

Report to Congress

Medicare Home Health Study: An Investigation on Access to Care and Payment for Vulnerable Patient Populations

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1. Executive Summary

Under the Medicare home health benefit, individuals meeting the eligibility criteria-- those who are generally confined to the home and need intermittent skilled care for their illness or injury-- can receive needed care at home. Medicare home health services include intermittent skilled nursing care, physical therapy, continuing occupational therapy, speech--language pathology, home health aide services, and medical social services. Since October 2000, Medicare has paid for home health services under a home health prospective payment system (HH PPS).

Section 3131(d) of the Patient Protection and Affordable Care Act (Pub. L. 111-148) directs the Secretary of Health and Human Services to conduct a study on home health agency (HHA) costs involved with providing ongoing access to care to low-income Medicare beneficiaries or beneficiaries in medically underserved areas and in treating beneficiaries with high levels of severity of illness. This report presents results of research conducted pursuant to Section 3131(d).

In order to examine access to Medicare home health services and payment, relative to cost, for the vulnerable patient populations, the research team performed extensive analysis of both survey and administrative data. Specifically, the research team collected survey data from physicians and HHAs to examine factors associated with potential access to care issues. The surveys provided information on whether, and the reasons as to why, patients were not placed or admitted for home health services or experienced delays in receiving home health services, and information on the characteristics of patients who may have experienced access issues.

The research team also analyzed administrative data through descriptive and regression analyses to examine the relationship between patient characteristics and estimated financial margin (difference between payment and estimated cost). The study focused on margins because margin differences, particularly those associated with patient characteristics, indicate that financial incentives may exist in the HH PPS to provide home health care for certain types of patients over others. Lower margins, if systematically associated with care for vulnerable patient populations, may indicate financial disincentives for HHAs to admit these patients and may create access to care issues for them. A very broad set of patient characteristics, including clinical, non-clinical, and demographic characteristics, were tested to examine possible sources of margin variation. The majority of the analysis focused on “normal” episodes (non-low utilization payment adjustment episodes, non-partial episodes, non-outlier episodes). The research team conducted a separate analysis to examine the relationship between patient characteristics and financial margin for outlier episodes. After identifying the vulnerable patient populations whose home health care may be associated with lower margins under the HH PPS, and who may experience access to

care issues, the research team explored potential payment methodology options to alleviate margin differences.

Survey findings: Over 80 percent of HHAs and over 90 percent of physicians reported that access to home health care for Medicare fee-for-service beneficiaries in their local area was excellent or good. When survey respondents reported access issues, specifically their inability to place or admit Medicare fee-for-service patients into home health, the most common reason reported was that the patients did not qualify for the Medicare home health benefit. HHAs and physicians also cited family or caregiver issues as an important contributing factor in the inability to admit or place patients. About 17.2 percent of HHAs and 16.7 percent of physicians reported insufficient reimbursement as an important contributing factor in the inability to admit or place patients. The survey results suggest that much of the variation in access to Medicare home health services is associated with social and personal conditions and therefore CMS' ability to improve access for certain vulnerable patient populations through payment policy may be limited.

Administrative data findings: Analysis of CY 2010 HHA payment and cost data suggests that margins may differ substantially across the HH PPS case-mix groups. In addition, particular beneficiary characteristics appear to be strongly associated with margin, and thus may create financial incentives to select certain patients over others. Margins were estimated to be lower in CY 2010 for patients who required parenteral nutrition, who had traumatic wounds or ulcers, or required substantial assistance in bathing. Given that these variables are already included in the HH PPS case-mix system, the results indicate that modifications to the case-mix system may be needed. Furthermore, in CY 2010, beneficiaries admitted after acute or post-acute stays or who had high Hierarchical Condition Category scores¹ or certain poorly-controlled clinical conditions, such as poorly-controlled pulmonary disorders, were also associated with substantially lower home health margins. In addition, other characteristics, such as those describing assistance by informal caregivers for ADL needs and those describing socio-economic status, such as dual eligibility for Medicare and Medicaid, were strongly associated with margins. Exploration of potential payment methodology changes indicated that accounting for additional variables in HH PPS reimbursement may decrease the difference in estimated margin between individuals in specific vulnerable subgroups and those not in the subgroups, thereby potentially decreasing financial incentives to select certain types of patients over others.

¹CMS currently uses Hierarchical Condition Category (HCC) data to risk-adjust capitated payments to Medicare Advantage plans. Diagnoses and demographic information are used to develop an overall HCC score, which is used to set each enrollee's monthly capitation rate.

Next Steps: CMS plans to further explore margin differences across patient characteristics and possible payment methodology changes suggested by the results of this study using more current data. Given the recalibration of the case-mix weights in CY 2012, which increased case-mix weights for no- or low-therapy episodes and lowered weights associated with high-therapy episodes, the variation in margins across the Home Health Resource Groups (HHRGs) seen in this study's analysis of CY 2010 data may have already been reduced. Any variables under consideration for incorporation into the payment system will need to be assessed, first, to determine the added value of the variable when weighed against possible adverse incentives that the payment change may create.

2. Background

The Home Health Prospective Payment System (HH PPS) was implemented October 1, 2000. The system is designed to make Medicare payments on the basis of a national, standardized 60-day episode amount for all covered home health services, adjusted for case-mix and area wage differences. Covered home health services include intermittent skilled nursing services, home health aide services, physical therapy services, speech-language pathology services, continuing occupational therapy services, medical social work, and routine and non-routine medical supplies. Durable medical equipment is separately billable and certain osteoporosis drugs, when criteria are met, are covered and billed during the home health episode, but are reimbursed on a reasonable cost basis.

In addition to the national, standardized 60-day episode amount, HHAs can receive an outlier payment for those episodes whose imputed cost exceeds a threshold amount due to unusual variations in the type or amount of medically necessary care. The amount of the outlier payment is a proportion (currently 80 percent) of the amount of imputed costs beyond the threshold. Episodes with outlier payments are defined as outlier episodes. Episodes with four or fewer visits are Low-Utilization Payment Adjustment (LUPA) episodes and are paid on a national per-visit basis.

The Patient Protection and Affordable Care Act (Pub. L. 111-148), also referred to as the Affordable Care Act, was enacted on March 23, 2010 and amended by the Health Care and Education Reconciliation Act of 2010 (Pub. L. 111-152), enacted on March 30, 2010. Section 3131(d) of the Affordable Care Act requires the Secretary of Health and Human Services to conduct a study on HHA costs involved with providing ongoing access to care to low-income Medicare beneficiaries or beneficiaries in medically underserved areas, and in treating beneficiaries with high levels of severity of illness. As part of the study, the Secretary may analyze methods to potentially revise the home health prospective payment system, such as:

- payment adjustments for services that involve either more or fewer resources than are reflected in the current HH PPS;

- changes to reflect resources involved with providing home health services to low-income Medicare beneficiaries or Medicare beneficiaries residing in medically underserved areas;
- ways outlier payments could be revised to reflect the costs of treating Medicare beneficiaries with high levels of severity of illness; and
- other issues determined appropriate by the Secretary.

In addition, the Secretary may analyze operational issues involved with implementation of potential revisions to the HH PPS and determine whether additional research is needed. Section 3131(d) of the Affordable Care Act also requires that the Secretary submit a Report to Congress on the study, along with any potential recommendations for legislation and administrative action as the Secretary determines appropriate. If specific payment changes are identified, Section 3131(d) of the Affordable Care Act gives the Secretary the authority to conduct a separate demonstration project to test the recommended payment system changes resulting from the study.

The Affordable Care Act study provision was enacted to address concerns that vulnerable patient populations may experience problems in accessing Medicare home health services and that the current HH PPS encourages providers to adopt selective admission patterns. The Centers for Medicare & Medicaid Services (CMS) awarded a contract to L&M Policy Research, along with subcontractors Avalere Health, Mathematica Policy Research, and Social & Scientific Systems (SSS), to conduct the mandated study on access to care and payment for vulnerable patient populations (i.e., low-income Medicare beneficiaries or beneficiaries in medically underserved areas and patients with high levels of severity of illness) and explore potential payment methodology options to address issues identified in the study.

3. Overview

The premise of the study is that payment, relative to the cost of care, for specific patient populations may vary and that HHAs may avoid patients with characteristics that are associated with lower margins, creating potential access issues for these patients.

The first goal of the study was to identify the vulnerable patient populations with potential access to care issues. In order to identify these populations, the research team performed a literature review, met with a technical expert panel (consisting of industry representatives, physicians, home health research experts, and other stakeholders), and conducted open-door forums. Based on their input and the data available, the research team developed an analytic plan to identify and examine patient characteristics that may be associated with lower margins. The analytic plan involved the use of statistical analyses of administrative data to examine the relationship between patient characteristics and margins. The second goal of the study was to explore potential

payment methodology options based on the results of the administrative data analyses. The methods and findings of these analyses are described in Section 4.

In addition to performing analysis of administrative data, the research team conducted surveys of physicians and HHAs in order to examine access to care and factors involved in access to care issues. The survey methodology and findings are described in Section 5.

4. Analysis

4.1 Analytic Approach

In order to identify patient characteristics that may be associated with lower margins, the research team first calculated estimated episode margins. Estimated episode margins were calculated as the difference between the payment for an episode minus the cost for an episode. The cost per episode was calculated by summing the product of an HHA's specific costs per visit per discipline, as reported on the cost report, and the number of visits per discipline per episode, as reported on the claim, across disciplines.² The payment per episode was obtained from claims data.³ For the analyses in this section, the research team only examined data from freestanding HHAs and matched cost report data to claims data, as described in more detail in Section 4.2.

After calculating the estimated episode margins, the research team examined the relationship between patient characteristics and episode margins through the use of descriptive and regression analysis. The descriptive analyses were performed at the HHRG-level and episode-level and are described in further detail in Sections 4.3 and 4.4. The regression analyses are described in further detail in Sections 4.5.

In addition to using regression analyses to identify patient characteristics that may be associated with lower margins, regression analyses were also used to explore and examine various payment methodology options. Subgroup analyses were performed to explore the potential for various groups of added case-mix characteristics to reduce margin disparities for specific vulnerable patient populations. The methods and findings of these analyses are described in Sections 4.5.

²Episodes for which costs could not be reliably estimated or for which cost information was unavailable through the cost reports were excluded. Episode costs associated with the provision of durable medical equipment (DME), non-routine supplies, prosthetics, and oxygen, were also excluded. Many cost reports did not report NRS costs even when NRS was supplied. Therefore, given the lack of consistent NRS cost data, NRS was not examined under this study.

³Given the cost exclusions, explicit claim payments for DME, non-routine supplies, prosthetics, and oxygen were excluded from the episode payment.

The majority of the analyses examined normal episodes (episodes other than LUPA, partial episode payment (PEP), or outlier episodes), since the majority of home health episodes are normal episodes. However, since Section 3131(d) of the Affordable Care Act specifically mentioned that the Secretary may examine ways outlier payments may be revised, the research team also performed analysis of outlier episodes, as described in Section 4.6.

4.2 Data Sources

In order to perform the analyses for the study, analytic files were constructed from various data sources. The primary source of data for analyses described in this report was the Home Health Datalink file, which consists of home health claims records, Outcome and Assessment Information Set (OASIS) data, beneficiary demographic and entitlement status data, hierarchical condition category (HCC) data⁴, Part D low-income subsidy (LIS) data, and inpatient hospital, inpatient rehabilitation, and skilled nursing facility (SNF) claims summaries for periods preceding and following the home health episode. The Datalink file was merged with fiscal year (FY) 2010 Medicare cost report data, carrier standard analytic files, outpatient standard analytic files, SNF standard analytic files, the 2011 area resource file (ARF), 2007-2010 Census Bureau data, and a rural urban commuting area codes (RUCA) file.

The analyses mainly used CY 2010 claims data, which were the most current, complete data at the time of the study. The analyses focused on home health episodes that could be linked to HHA cost report data in the FY 2010 cost report file. Certain cost reports with missing data, extreme values, or questionable data in the FY 2010 cost report dataset were excluded in order to improve the robustness of the data.⁵ After the exclusions were performed, 5,418 cost reports remained (Table 1).

