Supplemental Online Content

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## eTable 1. HHVBP States and Non-HHVBP States in their Corresponding Regional Group

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

Abbreviations: HHVBP, home health value-based purchasing.
eTable 2. Core Set of Covariates Used in Episode-Level Analyses for FFS Claims and OASIS Measures During Baseline and Intervention Periods, by HHVBP and non-HHVBP

| Covariate a | HHVBP States | Non-HHVBP States | Standardized Difference in Means b |
|-------------|--------------|------------------|----------------------------------|
|              | Baseline c   | Intervention c   | Baseline c | Intervention c | Baseline c | Intervention c |
| HH FFS episodes, no. d | 4,442,930 | 7,704,805 | 15,417,548 | 26,353,991 | N/A | N/A |
| Beneficiary Characteristics | | | | | | |
| Age | | | | | | |
| <65 years | 13.0% | 11.2% | 15.6% | 13.7% | -0.08 | -0.08 |
| 65-84 years | 56.3% | 57.4% | 56.8% | 58.4% | -0.01 | -0.02 |
| 85 years and older | 30.8% | 31.4% | 27.6% | 27.8% | 0.07 | 0.08 |
| Sex | | | | | | |
| % Male | 37.9% | 39.6% | 37.2% | 39.0% | 0.01 | 0.01 |
| % Female | 62.1% | 60.4% | 62.8% | 61.0% | -0.01 | -0.01 |
| Race/Ethnicity (Mutually Exclusive) o | | | | | | |
| Hispanic (regardless of Black/White/Other race) | 9.5% | 6.1% | 8.5% | 7.5% | 0.03 | -0.06 |
| Non-Hispanic Black | 10.1% | 10.0% | 16.5% | 13.6% | -0.21 | -0.12 |
| Non-Hispanic White | 79.1% | 82.4% | 71.8% | 75.2% | 0.18 | 0.19 |
| Non-Hispanic other | 1.2% | 1.4% | 3.0% | 3.5% | -0.17 | -0.17 |
| Non-Hispanic multiracial | 0.1% | 0.1% | 0.2% | 0.2% | -0.02 | -0.02 |
| % Dual eligible | 30.3% | 25.0% | 34.5% | 32.3% | -0.09 | -0.17 |
| % Rural | 4.9% | 5.0% | 9.4% | 9.2% | -0.21 | -0.20 |
| % of persons in the patient’s county of residence who are ages 25 years and older with less than a high school diploma | 12.6% | 12.2% | 14.9% | 14.6% | -0.48 | -0.52 |
| Alignment with selected APMs | | | | | | |
| BPCI Model 2 | 0.9% | 1.6% | 0.9% | 1.4% | 0.01 | 0.02 |
| BPCI Model 3 | 0.1% | 0.3% | 0.2% | 0.2% | -0.02 | 0.01 |
| BPCI Advanced | 0.0% | 0.7% | 0.0% | 0.8% | * | -0.01 |
| Covariate a      | HHVBP States | Non-HHVBP States | Standardized Difference in Means b |
|------------------|--------------|------------------|-----------------------------------|
|                  | Baseline c   | Intervention c   | Baseline c | Intervention c | Baseline c | Intervention c |
| CJR              | 0.0%         | 0.6%             | 0.0%       | 0.6%           | *          | -0.01          |
| MSSP             | 18.2%        | 21.0%            | 14.7%      | 20.2%          | 0.09       | 0.02           |
| Next Generation ACO | 0.0%     | 4.8%             | 0.0%       | 2.3%           | *          | 0.11           |
| OCM              | 0.0%         | 1.6%             | 0.0%       | 1.6%           | *          | 0.001          |
| Pioneer ACO      | 4.5%         | 0.7%             | 2.0%       | 0.1%           | 0.12       | 0.07           |

**Agency Characteristics**

- **Ownership**
  - For-profit: 71.0% - 72.3% | 69.5% - 72.2% | 0.03 | 0.002
  - Non-profit: 25.9% - 25.3% | 28.0% - 26.1% | -0.05 | -0.02
  - Government-owned: 3.1% - 2.4% | 2.5% - 1.7% | 0.04 | 0.05

- **Setting**
  - Hospital-based: 8.4% - 7.5% | 11.1% - 9.2% | -0.10 | -0.06
  - Freestanding: 91.6% - 92.5% | 88.9% - 90.8% | 0.10 | 0.06

- **Chain Affiliation**
  - Affiliated: 48.7% - 53.6% | 34.4% - 39.2% | 0.29 | 0.29
  - Not Affiliated: 42.3% - 37.8% | 57.8% - 54.0% | -0.31 | -0.33
  - Missing: 3.1% - 0.9% | 2.1% - 0.8% | 0.06 | 0.01
  - Undetermined: 5.9% - 7.8% | 5.7% - 6.0% | 0.01 | 0.07

- **HHA Age**
  - <4 years: 7.3% - 2.2% | 6.8% - 3.8% | 0.02 | -0.11
  - 4-10 years: 25.4% - 18.2% | 24.1% - 17.8% | 0.03 | 0.01
  - >10 years: 67.3% - 79.6% | 69.1% - 78.4% | -0.04 | 0.03

- **HHA Size**
  - 1-59 OASIS episodes: 1.3% - 0.8% | 3.4% - 2.4% | -0.19 | -0.19
  - 60-249 OASIS episodes: 7.5% - 4.9% | 15.6% - 12.4% | -0.31 | -0.35
  - 250-499 OASIS episodes: 11.1% - 8.0% | 14.7% - 12.4% | -0.11 | -0.16
  - 500-999 OASIS episodes: 17.1% - 14.7% | 16.8% - 16.4% | 0.01 | -0.05

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| Covariate a | HHVBP States | Non-HHVBP States | Standardized Difference in Means b |
|-------------|--------------|------------------|-----------------------------------|
|             | Baseline c   | Intervention c   | Baseline c | Intervention c | Baseline c | Intervention c |
| 1,000 or more OASIS episodes | 63.0% | 71.5% | 49.5% | 56.4% | 0.28 | 0.34 |
| Core Clinical Indicators Used for Episode-Level Impact Measures f | | | | | |
| Ambulation and Locomotion | | | | | |
| Able to independently walk with the use of a one-handed device | 13.9% | 6.2% | 15.1% | 7.1% | -0.04 | -0.03 |
| Requires two-handed device for level ground or human assistance for stairs and uneven ground | 32.3% | 15.6% | 32.8% | 19.4% | -0.01 | -0.10 |
| Walks only with supervision or assistance from another at all times | 42.6% | 64.0% | 40.2% | 59.7% | 0.05 | 0.09 |
| Chairfast to bedfast | 11.2% | 14.1% | 11.9% | 13.8% | -0.02 | 0.01 |
| Risk for Hospitalization | | | | | |
| Multiple hospitalizations in past 6 months | 36.4% | 33.2% | 37.1% | 33.2% | -0.01 | -0.001 |
| History of falls | 32.8% | 36.0% | 31.4% | 33.5% | 0.03 | 0.05 |
| Currently taking 5 or more medications | 88.3% | 92.5% | 87.0% | 92.1% | 0.04 | 0.02 |
| Surgical wound | 24.4% | 25.4% | 25.6% | 26.7% | -0.03 | -0.03 |
| Requires urinary catheter | 4.4% | 4.7% | 4.6% | 4.7% | -0.01 | -0.002 |
| Discharged from inpatient facility in last 14 days | 67.8% | 68.7% | 71.4% | 70.8% | -0.08 | -0.05 |
| Pressure ulcer | | | | | |
| Pressure ulcer stage 2 | 3.2% | 3.0% | 3.4% | 3.2% | -0.01 | -0.01 |
| Pressure ulcer stage 3 | 0.9% | 0.9% | 1.0% | 1.0% | -0.01 | -0.01 |
| Pressure ulcer stage 4 | 0.5% | 0.5% | 0.6% | 0.6% | -0.01 | -0.01 |
| Pressure ulcer not stageable | 0.9% | 1.0% | 1.1% | 1.1% | -0.01 | -0.01 |
| Neoplasm diagnosis | 8.1% | 8.8% | 8.7% | 9.1% | -0.02 | -0.01 |

Abbreviations: ACO, accountable care organization; APM, alternative payment model; BPCI, bundled payment for care improvement; CJR, comprehensive care for joint replacement; FFS, fee-for-service; HHA, home health agency; HH, home health; HHCAHPS, Home Health Care
Consumer Assessment of Healthcare Providers and Systems; HHVBP, home health value-based purchasing; MSSP, Medicare shared savings program; OASIS, Outcome and Assessment Information Set; OCM, oncology care model.

a For the HHA-level HHCAHPS measures, we excluded patient age and area education variables since comparable factors were already accounted for in the risk adjusted HHCAHPS measure values. Additionally, we did not specify OASIS episode characteristics (aggregated to the agency level) as covariates for analyses of the HHA-level impact measures, given that each of these measure values already reflected risk adjustment based on any clinical factors that were deemed relevant to measuring agency performance under HHVBP.

b Standardized differences in means compare the means of HHVBP and non-HHVBP states during each time period—baseline (2013 – 2015) and intervention (2016 – 2020). In this case, the standardized difference in means is the difference in means between the HHVBP and non-HHVBP groups divided by the standard deviation of the HHVBP group.

c Baseline period was from January 1, 2013, to December 31, 2015; the intervention period was from January 1, 2016, to December 31, 2020.

d Reflects total number of observations across the baseline and intervention periods. The sample size for each measure may be lower than these totals due to missing data or measure-specific reporting requirements.

o Race indicators (white, Black, Hispanic, other race) came from OASIS assessment item M0140 and was recoded to mutually exclusive groups; American Indian or Alaska Native, Asian and Native Hawaiian or Pacific Islander are grouped into the “other” race category.

i Derived from OASIS assessment at start of home health care.
etTable 3. Measure specifications for Average Medicare Spending per Day during and following FFS Home Health Episodes of Care

| Measure Description | Pre-PDGM                                                                 | Post-PDGM                                                                 |
|---------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Pre-PDGM            | Average Medicare Part A and Part B payments (or “Expenditure Components” listed below) per day during and up to 37 days following HH episodes of care. This measure includes payments that occur between the start of the HH episode (start of care [SOC]) and a 37-day look-out period following the last HH visit (end of care) or until the start of the next HH 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 7 days post last HH visit and additional 30 days thereafter or until the start of the next HH episode that begins on or before the 37th day or until death or loss of FFS Part A eligibility; whichever comes earlier. | Average Medicare Part A and Part B payments (or “Expenditure Components” listed below) per day during and up to 30 days following HH episodes of care. This measure includes payments that occur between the start of the HH episode (start of care [SOC]) and the 59th day after the SOC, the start of the next HH episode, death, or loss of FFS Part A eligibility; whichever comes earlier. |
| Measure Numerator   | Pre-PDGM: Total Medicare Part A and Part B payments (or “Expenditure Components” listed below) between the SOC and a 37-day look-out period following the last HH visit (end of care) or until the start of the next HH episode that begins on or before the 37th day or until death or loss of FFS Part A eligibility; whichever comes earlier. | Post-PDGM: Total Medicare Part A and Part B payments (or “Expenditure Components” listed below) between the SOC and the 59th day after the SOC, the start of the next HH episode, death, or loss of FFS Part A eligibility; whichever comes earlier. |
| Numerator Details   | Pre-PDGM: Sum of Medicare payments on all Part A and Part B claims (or “Expenditure Components” listed below) with a claim start date (i.e., based on “CLM_FROM_DT”) occurring between the SOC and a 37-day look-out period following the last HH visit (end of care) or until the start of the next HH episode that begins on or before the 37th day or until death or loss of FFS Part A eligibility; whichever comes earlier. Where applicable, the 37-day look-out period following the end of care is truncated to prevent possible double counting of payments for claims that occur during a subsequent HH episode beginning during this 37-day period. | Post-PDGM: Sum of Medicare payments on all Part A and Part B claims (or “Expenditure Components” listed below) with a claim start date (i.e., based on “CLM_FROM_DT”) occurring between the SOC and... |
the 59th day after the SOC, the start of the next HH episode, death, or loss of FFS Part A eligibility; whichever comes earlier. Where applicable, the look-out period is truncated to prevent possible double counting of payments for claims that occur during a subsequent HH episode beginning during this period.

