their patients services beyond home health and community-based care. This home health agency further noted that the local area agency on aging will often reach out to other parts of their social services organization to help connect their patients in need of additional resources.

- **Use of data for quality assurance and performance improvement.** All three agencies described using software and data analytics to identify performance improvement focus areas and inform their planning, performance improvement projects, and staff education. The lower star-rated agency described using the analytics to prioritize areas where they can "make the quickest movement" to show improvement.

Polk County agencies also reported facing barriers in providing patient care, with the higher star-rated agencies noting somewhat different challenges than the lower star-rated agency.

- **Challenges in staff recruitment and retention.** Unlike the lower star-rated agency, neither of the two higher star-rated agencies have social workers on staff and felt it was difficult to make that kind of hire. One mentioned how nurses are filling in the gap using their case management skills, such as working with adult protective services when needed. The other agency did not say it was necessary to hire a social worker, since they depend on Aging Resources of Central Iowa to help address patient's social needs but did note that it would be beneficial to have a social worker.
- **Operational burdens on staff.** The higher star-rated agencies noted challenges in providing care for patients in rural areas near the Polk County border. The other agency described the additional travel time to reach these patients, stating that it's a "lot of miles, and that takes a lot of time."
- **Patient case mix.** The lower star-rated agency believed that they serve more higher acuity patients, such as those with complicated wound care and infusion needs, than other home health agencies serving the area; they felt that the higher acuity of their patients may be impacting their outcomes. (This is consistent with our internal analysis, which found that the average HCC score of this agency is lower than the Polk County average, and higher than the other two agencies interviewed.)[a] They also mentioned the challenge of working with MA plans and educating patients who have switched to MA about their coverage. Unlike the higher star-rated agencies that have mainly FFS Medicare patients, the lower star-rated agency takes a mix of patients with different types of insurance and serves Medicaid patients.

Discussion

Polk County was identified as a community that was delivering more equitable home health care, relative to other counties across the nation, to FFS Medicare patients across different racial/ethnic groups. While no clear explanation emerged for why Polk County performed well along equity dimensions during the original HHVBP Model, several themes were notable:

- **Differences among interviewed home health agencies:** The two higher star-rated agencies that we interviewed are both part of large chains that dedicate resources to staff education and training, especially around OASIS documentation. These agencies cited the resources and attention devoted to staff training and documentation as facilitators of their high scores. The lower star-rated agency cited staff training around documentation and staff retention as barriers to achieving a higher score.
- **Similarities among interviewed home health agencies:** Based on the interviews, all agencies regardless of their Star Ratings reported utilizing similar patient-centered care strategies, namely, not focusing on race/ethnicity data but rather on individual patient needs. For example, agencies described connecting patients with organizational or community resources to access durable medical equipment or receive nonskilled support in the home.
- **County-level attributes:** Beyond the care agencies provide, Polk County had other potential advantages that may have contributed to their stronger performance relative to other counties across the nation, in equitable use of quality agencies, including:
    - Having a majority (76.5%) of agencies serving the county being chain-affiliated, with the accompanying richer resources that chain affiliations can provide;
    - Having about one-quarter of agencies with a Star Rating of 4 or above;
    - Demographic characteristics that position the population to overall have better access to care and health outcomes. Specifically, Polk County has a predominately White and urban population. The agencies we spoke to described challenges with providing care to patients in rural areas. Given the well-documented deleterious effects of minority stress on health outcomes,[15] the combination of having a majority non-Hispanic White population may have allowed Polk County to perform well on outcomes related to more equitable access to home health care among racial/ethnic minorities; and
    - Availability of and ease with connecting patients to needed community resources.

Ultimately, several factors may contribute to Polk County's ability to provide more equitable, quality home health care to racial/ethnic minorities. Polk County's population may experience fewer deleterious health outcomes related to minority stress due to its population being majority non-Hispanic White. Being a primarily urban area, especially relative to the rest of the state, may have facilitated access for all patients. Further, the majority of episodes delivered in Polk County were delivered by agencies that were chain-affiliated, which tend to be better resourced.