⁴CMS currently uses Hierarchical Condition Category (HCC) data to risk-adjust capitated payments to Medicare Advantage plans. Diagnoses and demographic information are used to develop an overall HCC score, which is used to set each enrollee's monthly capitation rate.

⁵ Cost reports were excluded if they met any of the following criteria:

- 1) Cost reports were for HHAs that were not freestanding.
- 2) Cost reports were for HHAs in US territories.
- 3) Time covered by the cost report was less than 10 months or greater than 14 months.
- 4) Any component of total payments was missing.
- 5) Any component of total costs was missing.
- 6) Cost reports were for HHAs that had an average cost per episode in the 1st or 99th percentile of all HHAs' costs per episode.
- 7) Cost reports had payment or costs that were outliers; where extreme values were identified if the log of the ratio of payment to costs exceeds the 90th percentile of the distribution plus 1.5 times the interdecile range, or if the log of the ratio of payment to costs is less than the 10th percentile minus 1.5 times the interdecile range.
- 8) HHA margins were among the highest 5 percent or the lowest 5 percent.
- 9) Outlier ratio (total outlier payments/total payments) was greater than or equal to 0.10.
- 10) Cost reports had costs per visit in the top or bottom 1% for all cost per visit variables.

Table 1. Counts of Freestanding HHA Cost Reports For Each Exclusion Criterion, Fiscal Year 2010

Row	Data Characteristics	Observed Counts
1	Number of providers	8,620
2	Number of non-US providers	38
3	Number with invalid cost report months (<10 or >14)	407
4	Number with any Medicare payment components missing	1,131
5	Number with any Medicare cost components missing	2
6	Number that are top/bottom 1% of cost per episode	746
7	Number of payment-to-cost-ratio outliers	16
8	Number of margin outliers	628
9	Number with outlier payment ratio >0.1	225
10	Number that are Top/Bottom 1% for all cost per visit variables	9
11	Provider count after all deletions (in rows 2-10)	5,418

Note: Criteria are applied in the order listed above

Source: HCRIS Cost Reports downloaded from CMS on 10/15/2011.

4.3 HHRG-level analysis

The research team's first approach to identifying patient characteristics that may be associated with lower margins was to identify HHRGs and the characteristics of episodes within the HHRGs that are more likely to have higher or lower margins. Ideally, HHRGs should have the same average estimated margin (average estimated payment minus average estimated cost), indicating that there are no financial incentives to admit a patient who would be categorized into one HHRG over a patient categorized into a different HHRG. The research team examined normal episodes and looked at the average estimated cost, average estimated margin, average estimated payment to cost ratio, and cost variation across HHRGs (please see Table 1 in Appendix A). The analysis showed that in CY 2010, as expected, the average estimated margin for each HHRG was positive, varying from \$133 to \$1,913. For instance, the research team estimated that episodes with the HHRG 1C1F1S1 (low clinical score, low functional score, 0-5 therapy visits) had an average estimated margin of \$133 and a payment to cost ratio of 1.11 while episodes with HHRG 5C3F3S1 (high clinical score, high functional score, 20 or more therapy visits) had an average estimated margin of \$1,913 and a payment to cost ratio of 1.33.

Note that the variation in the average estimated margin across HHRGs with varying therapy levels may have been mitigated by the CY 2012 recalibration of the case mix weights, where CMS lowered the case-mix weights for high therapy groups and increased the payments for low

or no-therapy groups. A reduction in the margin variation due to recalibration would not be reflected in the data used for analysis. However, while the weight recalibration specifically focused on average estimated margin differences across HHRGs with differing therapy levels, there may still be variation in the margins across HHRGs with similar therapy levels.

After arraying the HHRGs according to average estimated margin, the research team focused on the top and bottom HHRGs that exhibited high variation in cost and included sufficient numbers of episodes. Then, they examined whether characteristics in the selected HHRGs were associated with lower episode margins. For the analysis, the research team examined a broad range of beneficiaries' socio-economic, clinical, and functional characteristics as well as characteristics of the home health episode (such as receipt of skilled nursing services) and HHA characteristics. The results in this section are calculated using percent margins rather than payment-to-cost differences. Calculating margins as a percentage of cost is consistent with the approach followed by MedPAC and provides a natural scale for margin across the 153 HHRGs, which differ by a factor of five in median cost. (A \$100 episode margin might be considered significant for HHRG 1C1F1S1 (median cost \$1,064), but small for HHRG 5C3F3S1 (median cost \$5,378)).⁶ The results indicated that for the selected HHRGs:⁷

- Episodes for Medicare beneficiaries who were dually eligible for Medicare and Medicaid had estimated margins that were about two percentage points lower, on average, than did episodes for beneficiaries who were not dually eligible. For HHRGs classified as “low margin,” margins averaged about five percentage points lower for dually eligible than for other beneficiaries. For HHRGs classified as “moderate or high margin,” margins were 0.6 to 2.5 percentage points lower on average for dually eligible beneficiaries.
- Episodes in which the beneficiary resided in a health professional shortage area (HPSA)⁸ had estimated margins about three percentage points lower than episodes in which beneficiaries did not reside in a HPSA.
- Episodes for beneficiaries with a higher HCC score, indicative of higher illness burden (as measured by higher expected Medicare expenditures for services from all providers), had estimated margins averaging about seven percentage points lower than episodes for beneficiaries with lower HCC scores. Episodes for beneficiaries with HCC scores in the highest quartile had estimated margins that ranged from 8.0 percent to 29.9 percent, compared to a range of 14.2 percent to 35.6 percent for those with HCC scores in the lowest quartile.

⁶ Percent margin was calculated as payments minus costs, divided by payments times one hundred.

⁷ Calculations are weighted averages of margin differences taken from tables in Appendix B, using the share of episodes as weights.

⁸HPSA designations are assigned by the Health Resource Service Administration (HRSA). For this analysis, HPSA status was examined at the county level and HPSA episodes were identified and defined as those in which the beneficiary resided in a whole county HPSA, where the entire county was designated as a HPSA.

- For the selected HHRGs with large enough sample sizes to make comparisons, episodes where patients were diagnosed with a stage 2 or higher pressure ulcer had margins averaging about 11 percentage points lower than those in which the patient had no pressure ulcer.

When examining the relationship between functional status and HHRG margin, the analysis showed that for the selected HHRGs:

- Home health episodes in which Medicare beneficiaries had a severe visual impairment had margins that were roughly five percentage points lower, on average, than those episodes in which the beneficiaries' vision was assessed as "normal."
- Episodes in which a beneficiary was totally dependent in upper body dressing had margins that were about five percentage points lower than those in which the beneficiary was independent in this activity.

When examining characteristics of home health episodes, the research team found that episodes in which no skilled nursing services were rendered were about 30 percentage points more profitable on average than those with skilled nursing services. It should be noted, however, that 98 percent of all episodes in the analytic sample did contain at least one skilled nursing visit. Across all of the selected HHRGs, margins for episodes that received no skilled nursing services ranged from 38.8 percent to 66.5 percent, compared to a range of 9.7 percent to 33.2 percent for episodes in which skilled nursing services were provided. The large difference in the margins suggests that there may be a financial incentive to select patients who do not need skilled nursing services, which constituted about 2 percent of all episodes in the analytic sample.

When examining HHA characteristics, the research team observed that for the selected HHRGs:

- Episodes provided by proprietary HHAs had consistently higher margins than those provided by voluntary, non-profit HHAs. Margins for proprietary agencies exceeded those for non-profit agencies by an average of 7 percentage points.
- Margins for high-volume HHAs were much higher than that of low volume HHAs, potentially reflecting a greater ability to achieve economies of scale. Episodes provided by HHAs at or above the 75th percentile of annual episodes per HHA were associated with margins 13 percentage points higher than episodes provided by agencies at or below the 25th percentile of episodes per HHA.
- The analysis found no consistent pattern with regard to the relative margin for home health episodes rendered by providers in rural versus metropolitan communities.

Additional details on the results of this analysis are presented in the Appendix B, Tables 2 through 7.

4.4 Episode-level analyses

In order to more thoroughly analyze patient characteristics that may be associated with lower margins, the research team performed a descriptive analysis at the episode level, rather than the HHRG level, and examined the patient characteristics associated with episodes in the top and bottom estimated margin deciles. The analysis also included a larger variety of patient characteristics than was used in the HHRG level analysis.

The research team ranked each episode based on the estimated episode margin, divided the episodes into estimated margin deciles, and examined the prevalence of various patient characteristics across the deciles. The list of variables the team examined is shown in the Appendix C, Table 8.

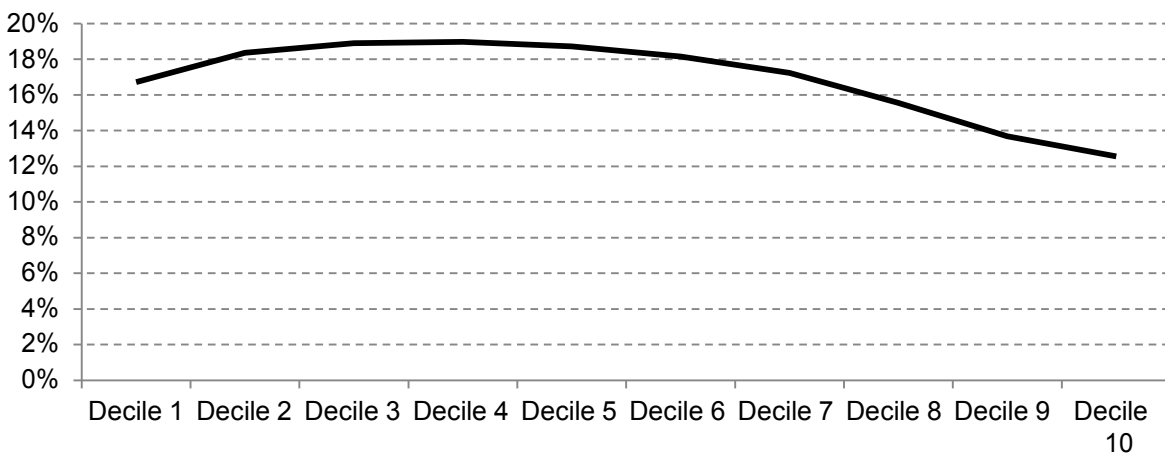
The research team identified variables that were more prevalent in the low margin deciles and some that were more prevalent in the high margin deciles. Some of the variables that the research team identified were low-income subsidy (LIS) eligibility, HCC score, percent poverty by quartiles, dyspneic when at rest and when walking, vision impairment, hearing impairment, skin lesion or open wound, living status (alone or in a congregate facility), and various clinical conditions. The characteristics shown in Figures 1 through 5 are examples of some of the variables the research team identified. Figures 1 through 5 illustrate the prevalence of episodes for patients with selected characteristics by the margin deciles.

Figure 1 shows the prevalence of episodes for patients with acute myocardial infarction by the margin deciles⁹ and Figure 2 shows the prevalence of episodes for patients with pulmonary disorders by the margin deciles. These figures show that episodes for patients with acute

⁹Figure 1 shows curvature, indicating that the prevalence of episodes for patients with acute myocardial infarction is highest in the fourth margin decile. Even though the prevalence of episodes for patients with acute myocardial infarction was not highest in the lowest margin decile, there still was a higher prevalence of these episodes among the lower margin deciles than the higher margin deciles. Therefore, not only was the difference in prevalence between the lowest and highest decile examined, the peak to trough difference was also examined. One of the criteria used to identify characteristics of interest was whether the characteristics had a peak-to-trough difference in values across deciles that were either a) greater than 10 percentage points or b) a factor of two or more.

myocardial infarction and/or pulmonary disorders are more prevalent in the lower margin deciles and less prevalent in the higher margin deciles. For instance, about 16.7 percent of episodes in the lowest margin decile and 18.4 percent of episodes in the second lowest margin decile were episodes for patients with a diagnosis of acute myocardial infarction (AMI). In contrast, 13.7 percent of episodes in the ninth decile and 12.5 percent of episodes in the tenth decile were episodes for patients with a diagnosis of AMI. In addition, in the lowest margin decile, about 1.1 percent were episodes for patients with pulmonary disorder while in the highest margin decile, about .43 percent of episodes were episodes for patients with pulmonary disorder.