**Measure Denominator**

| Pre-PDGM: | Total number of eligible days accrued during and in periods of up to 37 days following the last HH visit date of all HH FFS episodes starting in a given calendar quarter. |
| Post-PDGM: | Total number of eligible days accrued during and in periods of up to 30 days following all HH FFS episodes starting in a given calendar quarter. |

**Denominator Details**

| Pre-PDGM: | Denominator includes all days occurring between the SOC and a 37-day look-out period following the last HH visit (end of care) or until the start of the next HH episode that begins on or before the 37th day or until death, or loss of FFS Part A eligibility, for HH episodes of all types (LUPAs, outliers, PEPs, etc.) starting in a given calendar quarter, irrespective of whether they are first, second, or higher episodes in a sequence. HH episodes are excluded in the absence of a HH visit date. The maximum number of days that can be included in the denominator is 97 days for a 60-day episode of care (60 + 37 days), unless the last HH visit date occurs before the HH episode claim end date and/or a subsequent HH episode, death, or loss of FFS Part A eligibility occurs prior to the end of the 37-day look-out period. |
| Post-PDGM: | Denominator includes all days occurring between the SOC and the 59th day after the SOC, the start of the next HH episode, death, or loss of FFS Part A eligibility, for HH episodes of all types (LUPAs, outliers, PEPs, etc.) starting in a given calendar quarter, irrespective of whether they are first, second, or higher episodes in a sequence. HH episodes are excluded in the absence of a HH visit date. The maximum number of days that can be included in the denominator is 60 days for a 30-day episode of care (30 + 30 days), unless a subsequent HH episode, death, or loss of FFS Part A eligibility occurs prior to the end of the 30-day episode or 30-day look-out period. |

**Expenditure Components**

Besides the total Medicare Part A and Part B spending measure, we repeated the same calculation for each individual expenditure component, including: Medicare Part B carrier and DME combined, HH, Hospice, Inpatient, Outpatient Emergency Department and Observation Stays, other Outpatient, Outpatient types combined, and SNF and obtained average Medicare spending per day during and following FFS HH episodes of care for each of the expenditure components.

**Notes:**

This measure along with each of its components were individually capped at both the lower and upper ends to reduce the influence of extreme expenditure outliers. For each year, the measure was capped at the 99th percentile of the unweighted spending per-day measure (i.e. any values...
greater than 99th percentile were set to the 99th percentile value), and any negative payment values were set to zero dollars. The post-PDGM spending measure definition was applied retrospectively to 60-day HH episodes from 2013-19 (all Medicare payments between the SOC and the 89th day after the SOC, the start of the next HH episode, death, or loss of FFS Part A eligibility; whichever comes earlier) in order to draw accurate inferences about the impacts in 2020 following the implementation of the PDGM.

| Abbreviations: DME, durable medical equipment; FFS, fee-for-service; HH, home health; LUPA, low utilization payment adjustment; PDGM, Patient Driven Groupings Model; PEP, partial episode payment; SNF, skilled nursing facility |
**eTable 4. Average Medicare Parts A and B Payments Per Day, During and Following Home Health**

| Unadjusted Measure Values | HHVBP States | Non-HHVBP States |
|---------------------------|--------------|------------------|
|                           | Baseline a   | Intervention a   | Baseline a   | Intervention a |
| **Average Medicare parts A and B payments per day during FFS HH episodes of care (SD)** | $150.60 ($1302.27) | 2016-2019: $161.70 ($1416.21) | $135.34 ($1326.86) | 2016-2019: $150.38 ($1443.50) |
|                           | $144.25 ($1412.40) | 2020: $165.09 ($1367.15) | $135.79 ($1429.97) | 2020: $162.43 ($1377.60) |
| **Average Medicare parts A and B payments per day following FFS HH episodes of care b (SD)** | $105.97 ($1303.35) | 2016-2019: $114.93 ($1382.44) | $116.54 ($1411.44) | 2016-2019: $123.51 ($1481.86) |
|                           | $82.25 ($1086.45) | 2020: $113.31 ($1472.70) | $89.38 ($1167.71) | 2020: $120.26 ($1574.35) |

**Cumulative (2016-2020) Multivariate Results**

|                           | D-in-D Estimate | (95% CI) | P-value | Cumulative Impact |
|---------------------------|-----------------|----------|---------|-----------------|
| **Average Medicare parts A and B payments per day during FFS HH episodes of care** | -$2.07 | (-$3.80, $0.34) | 0.02 | -1.4% |
| **Average Medicare parts A and B payments per day following FFS HH episodes of care b** | $0.08 | (-$1.97, $2.12) | 0.94 | 0.1% |

Abbreviations: CI, confidence interval; D-in-D, difference-in-differences; FFS, fee-for-service; HH, home health; HHVBP, home health value-based purchasing; SD, Standard Deviation.

* Baseline period was from January 1, 2013, to December 31, 2015; the intervention period was from January 1, 2016, to December 31, 2020.

* Reflects Medicare payments during the home health episode through 37 days following the date of the last home health visit.
eTable 5. Multivariate D-in-D Regression Results for the Claims-based Measures

| State          | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Combined Spending Model<sup>a</sup> | Pre-PDGM | Post-PDGM |
|----------------|----------------------------------------------------------|----------------------------------------|-------------------------------|-----------------------------------|----------|-----------|
| N              | 21,003,491 FFS Episodes                                   | 21,003,491 FFS Episodes                 | 43,759,916 FFS Episodes       | 93,641,792 FFS Episodes           |          |           |
| Intercept      | 3.52**                                                   | 11.29**                                | 2.44**                        | 77.75**                          | -11.5**  |           |
| State          |                                                          |                                        |                               |                                   |          |           |
| Alaska         | 0.47                                                     | 2.01**                                 | -2.73**                       | 14.25**                          | -3.69    |           |
| Alabama        | 1.6**                                                    | -3.4**                                 | -0.97**                       | -27.09**                         | 3.93**   |           |
| Arkansas       | 1.16**                                                   | -1.86**                                | -0.84**                       | -21.88**                         | 4.11**   |           |
| Arizona        | 0.73*                                                    | -0.91*                                 | -0.72**                       | 11.85**                          | -3.27**  |           |
| California     | 0.52                                                     | -2.69**                                | -0.34**                       | 25.69**                          | -0.44    |           |
| Colorado       | -1.4**                                                   | 0.3                                    | 0.03                          | -7.73*                           | -2.28**  |           |
| Connecticut    | 2.47**                                                   | -1.58**                                | 2.25**                        | 21.22**                          | -0.04    |           |
| Delaware       | 1.48**                                                   | -2.4**                                 | 0.06                          | 12.36**                          | -3.4**   |           |
| Florida        | 1.76**                                                   | -4.23**                                | -0.45**                       | 6.58*                            | 0.11     |           |
| Georgia        | 1.69**                                                   | -1.58**                                | -1.26**                       | -10.65**                         | 2.35**   |           |
| Hawaii         | 1.03**                                                   | 2.03**                                 | -0.84**                       | 18.68**                          | -3.13**  |           |
| Iowa           | 1.87**                                                   | -1.82**                                | 0.78**                        | -6.86                            | -0.37    |           |
| Idaho          | -1.46**                                                  | -0.62                                 | -1.02**                       | -18.33**                         | 1.95*    |           |
| Illinois       | 1.95**                                                   | -3.44**                                | -0.05                         | -2.54                            | 3.32**   |           |
| Indiana        | 2.25**                                                   | -1.59**                                | 0.47**                        | 0.39                             | 3.07**   |           |
| Kansas         | 2.05**                                                   | -2.28**                                | 0.77**                        | -8.57**                          | 1.8*     |           |
| Kentucky       | 2.31**                                                   | -1.96**                                | -0.02                         | -14.22**                         | 3.1**    |           |
| Louisiana      | 0.92**                                                   | -1.5**                                 | -2.16**                       | -23.35**                         | 4.96**   |           |
| Massachusetts  | 2.19**                                                   | -2.9**                                 | 1.05**                        | 17.12**                          | 0.45     |           |
| Maryland       | 1.57**                                                   | -3.12**                                | 0.09                          | 23.21**                          | -1.66    |           |
| Maine          | 0.78*                                                    | 0.06                                   | 0.58**                        | -9.84**                          | 0.85     |           |
| Michigan       | 2.18**                                                   | -2.71**                                | -0.002                        | -1.22                            | 0.16     |           |
| Minnesota      | 1.83**                                                   | -2.34**                                | 0.92**                        | 0.64                             | -1.87*   |           |
| Missouri       | 2.08**                                                   | -2.47**                                | 0.15                          | -8.67**                          | -0.44    |           |

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| State             | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
|-------------------|-------------------------------------------------------------|-----------------------------------------|------------------------------|----------|-----------|
| Mississippi       | 0.52                                                        | -2.53**                                 | -1.43**                      | -29.49** | 5.28**    |
| Montana           | -0.39                                                       | -2.09**                                 | -0.01                        | -19.05** | -0.5      |
| North Carolina    | 1.1**                                                       | -1.43**                                 | -0.66**                      | -12.65** | 0.32      |
| North Dakota      | 2.12**                                                      | -2.88**                                 | 0.94**                       | -8.24    | -0.19     |
| Nebraska          | 1.33**                                                      | -3.76**                                 | 0.77**                       | -1.91    | -0.6      |
| New Hampshire     | 1.66**                                                      | -0.9                                    | 0.9**                        | -2.3     | 0.57      |
| New Jersey        | 2.61**                                                      | -4.5**                                  | 1.6**                        | 26.47**  | -1.65     |
| New Mexico        | -0.99**                                                     | 0.11                                    | -1.25**                      | -22.98** | 3.8**     |
| Nevada            | 0.77*                                                       | -2.32**                                 | -1.04**                      | 14.14**  | 1.81*     |
| New York          | 2.87**                                                      | -4.5**                                  | 0.03                         | 26.67**  | -1.44     |
| Ohio              | 1.95**                                                      | -1.47**                                 | 0.38*                        | -7.38*   | 2.57**    |
| Oklahoma          | 0.61*                                                       | -0.77                                   | -1.67**                      | -27.39** | 5.36**    |
| Oregon            | -0.76*                                                      | 0.61                                    | -1.41**                      | -14.62** | 2.06**    |
| Pennsylvania      | 2.6**                                                       | -2.96**                                 | 0.51**                       | 1.51     | 0.41      |
| Rhode Island      | 2.01**                                                      | -2.03**                                 | 1.6**                        | 6.81     | 0.64      |
| South Carolina    | 0.84*                                                       | -1.76**                                 | -1.17**                      | -12.67** | 0.94      |
| South Dakota      | 1.55**                                                      | -3.26**                                 | 1.4**                        | -6.88    | -1.95     |
| Tennessee         | 1.41**                                                      | -2.91**                                 | -0.63**                      | -18.5**  | 3.46**    |
| Texas             | 0.54                                                        | -1.96**                                 | -1.5**                       | -13.88** | 4.61**    |
| Utah              | -2.43**                                                     | -2.25**                                 | -0.51**                      | -14.33** | 0.72      |
| Virginia          | 1.88**                                                      | -1.4**                                  | -0.4*                        | -10.46** | 0.82      |
| Vermont           | 0.77*                                                       | -1.27**                                 | 0.23                         | -8.22    | 2.12**    |
| Washington        | -0.12                                                       | -0.81                                   | -1.14**                      | 0.82     | -0.01     |
| Wisconsin         | 1.85**                                                      | -1.04*                                  | 0.26                         | -5.55    | 0.47      |
| West Virginia     | 2.58**                                                      | -0.8                                    | -1.18**                      | -14.29** | 3.39**    |
| Wyoming           | Reference                                                   | Reference                               | Reference                    | Reference | Reference |