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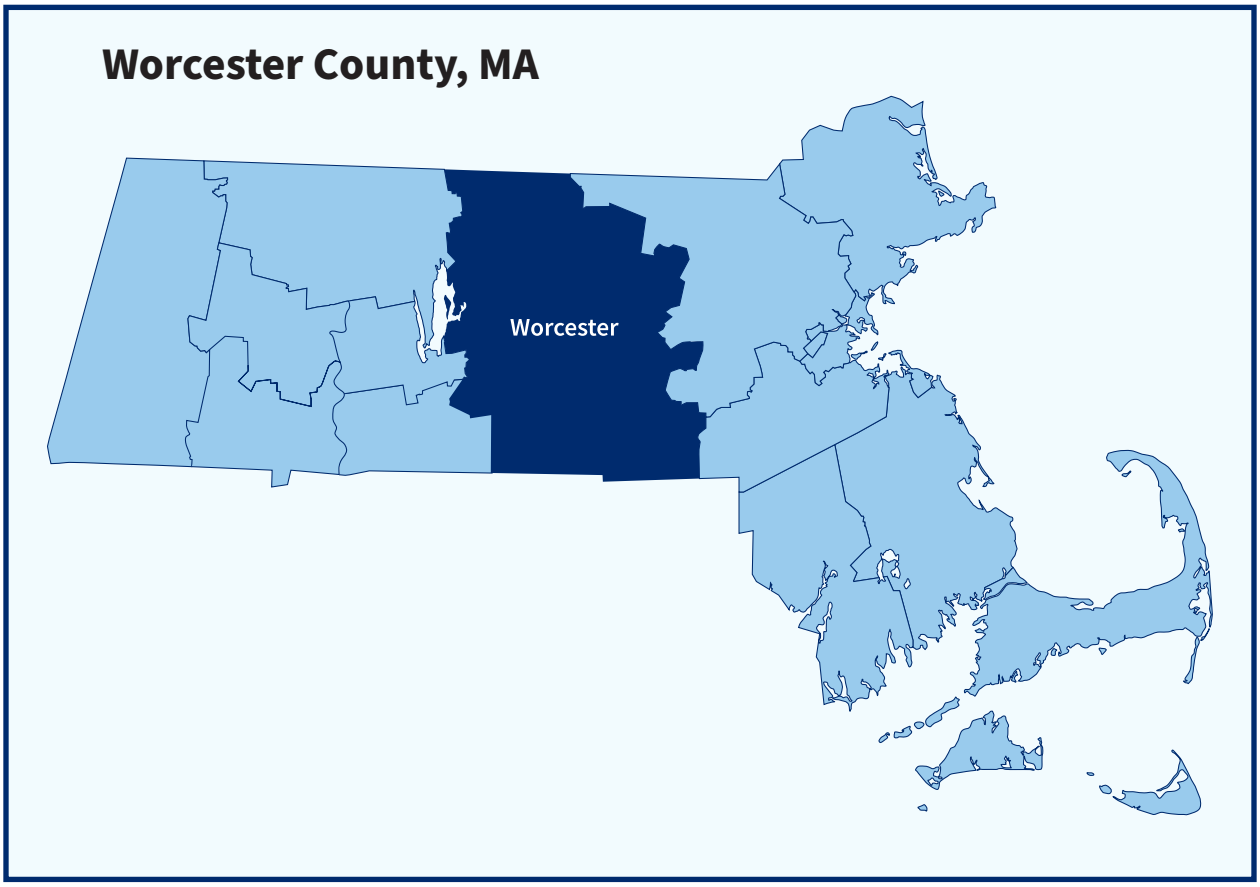
CASE STUDY: Worcester County, Massachusetts

Introduction

Through previous analyses to support our evaluation of the original HHVBP Model, we identified Worcester County as one of the HHVBP counties that did *not* perform well in terms of equitable use of higher quality home health agencies among racial and ethnic minority fee-for-service (FFS) Medicare patients. That is, unlike the other case studies, use of higher quality agencies serving Worcester County was lower among most racial or ethnic minority patient groups, relative to White patients, between 2014-15 and 2018-19.[1] To help contextualize patterns of differential use of higher quality agencies, we conducted an environmental scan and analysis of FFS Medicare home health data for Worcester County and interviewed three home health agencies serving the county in early 2023. Our findings of this case study are summarized below.