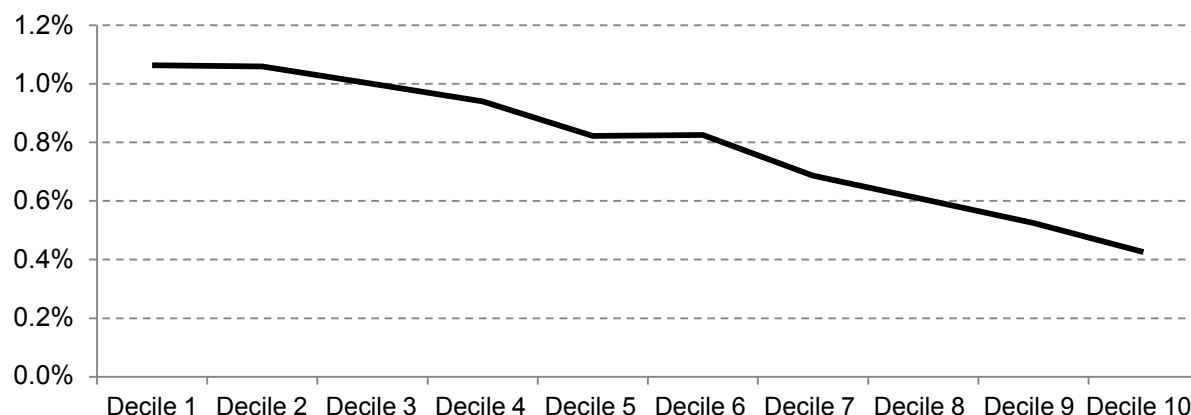
Figure 1. Prevalence of Acute Myocardial Infarction, by Margin Deciles



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Note: Episodes have been divided into deciles based on their estimated margin. Decile 1 represents the episodes with margins in the lowest decile and decile 10 represents the episodes with margins in the highest decile.

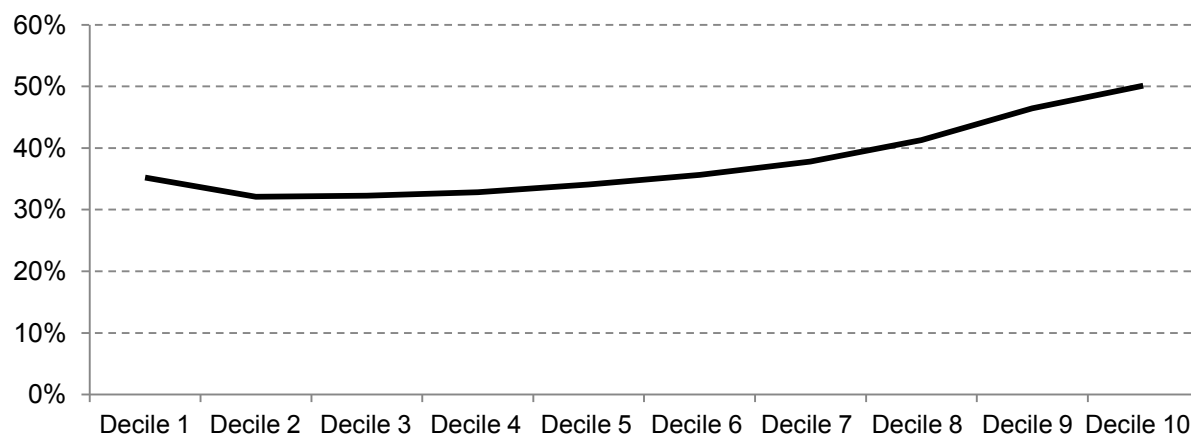
Figure 2. Prevalence of Pulmonary Disorder, by Margin Deciles



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

A number of the variables were more prevalent with the higher margin deciles, rather than the lower margin deciles. Figure 3 shows the prevalence of episodes with patients with surgical procedures by the margin deciles. About 35.2 percent of episodes in the lowest margin decile and about 32.1 percent of episodes in the second lowest margin decile were episodes for patients with surgical procedures. In contrast, about 46.4 percent of episodes in the ninth decile and 50.1 percent of episodes in the tenth decile were episodes for patients with surgical procedures.

Figure 3. Prevalence of Surgical Procedures, by Margin Deciles

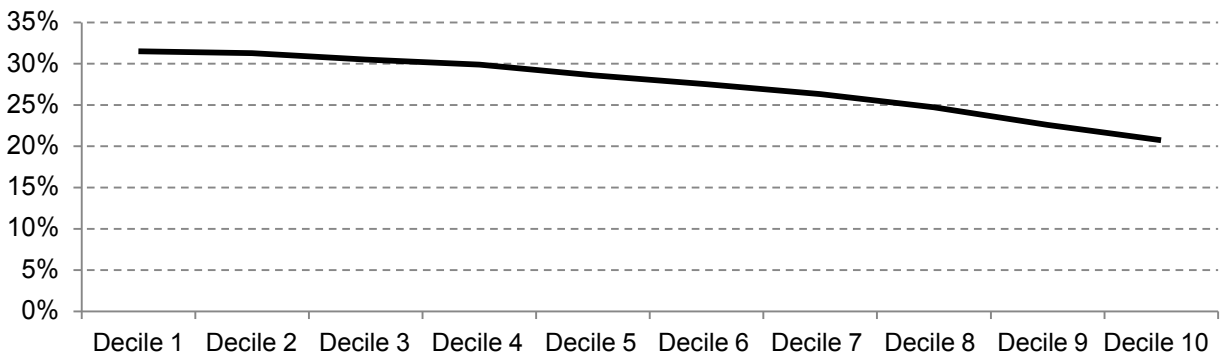


Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Episodes for patients living alone were more prevalent in the low-margin deciles than the high margin deciles, while episodes for patients living in a congregate facility were more commonly

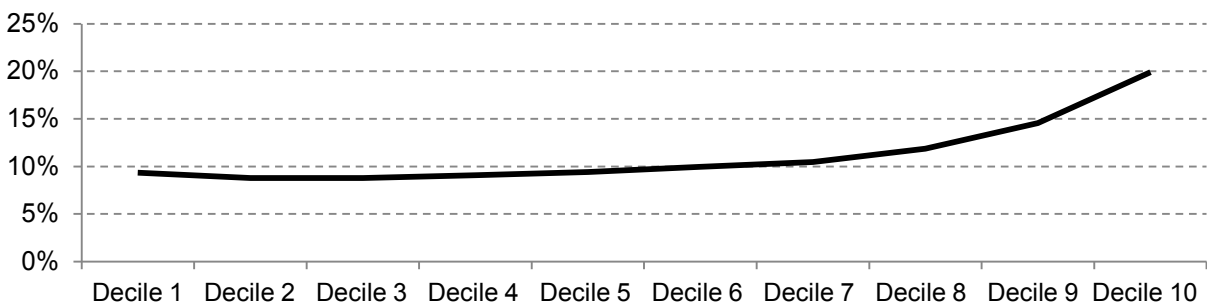
found in high-margin deciles (see Figure 4 and Figure 5 below). In the lowest margin decile, about 31.5 percent of episodes were episodes for patients who were living alone while in the highest margin decile, about 20.8 percent of episodes were episodes for patients who were living alone. Also, in the lowest margin decile, 9.4 percent of episodes were episodes for patients living in a congregate facility while in the highest margin decile, 19.9 percent of episodes were episodes for patients living in a congregate facility. Additional results for this analysis can be found in the Appendix C, Table 8.

Figure 4. Prevalence of Patient Living Alone, by Margin Deciles



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Figure 5. Prevalence of Patient Living in Congregate Facility, by Margin Deciles



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

This analysis only examined univariate relationships between patient characteristics and episode margin and therefore, these results may be influenced by indirect effects of other, confounding, factors. In order to further examine the relationship between patient characteristics and episode margin, multivariate regressions were performed, as described in the section below. The

variables in this descriptive analysis were included in the regression models to ensure a thorough analysis of the various patient characteristics.

4.5 Regression analysis

4.5.1 Methods

4.5.1.1 Regression models

The goal of this analysis was to identify characteristics that may be independently associated with lower margins given the adjustments already implicitly made via HHRG assignment. The research team looked at two types of regression models: ordinary least squares regression models and fixed effects models.¹⁰ The fixed effects models controlled for the effects of both observed and unobserved factors that are fixed at the HHA level. Examining the results of the fixed effects models allowed the team to separate the effects of patient characteristics on episode margin from any HHA factors (such as cost inefficiency) potentially associated with the patient characteristics. Associations between HHA factors and patient characteristics could occur, for example, due to the local areas served by an HHA or referral patterns determining the HHA's client base.¹¹

The research team estimated ordinary least squares models with the estimated margin (payment to cost difference) for an episode as the dependent variable and patient and HHA characteristics as independent variables. Similarly, the research team estimated fixed effects models with the estimated margin for an episode as the dependent variable and patient characteristics as independent variables.¹² Since the fixed effects models control for the effects of HHA-level

¹⁰Since some of the variation in episode cost across geographic areas was due to differences in local wages, unrelated to patient characteristics, local wage effects were removed from the estimated payment to cost difference for each episode before the regressions were estimated. The HH PPS adjusts for differences in local wages using an area wage index determined based on the location of the beneficiary. During 2010, the HHRG payment to any HHA was multiplied by an adjustment factor, equal to $0.77082 \cdot w + 0.22918$, where w is the area wage index (74 FR 40964). As a result of this adjustment, two patients who were identical in every way would be associated with different margins if their sites of service had different wage index values. To remove this extraneous source of variation, unrelated to patients' health or background characteristics, local wage effects were removed by dividing each computed margin by the episode's wage adjuster for 2010, determined using a variable indicating the patient's residence zip code.

¹¹Although other analyses controlled for explicit HHA characteristics such as size and ownership, too little is known about the potential associations between HHA factors and caseload characteristics to assure that the regressions could isolate independent effects of patient variables. Therefore, the team used fixed effects models to assure HHA factors were fully accounted for.

¹²Each regression was estimated using the full analytic sample of HHAs determined suitable for study after the cost report exclusions. A comparison of the analytic sample to national estimates of HHA characteristics showed that the composition was similar to the national distribution by Census region, state location, and urban/rural status. However, there was a slight over-representation of for-profit, freestanding providers (~90% of providers for the sample versus 84% nationally). While weighting could have been applied to make the sample more nationally representative by ownership type, the goal of the analysis was to identify general relationships between margin and patient characteristics and the research team did not expect the weighting to result in markedly different results.

variables, HHA characteristics were not included as dummy variables in the fixed effects models. Both types of regressions were initially estimated with and without indicators for the 153 HHRGs and included the variables examined in the descriptive analysis described in Section 4.4. Because the coefficients for variables with and without the indicators for 153 HHRGs were similar, in general, and the goal of the analyses was to identify potential improvements to the current payment system, the team examined the regression models with the 153 HHRGs further. Specifically, including indicators for the HHRGs allowed the research team to study the separate impacts of various characteristics after controlling for the effects of the case-mix groups in the HH PPS. All patient variables were specified as indicator variables. A negative coefficient for an indicator variable indicates that there is a lower margin associated with episodes having the indicator than for episodes that do not have the indicator. HHAs may choose to avoid patients with the specific patient characteristic captured by the indicator variable. A positive coefficient for an indicator indicates that there is a higher margin associated with episodes with the indicator than for episodes that do not have the indicator. Here, HHAs may prefer to accept patients with the specific characteristic captured by the indicator variable. Strong positive or negative coefficients and/or large differences among the coefficients for patient characteristics indicators may suggest that there are financial incentives to select patients with particular characteristics. Access issues could result for those patients who have characteristics associated with lower margins. Ideally, the coefficients for the patient characteristic variables should be similar and close to 0, indicating that there are not strong financial incentives to select one type of patient over another.