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|                          | Health Care Utilization During HH Episodes | Combined Spending Model \(^a\) |
|--------------------------|------------------------------------------|--------------------------------|
|                          | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
| 2018                     | -0.35**                                  | 0.76**                                 | -0.06**                      | 0.96**   | -1.08**   |
| 2019                     | -0.42**                                  | 0.89**                                 | -0.11**                      | 4.79**   | -1.79**   |
| 2020                     | -3.06**                                  | -0.3**                                 | -1.75**                      |          | 2.71**    |
| Intervention*2016\(^b\)  | -0.23**                                  | 0.26**                                 | -0.19**                      | -1.12**  | -0.11     |
| Intervention*2017\(^c\)  | -0.04                                    | 0.23**                                 | -0.2**                       | -2**     | -0.03     |
| Intervention*2018\(^d\)  | -0.14                                    | 0.37**                                 | -0.28**                      | -1.99**  | -0.03     |
| Intervention*2019\(^e\)  | -0.27**                                  | 0.36**                                 | -0.29**                      | -2.68**  | -0.08     |
| Intervention*2020\(^f\)  | -0.08                                    | 0.22**                                 | -0.6**                       |          | -3.26**   |
| Quarter                  |                                          |                                        |                              |          |           |
| Quarter 1                | Reference                                | Reference                              | Reference                     | Reference | Reference |
| Quarter 2                | -0.24**                                  | 0.53**                                 | -0.13**                      | -2.31**  | 0.88**    |
| Quarter 3                | -0.18**                                  | 0.64**                                 | -0.09**                      | -0.73**  | 1.41**    |
| Quarter 4                | 0.1**                                    | 0.32**                                 | -0.06**                      | -1.28**  | 1.02**    |
| Age                      |                                          |                                        |                              |          |           |
| Less than 65 years       | -0.31**                                  | 1.32**                                 | -1.1**                       | -5.39**  | 0.91**    |
| 65-84 years              | Reference                                | Reference                              | Reference                     | Reference | Reference |
| 85 years or older        | 0.67**                                   | 0.79**                                 | 0.79**                       | -9.52**  | 0.75**    |
| Female                   | -1.24**                                  | 0.68**                                 | -0.11**                      | -11.46** | 0.43**    |
| Race/Ethnicity (Mutually Exclusive) |                          |                                        |                              |          |           |
| Non-Hispanic Black       | 0.57**                                   | 1.03**                                 | -0.54**                      | 8.44**   | 1.69**    |
| Hispanic                 | -0.14**                                  | -0.15**                                | -0.94**                      | 5.69**   | -0.94**   |
| Non-Hispanic Other Race  | -0.49**                                  | -2.69**                                | -0.91**                      | 1.27**   | -1.14**   |
| Non-Hispanic Multiracial | -0.42**                                  | 0.11                                   | -0.42**                      | 0.94     | 0.2       |
| Non-Hispanic White       | Reference                                | Reference                              | Reference                     | Reference | Reference |
| Dual Eligible            | 0.81**                                   | 2.02**                                 | 0.05**                       | -0.44**  | 1.88**    |
| Rural                    | -0.31**                                  | 1.7**                                  | 0.31**                       | -6.92**  | 0.83**    |

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### Health Care Utilization During HH Episodes

| Original Reason for Medicare Entitlement | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
|-----------------------------------------|----------------------------------------------------------|------------------------------------------|----------------------------|-----------|-----------|
| ESRD                                    | 11.99**                                                  | 0.65**                                   | 1.18**                     | 138.34**  | 4.43**    |
| Disability                              | 1.08**                                                   | 1.54**                                   | 0.2**                      | 4.22**    | 1.3**     |
| Age                                     | Reference                                                | Reference                                | Reference                  | Reference | Reference  |
| Current Reason for Medicare Entitlement  |                                                          |                                          |                           |           |           |
| ESRD                                    | 2.99**                                                   | 0.95**                                   | -0.12**                    | 29.89**   | -0.28     |
| Disability                              | 0.34**                                                   | 1.19**                                   | -0.13**                    | 9.48**    | -1.14**   |
| Age                                     | Reference                                                | Reference                                | Reference                  | Reference | Reference  |
| Hospital-based HHA                      | 0.21**                                                   | 0.16                                     | 0.38**                     | 1.28      | -1.22**   |
| Ownership                               |                                                          |                                          |                           |           |           |
| Non-profit                              | 0.34**                                                   | 0.1                                     | 0.21**                     | 1.99**    | -2.57**   |
| Government-owned                        | 0.61**                                                   | 0.93**                                   | 0.55**                     | 2.17*     | -1.51**   |
| For-profit                              | Reference                                                | Reference                                | Reference                  | Reference | Reference  |
| HHA Size                                |                                                          |                                          |                           |           |           |
| 1-59 OASIS episodes                     | -1.99**                                                  | -1.22**                                  | -0.58**                    | -15.21**  | 1.6**     |
| 60-249 OASIS episodes                   | -0.86**                                                  | -1.01**                                  | -0.41**                    | -8.35**   | 1.9**     |
| 250-499 OASIS episodes                  | -0.48**                                                  | -0.44**                                  | -0.2**                     | -4.53**   | 1.65**    |
| 500-999 OASIS episodes                  | -0.24**                                                  | 0.03                                     | -0.08**                    | -2.05**   | 0.82**    |
| 1,000 or more OASIS episodes            | Reference                                                | Reference                                | Reference                  | Reference | Reference  |
| HHA Age                                 |                                                          |                                          |                           |           |           |
| 0-3 years                               | -0.51**                                                  | -0.36**                                  | -0.11**                    | 1.06*     | -0.05     |
| 4-10 years                              | -0.46**                                                  | -0.36**                                  | -0.13**                    | 0.17      | 0.17      |
| 11 years or more                        | Reference                                                | Reference                                | Reference                  | Reference | Reference  |

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| Health Care Utilization During HH Episodes | Combined Spending Model<sup>a</sup>
|------------------------------------------|----------------------------------|
| **Unplanned acute care hospitalizations among 1st HH episodes** | **Outpatient ED use among 1st HH episodes** | **Skilled Nursing Facility Use** | **Pre-PDGM** | **Post-PDGM** |
| Missing | -0.36* | -0.97** | 0.01 | 0.38 | -0.75* |
| Undetermined | -0.001 | -0.55** | 0.04 | 2.17 | -0.83** |
| Not Affiliated | 0.03 | -0.68** | -0.1** | 0.43 | -0.1 |
| Affiliated | Reference | Reference | Reference | Reference | Reference |
| % of Persons in the Patient's County of Residence who are Ages 25 years and Older with Less than a High School Diploma | -0.003 | -0.06** | -0.02** | -0.35** | 0.11** |
| Ambulation and Locomotion | Needs no human assistance or assistive device | Reference | Reference | Reference | Reference |
| Requires two handed device for level ground or human assistance for stairs and uneven ground | 1.52** | -0.36** | 0.93** | 12.54** | 0.78** |
| Walks only with supervision or assistance from another at all times | 2.62** | -0.004 | 1.42** | 21.99** | 0.45** |
| Chairfast to bedfast | 5.54** | -0.62** | 1.34** | 41.01** | 3.33** |
| Risk for Hospitalization | Multiple hospitalizations in past 6 months | 6.57** | 1.63** | 1.05** | 33.53** | 2.71** |
| History of falls | 1.07** | 1.75** | 1.08** | 7.09** | 1.29** |

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|                          | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
|--------------------------|------------------------------------------------------------|----------------------------------------|------------------------------|----------|-----------|
| Currently taking 5 or more medications | 1.83**                                                   | 1.13**                                  | 0.34**                        | 10.35**  | 0.98**    |
| Surgical wound           | -2.55**                                                   | -0.7**                                  | -1.48**                       | 8.56**   | -4.32**   |
| Requires urinary catheter| 3.54**                                                   | 4.4**                                   | -0.29**                       | -13.12** | 2.96**    |
| Discharged from Inpatient Facility in last 14 Days | 1.59**                                                   | 1.63**                                  | 0.85**                        | 11.92**  | -1.04**   |
| Pressure Ulcer            |                                                           |                                         |                              |          |           |
| Stage 1                  | Reference                                                 | Reference                              | Reference                    | Reference| Reference |
| Stage 2                  | 4.37**                                                   | -0.55**                                | 0.68**                       | 23.36**  | 1.92**    |
| Stage 3                  | 4**                                                       | -1.38**                                | 0.21**                       | 29.73**  | 2.57**    |
| Stage 4                  | 3.22**                                                   | -2.71**                                | -1.1**                       | 34.66**  | 1.65**    |
| Not Stageable            | 5.61**                                                   | -0.71**                                | 0.85**                       | 44.29**  | 3.69**    |
| Neoplasm Diagnosis       | 6.54**                                                   | 0.03                                   | 0.44**                       | 62.93**  | 1.05**    |
| HIPPS Code Clinical Grouping |                                                          |                                         |                              |          |           |
| Behavioral Health        | -0.08                                                   | 2.71**                                  | 0.05                         | -8.96**  | 1.62**    |
| Complex Nursing Interventions | 5.11**                                             | 2.74**                                  | -0.57**                      | 2.74**   | 4.63**    |
| Surgical Aftercare       | -0.54**                                                   | 0.58**                                  | -0.78**                      | -22.22** | -0.18*    |
| Cardiac and Circulatory  | 3.63**                                                   | 0.21**                                  | 0.29**                       | 7.2**    | 2.18**    |
| Endocrine                | 1.39**                                                   | 0.23**                                  | 0.37**                       | 7.13**   | 2.22**    |
| Gastrointestinal Tract and Genitourinary System | 4.47**                                                   | 1.22**                                  | 0.61**                       | 8.88**   | 0.7**     |
| Infectious Disease, Neoplasms, and | 6.23**                                                   | 0.45**                                  | 0.2**                        | 37.45**  | 2.07**    |