Overall Description

Worcester County, located in central Massachusetts, is home to a population of 862,029 residents.[2] Worcester County is almost 20% rural,[3] while also having the largest area of any county in the state.[4] Its largest industries are health care and social assistance, and educational services.[5] The majority of county residents are non-Hispanic White (74.5%).[2] The sociodemographic characteristics of Worcester County's population (e.g., proportions of those age 65 and above, or in poverty) are similar to the rest of its state and nation, with differences of less than 1-2 percentage points.[6,7] However, there are slightly larger differences — of 3-4 percentage points — in race/ethnicity: Worcester County has a slightly higher share of non-Hispanic White residents (74.5%) than Massachusetts (70.1%),[6] and a much higher share than the nation (59.3%).[7]

Overall, Worcester County's population health compared favorably to that of the nation, but not the state.[8,9] County Health Rankings placed Worcester County in the least healthy quartile of Massachusetts counties based on health (e.g., adult obesity) and social determinant of health indicators (e.g., violent crime rates).[9] Worcester County also performed worse on a key health equity indicator, with greater racial/ethnic gaps in toxic air exposure compared to its state or nation.[8] However, Worcester County performed better than the state or nation on other metrics (e.g., smoking rates, smaller racial/ethnic gaps in low birth weight and premature death).[8,9]

Health Care Market Context

Worcester County — and Massachusetts more generally — have some of the lowest uninsurance rates in the country: only 2.8% of Worcester County[5] and 2.5% of Massachusetts residents lacked health insurance in 2021,[10] compared to 8.3% of U.S. residents.[11] Among insured Worcester County residents, one-tenth are covered by Medicare (10.7%), one-fifth by Medicaid (19.5%) and about half by employee-sponsored plans (54.4%).[5] Medicare Advantage (MA) penetration — reflecting the share of eligible Medicare patients enrolled in an MA plan — in the county is 42.2% (March 2023)[12] — higher than the rest of the state (31.0%), though lower than the national rate of approximately one-half (48.0%).[13]

Health care delivery in Worcester County is dominated by the University of Massachusetts Memorial Health System, which owns at least eight of approximately 19 hospitals serving the county.[14,15] The University of Massachusetts as well as three other hospitals/health systems in Worcester County own home health agencies serving the county.[16,17,18,19] The largest system, the University of Massachusetts Memorial Medical Center, has three campuses with 781 licensed beds between them.[20] Two other large hospitals serving the area have 320[21] and 303[22] staffed beds.

With respect to home health care, 58 agencies delivered 23,415 FFS Medicare home health episodes in Worcester County in 2021. Of the 58 agencies, 40 delivered at least 10 episodes of FFS Medicare home health care in the county in 2021.[a] Shares of episodes delivered by chain-affiliated agencies were lower in Worcester County compared to Massachusetts but shares of episodes affiliated with for-profit agencies were higher in the county compared to the state (Exhibit 35).

The state Medicaid program, MassHealth, also works with Worcester County to provide behavioral health and long-term services and supports through a Community Partners program.[23]

Quality, Equity, and Home Health Care

Recent Quality of Patient Care Star Ratings data indicate that Worcester County did not have a plethora of higher quality agencies. Collectively, a little over a quarter (26.2%) of all FFS Medicare home health episodes delivered in Worcester County were affiliated with 4+ star-rated agencies in 2021 — lower than the state's share of FFS Medicare home health episodes affiliated with a 4+ star-rated agency (37.6%) (Exhibit 35). Of the 40 Worcester County agencies with at least 10 FFS Medicare home health care episodes delivered in the county in 2021, only 10% had a Star Rating of 4 or above in 2021.[a]

Compared to the state, a slightly larger share of FFS Medicare home health episodes in Worcester County were delivered to dually eligible patients (26.1% county versus 24.4% state) and White patients (90.8% county versus 88.8% state) in 2021 (Exhibit 35). Otherwise, episodes in both the county and the state were delivered to patients with similar average Hierarchical Condition Category (HCC) scores and chronic condition counts (differences of <0.1).

Within Worcester County, patients who received FFS Medicare home health episodes from 4+ star-rated agencies were similar to those receiving episodes from all Worcester County agencies (with percentage point or average score/count differences of <1% or 0.1) in terms of race/ethnicity, average HCC scores and chronic condition counts (Exhibit 35). A slightly larger share of dually eligible patients received episodes from 4+ star-rated agencies serving Worcester County (28.0%) than from all home health agencies serving Worcester County (26.1%) (Exhibit 35).