Results from the full regression models, both OLS and fixed-effects, appear in Appendix D, Table 10. The full regression models contained over 300 covariates, including indicators for each of the 153 HHRGs. More than 25 coefficients in the fixed-effect, full regression model exceed \$100 in absolute value. Clinical variables such as presence of stasis ulcers, open lesions, receipt of IV therapy, enteral or parenteral nutrition, and poor control of a number of conditions, including traumatic wounds, and pulmonary disorder all were estimated to reduce episode margins by more than \$100. Other variables with effects exceeding \$100 included several levels of need for assistance in bathing, need for assistance in ambulation, and provision of assistance by informal caregivers for ADL needs, medication administration, and procedures and treatments.

Other measures had somewhat smaller, though still substantial and consistent, effects. These included the quartile of the patient's HCC score and the quartile of median household income in the patient's ZIP code of residence.

From the full-model estimates, variables were selected for further investigation. In general, variables with a statistically significant coefficient around or exceeding +/-50 in the fixed-effect regression model were chosen for use in further analyses. In some cases, variables related to the

selected variables were chosen as well.¹³ Once selected, the variables were grouped into six broad categories summarizing their type or role (see Table 2).

Table 2. Groups of Variables Selected From Full Regression Model

Variable Set	Description
Group 1: Variables used in case-mix assignment of HHRG group	Intravenous therapy at home, Parenteral nutrition, Enteral nutrition, Unhealed stage 2 pressure ulcer, Traumatic wounds, Ulcer, Dyspneic: when at rest, Dyspneic: with minimal exertion, Dyspneic: with moderate exertion, Bathing: able to bathe with use of devices, Bathing: needs assistance, Bathing: needs assistance throughout, Bathing: bathed in bed or bedside chair independently, Bathing: bathed in bed or bedside chair with assistance, Bathing: unable to participate effectively in bathing and is bathed totally by another person, Toilet Transferring: Totally Dependent, Ambulation: requires assistance, Transferring: bedfast, able to position, Bowel incontinence rare, Bowel incontinence frequent, Ostomy
Group 2: Variables describing area income	Indicator for quartile of median household income by zip code
Group 3: Variable describing prior hospital admissions	Indicator for hospital or post-acute setting discharge in the 14-day period before start of home care
Group 4: Variables describing overall health status	Indicator for quartile in which beneficiary's Hierarchical Condition Code (HCC) score lies
Group 5: Variables describing poor control of clinical conditions ¹⁴	Poor control of: cardiac dysrhythmia, diabetes, peripheral vascular disease, pulmonary disorder, Alzheimer's disease, dementia, heart disease, heart failure, hypertension, musculoskeletal connective tissue disease, neurological disorder (other than Alzheimer's), psychiatric disorder, stroke, cancer, or depression
Group 6: Other variables describing clinical or functional status	Open lesion, Speech impairment, Impaired hearing, Oxygen use, Need for ADL assistance, Need for IADL assistance, Need for medication assistance, Assistance provided for procedures or treatments, Temporary health risk, Fragile status, Urinary incontinence or catheter, Urinary tract infection

¹³ For example, dyspneic with moderate exertion was included in the first group of variables, since the variable was related to dyspneic with at rest and dyspneic with minimal exertion, variables which had coefficients around -50 in the fixed effects model.

¹⁴ Our analysis defined a condition as poorly controlled when it was a primary diagnosis reported by the clinician completing the OASIS assessment as either poorly controlled or uncontrolled. We did not include the following three OASIS assessment categories in the poorly controlled category: asymptomatic, well controlled, or controlled with difficulty.

These six categories of variables were then added successively to an OLS and fixed effects regression model that initially contained only indicators for the 153 HHRGs. The HHRG-only models represented the effects of the HH PPS case-mix groups on episode margins. It should be noted that the regression results from the OLS and fixed-effect HHRG-only models were roughly the same, despite the fact that the fixed effects model adjusted for HHA-level variation in margin.

By adding the groups of variables sequentially onto the HHRG-only models, the research team was able to examine the potential effects of adding groups of variables one-by-one on margin differences.

Each regression model was also estimated with an additional HHA-level variable intended to capture the HHA's share of low-income patients when compared to their total Medicare patient population. This dual proportion measure was defined as the proportion of total episodes for CY 2010 provided to beneficiaries who were dual eligible (eligible for both Medicare and Medicaid).¹⁵

4.5.1.2 Subgroup analysis methods

In addition to examining the regression models' coefficients and amount of variation explained when adding the six groups of variables outlined above, the research team estimated the impact of adding the six groups of variables on margin differentials for eight selected vulnerable patient population subgroups of interest (described below). The purpose of this analysis was to assess the potential value of adding the six groups of variables into the current case-mix system. The vulnerable patient population subgroups were chosen to exemplify several different kinds of vulnerable patient population subgroups--for example, patients with no caregiver assistance. Specifically, for each of the six groups of variables added onto the HHRG only model, the research team examined the extent to which the additions may remedy potential under-estimation of costs for the eight vulnerable patient population subgroups.

¹⁵ The research team labeled an episode as one that was provided to a dually eligible beneficiary if the dual status code for the beneficiary was '01' through '08' for the month of December 2010 (Qualified Medicare Beneficiaries (QMB) only, QMB and Medicaid coverage including RX, Specified Low-income Medicare Beneficiaries (SLMB) only, (SLMB) and Medicaid coverage including RX, Qualified Disabled and Working Individuals (QDWI), Qualifying Individuals (QI), Other Dual Eligibles (non-QMB, SLMB, QWDI, or QI) w/Medicaid coverage including RX.)

Using 60 percent of the data as a “test sample” (about 1.5 million of the 2,489,495 total observations), and the remaining 40 percent as a “validation sample” (996,000 observations), the research team assessed the performance of each regression model for members of certain vulnerable patient population subgroups. Specifically, coefficients were estimated from regression models based on the test sample (a 60 percent random sample of entire sample) and the estimated coefficients were then applied to the validation sample (40 percent of analytic sample) to obtain the predicted values of the dependent variable, wage index-adjusted margins. The differences between the predicted and actual value of Medicare margins were then compared to assess the models. This difference (Actual Medicare margin – Predicted Medicare margin) is the “prediction error” or *PE*.

A positive value for *PE* implies that the model predicts a higher margin than in reality and actual costs are lower than the model predicts. A negative value for *PE* implies that the model predicts a lower margin than in reality and actual costs are higher than the model predicts. Mean values of *PE* were compared for beneficiaries who were members to those who were not members of the eight specified vulnerable patient population subgroups, defined below:

1. Beneficiaries with poorly controlled conditions.
2. Beneficiaries with ulcers or wounds.
3. Beneficiaries with respiratory conditions.
4. Beneficiaries with risk of hospitalization.
5. Beneficiaries with clinically complex conditions.
6. Beneficiaries who live in low-income zip codes.
7. Beneficiaries who are not Caucasian.
8. Beneficiaries with no caregiver assistance.

Specifically, for each of the vulnerable patient population subgroups above, the difference between the average *PE* for members of the subgroup and the average *PE* for non-members was calculated (the difference in *PE* (ΔPE) = *PE* for subgroup – *PE* for non-subgroup). Ideally, ΔPE should be around 0. This would indicate that the model under or over-predicts costs for members of the subgroup at the same level that the model under or over-predicts costs for members of the non-subgroup, which would suggest that there is no financial incentive to provide services to a member of the subgroup versus a non-subgroup member. Larger absolute values of ΔPE indicate an increasing financial incentive to provide home health services to members of one subgroup in preference to the other.

4.5.2 Findings

4.5.2.1 Results of Regression Analysis of Six Sequential Models

The results of the six regression models, where each of the six categories of variables listed in Table 2 were successively added onto the HHRG only model, can be found in Tables 12 through 17 of Appendix E. For discussion purposes, the fixed-effect model with the HHRG indicators and all 6 groups of variables listed in Table 2 are the focus of the presentation in this section.

When examining the regression models, it is important to look at the coefficients for each of the variables in the context of the larger picture. The average margin for all episodes in the model with HHRG indicators plus all six groups of variables, as shown in Table 17 of Appendix E, was \$893.58. Similar to the HHRG-only models, the coefficients associated with the 153 HHRG dummy variables in the regressions with the six groups of variables were all positive. In order to determine the estimated margin for a particular episode, one must combine the HHA fixed effect, the coefficient for the HHRG, and the coefficients for each of the characteristics that the patient has. A number of the coefficients for the HHRG dummy variables were large positive numbers so that the average margin for an episode in CY 2010, even for a patient with characteristics that had a negative coefficient in the regression model, may still have been positive.

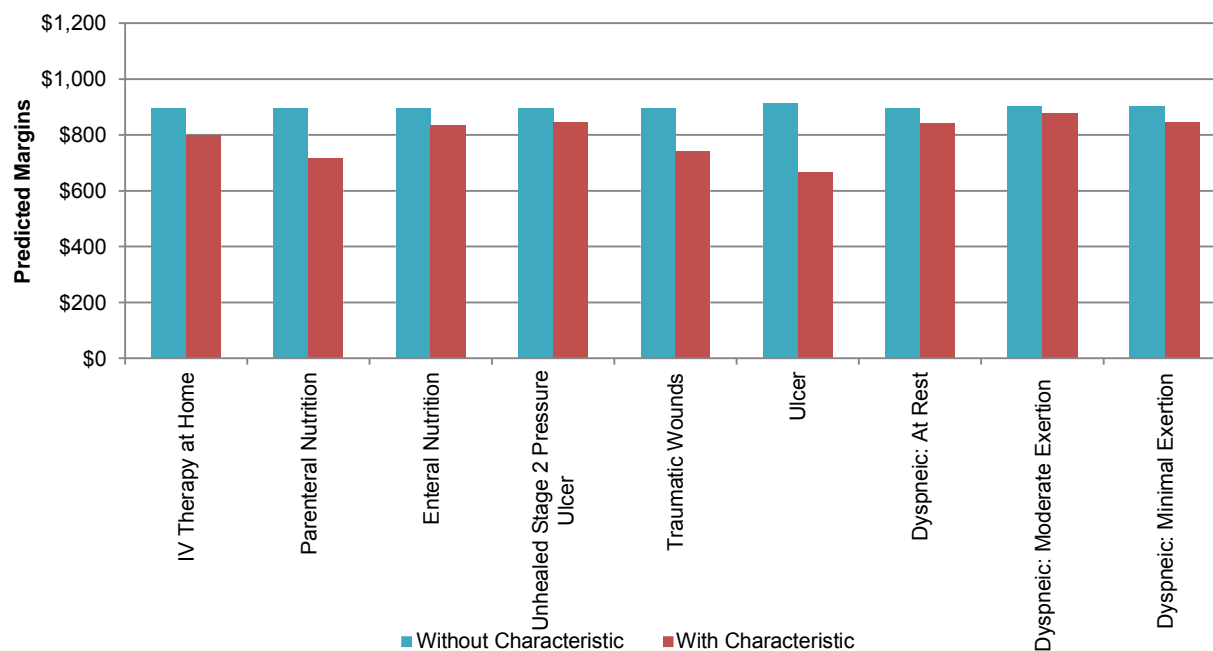
Figures 6 through 10 below show the predicted margin (payment to cost difference) for the “average” episode for patients with and without each characteristic of interest. The “average” episode is an episode for which all of the patient characteristics and variables in the regression model, except for the characteristic of interest, are set equal to the average.¹⁶ This analysis allows for a uniform examination of the effects of various patient characteristics on estimated margin.