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| Health Care Utilization During HH Episodes | Combined Spending Model \( a \) |
|------------------------------------------|-------------------------------|
| **Unplanned acute care hospitalizations among 1st HH episodes** | **Outpatient ED use among 1st HH episodes** | **Skilled Nursing Facility Use** | **Pre-PDGM** | **Post-PDGM** |
| Blood-forming Diseases | 1.32** | 0.99** | 0.19** | 1.83** | -0.3** |
| Other | 1.32** | 0.99** | 0.19** | 1.83** | -0.3** |
| Respiratory | -4.69** | -1.7** | -0.98** | -23.28** | -3.25** |
| Musculoskeletal Rehabilitation | -0.88** | 1.2** | -0.24** | -2.23** | -0.04 |
| Neuro/stroke Rehabilitation | 2.71** | -0.45** | 0.79** | 16.06** | 3.35** |
| Wounds | Reference | Reference | Reference | Reference | Reference |
| None | Reference | Reference | Reference | Reference | Reference |
| Admission Source | Oxygen Therapy | 9.86** | -0.18** | 1.44** | 45.19** | 1.2** |
| ACH | 5.11** | -0.21** | -0.22** | 24.72** | -3.26** |
| IPF | 0.91** | 5.12** | 0.65** | 18.88** | 1.6** |
| IRF | 3.88** | -0.77** | 0.3** | 30.69** | -0.08 |
| LTCH | 7.29** | -0.9** | -0.22** | 53.95** | -0.65** |
| SNF | 3.76** | -0.96** | 2.09** | 20.37** | -0.22** |
| Community | Reference | Reference | Reference | Reference | Reference |
| Oxygen Therapy | 9.86** | -0.18** | 1.44** | 45.19** | 1.2** |
| Alignment with selected APMs | BPCI Model 2 | -1.48** | -0.48** | 0.04 | -4.36** | -5.43** |
| BPCI Model 3 | -0.15 | -0.21 | 0.76** | 6.91* | -4.37** |
| BPCI Advanced | 0.11 | -0.68** | 0.32** | 6.84** | -0.64* |
| MSSP | -0.16** | 0.07** | -0.17** | 0.15 | -0.52** |
| Next Generation ACO | -0.12* | -0.28** | 0.1** | -0.32 | -0.26* |
| Pioneer ACO | -0.13 | -0.03 | 0.2** | 1.34** | 0.53** |
| CJR | -4.01** | -0.84** | -0.94** | -34.6** | -4.26** |
| OCM | 3.93** | 0.02 | 0.23** | 68.24** | -0.73** |

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| Review Choice Demonstration | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Combined Spending Model a |
|-----------------------------|-------------------------------------------------------------|----------------------------------------|-----------------------------|------------------------|
| Active Participant          | 0.24**                                                      | 0.24**                                 | 0.47**                      | -0.34                  | 0.07                  |
| Inactive Participant        | 0.7**                                                       | 0.74**                                 | 0.38**                      | -1.94                  | 5.25**                |
| Non-Participant             | Reference                                                  | Reference                              | Reference                   | Reference              | Reference             |

- **Intervention** Ambulation and Locomotion: Requires two handed device for level ground or human assistance for stairs and uneven ground
- **Intervention** Ambulation and Locomotion: Walks only with supervision or assistance from another at all times
- **Intervention** Ambulation and Locomotion: Chairfast to bedfast

| Initial COVID-19 diagnosis 61-90 days before HH episode start date | 1.14** | 1.4** | -0.05 | 10.85** |
| Initial COVID-19 diagnosis 31-60 days before HH episode start date | -1.8** | 0.34* | -0.14** | -3.11** |
| Initial COVID-19 diagnosis 1-30 days | -3.52** | 0.75** | 0.3** | 39.87** |
| Health Care Utilization During HH Episodes | Combined Spending Model<sup>a</sup> |
|------------------------------------------|----------------------------------|
| Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
| before HH episode start date | | | | |
| Initial COVID-19 diagnosis during HH episode | 36.06** | 2.41** | 13.8** | 377.44** |
| Initial COVID-19 diagnosis 1-30 days following HH episode end date | 44.64** | 2.12** | 13.93** | 232.58** |
| No COVID-19 diagnosis or initial COVID-19 diagnosis > 90 days before HH episode start date | Reference | Reference | Reference | Reference |
| Regional rates of Medicare FFS inpatient stays associated with COVID-19 diagnoses | -0.01** | -0.02** | -0.0004 | -0.14** |
| County-level rates of COVID-19 Diagnoses | | | | |
| Greater than or equal to 75th Percentile | -0.66** | -0.56** | -0.81** | -4.05** |
| 25th to 75th Percentile | -0.09 | -1.05** | -0.68** | -7.52** |
| Less than 25th Percentile | Reference | Reference | Reference | Reference |
| State*Linear time trend | | | | |
| Alaska*Linear time trend | | | 3.6** | 0.67 |
| Alabama*Linear time trend | | | 1.05** | 0.22* |

<sup>a</sup> Model adjusted for age, sex, race, income, number of chronic conditions, number of primary care visits, number of hospitalizations, number of emergency department visits, number of skilled nursing facility visits, and COVID-19 diagnosis status.
| State          | Combined Spending Model a | Pre-PDGM | Post-PDGM |
|---------------|---------------------------|----------|-----------|
| Arkansas      | 2.09**                    | 0.04     |           |
| Arizona       | 0.86**                    | 0.65**   |           |
| California    | 2.07**                    | 0.56**   |           |
| Colorado      | 2.7**                     | 0.06     |           |
| Connecticut   | 1.65**                    | 0.25     |           |
| Delaware      | 1.53**                    | 0.68**   |           |
| Florida       | 1.27**                    | 0.3**    |           |
| Georgia       | 1.79**                    | 0.41**   |           |
| Hawaii        | 3.42**                    | 0.35     |           |
| Iowa          | 2.99**                    | 0.69**   |           |
| Idaho         | 1.07**                    | 0.55**   |           |
| Illinois      | 2.81**                    | -0.13*   |           |
| Indiana       | 1.48**                    | 0.1      |           |
| Kansas        | 1.64**                    | 0.54**   |           |
| Kentucky      | 1.36**                    | 0.12     |           |
## Health Care Utilization During HH Episodes

|                                | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Combined Spending Model | Pre-PDGM | Post-PDGM |
|--------------------------------|-------------------------------------------------------------|----------------------------------------|------------------------------|-------------------------|----------|-----------|
| Louisiana*Linear time trend    |                                                             |                                        |                              |                         | 1.26**   | 0.34**    |
| Massachusetts*Linear time trend|                                                             |                                        |                              |                         | 2.54**   | 0.14      |
| Maryland*Linear time trend     |                                                             |                                        |                              |                         | 1.53**   | 0.88**    |
| Maine*Linear time trend        |                                                             |                                        |                              |                         | 2.6**    | 0.15      |
| Michigan*Linear time trend     |                                                             |                                        |                              |                         | 1.6**    | 0.14      |
| Minnesota*Linear time trend    |                                                             |                                        |                              |                         | 3.24**   | 0.42*     |
| Missouri*Linear time trend     |                                                             |                                        |                              |                         | 1.93**   | 0.56**    |
| Mississippi*Linear time trend  |                                                             |                                        |                              |                         | 2.14**   | 0.04      |
| Montana*Linear time trend      |                                                             |                                        |                              |                         | 2**      | 0.66*     |
| North Carolina*Linear time trend|                                                             |                                        |                              |                         | 1.72**   | 0.59**    |
| North Dakota*Linear time trend |                                                             |                                        |                              |                         | 2.23**   | 1.07*     |
| Nebraska*Linear time trend     |                                                             |                                        |                              |                         | 3.77**   | 0.13      |
| New Hampshire*Linear time trend|                                                             |                                        |                              |                         | 1.87**   | 0.4       |
| New Jersey*Linear time trend   |                                                             |                                        |                              |                         | 4.28**   | -0.34**   |
| New Mexico*Linear time trend   |                                                             |                                        |                              |                         | 1.43**   | 0.09      |
| State                  | Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Combined Spending Model a |
|------------------------|------------------------------------------------------------|----------------------------------------|------------------------------|---------------------------|
| Nevada*Linear time trend |                                                            |                                        |                              | 2.56** 0.01               |
| New York*Linear time trend |                                                            |                                        |                              | 1.83** 0.5**               |
| Ohio*Linear time trend  |                                                            |                                        |                              | 1.8** 0.25**               |
| Oklahoma*Linear time trend |                                                            |                                        |                              | 1.78** 0.29**               |
| Oregon*Linear time trend |                                                            |                                        |                              | 2.59** 0.51**               |
| Pennsylvania*Linear time trend |                                                            |                                        |                              | 1.89** 0.17*               |
| Rhode Island*Linear time trend |                                                            |                                        |                              | 2.15** -0.26               |
| South Carolina*Linear time trend |                                                            |                                        |                              | 0.8** 0.7**               |
| South Dakota*Linear time trend |                                                            |                                        |                              | 2.99** 0.09               |
| Tennessee*Linear time trend |                                                            |                                        |                              | 1.92** -0.08               |
| Texas*Linear time trend  |                                                            |                                        |                              | 2.44** 0.34**               |
| Utah*Linear time trend   |                                                            |                                        |                              | 1.93** 0.54**               |
| Virginia*Linear time trend |                                                            |                                        |                              | 1.45** 0.26**               |
| Vermont*Linear time trend |                                                            |                                        |                              | -1.78 0.6**               |
| Washington*Linear time trend |                                                            |                                        |                              | 1.76** 0.13               |

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| Health Care Utilization During HH Episodes | Combined Spending Model<sup>a</sup> |
|------------------------------------------|----------------------------------|
| Unplanned acute care hospitalizations among 1st HH episodes | Outpatient ED use among 1st HH episodes | Skilled Nursing Facility Use | Pre-PDGM | Post-PDGM |
| Wisconsin*Linear time trend               |                                  |                                | 1.75**   | 0.55**    |
| West Virginia*Linear time trend           |                                  |                                | 1.46**   | 0.21      |
| Wyoming*Linear time trend                 |                                  |                                | 2.43**   | 0.31      |

Abbreviations: ACH, acute care hospitalization; ACO, accountable care organization; APM, alternative payment model; BPCI, bundled payment for care improvement; CJR, comprehensive care for joint replacement; D-in-D, difference-in-differences; ED, emergency department; ESRD, end-stage renal disease; FFS, fee-for-service; HHA, home health agency; HH, home health; HIPPS, health insurance prospective payment system; IPF, inpatient psychiatric facility; IRF, inpatient rehabilitation facility; LTCH, long-term care hospital; MSSP, Medicare shared savings program; OASIS, Outcome and Assessment Information Set; OCM, oncology care model; PDGM, Patient Driven Groupings Model; SNF, skilled nursing facility.

* P<.10; ** P<.05. <sup>a</sup> Parameter estimates for 2020 for spending measure is the sum of pre-PDGM and post-PDGM regression coefficients.