Perspectives from Home Health Agencies

The three Worcester County agencies that we spoke with spanned a range of Star Ratings. One of the agencies had a Star Rating of 3.5 or above in 2019, while the other two had a Star Ratings below 3.5 (the lower star-rated agencies were both non-profits; the other agency was for-profit and part of a chain). All three agencies serve Medicaid patients.[b]

During interviews, home health agency staff discussed multiple approaches to providing quality care that met the diverse needs of their patients. Notably, none of the agencies we spoke with said that they tracked race and ethnicity data or considered it in care delivery. Instead, they highlighted other critical success factors in their ability to respond to patient needs, including the cultural and social service needs of their patients:

- **A patient-centered approach to care.** While each agency reported serving different combinations of non-White patients, all agency interviewees recognized the importance of attending to patient and caregiver needs, including those related to language and culture. To the extent possible, interviewees from two of the agencies reported trying to connect patients with staff that are fluent in their native language when possible; the third agency reported more often relying on a language line to serve those who do not speak English.

> "We do a lot in terms of assessing skills and continuing education and competency. I think they have the skills. We give them the tools and that's what they use to help patients."

[a] Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

[b] Unlike the metrics used to distinguish Worcester County from other counties, which relied in part on a Quality of Patient Care Star Rating of 4 or higher, we "relaxed" the threshold for distinguishing quality home health agencies for our interviews to a Star Rating of 3.5 or higher. This decision helped address recruitment challenges by enlarging the eligible pool of quality agencies for recruitment.

Exhibit 35. Key Characteristics of the Home Health Landscape in 2021

Characteristics	Worcester County		Massachusetts
	FFS Medicare Home Health Episodes		
	All Agencies	4+ Star-Rated Agencies Only	All Agencies
Number of Home Health Episodes*	23,415	6,138	261,041
Proportion of Episodes Provided by an Agency with a Quality of Patient Care Star Rating of 4 or Higher**	26.2%	-	37.6%
Select Sociodemographic Characteristics of Patients Receiving Home Health Episodes			
Proportion of Patients from Racial and Ethnic Subgroups:			
Hispanic or Latino (of any race)	4.0%	4.0%	3.4%
Not Hispanic or Latino:			
White	90.8%	91.6%	88.8%
Black or African American	1.8%	1.4%	4.3%
Asian American or Pacific Islander	0.8%	0.6%	1.1%
American Indian or Alaska Native	0.02%	0.0%	0.05%
Proportion of Dually Eligible Patients	26.1%	28.0%	24.4%
Select Health Characteristics of Patients Receiving Home Health Episodes			
Average HCC Scores among Home Health Patients***	3.4	3.5	3.3
Average Number of Chronic Conditions among Home Health Patients	5.8	5.9	5.8
Select Characteristics of Agencies Delivering Home Health Episodes			
Proportion of Episodes Affiliated with a Chain Agency	25.9%	-	29.0%
Proportion of Episodes Affiliated with a For-Profit Agency	51.0%	-	40.9%

Based on our internal analysis of Medicare FFS home health data from the Chronic Condition Warehouse (CCW). See Methods section of the Overview chapter at the beginning of this Appendix.

** Based on all Medicare FFS home health episodes delivered in the county/state in CY 2021.*

*** Denominators for proportions capture all episodes of care provided by all agencies serving the county (or state), including episodes/agencies that are missing a value for the given measure of interest (e.g., Star Rating). For example, the proportion of episodes affiliated with an agency with a CMS Star Rating of 4 or higher is based on a denominator of all episodes provided by all agencies serving the county/state, regardless of whether or not that agency has a Star Rating.*

**** Denominators for averages capture only episodes that have a non-missing value for the measure of interest (e.g., HCC Score).*

- **Training and retention of experienced staff.** All three agencies mentioned providing extensive training to staff, in part through their parent organizations, to include diversity training, and that the training was essential to their ability to provide high quality care. They also all had access to data analytic software and timely data through their electronic health records that they use to identify areas for improvement at the agency and individual staff level.

> "It's very rare that we can't provide something in some way from community resources … our social worker will connect them to an agency to get assistance."

- **Organizational resources and governance.** Each of the interviewees noted that social workers on staff play a key role in connecting patients and families to needed services and are highly cognizant of the resources available in the community. One of the agencies also mentioned having behavioral health nurses on staff that work with patients with primary behavioral health diagnoses.
- **Community resources.** Several interviewees mentioned the availability of home and community-based services for patients as they age, as well as other area services that provide important support to patients with social needs. These services include churches offering used durable medical equipment at no cost to patients, and other area agencies offering food and transportation services.