Figures 6 and 7 show the effects of the first group of sequentially added variables on episode margin. Among the Group 1 variables, which are variables in the current case-mix system, the receipt of parenteral nutrition, presence of traumatic wounds, presence of ulcers, and the need for significant assistance in bathing in bed/at bedside or the need to be bathed totally by another person were each associated with an expected reduction of more than \$150 in margin (i.e., more

¹⁶ We note that this is not the same as predicting the exact margin for episodes with and without the characteristic. This analysis does not account for associations among characteristics and therefore the values for some of the characteristics may be different than the average value used in this analysis.

than 16 percent of the expected overall margin).¹⁷ In other words, in CY 2010, episodes for patients with each of the characteristics mentioned above were associated with at least a \$150 lower margin than episodes for patients that did not have these characteristics. For example, in CY 2010, episodes for patients with parenteral nutrition were, on average, associated with a \$178.53 lower margin than episodes for patients without parenteral nutrition.

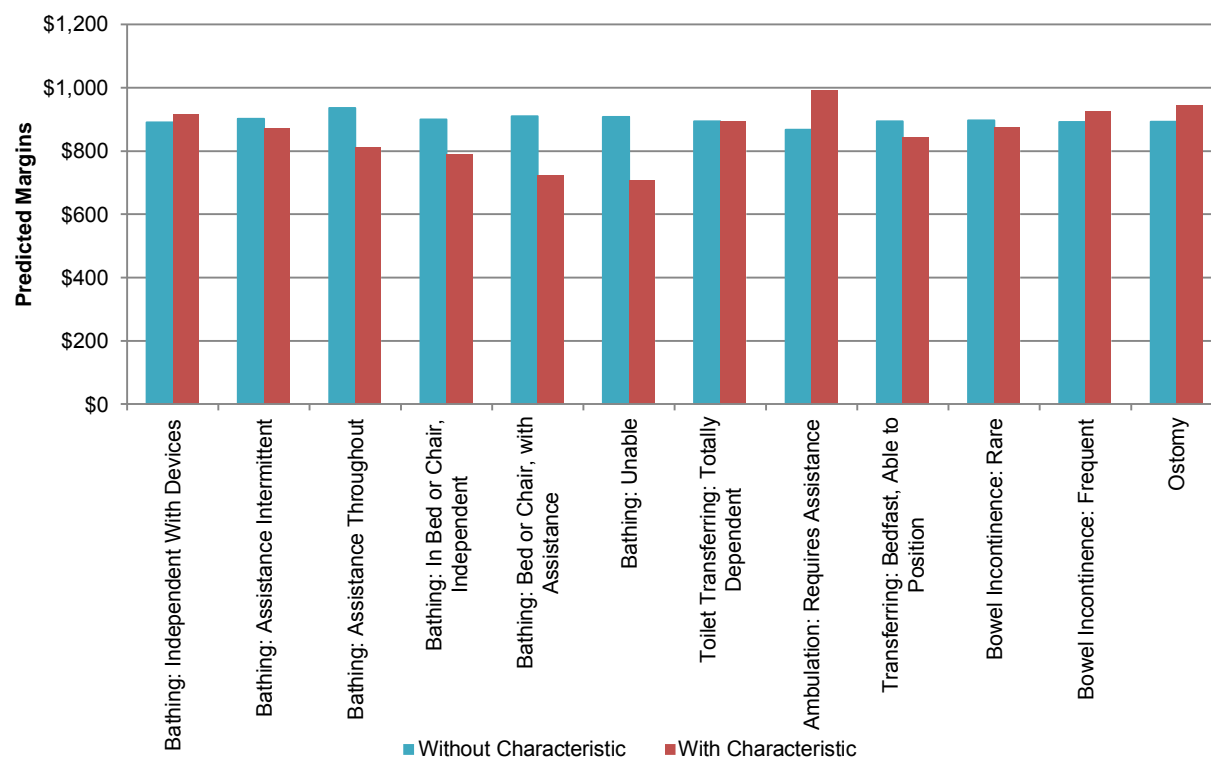
Figure 6. Predicted Margins for Patients With and Without Selected Characteristics in the HH PPS (Services, Wounds, and Dyspnea) – Group 1 variables



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

¹⁷ The reason for the significant positive margin associated with needing assistance in ambulation is not readily apparent but it may be the result of a selection effect. It is quite difficult to function effectively at home if one cannot ambulate independently unless one has caregiver assistance. Thus needing assistance in ambulation can also indicate the presence of an informal caregiver in the home. (Because bathing can be more intermittent, needing assistance in bathing might not.)

Figure 7. Predicted Margins for Patients With and Without Selected Characteristics in the HH PPS (Bathing, Ambulation/Transferring, and Bowel) – Group 1 variables



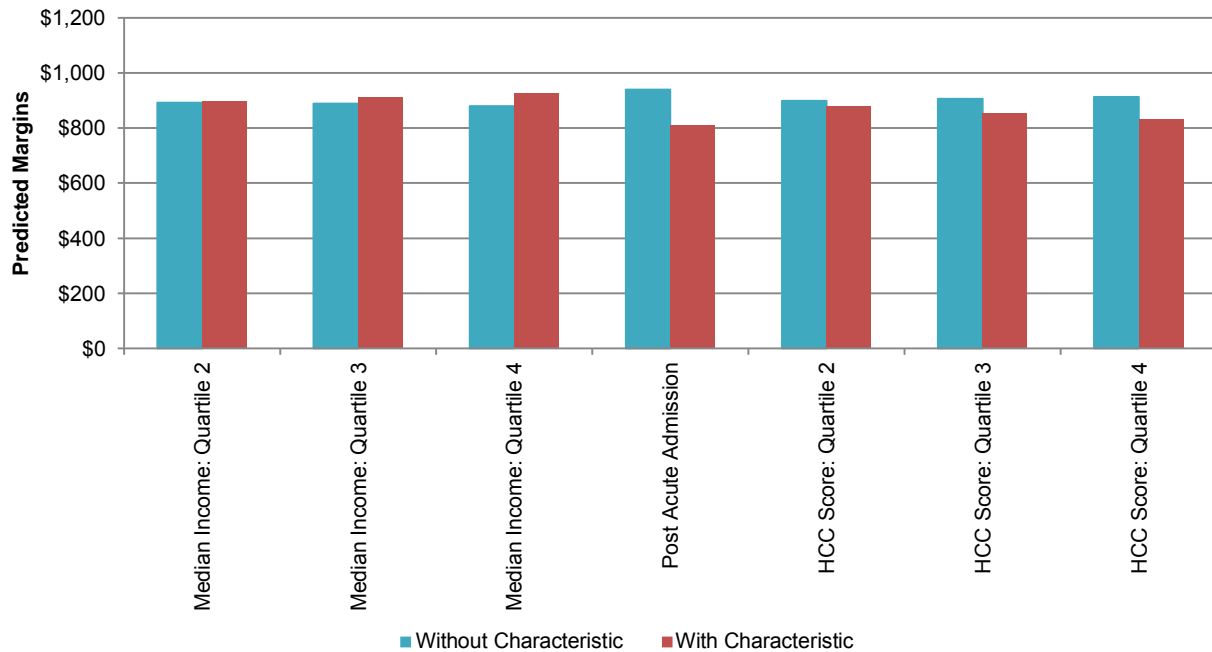
Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Note: Toilet Transferring: Totally Dependent is shown in the figure but was insignificant in the fixed-effect model.

Figure 8 shows the effects of the variables in Groups 2, 3, and 4 on episode margin. The results for the Group 2 variables, dummy variables indicating the quartile of median household income in the beneficiary's ZIP code of residence, indicated an increase in margin ranging from \$7 to \$48 for each movement across income quartiles.

The sole Group 3 variable, an indicator for episodes for patients with an acute or post-acute stay within 14 days prior to the home health episode, was associated with a significant reduction in margin of about \$130. The results from Group 4 indicated that higher HCC scores were consistently associated with lower margins. An episode provided to a beneficiary in the highest quartile of HCC scores had an estimated margin of about \$80 less than an episode provided to a beneficiary in the lowest quartile of HCC scores.

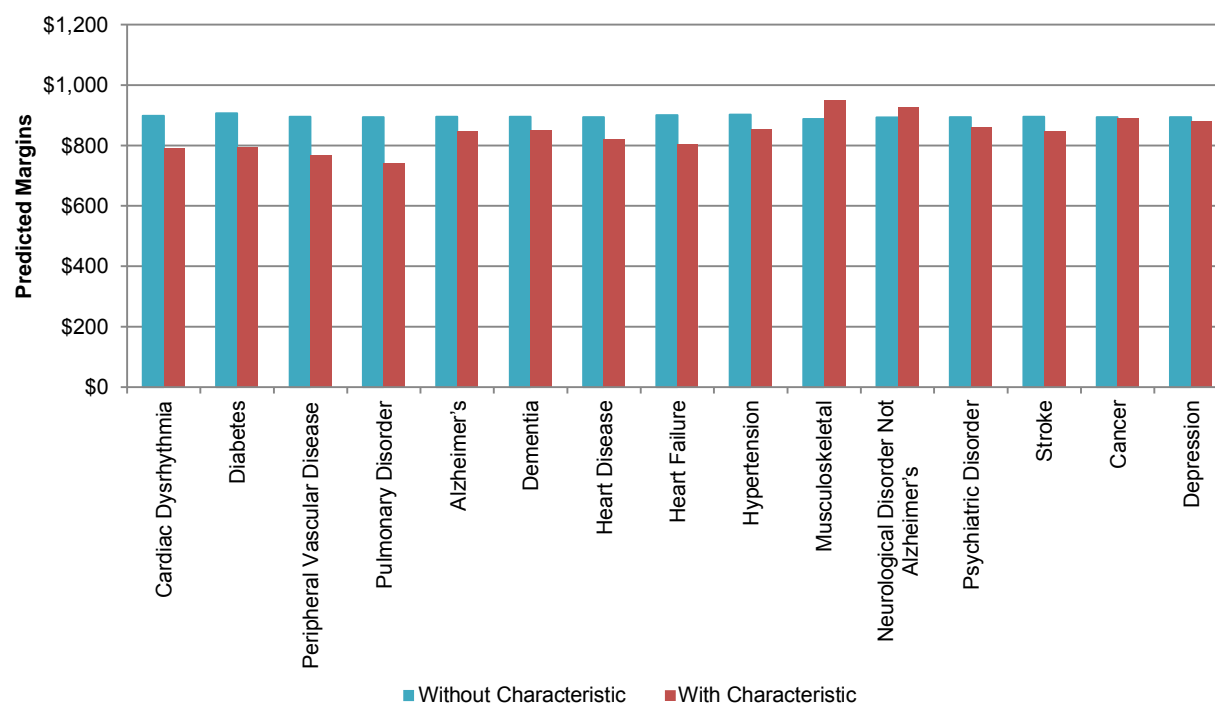
Figure 8. Predicted Margins for Patients With and Without ZIP Code Median Household Income, PAC Admission & HCC Score Quartile – Group 2 - 4 variables



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Figure 9 shows the estimated margin differences for variables in Group 5. Group 5 contains indicator variables for each of 15 diagnostic conditions listed as the primary diagnosis and judged poorly controlled by the clinician completing the OASIS assessment at the start of the episode. Poor control of cardiac dysrhythmias, diabetes, peripheral vascular disease, and pulmonary disorders were all associated with reductions of more than \$100 (more than 11 percent) in the expected margin in the fixed-effect model.