<sup>b</sup> D-in-D estimate for 2016.  <sup>c</sup> D-in-D estimate for 2017.  <sup>d</sup> D-in-D estimate for 2018.  <sup>e</sup> D-in-D estimate for 2019.  <sup>f</sup> D-in-D estimate for 2020.
### eTable 6. Multivariate D-in-D Regression Results for the OASIS-based Measures

| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| N of OASIS-based episodes    | 53,570,641              | 39,267,062              | 39,267,062             | 29,737,485             | 32,664,331                                    | 33,134,830                                    |
| Intercept                   | 92.45**                 | 0.49**                  | 0.15**                 | 55.72**                | 42.07**                                       | 49.29**                                       |
| State                       |                         |                         |                        |                        |                                               |                                               |
| Alaska                      | 1.53                    | -0.3**                  | -0.1**                 | -2.71                  | -11.00**                                      | -6.02**                                       |
| Alabama                     | -6.27**                 | 0.22**                  | 0.04**                 | 7.56**                 | 10.39**                                       | 9.22**                                        |
| Arkansas                    | -5.75**                 | 0.16**                  | 0.04**                 | 3.6                    | 8.18**                                        | 6.41**                                        |
| Arizona                     | 0.76                    | 0.002                   | -0.03                  | 6.75**                 | 1.26                                          | 2.95                                          |
| California                  | 2.58*                   | 0.04                    | -0.01                  | 11.08**                | 3.55**                                        | 10.16**                                       |
| Colorado                    | 1.34                    | 0.05                    | 0.02                   | 5.26**                 | 2.8                                           | 4.68**                                        |
| Connecticut                 | -8.23**                 | -0.1*                   | -0.03**                | 2.64                   | 0.01                                          | 3.82                                          |
| Delaware                    | 1.18                    | 0.05                    | 0.01                   | 6.29**                 | 4.75**                                        | 8**                                           |
| Florida                     | -1.87                   | 0.17**                  | 0.04**                 | 3.95*                  | 2.97                                          | 10.94**                                       |
| Georgia                     | -1.51                   | 0.09*                   | 0.01                   | 6.17**                 | 2.78                                          | 6.29**                                        |
| Hawaii                      | 2.83*                   | -0.15**                 | -0.05**                | 7.91**                 | -6.4**                                        | 4.74**                                        |
| Iowa                        | -7.22**                 | 0.03                    | 0.01                   | 3.33                   | 7.22**                                        | 8.07**                                        |
| Idaho                       | 0.83                    | 0.06                    | 0.03*                  | 8.47**                 | 3.93                                          | 4.5*                                          |
| Illinois                    | -1.41                   | 0.12**                  | 0.02                   | 7.71**                 | 9.29**                                        | 11.08**                                       |
| Indiana                     | -4.62**                 | 0.05                    | 0.01                   | 4.91**                 | 4.48**                                        | 6.28**                                        |
| Kansas                      | -2.11                   | 0.11**                  | 0.03**                 | 4.85**                 | 4.87**                                        | 6.61**                                        |
| Kentucky                    | -5.23**                 | 0.13**                  | 0.02*                  | 5.82**                 | 4.61**                                        | 6.97**                                        |
| Louisiana                   | -10.73**                | 0.07                    | -0.002                 | -0.13                  | 7.25**                                        | 3.33                                          |
| Massachusetts               | -8.14**                 | 0.04                    | 0.01                   | 4.61*                  | 7.17**                                        | 8.67**                                        |
| Maryland                    | -0.76                   | 0.09*                   | 0.01                   | 10.15**                | 5.51**                                        | 8.89**                                        |
| Maine                       | -0.8                    | 0.06                    | 0.02                   | 3.22                   | 4.93**                                        | 8.39**                                        |
| Michigan                    | 1.22                    | 0.17**                  | 0.03**                 | 8.19**                 | 8.07**                                        | 8.54**                                        |
| Minnesota                   | -3.65**                 | -0.13**                 | -0.04**                | 0.71                   | -3.73                                         | 1.78                                          |
| Missouri                    | -0.04                   | 0.13**                  | 0.03**                 | 5.84**                 | 5.41**                                        | 5.48**                                        |
| State                  | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| Mississippi           | -10.01**                | 0.16**                  | 0.03*                  | 3.82                   | 10.88**                                       | 7.08**                                        |
| Montana               | 4.07**                  | -0.06                   | 0.001                  | 3.32                   | -0.21                                         | 5.73*                                         |
| North Carolina        | -2.06                   | -0.03                   | -0.02                  | 4.88**                 | -2.37                                         | 5.63**                                        |
| North Dakota          | -0.86                   | 0.1*                    | 0.03                   | 9.49**                 | 9.24**                                        | 10.53**                                       |
| Nebraska              | -2.98*                  | -0.01                   | -0.01                  | 4.61*                  | 0.37                                          | 8.06**                                        |
| New Hampshire         | -2.99*                  | 0.01                    | 0.01                   | 3.92                   | 5.33**                                        | 6.31**                                        |
| New Jersey            | 1.05                    | 0.12**                  | 0.03*                  | 10.52**                | 9.48**                                        | 11.14**                                       |
| New Mexico            | -3.25**                 | 0.02                    | -0.002                 | 4.23*                  | 5.6**                                         | -0.09                                         |
| Nevada                | -1.81                   | 0.12**                  | 0.02                   | 6.68**                 | 9.8**                                         | 4.94*                                         |
| New York              | -1.16                   | 0.04                    | 0.0005                 | 7.77**                 | 5.83**                                        | 8.76**                                        |
| Ohio                  | -4.86**                 | 0.04                    | 0.02                   | 3.46                   | 3.69                                          | 3.59                                          |
| Oklahoma              | -13.73**                | 0.06                    | 0.01                   | -1.86                  | 8.15**                                        | 0.82                                          |
| Oregon                | 0.52                    | -0.2**                  | -0.08**                | 0.49                   | -10.13**                                      | 0.01                                          |
| Pennsylvania          | -1.76                   | 0.06                    | 0.01                   | 7.06**                 | 4.75**                                        | 8.2**                                         |
| Rhode Island          | -1.89                   | 0.13**                  | 0.04**                 | 8.48**                 | 6.4**                                         | 7.85**                                        |
| South Carolina        | -0.31                   | 0.18**                  | 0.05**                 | 9.72**                 | 9.39**                                        | 9.02**                                        |
| South Dakota          | 3.54*                   | 0.05                    | 0.02                   | 7.76**                 | 0.63                                          | 10.42**                                       |
| Tennessee             | -6.87**                 | 0.05                    | -0.002                 | 1.93                   | 3.24                                          | 3.93                                          |
| Texas                 | -10.12**                | -0.06                   | -0.04**                | -5.78**                | 0.41                                          | -3.52                                         |
| Utah                  | 1.56                    | 0.12**                  | 0.04**                 | 7.95**                 | 6.79**                                        | 2.76                                          |
| Virginia              | -0.84                   | 0.08                    | 0.02                   | 7.33**                 | 3.74**                                        | 6.38**                                        |
| Vermont               | -3.48**                 | -0.02                   | 0.0002                 | 1.05                   | 3.87                                          | 6.39*                                         |
| Washington            | -0.67                   | -0.13**                 | -0.06**                | 1.13                   | -6.19**                                       | 0.69                                          |
| Wisconsin             | -0.64                   | -0.03                   | -0.01                  | 4.69*                  | 0.19                                          | 6.18**                                        |
| West Virginia         | -4.95**                 | 0.17**                  | 0.05**                 | 6.45**                 | 9.09**                                        | 7.41**                                        |
| Wyoming               | Reference               | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |

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### OASIS-based Quality Measures

|                  | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| 2018             | 1.17**                  | 0.09**                  | 0.05**                 | 3.22**                 | 4.75**                                        | 6.06**                                        |
| 2019             | 1.81**                  | 0.14**                  | 0.07**                 | 4.16**                 | 8.11**                                        | 7.7**                                         |
| 2020             | 3.5**                   | 0.2**                   | 0.08**                 | 4.36**                 | 10.22**                                       | 8.4949**                                     |
| Intervention*2016^a | 0.42**                  | 0.02**                  | 0.01**                 | 0.8*                   | 1.91**                                        | 1.24**                                        |
| Intervention*2017^b | 0.55**                  | 0.04**                  | 0.01**                 | 0.75                   | 3.06**                                        | 1.75**                                        |
| Intervention*2018^c | 0.97**                  | 0.05**                  | 0.02**                 | 0.06                   | 3.19**                                        | 1.97**                                        |
| Intervention*2019^d | 1.19**                  | 0.05**                  | 0.02*                  | -0.4                   | 2.61**                                        | 2.48**                                        |
| Intervention*2020^e | 1.39**                  | 0.04                   | 0.01                   | -1.49                  | 1.58                                          | 2.58**                                        |
| Quarter          |                         |                         |                        |                        |                                               |                                               |
| Quarter 1        | Reference               | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| Quarter 2        | 0.96**                  | 0.02**                  | 0.01**                 | 0.59**                 | 0.95**                                        | 0.61**                                        |
| Quarter 3        | 0.91**                  | 0.03**                  | 0.01**                 | 0.85**                 | 1.64**                                        | 1.05**                                        |
| Quarter 4        | 1.33**                  | 0.04**                  | 0.02**                 | 1.17**                 | 2.42**                                        | 1.45**                                        |
| Age              |                         |                         |                        |                        |                                               |                                               |
| Less than 65 years of age | -2.56**              | 0.03**                  | 0.01**                 | -0.39**                | 3.76**                                        | -5.55**                                       |
| 65-84 years of age | Reference              | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| 85 years of age or older | -1.13**               | -0.25**                 | -0.1**                 | -1.68**                | -12.54**                                      | 2.31**                                        |
| Female           | 2.14**                  | 0.03**                  | -0.01**                | 0.85**                 | 2.17**                                        | -2.21**                                       |
| Race/Ethnicity (Mutually Exclusive) |                   |                         |                        |                        |                                               |                                               |
| Non-Hispanic Black | -0.04                  | -0.05**                 | -0.02**                | 0.96**                 | -0.11                                         | 1.39**                                        |
| Hispanic         | 2.17**                  | -0.08**                 | -0.02**                | -1.5**                 | -6.13**                                       | 1.89**                                        |
| Non-Hispanic Other Race | 3.67**                | -0.04**                 | 0.001                  | 1.81**                 | -2.56**                                       | 2.13**                                        |
| Non-Hispanic Multiracial | -0.17                | -0.03**                 | -0.01**                | 0.01                   | -0.91**                                       | -1.25**                                       |
| Non-Hispanic White | Reference              | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| Dual Eligible    | -4.78**                 | -0.12**                 | -0.04**                | -3.68**                | -4.02**                                       | -1.64**                                       |