  However, these three Worcester County agencies reported facing critical barriers in providing patient care, with the challenges common to all three agencies being the relatively high levels of social needs, special considerations in serving patients located in the more remote parts of the county, and clinical complexity of patients. The two agencies with lower Star Ratings also faced significant challenges related to staff retention and associated challenges in training and documentation given staff turnover.

> "There are just the living arrangements. When you have people that really can't afford the kind of food they should be eating, or have challenges with getting their medications, or patients who are home bound and don't have family members, and then just the age of the patient population, those are all things that really become challenges in terms of the patients."

- **Patients' social needs.** The two agencies that also serve other counties indicated that the patients they care for in Worcester County tend to have a lower socio-economic status and therefore require more social supports than those in other parts of the state. Patients may have a variety of social needs and meeting these needs can be challenging.

  While connecting these patients with needed services takes time, all the agencies interviewed said that resources are available. One of the agencies indicated that they have a limited number of social workers, so they primarily conduct their work by telephone or using video conferencing.
- **Operational burdens on staff.** All three agencies mentioned facing greater barriers in serving patients located in the more remote, rural parts of the county. The travel time required to serve patients located in these areas makes it difficult to find staff willing to travel. One agency administrator also noted that staff encounter connectivity issues resulting in staff being unable to access or update medical records for patients while working in those areas.

  One of the lower star-rated agencies interviewed expressed frustration at the amount of documentation required on the part of home health agencies and the challenges faced in their work to ensure that staff meet the documentation requirements. This agency noted that it is difficult to keep staff for a full year once they understand the amount of documentation required following each visit.

- **Patient case mix.** All three of the agencies reported caring for patients in the county who are more complex and at higher risk for hospitalization than those cared for by other agencies in the county. (Their reports are consistent with our internal analysis of home health data, showing that patients served by the three agencies interviewed have higher-than-county- average HCC scores).[a] Two of the agencies reported taking care of patients needing specialized wound care and those on IVs, and the third agency noted the patients coming from the nearby hospital system are particularly acute.

> "If you're talking about really taking care of patients and really being able to impact good outcomes, then you really need to have the time for being able to actually provide the care, not fill out [OASIS] questions."

- **Challenges in staff recruitment and retention.** The two lower star-rated agencies identified retaining staff as being a critical challenge, particularly following the introduction of COVID-19. One of these agencies relies partly on travel staff and has shifted to increasing the proportion of licensed practical nurses (LPN) in their staff mix; the other agency has significantly decreased the number of patients it will accept and limited its service area since they are unable to hire needed staff.

Discussion

Worcester County was identified through our own internal analysis and equity metrics as performing worse, relative to other counties across the nation, in terms of equitable use of high-quality home health agencies among racial/ethnic minority FFS Medicare patients.

> "The hospitals are so full… There are no beds. ED borders are up. Some of these patients are getting discharged too soon, and they're going to be readmitted."

Across all data collection and analysis activities, no "magic bullet" finding emerged to help distinguish or explain why there were racial/ethnic inequities in the use of quality home health agencies serving Worcester County during the original HHVBP Model. However, several notable themes arose:

- **Differences among interviewed home health agencies:** Compared to the for-profit agency that was consistently 3.5 stars or above, the lower star-rated agencies were non-profit.
- **Similarities among interviewed home health agencies:** All three agencies we spoke with shared certain characteristics:
  - All three agencies, regardless of their Star Ratings, reported deploying similar patient-centered care strategies — namely, not focusing on race/ethnicity data but rather on individual patient needs.
  - All three agencies had notably higher average HCC scores than the county average.
  - The agencies all acknowledged the importance of and relied on community resources to help meet patient needs beyond just clinical care — such as access and/or ability to pay for transportation and meals.
- **County-level attributes:** Beyond strategies deployed by agencies to provide care, Worcester County had other unique features that may have contributed to their worse performance, relative to other counties across the nation, in the racial/ethnic gaps observed in use of high-quality home health agencies:
  - Lacking a plethora of agencies with a Star Rating of 4 or above.
  - Being more rural than the "high performing" counties we profiled in our analysis.

In sum, while the home health agencies serving Worcester County that we interviewed strived to provide care that acknowledged patient needs, including social needs, the county lacked a plethora of agencies with a Star Rating of 4 or above. This may have contributed to inequities in access to quality agencies. That the county is 20% rural, while also being the largest county in its state, may have also contributed to transportation and access to care issues that tend to differentially impact racial/ethnic minorities.

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