Figure 9. Predicted Margins for Patients With and Without Selected Poorly Controlled Conditions – Group 5 variables

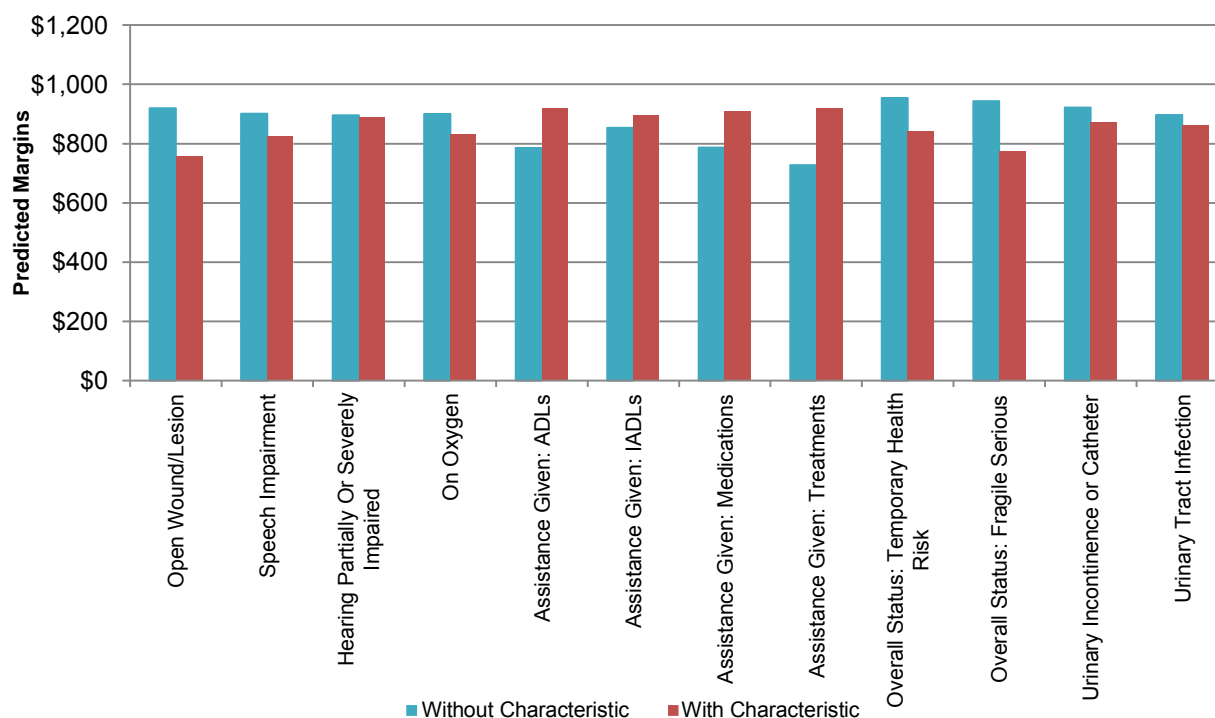


Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

Note: The variable indicating a primary diagnosis of cancer that is poorly controlled is shown in the figure but was insignificant in the fixed-effect model.

Figure 10 shows the estimated margin differences for variables in Group 6. Three variables in Group 6 were found to be associated with reductions of more than \$100 in the expected margin: open lesion, temporary health risk, and fragile-serious overall status. Variables describing caregiver assistance with ADLs, medication administration, and procedures or treatments were associated with increases of more than \$100 in the expected margin, suggesting that episodes for patients with no caregiver assistance have lower margins.

Figure 10. Predicted Margins for Patients With and Without Additional Characteristics – Group 6 variables



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

The goodness of fit statistic (R-squared value) for the regression with all 6 groups of variables added to the model was modest, 0.182 for the OLS model and 0.342 for the fixed effects model. It should be noted that the regression models in this analysis predict estimated margin, not resources expended or actual costs. The R-squared value for a payment model, which only predicts resources or costs, may be different from the values presented in this analysis.¹⁸ It also should be noted that the R-squared value for the model with the full initial set of patient-level characteristics and HHA fixed effects was 0.352, indicating the substantial variation in costs that cannot be explained by HHA effects or the various patient characteristics examined in the study.

¹⁸ Margin is the difference between cost and payment, and the payment is produced from the estimates of a statistical model that aims to predict resource use. One should expect the R-squared from a model predicting margin to be lower than one predicting cost because the statistical model underlying the payment has, conceptually, already explained a significant portion of the systematic (non-idiosyncratic) variation in cost. By construction, therefore, assuming a reasonably-predictive statistical payment model, the variation in margin across episodes has a much higher proportion of non-systematic (idiosyncratic) variation that cannot be explained by beneficiary-, agency-, or area- level characteristics than does episode cost.

4.5.2.2 Dual proportion effects

Table 3 shows the coefficients and t-values for the dual proportion variable when added to each of the successive regression models and when controlling for HHA characteristics plus other variables. Adding HHA-level variables to the model allowed the team to control for some HHA characteristics in lieu of using fixed effects.¹⁹ Estimated coefficients for the dual proportion variable in each of the successive regression models vary from -464 to -548. After adding the HHA variables into the regression model as well as other characteristics, the dual proportion variable still had a negative, significant coefficient, although its impact decreased to -118.54. The regressions with the dual proportion variable and the six groups of variables added successively to the HHRG model can be found in Appendix F, Tables 18 through 24.

Table 3. Value of Dual Proportion Coefficient in Alternative Regression Specifications

Values	Group 1	Groups 1-2	Groups 1-3	Groups 1-4	Groups 1-5	Groups 1-6	All groups and HHA characteristics plus other variables
Dual Proportion	-472.79	-464.74	-521.45	-542.12	-547.74	-464.39	-118.54
T-Value	-104.66	-99.46	-110.06	111.70	-112.18	-94.93	-19.39
R ²	0.150	.150	.152	0.154	0.158	0.186	.213

Note: All models contain indicator variables for HHRG. Full regression results appear in Appendix F.

Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

4.5.2.3 Results of the Subgroup Analysis

Figure 11 shows the estimated values for ΔPE , the difference in prediction errors for subgroup members and non-members, for each of the eight vulnerable patient population subgroups defined in Section 4.5.1.2, as the dual proportion variable and the six groups of variables are successively added onto the HHRG-only model. For the HHRG-only model, values of ΔPE were negative for seven of the eight vulnerable subgroups. In five of those seven cases, the absolute value of ΔPE was more than 10 percent of the value of margin itself. That is, for five of the defined vulnerable subgroups, the value of actual minus predicted margin was more than \$87 lower for members of the subgroup than for those who were not. These results suggest that there may be financial incentives in the HH PPS for HHAs to avoid providing home health services to patients that fall into certain subgroups. The largest discrepancy was for beneficiaries with

¹⁹ An OLS model was used. Using the dual proportion variable, which is specified as an HHA-specific value, precludes simultaneous estimation of fixed effects in the same equation.

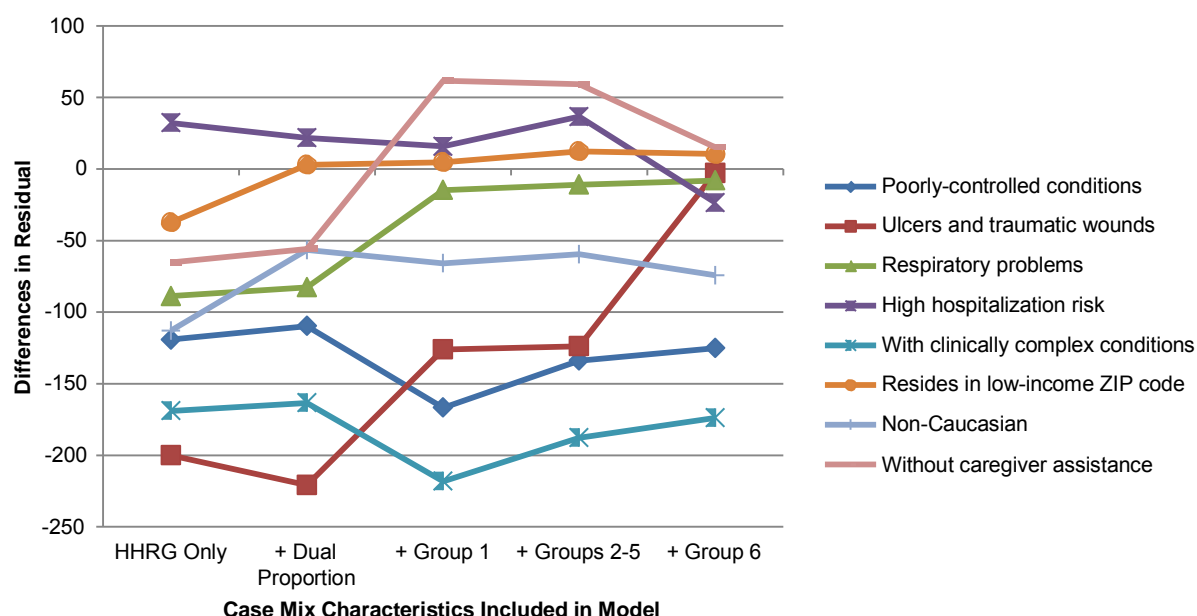
ulcers and traumatic wounds. For members of this subgroup, the prediction error was \$200 lower than for those not in the subgroup.

The addition of the dual proportion variable to the HHRG-only model brought about an improvement in accuracy for two of the eight vulnerable patient population subgroups (patients who are non-Caucasian or reside in low-income zip code areas), but only to a degree. For the non-Caucasian subgroup, the value of ΔPE was halved from -\$112.93 to -\$56.60. Note that for both of these subgroups, additional variables, shown here as the constituents of Groups 1 through 6, did not produce further improvements in prediction error. The addition of the six groups of variables, particularly the variables in Group 1, produced improvements for three of the eight subgroups: ulcers and traumatic wounds, respiratory problems, and lack of caregiver assistance.²⁰

Of the five vulnerable patient population subgroups that had a significantly negative ΔPE in the HHRG-only model, two of the subgroups, patients with poorly-controlled conditions and with clinically complex conditions, still had significantly negative ΔPE values after the addition of dual proportion variable and the six groups of variables listed in Table 2. In other words, the prediction error for the two subgroups – patients with poorly controlled conditions and with clinically complex conditions– did not improve under any combination of the dual proportion variable with other explanatory variables. In some cases, additional explanatory variables actually worsened the discrepancy between subgroup members and non-members for these two subgroups. Additional research may be needed to identify ways to lessen the potential financial incentive to select patients who do not have poorly controlled conditions or clinically complex conditions over those who have poorly controlled conditions or clinically complex conditions.

²⁰ In order to simplify the figure, results for the addition of Groups 2 through 5 were compressed to a single data point showing the net result of all variables included in the four groups. The addition of each individual group of variables may cause the difference in prediction error to increase or decrease, but the effects of Groups 2 through 5 were not dramatic.

Figure 11. Difference in Prediction Errors for Members of Vulnerable Patient Populations versus Non-Members as Case-Mix Variables Are Sequentially Added, Models with Dual Proportion Variable



Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

4.6 Analysis of Outlier episodes

4.6.1 Outlier Analysis Methodology

In addition to looking at normal episodes, the research team examined whether certain patient characteristics for outlier episodes are associated with under-reimbursement and examined whether adjustments to outlier payments to more adequately pay for specific patient characteristics are needed.

The research team first identified all of the outlier episodes that could be matched with the cost reports in the final cost report sample (a total of 97,860 episodes). The final sample is described in detail in Section 4.2. In addition to dropping outlier episodes that could not be matched to the final cost report sample, the research team excluded outlier episodes if they had zero episode payments, were partial episode payment (PEP) episodes, or were in any of the 23 counties that the Office of the Inspector General deemed as having suspicious outlier billing practices.²¹ Thus, of the 97,860 outlier episodes in 2010, which matched the cost report sample, 59,656 outlier episodes remained for the analyses after the exclusions were applied.²² Because of a

²¹OIG report “Aberrant Medicare Home Health Outlier Payment Patterns in Miami-Dade County and Other Geographic Areas in 2008.”

²²2,720 outlier episodes were dropped since they were partial episode payment episodes. 19,626 outlier episodes were dropped because they occurred in a county with suspicious billing practices.

claims-processing error in the calculation of the 10 percent HHA level outlier cap in CY 2010, some episodes may not have been correctly identified as outlier episodes in the claims data; therefore, it is likely that the team was unable to include all outlier episodes that would have met the inclusion criteria.

The 59,656 outlier episodes were matched to the patient's start of care or resumption of care assessment to obtain detailed information on patient characteristics. The research team selected the OASIS assessment whose date was closest to the start of care date for the outlier episode. Although a large majority of the OASIS assessments selected were relatively close to the claim date, 10 percent of the sample's assessments occurred approximately two years prior to the outlier episode, thus introducing the potential for measurement error. There were also a number of instances where OASIS-B assessments needed to be cross-walked to OASIS-C assessments. Some variables available on the OASIS-C assessment were not available in the OASIS-B assessment. Of the 59,656 outlier episodes included in our analysis, 17,154 episodes were matched to an OASIS-B assessment while the remainder was matched to an OASIS-C assessment.