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## OASIS-based Quality Measures

| Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| Medicaid                | -2.37**                 | -0.13**                | -0.04**                | -2.2**                                        | -2.48**                                        |
| Rural                   | -2.45**                 | 0.05**                 | 0.02**                 | -0.03                                         | 2.14**                                         |
| Hospital-based HHA      | 0.9**                   | -0.05**                | -0.02**                | -0.3                                          | -1.82**                                        |
| Ownership               |                         |                        |                        |                                               |                                               |
| Non-profit              | 2.98**                  | 0.03**                 | 0.001                  | 0.18                                          | 2.3**                                          |
| Government-owned        | 2.2**                   | -0.02                  | -0.01                  | -0.02                                         | -0.52                                          |
| For-profit              | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| HHA Size                |                         |                        |                        |                                               |                                               |
| 1-59 OASIS episodes     | -9.63**                 | -0.36**                | -0.12**                | -16.97**                                      | -13.69**                                      |
| 60-249 OASIS episodes   | -5.01**                 | -0.16**                | -0.07**                | -8.77**                                       | -7.62**                                       |
| 250-499 OASIS episodes  | -2.31**                 | -0.07**                | -0.04**                | -4.37**                                       | -4.16**                                       |
| 500-999 OASIS episodes  | -0.97**                 | -0.02**                | -0.01**                | -1.62**                                       | -1.78**                                       |
| 1,000 or more OASIS     | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| episodes                |                         |                        |                        |                                               |                                               |
| HHA Age                 |                         |                        |                        |                                               |                                               |
| 0-3 years               | 2.55**                  | 0.05**                 | 0.01**                 | 0.3                                          | -0.12                                         |
| 4-10 years              | 0.64**                  | 0.01                   | -0.001                 | -0.49*                                        | -0.96**                                       |
| 11 years or more        | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| HHA Chain               |                         |                        |                        |                                               |                                               |
| Missing                 | 2.05**                  | -0.02                  | -0.01                  | -5.05**                                       | -2.5**                                        |
| Undetermined            | 1.3**                   | -0.01                  | 0.001                  | -1.16*                                        | 0.11                                          |
| Not Affiliated          | 0.44**                  | -0.05**                | -0.03**                | -3.25**                                       | -2.84**                                       |
| Affiliated              | Reference               | Reference              | Reference              | Reference                                     | Reference                                     |
| % of Persons in the     | -0.1**                  | -0.003**               | -0.001**               | -0.21**                                       | 0.04                                          |
| Patient's County of     |                         |                        |                        |                                               |                                               |
| Residence who are       |                         |                        |                        |                                               |                                               |
| Ages 25 years and       |                         |                        |                        |                                               |                                               |

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## OASIS-based Quality Measures

| Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-------------------------|-------------------------|-----------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| Older with Less than a High School Diploma |                         |                       |                        |                                               |                                               |
| Ambulation and Locomotion |                         |                       |                        |                                               |                                               |
| Needs no human assistance or assistive device | Reference | Reference | Reference | Reference | Reference | Reference |
| Requires two handed device for level ground or human assistance for stairs and uneven ground | -2.5** | 0.14** | 0.03** | 0.41** | -0.91** | -2.09** |
| Walks only with supervision or assistance from another at all times | -3.64** | 0.26** | 0.16** | 4.58** | 1.96** | 1.73** |
| Chairfast to bedfast | -13.88** | -0.41** | -0.13** | -3.55** | -19.12** | -4.19** |
| Risk for Hospitalization |                         |                       |                        |                                               |                                               |
| Multiple hospitalizations in past 6 months | -14.86** | -0.1** | -0.04** | -4.62** | -2.25** | -2.71** |
| History of falls | -0.17** | -0.02** | -0.02** | 0.73** | -3.14** | -1.26** |
| Currently taking 5 or more medications | -4.73** | 0.03** | -0.002 | -2.64** | 0.32** | -1.37** |
| Surgical wound | 9.55** | 0.38** | 0.12** | 9.41** | 14.69** | 3.65** |
| Requires urinary catheter | -14.21** | -0.21** | -0.11** | -2.74** | -4.32** | -1.8** |
| Discharged from Inpatient Facility in last 14 Days | -7.4** | 0.21** | 0.07** | 2.77** | 8.43** | 1.34** |
| Pressure Ulcer |                         |                       |                        |                                               |                                               |
| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|------------------------|-----------------------|------------------------|-----------------------------------------------|------------------------------------------------|
| Stage 1                     | Reference               | Reference              | Reference             | Reference              | Reference                                     | Reference                                     |
| Stage 2                     | -11.32**                | -0.38**                | -0.18**               | -6.11**                | -9.18**                                       | -3.68**                                       |
| Stage 3                     | -13.09**                | -0.32**                | -0.17**               | -4.84**                | -5.61**                                       | -4.04**                                       |
| Stage 4                     | -15.02**                | -0.41**                | -0.25**               | -5.69**                | -6.76**                                       | -8.13**                                       |
| Not Stageable               | -14.55**                | -0.34**                | -0.16**               | -5.51**                | -9**                                          | -4.75**                                       |
| Neoplasm Diagnosis          | -13.61**                | -0.14**                | -0.04**               | -6.44**                | -2.81**                                       | -3.47**                                       |
| Intervention*Ambulation and Locomotion: Requires two handed device for level ground or human assistance for stairs and uneven ground | 2.34**                  | 0.02**                 | 0.01                  | 1.18**                  | 2.6**                                        | 0.96**                                        |
| Intervention*Ambulation and Locomotion: Walks only with supervision or assistance from another at all times | 2.35**                  | 0.01                   | 0.002                 | 1.66**                  | 3.81**                                       | 0.53                                          |
| Intervention*Ambulation and Locomotion: Chairfast to bedfast | 2.13**                  | -0.01                  | 0.01                  | 2.09**                  | 4.01**                                       | 1.07**                                       |
| Regional rates of Medicare FFS inpatient stays associated with COVID-19 diagnoses | 0.01**                  | -0.001**               | -0.0004**             | -0.01*                  | -0.02**                                       | 0.004                                         |
| County-level rates of COVID-19 Diagnoses | Greater than or equal to 75th Percentile | -1.23**                | 0.03**                | 0.01*                   | -1.14**                                      | -0.4*                                         |
|                             | 25th to 75th Percentile | -1.26**                | 0.01*                 | -0.001                  | -0.96**                                      | -0.49**                                      | -0.9**                                       |
| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|------------------------|-----------------------|-----------------------|---------------------------------------------|-----------------------------------------------|
| Less than 25th Percentile   | Reference               | Reference              | Reference             | Reference             | Reference                                  | Reference                                    |
| State*Linear time trend     |                         |                        |                       |                       |                                             |                                              |
| Alaska*Linear time trend    | -0.46                   | 0.02*                  | 0.004                 | 0.57*                 | 1.63**                                     | 0.05                                         |
| Alabama*Linear time trend   | -0.03                   | 0.04**                 | 0.02**                | 2.05**                | 2.44**                                     | 1.79**                                       |
| Arkansas*Linear time trend  | 0.31**                  | 0.04**                 | 0.02**                | 2.36**                | 2.04**                                     | 1.84**                                       |
| Arizona*Linear time trend   | -0.55**                 | 0.03**                 | 0.01**                | 1.54**                | 1.98**                                     | 1.18**                                       |
| California*Linear time trend| -0.19**                 | 0.02**                 | 0.005**               | 1.17**                | 1.57**                                     | 0.6**                                        |
| Colorado*Linear time trend  | -0.15                   | 0.04**                 | 0.01**                | 1.69**                | 1.86**                                     | 1.37**                                       |
| Connecticut*Linear time trend| 0.32**                 | 0.04**                 | 0.01**                | 1.97**                | 1.94**                                     | 1.35**                                       |
| Delaware*Linear time trend  | -0.39*                  | 0.05**                 | 0.02**                | 1.69**                | 1.94**                                     | 1.3**                                        |
| Florida*Linear time trend   | -0.39**                 | 0.01**                 | 0.01**                | 2.2**                 | 2.27**                                     | 0.06                                         |
| Georgia*Linear time trend   | -0.37**                 | 0.04**                 | 0.02**                | 2.08**                | 2.57**                                     | 1.76**                                       |
| Hawaii*Linear time trend    | -0.24                   | 0.03**                 | 0.01                  | 1.09**                | 2.02**                                     | 0.73**                                       |
| Iowa*Linear time trend      | -0.18                   | 0.02**                 | 0.001                 | 0.91**                | 0.34                                       | -0.39*                                       |
| Idaho*Linear time trend     | -0.26*                  | 0.02**                 | 0.01**                | 1.16**                | 1.72**                                     | 1.22**                                       |
| Illinois*Linear time trend  | 0.17**                  | 0.02**                 | 0.01**                | 1.19**                | 0.88**                                     | 0.27*                                        |
## OASIS-based Quality Measures

|                                | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|--------------------------------|-------------------------|-------------------------|-------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| Indiana* Linear time trend     | 0.36**                  | 0.04**                  | 0.01**                  | 1.62**                 | 1.96**                                        | 0.96**                                        |
| Kansas* Linear time trend      | -0.1                    | 0.03**                  | 0.01**                  | 1.57**                 | 1.88**                                        | 0.75**                                        |
| Kentucky* Linear time trend    | 0.25                    | 0.04**                  | 0.01**                  | 1.77**                 | 2.31**                                        | 1.36**                                        |
| Louisiana* Linear time trend   | 1.11**                  | 0.05**                  | 0.02**                  | 3.24**                 | 2.65**                                        | 2.35**                                        |
| Massachusetts* Linear time trend | -0.53**              | 0.03**                  | 0.01**                  | 1.17**                 | 0.63**                                        | -0.18                                         |
| Maryland* Linear time trend    | -0.33*                  | 0.04**                  | 0.02**                  | 1.16**                 | 1.57**                                        | 0.94**                                        |
| Maine* Linear time trend       | -0.14                   | 0.03**                  | 0.01**                  | 0.85**                 | 1.17**                                        | 0.19                                          |
| Michigan* Linear time trend    | -0.02                   | 0.02**                  | 0.01**                  | 1.06**                 | 1.34**                                        | 0.62**                                        |
| Minnesota* Linear time trend   | 0.12                    | 0.02**                  | 0.005                   | 0.76**                 | 0.77                                          | 0.63**                                        |
| Missouri* Linear time trend    | 0.03                    | 0.03**                  | 0.01**                  | 1.46**                 | 1.8**                                         | 0.69**                                        |
| Mississippi* Linear time trend | 0.88**                  | 0.04**                  | 0.02**                  | 2.57**                 | 2.11**                                        | 2.07**                                        |
| Montana* Linear time trend     | -0.38*                  | 0.03*                   | 0.001                   | 0.5                    | 0.56                                          | -0.62                                         |
| North Carolina* Linear time trend | -0.55**              | 0.04**                  | 0.02**                  | 1.74**                 | 2.84**                                        | 1.06**                                        |
| North Dakota* Linear time trend | -0.39                   | 0.02                    | 0.004                   | 1.05**                 | 0.8                                           | 0.67                                          |
| Nebraska* Linear time trend    | -0.51**                 | 0.03**                  | 0.01**                  | 1.24**                 | 1.46**                                        | 0.11                                          |
| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|------------------------|-----------------------|-----------------------|-----------------------------------------------|-----------------------------------------------|
| New Hampshire *Linear time trend | 0.05 | 0.05** | 0.02** | 1.55** | 1.78** | 1.19** |
| New Jersey *Linear time trend | -0.33** | 0.04** | 0.01** | 1.27** | 1.05** | 0.9** |
| New Mexico *Linear time trend | 0.01 | 0.02** | 0.004 | 1.06** | 0.99** | 0.63** |
| Nevada *Linear time trend | -0.39* | 0.01* | 0.004 | 0.74** | 0.45 | 0.54 |
| New York *Linear time trend | 0.48** | 0.05** | 0.02** | 2** | 1.63** | 1.12** |
| Ohio *Linear time trend | 0.22 | 0.04** | 0.01** | 1.53** | 2.18** | 1.07** |
| Oklahoma *Linear time trend | 0.46** | 0.04** | 0.01** | 2.18** | 1.69** | 1.66** |
| Oregon *Linear time trend | 0.09 | 0.03** | 0.01** | 0.97** | 1.74** | 0.76** |
| Pennsylvania *Linear time trend | -0.3** | 0.04** | 0.01** | 1.38** | 1.71** | 0.84** |
| Rhode Island *Linear time trend | -0.24* | 0.06** | 0.02** | 1.23** | 1.25** | 0.96** |
| South Carolina *Linear time trend | -0.35** | 0.04** | 0.02** | 1.01** | 1.48** | 0.71** |
| South Dakota *Linear time trend | -0.04 | 0.03** | 0.01** | 0.78** | 2.08** | -0.14 |
| Tennessee *Linear time trend | -0.25* | 0.04** | 0.01** | 2.69** | 2.82** | 2.07** |
| Texas *Linear time trend | 0.65** | 0.04** | 0.01** | 2.76** | 2.46** | 2.06** |
| Utah *Linear time trend | -0.06 | 0.03** | 0.01** | 0.69** | 1.28** | 1.63** |
| Virginia *Linear time trend | -0.14 | 0.04** | 0.01** | 1.51** | 1.85** | 1** |