In order to more accurately examine the margin for outlier episodes, adjustments were made to the cost for outlier episodes. Because outlier visits have been shown to be shorter, on average, than the average length of a visit for normal episodes, the research team adjusted the HHA-level costs per visit to account for the length of the outlier visit relative to the length of a non-outlier visit for each HHA.^{23,24} Specifically, the adjusted costs per visit were created by multiplying the cost-per-visit from the cost report (which reflects the average cost per visit for the HHA) by the ratio of the average length of an outlier visit to the average length of a visit at the HHA level. The cost per episode was then calculated using the adjusted cost per visit per discipline and the visits per discipline for an episode. The estimated episode margin was then calculated using the adjusted cost per episode.

The research team calculated the mean estimated episode margin for all outlier episodes and grouped the 59,656 outlier episodes into three categories by comparing the episode's estimated margin to the overall mean estimated episode margin. The three categories were large-loss, small-loss, and positive margin episodes. Large-loss episodes were outlier episodes that had a greater loss than the mean estimated margin for all outlier episodes. Small-loss episodes were outlier episodes that had a smaller loss than the mean estimated margin for all outlier episodes.

²³ Although the exact reason why outlier visits are shorter, on average, is not known, diabetics who require multiple visits per day for insulin administration (but do not need much additional care) are thought to be a contributing factor.

²⁴ Cheh, Valerie and Schurrer, John. Home Health Independence Patients: High Use, but Not Financial Outliers, Report to Centers for Medicare and Medicaid, Mathematical Policy Research. March 31, 2010.

Positive margin episodes had a positive estimated margin. Table 4 shows the number and proportion of outlier episodes in each category. Over 42 percent of outlier episodes resulted in losses that exceeded \$2,442 and 8.05 percent of outlier episodes had positive estimated margins.

By grouping the outliers into the three margin categories, the research team was able to examine the distribution of episodes across the margin categories by specific patient characteristics of interest.

Table 4. Distribution of Loss Categories for Financial Outlier Episodes

Loss Categories	Category Definitions	Outlier Episodes in Category (#)	Outlier Episodes in Category (%)
Large-Loss Episodes	Less than the mean estimated margin. (< -\$2442)	25,379	42.54%
Small-Loss Episodes	Greater than the mean estimated margin, and below break-even point. (>\$2442 - \$0)	29,477	49.41%
Positive Margin Episodes	Greater than the break-even point. (>\$0)	4,800	8.05%

Source: L&M Policy Research analysis of study data. See Section 4.2 Data Sources for data description.

4.6.2 Outlier Analysis Findings

The analysis focused on four types of patient characteristics, with detailed results presented in Appendix G, Tables 25 through 28. When examining the characteristics, the research team compared the average estimated margin for episodes for patients with a particular characteristic to the average estimated margin for all outlier episodes. A 10 percent threshold in estimated margin difference between outlier episodes with a particular characteristic and all outlier episodes was used to identify characteristics that were associated with significantly large losses. In addition, the team examined the number of outlier cases with a particular characteristic to ensure that the results were reliable and that any future outlier payment proposals that involve a specific patient characteristic would affect a significant number of episodes. Furthermore, the team examined the percentage of profitable cases for each patient characteristic to assess the degree to which outlier payment increases for a patient characteristic may cause overpayment for some episodes.

Socio-demographic variables

The team found very little variation in the average estimated episode margin across socio-demographic characteristics. A notable exception was that patients whose eligibility for Medicare was due to both End Stage Renal Disease and Old Age had higher losses on average and a lower proportion of costs recovered; however, there were only 52 of these episodes in the 2010 sample. Episodes for patients who lived in high poverty areas, specifically patients who lived in areas with the highest quartile of poverty, also had about 10 percent higher average losses than the average loss for all outlier episodes. However, the provision of outlier care for beneficiaries in high-poverty areas was concentrated in a small fraction (6.1%) of the HHAs serving any outlier cases, with one HHA exerting a substantial influence on the loss results. Specifically, one HHA provided over 10 percent of the outlier episodes (577) for patients in high poverty areas.

Functioning

Table 26 in Appendix G suggests that an individual's functioning ability does not affect outlier losses. There is little variation in the average outlier loss for patients who are more functionally limited, and there is little variation in costs across those with different functional limitations.

Patient living situation and caregiving situation

The research team examined the data to determine whether the patient's living situation is related to outlier losses. In general, the research team found little evidence that it is. Patients who live alone with nighttime or daytime care seem to generate higher losses than those who live alone without any care. However, the difference between the average estimated margin for patients who live alone with nighttime or daytime care and the average estimated margin for patients who live alone without any care was not greater than or equal to the 10 percent threshold used to identify characteristics of interest. We also found that patients who live in congregate housing with just daytime or just nighttime care have lower losses on average; however, only 117 episodes included patients meeting those criteria.

Care needs

Using the care needs indicators coded in OASIS, the research team found little evidence that the estimated margin associated with such episodes varied systematically by care needs. Episodes for patients who were able to administer their medications independently had similar losses when compared to those who needed assistance. This was consistent with other measures of care needs as well.

In summary, the outlier analysis reviewed a large set of variables available in the project's analytic data. The results showed very little indication of systematic differences in episode losses across patient categories represented by the variables, excepting a few instances where very small numbers of cases suggested a circumstance or characteristic is rare. Although HHAs,

for the most part, lost money on outlier episodes, these findings, based on data available, do not suggest a basis for refining the HH PPS outlier policy to compensate for unusual losses.

4.7 Data Limitations

It is important to note the assumptions and data limitations of the analyses presented in this Report. One of the goals of the analyses, pursuant to the Congressional mandate, was to identify the costs associated with the care of beneficiaries with various characteristics and assess episode margin across the spectrum of home health patients. Episode margin is defined using the payment for an episode and the estimated cost for an episode. The estimated cost for an episode was calculated using HHA specific costs per visit for each of the six disciplines in the Medicare home health benefit and the number of visits per discipline on the episode claim. Therefore at the HHA level, the measured cost of an episode can vary only because of variation in the number of home health visits or in the mix of visits across disciplines. The cost per visit per discipline was assumed to be constant across all episodes at the HHA-level. The cost report does not contain costs specific to each type of episode and does not contain detailed information on the variation of costs associated with providing care to the various types of beneficiaries within each HHA. For example, the differences in costs that arise from differences in the duration of visits across patients for each HHA are not reported on the cost report and were not examined in the analyses. One alternative approach to our methodology would be to obtain visit length information from claims data and combine the data with local wage rates for each of the six disciplines to estimate episode resource cost. However, this method may not capture the total cost of the visit, such as costs for coordination of care and transportation and administrative costs. In addition, analysis of outlier episodes found little systematic variation in the duration of visits, which would suggest that visits for non-outlier episodes may also show little variation in the visit length. Therefore, for this study, the research team examined cost differences for patients using the cost information from each HHA's cost report and the mix of services provided, as reported on the claim.

A potential drawback to using cost report data is that the data are largely unaudited and therefore the accuracy of the cost report data may be questionable.²⁵ Exclusion of cost reports for some HHAs was done to increase the robustness of the data. Unfortunately, the accuracy of the cost reports in the sample can only be assessed through cost report audits, an activity which was

²⁵We note that while the cost report data is not audited, the Officer or Director of the home health agency must certify that each cost report is a true, correct and complete report. The HHA Medicare cost report (MCR) Form (CMS-1728-94) states that "Misrepresentation or falsification of any information contained in this cost report may be punishable by criminal, civil and administrative action, fine and/or imprisonment under federal law. Furthermore, if services identified in this report were provided or procured through the payment directly or indirectly of a kickback or were otherwise illegal, criminal, civil and administrative action, fines and/or imprisonment may result."

beyond the scope of this study. For example, if non-allowable costs are systematically included in cost reports from HHAs having a tendency to serve specific types of patients, the result could be misleadingly low margins for episodes serving such patients. We employed a fixed effects model to limit the effects of HHA factors, including situations such as overstated costs, on the results, but not all analyses could be formulated in a fixed effects framework.

In addition, the research team did not include data from facility-based HHAs and a relatively large number of low-volume HHAs. Because of difficulties of separating out facility-allocated overhead costs from direct and indirect costs specific to home health, hospital-based HHAs were excluded. Similarly, the research team excluded episodes from low utilization HHAs due to the differences in cost reporting requirements for these HHAs.²⁶

Since the analyses were performed on 2010 cost and claims data, these data will not reflect recent payment and policy changes in the HH PPS, which were implemented after 2010. Therefore, analysis with more current data may need to be performed to examine the current relationship between episode margins and patient characteristics as well as the estimated margin across patient characteristics.

5. Surveys on Access to Care and Factors Involved with Potential Access to Care Issues

5.1 Survey Methodology

In addition to performing analysis of administrative data, the research team conducted two surveys on access to care and factors involved with potential access to care issues. The surveys not only supplemented the larger quantitative analyses, but they also provided insight on questions that could not be answered using administrative data. For instance, while claims and cost report data only provide information on patients who have received home health services, the surveys provided information on whether patients have been denied home health services or experienced delays in receiving home health services. The survey also elicited information on the characteristics of patients who may have experienced these access issues.

The surveys were administered to physicians who referred vulnerable patient populations to Medicare home health and to Medicare-certified HHAs. Both target populations offered unique perspectives on the characteristics of Medicare beneficiaries who may have experienced access

²⁶Per, CMS Pub. 15-2, Section 110(B), for a low Medicare Utilization-Complex Provider.--The contractor may authorize less than a full cost report when a complex provider, including all of the provider based components, e.g., SNF, HHA, had low utilization of covered services by Medicare beneficiaries in a reporting period and received correspondingly low payments which, in the aggregate, appear to justify making a final settlement for that period based on less than a normally required full cost report.

issues. For both of the surveys, the vulnerable patient population was defined as beneficiaries who were either eligible for the Part D low-income subsidy (LIS)²⁷ or residing in a health professional shortage area (HPSA).

In order to develop the physician survey sample, members of the research team identified all physicians who referred at least 25 Medicare beneficiaries for home health services in 2010 where the beneficiaries were members of the vulnerable patient population and for whom at least half of all referrals were for members of the vulnerable patient population. From this set of physicians, a simple random sample of 510 physicians was drawn. Contact information for physicians in the survey sample was obtained from the National Plan and Provider Enumeration System (NPPES) file. Physicians with a practice location outside the 50 States and the District of Columbia were excluded.

In order to develop the Medicare-certified HHA sample, the team identified all HHAs that submitted claims for services provided to Medicare beneficiaries in 2010. Episodes were limited to those with both start and end dates during 2010. HHAs with fewer than 10 referrals during the year and those located outside the 50 States and the District of Columbia were excluded. A random sample of 1,075 HHAs, stratified by rural/urban status, was selected. For the HHAs in the survey sample, contact information was obtained from the Provider of Services (POS) file.²⁸

The survey materials were in the field from late January through May 2013. A description of the detailed survey methodology can be found in the Appendix H. Response rates, calculated as the ratio of the number of completed cases to the number of eligible cases in the sample, were 72 percent (N=756) and 59 percent (N=300) for the HHA and physician surveys, respectively. The response rates were within expected norms and generally consistent with the targeted rates.

5.2 Contents of the Questionnaires

The surveys asked HHAs and physicians about the proportion of Medicare fee-for-service (FFS) beneficiaries referred to home health that they were unable to admit or place as well the proportion of beneficiaries who experienced delays in receiving home health care or did not receive all home health services ordered. The surveys also asked HHAs and physicians about the

²⁷The LIS population includes all beneficiaries dually eligible for Medicare and Medicaid, as well as beneficiaries who are not eligible for Medicaid but who applied for and received the low-income subsidy.