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| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|-------------------------|-----------------------|-----------------------|-----------------------------------------------|-----------------------------------------------|
| Vermont*Linear time trend   | -0.16                   | 0.03**                  | 0.01**                | 1.08**                | 1.13**                                        | 0.69**                                        |
| Washington*Linear time trend| -0.25*                  | 0.06**                  | 0.02**                | 2.07**                | 2.64**                                        | 1.6**                                         |
| Wisconsin*Linear time trend | 0.1                     | 0.04**                  | 0.01**                | 1.52**                | 1.82**                                        | 1.07**                                        |
| West Virginia*Linear time trend | -0.19                | 0.06**                  | 0.02**                | 2.28**                | 2.49**                                        | 2.25**                                        |
| Wyoming*Linear time trend   | -0.03                   | 0.03**                  | 0.01**                | 0.96**                | 1.59**                                        | -0.25                                         |
| Start of Care TNC Self-Care: Less than 8 OASIS responses | Reference               |                         |                       |                       |                                               |                                               |
| Start of Care TNC Self-Care: 8-10 OASIS responses |                         |                         | 0.66**                |                       |                                               |                                               |
| Start of Care TNC Self-Care: 11-15 OASIS responses |                         |                         |                       | 1.05**                |                                               |                                               |
| Start of Care TNC Self-Care: 16 or more OASIS responses |                         |                         |                       | 1.16**                |                                               |                                               |
| Intervention*Start of Care TNC Self-Care: 8-10 OASIS responses |                         |                         |                       | 0.04**                |                                               |                                               |
| Intervention*Start of Care TNC Self-Care: 11-15 OASIS responses |                         |                         |                       | 0.04**                |                                               |                                               |
| Intervention*Start of Care TNC Self-Care: 16 |                         |                         |                       | 0.07**                |                                               |                                               |
| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| or more OASIS responses     |                         |                         |                        |                        |                                               |                                               |
| Start of Care TNC Mobility:Less than 4 OASIS responses |                         |                         |                        | Reference              |                                               |                                               |
| Start of Care TNC Mobility:4-6 OASIS responses         |                         |                         |                        | 0.26**                 |                                               |                                               |
| Start of Care TNC Mobility:7-9 OASIS responses         |                         |                         |                        | 0.53**                 |                                               |                                               |
| Start of Care TNC Mobility:10 or more OASIS responses  |                         |                         |                        | 0.71**                 |                                               |                                               |
| Intervention*Start of Care TNC Mobility:4-6 OASIS responses |                         |                         |                        | 0.01**                 |                                               |                                               |
| Intervention*Start of Care TNC Mobility:7-9 OASIS responses |                         |                         |                        | 0.01                   |                                               |                                               |
| Intervention*Start of Care TNC Mobility:10 or more OASIS responses |                         |                         |                        | 0.004                  |                                               |                                               |
| Start of Care Dyspnea:Patient is short of breath only when walking more than 20 feet |                         |                         |                        |                        | Reference                                     |                                               |
| Start of Care Dyspnea:Patient is dyspneic or |                         |                         |                        |                        |                                               | 17.37**                                      |
| OASIS-based Quality Measures                      | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|--------------------------------------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| noticeable short of breath with moderate exertion |                         |                         |                        |                        |                                               |                                               |
| Start of Care Dyspnea: Patient is dyspneic or noticeable short of breath with minimal exertion or at rest |                         |                         |                        |                        |                                               |                                               |
| Intervention*Start of Care Dyspnea: Patient is dyspneic or noticeable short of breath with moderate exertion |                         |                         |                        | 23.64**                 |                                               |                                               |
| Intervention*Start of Care Dyspnea: Start of Care Dyspnea: Patient is dyspneic or noticeable short of breath with minimal exertion or at rest |                         |                         |                        |                        | 0.09                                          |                                               |
| Intervention*Start of Care Dyspnea: Start of Care Dyspnea: Patient is dyspneic or noticeable short of breath with moderate exertion |                         |                         |                        |                        |                                               |                                               |
| Start of Care Oral Medication Management: Patient is able to take oral medications if prepared in advance/another person develops a drug diary |                         |                         |                        |                        | 0.3                                           | Reference                                     |

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| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|-------------------------|------------------------|-----------------------|-----------------------------------------------|-----------------------------------------------|
| Start of Care Oral Medication Management: Patient is able to take medications at the correct time if given reminders by other person at appropriate times |                         |                         |                        |          | 16.52**                                      |                                               |
| Start of Care Oral Medication Management: Patient is unable to take medication unless administered by another person |                         |                         |                        |          | 9.44**                                       |                                               |
| Intervention*Oral Medication Management: Patient is able to take medications at the correct time if given reminders by other person at appropriate times |                         |                         |                        |          | -3.42**                                      |                                               |
| Intervention*Oral Medication Management: Patient is unable to take medication unless administered by another person |                         |                         |                        |          | -3.56**                                      |                                               |
| OASIS-based Quality Measures | Discharged to community | TNC change in self-care | TNC change in mobility | Improvement in dyspnea | Improvement in management of oral medications | Improvement in pain interfering with activity |
|-----------------------------|-------------------------|-------------------------|------------------------|------------------------|-----------------------------------------------|-----------------------------------------------|
| Start of Care Pain: Pain does not interfere with activity | | | | | | Reference |
| Start of Care Pain: Pain Interferes less often with patient's activity or movement than daily pain | | | | | 16.04** | |
| Start of Care Pain: Pain Interferes daily with patient's activity or movement, but not constant pain | | | | | 16.53** | |
| Start of Care Pain: Patient is in constant pain | | | | | 29.27** | |
| Intervention*Pain: Pain Interferes less often with patient's activity or movement than daily pain | | | | | 0.17* | |
| Intervention*Pain: Pain Interferes daily with patient's activity or movement, but not constant pain | | | | | -0.66* | |
| Intervention*Pain: Patient is in constant pain | | | | | -2.15** | |

Abbreviations: D-in-D, difference-in-differences; FFS, fee-for-service; HHA, home health agency; OASIS, Outcome and Assessment Information Set; TNC, total normalized composite.

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* P<.10; ** P<.05.  

a D-in-D estimate for 2016.  
b D-in-D estimate for 2017.  
c D-in-D estimate for 2018.  
d D-in-D estimate for 2019.  
e D-in-D estimate for 2020.
**eTable 7. Multivariate D-in-D Regression Results for the HHCAHPS-based Measures**

| Patient Experience | Professional Care | Communication | Discussion of Care | Overall Care | Likely to Recommend |
|--------------------|------------------|---------------|-------------------|-------------|-------------------|
| N of HHA-years     | 62,148           | 62,148        | 62,148            | 62,148      | 62,148            |
| Intercept          | 85.17**          | 83.57**       | 77.4**            | 77.59**     | 75.25**           |

**State**

| State             | Intercept | State     | **Coef.** | **Coef.** | **Coef.** | **Coef.** | **Coef.** |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Alaska            | 0.91      | Alaska    | 0.32      | 0.71      | 0.46      | 0.07      |
| Alabama           | 4.41**    | Alabama   | 4.99**    | 6.62**    | 7.14**    | 6.96**    |
| Arkansas          | 2.17**    | Arkansas  | 2.22**    | 3.16**    | 3.69**    | 2.44**    |
| Arizona           | 0.47      | Arizona   | 0.01      | 0.97      | 0.13      | -1.95     |
| California        | -0.29     | California| -0.51     | 1.28*     | -0.33     | -2.81**   |
| Colorado          | 0.52      | Colorado  | 0.36      | 1.57**    | 0.81      | -1.32     |
| Connecticut       | -0.53     | Connecticut| -0.37    | 1.68**    | 0.14      | -1.45     |
| Delaware          | 1.17      | Delaware  | 1.42      | 3.48**    | 2.62      | 0.46      |
| Florida           | 1.7**     | Florida   | 1.5**     | 1.38**    | 2.91**    | 0.85      |
| Georgia           | 2.28**    | Georgia   | 2.69**    | 2.96**    | 4.21**    | 3.42**    |
| Hawaii            | 7.07**    | Hawaii    | 6.86**    | 4.17**    | 8.89**    | 9.22**    |
| Iowa              | -0.33     | Iowa      | -0.08     | 2.98**    | 0.76      | -2.09*    |
| Idaho             | 1.25*     | Idaho     | 0.58      | 0.25      | 1.61      | 1.18      |
| Illinois          | 1.6**     | Illinois  | 1.69**    | 3.35**    | 2.68**    | -0.08     |
| Indiana           | 0.48      | Indiana   | 0.9       | 1.59**    | 2.04**    | -1.04     |
| Kansas            | 1.01      | Kansas    | 1.03      | 3.25**    | 2.15**    | 0.81      |
| Kentucky          | 3.15**    | Kentucky  | 2.94**    | 2.76**    | 5.21**    | 4.0**     |
| Louisiana         | 4.76**    | Louisiana | 5.35**    | 6.91**    | 7.67**    | 7.58**    |
| Massachusetts     | 1.38**    | Massachusetts| 1.03   | 4.46**    | 2.49**    | 1.83      |
| Maryland          | 1.25      | Maryland  | 1.64*     | 2.17**    | 1.93      | -0.22     |
| Maine             | 0.99      | Maine     | 1.51*     | 1.64**    | 2.6**     | 2.62*     |
| Michigan          | 1.28**    | Michigan  | 1.34*     | 3.0**     | 2.42**    | -0.91     |
| Minnesota         | -1.44**   | Minnesota | -1.63**   | 0.04      | -1.9*     | -5.05**   |
| Missouri          | 1.61**    | Missouri  | 2.06**    | 3.88**    | 2.75**    | 0.42      |
| Mississippi       | 4.91**    | Mississippi| 5.28**  | 6.52**    | 7.8**     | 7.99**    |
| Montana           | -0.42     | Montana   | -0.71     | -0.44     | -0.58     | -2.77*    |
| North Carolina    | 3.54**    | North Carolina| 3.77** | 4.5**     | 5.67**    | 4.07**    |
| State                | Patient Experience | Professional Care | Communication | Discussion of Care | Overall Care | Likely to Recommend |
|---------------------|--------------------|-------------------|---------------|--------------------|--------------|---------------------|
| North Dakota        | 0.57               | 0.44              | 3.76**        | 0.89               | -0.36        |
| Nebraska            | -0.33              | 0.31              | 1.69*         | -0.15              | -2.38*       |
| New Hampshire       | 0.83               | 0.85              | 2.55**        | 2.43**             | 2.85*        |
| New Jersey          | 0.17               | 0.56              | 3.04**        | 0.79               | -1.28        |
| New Mexico          | 1.76**             | 1.45*             | 3.11**        | 2.68**             | 1.65         |
| Nevada              | 1.07               | -0.59             | 2.11**        | -0.18              | -0.01        |
| New York            | -3.12**            | -2.7**            | -0.33         | -3.72**            | -6.7***      |
| Ohio                | 0.45               | 0.3               | 1.91**        | 1.38               | -2.8**       |
| Oklahoma            | 2.22**             | 2.27**            | 4.26**        | 3.55**             | 2.07*        |
| Oregon              | -0.91              | -1.43*            | -0.97         | -2.6**             | -3.53**      |
| Pennsylvania        | 2.32**             | 2.84**            | 3.63**        | 4.4**              | 1.34         |
| Rhode Island        | 1.3*               | 2.07**            | 4.09**        | 2.72**             | 1.37         |
| South Carolina      | 4.01**             | 4.6**             | 5.29**        | 6.75**             | 6.29**       |
| South Dakota        | 1.41*              | 0.91              | 3.22**        | 2.08*              | 0.77         |
| Tennessee           | 3.04**             | 3.33**            | 3.69**        | 4.49**             | 3.76**       |
| Texas               | 2.22**             | 2.24**            | 5.43**        | 4.11**             | 2.73**       |
| Utah                | 0.13               | -1.41             | -0.72         | -0.18              | -0.95        |
| Virginia            | 1.36**             | 1.65**            | 1.25**        | 2.53**             | 0.81         |
| Vermont             | -0.61              | -0.78             | 0.27          | -0.42              | 1.85         |
| Washington          | -0.43              | -1.12             | 0.02          | -1.29              | -2.76**      |
| Wisconsin           | -0.25              | -0.04             | 1.24          | -0.11              | -2.77**      |
| West Virginia       | 3.25**             | 3.6**             | 3.19**        | 5.35**             | 4.88**       |
| Wyoming             | Reference          | Reference         | Reference     | Reference          | Reference     |
| Year                | 2013-2015          | Reference         | Reference     | Reference          | Reference     |
| 2016                | -0.08              | -0.04             | -0.03         | 0.21*              | -0.17        |
| 2017                | -0.18**            | -0.14*            | -0.25**       | -0.04              | -0.65**      |
| 2018                | -0.01              | 0.07              | -0.05         | 0.02               | -0.72**      |
| 2019                | 0.09               | 0.07              | 0.09          | 0.37**             | -0.53**      |
| 2020                | 1.53               | 0.68              | 0.81          | 1.09               | -3.38        |
| Intervention*2016 a | -0.11              | -0.22             | -0.35*        | -0.1               | 0.01         |
| Intervention*2017 b | 0.02               | -0.05             | 0.22          | 0.03               | 0.29         |

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| Patient Experience | Professional Care | Communication | Discussion of Care | Overall Care | Likely to Recommend |
|--------------------|------------------|---------------|-------------------|--------------|---------------------|
| Intervention*2018  | -0.08            | -0.3*         | -0.24             | 0.25         | 0.39                |
| Intervention*2019  | -0.41**          | -0.41**       | -0.62**           | -0.18        | -0.03               |
| Intervention*2020  | -0.48**          | -0.22         | -0.65**           | -0.23        | -0.72**             |
| Female             | 2.3**            | 1.03          | 1.67**            | 5.18**       | 4.22**              |
| Race/Ethnicity     |                  |               |                   |              |                     |
| (Mutually Exclusive)|                 |               |                   |              |                     |
| Non-Hispanic Black | -3.55**          | -6.23**       | -3.47**           | -7.49**      | -10.94**            |
| Hispanic           | -0.37            | -1.46**       | -4.93**           | -0.96**      | -2.38**             |
| Non-Hispanic Other Race | -10.56** | -9.05** | -2.97** | -12.72** | -13.89** |
| Non-Hispanic Multiracial | 3.51    | -2.56        | -4.23             | 1.04         | 1.22                |
| Non-Hispanic White | Reference        | Reference     | Reference         | Reference    | Reference            |
| Dual Eligible      | 1.76**           | 2.56**        | 9.19**            | 3.27**       | 4.48**              |
| Medicaid           | -4.46**          | -4.7**        | -5.25**           | -5.07**      | -8.23**             |
| Rural              | 1.98**           | 1.92**        | 2.17**            | 2.91**       | 4.56**              |
| Hospital-based HHA | 1.04**           | 1.36**        | 2.13**            | 1.38**       | 1.52**              |
| Ownership          |                  |               |                   |              |                     |
| Non-profit         | 0.96**           | 1.06**        | 1.48**            | 1.73**       | 2.93**              |
| Government-owned   | 1.46**           | 1.42**        | 1.69**            | 2.74**       | 4.14**              |
| For-profit         | Reference        | Reference     | Reference         | Reference    | Reference            |
| HHA Size           |                  |               |                   |              |                     |
| 1-59 OASIS episodes| -0.27            | -0.44*        | 0.7**             | -0.98**      | -1.84**             |
| 60-249 OASIS episodes| 0.24**    | 0.14          | 0.69**            | 0.18         | -0.25               |
| 250-499 OASIS episodes| 0.01     | -0.03         | -0.22*            | 0.004        | -0.41**             |
| 500-999 OASIS episodes| -0.05    | 0.02          | -0.22*            | -0.13        | -0.37**             |
| 1,000 or more OASIS episodes| Reference | Reference | Reference | Reference | Reference |
| HHA Age                  | Patient Experience | Communication | Discussion of Care | Overall Care | Likely to Recommend |
|-------------------------|--------------------|---------------|--------------------|--------------|---------------------|
|                         | Professional Care  |               |                    |              |                     |
| 0-3 years               | -0.36**            | -0.64**       | -0.29              | -1.11**      | -0.72**             |
| 4-10 years              | -0.35**            | -0.69**       | -0.32**            | -0.84**      | -0.89**             |
| 11 years or more        | Reference          | Reference     | Reference          | Reference    | Reference            |
| HHA Chain               |                    |               |                    |              |                     |
| Missing                 | -0.31              | -0.38         | -0.55*             | 0.03         | -0.62               |
| Undetermined            | 0.20               | 0.05          | -0.26              | 0.55**       | 0.47                |
| Not Affiliated          | 0.48**             | 0.22**5       | -0.7**             | 0.95**       | 1.03**              |
| Affiliated              | Reference          | Reference     | Reference          | Reference    | Reference            |
| Regional rates of       |                    |               |                    |              |                     |
| Medicare FFS inpatient  |                    |               |                    |              |                     |
| stays associated with   |                    |               |                    |              |                     |
| COVID-19 diagnoses      | 0.01               | 0.02          | 0.04**             | 0.03         | 0.02                |
| County-level rates of   |                    |               |                    |              |                     |
| COVID-19 Diagnoses      |                    |               |                    |              |                     |
| Greater than or         |                    |               |                    |              |                     |
| equal to 75th Percentile| -1.71              | -1.04         | -3.73*             | -0.19        | 3.11                |
| 25th to 75th Percentile | -1.71              | -1.09         | -2.51              | -1.28        | 3.9                 |
| Less than 25th Percentile| Reference          | Reference     | Reference          | Reference    | Reference            |

Abbreviations: D-in-D, difference-in-differences; FFS, fee-for-service; HHA, home health agency; HHCAHPS, Home Health Consumer Assessment of Healthcare Providers and Systems; OASIS, Outcome and Assessment Information Set.

* P<.10; ** P<.05. a D-in-D estimate for 2016. b D-in-D estimate for 2017. c D-in-D estimate for 2018. d D-in-D estimate for 2019. e D-in-D estimate for 2020.
**eTable 8. Sample Sizes for Analyses of Utilization, Medicare Payments, OASIS-based Quality, and HHCAHPS-based Measures**

| Measure                                                                 | HHVBP States | Non-HHVBP States |
|------------------------------------------------------------------------|--------------|------------------|
| **Home Health Utilization (county-year level)**                        |              |                  |
| FFS beneficiaries with at least 1 HH episode                           | 4,368        | 20,722           |
| **Health Care Utilization During HH Episodes (claims-based episode level)** |            |                  |
| Unplanned hospitalizations among 1st HH episodes                       | 5,422,915    | 15,580,576       |
| Total ED use                                                           | 5,459,773    | 15,691,141       |
| Outpatient ED use                                                      | 5,422,915    | 15,580,576       |
| ED use followed by inpatient admission                                 | 5,459,773    | 15,691,141       |
| SNF use                                                                | 9,990,283    | 33,769,633       |
| **Average Medicare Parts A and B Payments Per Day (episode level)**    |              |                  |
| During and following FFS HH episodes of care                           | 21,424,943   | 72,216,849       |
| **Components of Average Medicare Payments Per Day During and Following FFS HH Episodes of Care (claims-based episode level)** |        |                  |
| HH                                                                     | 21,424,943   | 72,216,849       |
| Inpatient                                                              |              |                  |
| Outpatient institutional                                               |              |                  |
| ED and observation stays                                              |              |                  |
| Other                                                                  |              |                  |
| SNF                                                                    |              |                  |
| Hospice                                                                |              |                  |
| Part B non-institutional                                               |              |                  |
| **OASIS-based Quality Measures (OASIS episode level)**                 |              |                  |
| Discharged to community                                                | 12,416,913   | 41,153,728       |
| TNC change in self-care                                               | 9,258,578    | 30,008,484       |
| TNC change in mobility                                                | 9,258,578    | 30,008,484       |
| Improvement in dyspnea                                                 | 7,182,872    | 22,554,613       |
| Improvement in management of oral medications                          | 7,778,353    | 24,885,978       |
| Improvement in pain interfering with activity                          | 7,773,002    | 25,361,828       |
| Measure                                                                 | HHVBP States | Non-HHVBP States |
|------------------------------------------------------------------------|--------------|------------------|
| Patient Experience (agency-year level)                                 |              |                  |
| How often the home health team gave care in a professional way         | 12,127       | 50,021           |
| (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)                                           |              |                  |

Abbreviations: ED, emergency department; FFS, fee-for-service; HH, home health; HHCAHPS, Home Health Care Consumer Assessment of Healthcare Providers and Systems; HHVBP, home health value-based purchasing; OASIS, Outcome and Assessment Information Set; SNF, skilled nursing facility; TNC, total normalized composite.
eFigure 1. Percentage of Home Health Episodes with an Initial COVID-19 Diagnosis, January to December 2020

[Graph showing the percentage of home health episodes with an initial COVID-19 diagnosis from January to December 2020, divided into HHVB and Non-HHVB categories.]
eFigure 2. Assessing Parallel Trends for Outcomes based on Adjusted Models

Legend: Each panel shows the adjusted measure value for HHVBP and non-HHVBP states for 2013-2020

Unplanned acute care hospitalization among first HH episodes

ED use without hospitalization among first HH episodes

Average Medicare payments per day during and following FFS HH episodes of care
Professional care

Communication

Discussion of care

Overall care rating

Likely to recommend