²⁸ It should be noted that an error was identified in the sampling algorithm which resulted in the exclusion of HHAs coded as “other” on the “type of facility” variable in the POS file. The error resulted in over-sampling of government and voluntary/not-for-profit HHAs, provider-based HHAs, HHAs located in rural areas, and HHAs in the Northeast. The team performed an examination of key characteristics of the included and excluded cases using claims data, examining measures such as mean HCC score, mean number of skilled nursing visits per episode, mean number of PT visits per episode, and mean case-mix weight. Only very small differences were found and were not statistically significant. The analysis did not reveal any systematic bias.

factors involved with these potential access issues. In addition, HHAs were asked about the cost of care relative to reimbursement for various patient characteristics given a hypothetical patient. The last question on both surveys asked about the current availability of home health services to Medicare beneficiaries in the area. The HHA results presented in this report have been weighted to reflect national estimates. The survey questionnaires can be found in Appendix H.

5.3 Survey Findings

HHA respondents were asked for the number of referrals to the HHA in the past month, as well as the number of referrals that the HHA was unable to admit for that month. Table 5 shows the ratio of referrals the HHA could not admit to the total number of referrals, reflecting the percent of referred patients that the HHA was unable to admit. Approximately one-quarter of HHAs (26.2%) were able to admit all referrals. A slightly greater proportion of HHAs (31.6%) were unable to admit more than 20 percent of patient referrals. Along with general trends, more specific differences by HHA characteristics are also noted in Table 5.

Only differences statistically significant at the 95 percent confidence level are discussed below. Smaller HHAs (with 50 or fewer total referrals in the prior month) were twice as likely as larger HHAs to report being able to admit all referrals (30.8% vs. 14.3%) but smaller HHAs were also more likely to report difficulties admitting more than 20 percent of referrals (36.9% vs. 17.8%). Over 60 percent of proprietary HHAs reported being unable to admit more than 10 percent of referrals, while approximately 40 percent of not-for-profit HHAs reported being unable to admit more than 10 percent of referrals. Provider-based HHAs were less likely than freestanding HHAs to be unable to admit more than 20 percent of referrals (21.6% vs. 33.2%).

Table 5. HHAs: Ratio of the Reported Number of Medicare FFS Patients Unable to be Admitted to Total Referrals in the Past Month

Percentage Unable to be Admitted						
Ratios	Total	0%	1 to 5 %	6 to 10%	11 to 20%	>20%
	N	%	%	%	%	%
Total	753	26.2	4.7	11.4	25.9	31.6
Percent of referrals for “vulnerable patients”						
Less than 50%	431	22.5	6.9	14.1	32.1	24.4
50% or more	322	28.6	3.4	9.8	22.1	36.2
Number of Referrals*						
50 or fewer referrals	377	30.8	2.1	7.5	22.8	36.9
Greater than 50 referrals	376	14.3	11.7	21.9	34.2	17.8
Location						
Urban	455	26.7	4.7	10.4	24.8	33.5
Rural	298	24.6	5.1	15.7	30.5	24.2
Ownership*						
Government	110	31.9	7.1	6.7	20.6	33.6
Proprietary	243	26.7	2.6	8.7	27.9	34.1
Not-for-Profit	400	22.7	12.0	23.2	20.3	21.8
Facility Type*						
Freestanding	416	26.8	4.4	9.8	25.9	33.2
Provider-based	337	22.9	7.2	22.1	26.2	21.6

Note: Social & Scientific Systems identified all physicians who referred at least 25 Medicare beneficiaries for home health services in 2010 where the beneficiaries were members of the vulnerable patient population and for whom at least half of all referrals were for members of the vulnerable patient population. For the purposes of the surveys, the vulnerable patient population, as described in the survey methodology section, is defined as beneficiaries who were either eligible for the Part D low-income subsidy (LIS)¹ or residing in a health professional shortage area (HPSA).

*A * symbol indicates statistically significant differences at $p < 0.05$; percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.*

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Physicians were asked about the percentage of Medicare FFS patients they wanted to refer for home health services but were unable to find a placement for during the past three months (see Table 6). Two-thirds of physicians reported that they ‘rarely or never’ were unable to find a placement and fewer than 5 percent of physicians were unable to find a placement for more than 10 percent of their Medicare FFS referrals.

Table 6. Reported Percentage of Medicare FFS Patients that Physicians Wanted to Refer, but Were Unable to Find Placement for, in the Past Three Months

Reported Percentages	N	Percent
Rarely or never	187	66.1
For fewer than 5% of patients	57	20.1
For 6 to 10% of patients	26	9.2
For 11 to 20% of patients	8	2.8
For more than 20% of patients	5	1.8
Total	283	100.0

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

As shown in Table 7, the vast majority of HHAs and physicians experienced relatively few delays in starting home care for Medicare-FFS patients, with approximately 85 percent of HHAs and physicians experiencing delays for five or fewer beneficiaries during the prior one-month and three-month periods. Only 7.4 percent of HHAs reported delays in the start of care for more than 10 patients in the past month and only five percent of physicians reported that the start of care was delayed for more than 10 of their referrals in the past three months.

Table 7. Reported Number of Times Start of Care Was Delayed for Medicare-FFS Patients

Number of Times	HHAs, Last Month		Physicians, Last Three Months	
	N	Percent	N	Percent
0 to 5	571	84.8	256	85.3
6 to 10	85	7.8	29	9.7
11 to 49	78	6.3	6	2.0
50+	19	1.1	9	3.0
Total	753	100.0	300	100.0

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

For HHAs and physicians reporting delays in placement, the typical length of the delay is shown in Table 8. More than half of HHA and physician respondent reported a typical delay of 24 to 48 hours, with approximately one-third reporting delays greater than 48 hours.

Table 8. Typical Reported Length of Delay in Start of Care

Length of Delay	HHAs, Past Month		Physicians, Past Three Months	
	N	Percent	N	Percent
Less than 24 hours	41	12.1	22	14.0
24 to 48 hours	261	52.9	85	54.1
More than 48 hours	125	34.9	50	31.8
Total	427	100.0	157	100.0

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Nearly all HHAs reported five or fewer referrals for which care was started, but not provided for all ordered services (97.6%, Table 9). Similarly, most physicians (86.3%) reported between zero and five placements for which HHAs could not provide all ordered services. However, a small number of physicians (5.7%) indicated that more than 10 of their Medicare FFS referrals were unable to get all services they had ordered.

Table 9. Reported Number of Medicare FFS Patients for Whom HHA Started Care, but Was Unable to Provide All Ordered Services

Reported Numbers	HHAs, Past Month		Physicians, Past Three Months	
	N	Percent	N	Percent
0 to 5	724	97.6	259	86.3
6 to 10	11	0.7	24	8.0
11 to 49	14	1.4	11	3.7
50+	4	0.2	6	2.0
Total	753	100.0	300	100.0

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Factors Contributing to Reported Inability to Admit/Refer

Both HHAs and physicians were asked to rate a series of 16 factors on how frequently each factor impacted their reported inability to admit or refer a Medicare FFS patient for home health services. Factors were grouped by HHA issues, medical issues related to the patient, or non-medical issues related to the patient. Ratings ranged from one (never important) to five (always important); the percentage of HHAs and physicians using a rating of four or five is reported in Table 10 and Table 11, respectively for each of the factors, along with the mean rating.

The most commonly reported important admission factors were generally non-medical issues related to the patient. The factor rated as important by the greatest number of HHAs (63.7%) was the inability of patients to qualify for the Medicare home health benefit. Nearly half of HHAs (48.2%) indicated patient or family refusal of services as important, and approximately one-third of HHAs cited family/caregiver issues—both patient/family/caregiver cannot be or is unwilling to be trained (30.8%) or cannot provide necessary support (32.2%). Patient living conditions or local area safety was rated as important by more than one-quarter of HHAs (26.5%) and two or more visits per day expected was cited as important by slightly less than one-quarter of HHAs (23.3%).

Table 10. Factors in Being Unable to Admit Medicare FFS Patients, All HHAs

Factors	N	Mean rating	Percent Rating Always/Often an Important Factor
Issue related to HHA			
Nursing staff with needed skill set not available	571	1.8	15.3
Therapy staff not available (e.g., PT, OT, ST)	573	2.0	18.0
Staff not experienced with medical condition(s)	570	1.6	9.8
Required equipment/supplies not available	566	1.6	10.2
Reimbursement not sufficient	570	2.0	17.2
Medical issue related to patient			
Severity/complexity of patient's medical condition	572	2.1	19.4
More than two episodes of care expected	568	1.6	9.8
Two or more visits per day expected	569	2.2	23.3
Routine evening or weekend care expected	570	1.8	14.4
Patient does not qualify for Medicare home health benefit	571	3.7	63.7
Non-medical issue related to patient			
Patient living conditions or local area unsafe	571	2.5	26.5
Patient located in hard-to-reach area or travel distance/time too great	570	2.1	16.9
Patient /family/caregiver cannot be or is unwilling to be trained	571	2.6	30.8
Family/caregiver is unable to provide necessary support	572	2.7	32.2
Language barrier/communication problems	565	1.7	12.9
Patient or family refused services	571	3.4	48.2

Note: Respondents were asked to rate the factor from 1 to 5 where 1 was 'never important' and 5 was 'always important'. Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Differences in these ratings were analyzed according to characteristics of the HHAs; only those differences that are statistically significant at the .05 level or higher are reported here.²⁹ HHAs that served a larger proportion of vulnerable patient populations were more likely to cite HHA capacity issues (such as specific staff or equipment not being available) as always or often important in precluding admissions, compared to HHAs serving a smaller proportion (Table 11). Compared to larger HHAs, smaller HHAs were more likely to report a set of factors related to HHA capacity and the expected amount of care required as determinants in being unable to admit beneficiaries. There was only one difference between rural and urban HHAs—HHAs located in rural areas were twice as likely as their urban counterparts to indicate that patients located in hard-to-reach areas or travel distance/time too great was an important factor in their inability to admit beneficiaries.

In terms of HHA ownership, proprietary HHAs were more likely to report insufficient reimbursement, the expectation of the patient needing more than two episodes of care, and language barriers/communication problems as important factors complicating admissions. Freestanding HHAs were more likely than provider-based HHAs to report that unavailable, but required, equipment/supplies and language barrier/communication problems were important factors in not admitting a patient, but less likely to indicate that lack of availability of therapy staff was an important issue.

²⁹ Differences between percentages rating a reason as a 4 or 5 were tested using a chi-square statistic and are reported for p-values less than .05.

Table 11. Factors in Being Unable to Admit Medicare FFS Patients, All HHAs, by Subpopulation

Factors	% Vulnerable Patient Population <50 vs. % Vulnerable Patient Population ≥50	Small vs. Large	Urban vs. Rural	Government vs. Proprietary vs. Not-for-Profit	Free- Standing vs. Provider- based
Therapy staff not available	--	--	--	--	16.5 vs. 27.5*
Staff not experienced with medical condition(s)	4.7 vs. 13.3*	12.6 vs. 4.2*	--	--	--
Required equipment/supplies not available	3.6 vs. 14.7**	12.8 vs. 4.8*	--	--	11.1 vs. 4.6*
Reimbursement not sufficient	--	20.3 vs. 10.6*	--	13.4 vs. 19.7 vs. 9.5*	--
More than two 60 day periods (episodes) of care expected	4.4 vs. 13.4**	13.4 vs. 2.3**	--	7.2 vs. 12.1 vs. 2.5*	--
Two or more visits per day expected	29.9 vs. 18.9*	--	--	--	--
Patient located in hard-to-reach area or travel distance/time too great	--	--	13.7 vs. 29.0*	--	--
Language barrier/communication problems	--	--	--	2.1 vs. 15.6 vs. 6.2**	14.1 vs. 5.3**

*Note: A * symbol indicates statistically significant differences at $p < 0.05$; ** indicates statistically significant differences at $p < 0.01$. Small vs. large subgroups were defined using claims data, with small groups having 449 or fewer referrals, and large groups having greater than 449 referrals. Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.*

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

The important reasons for admission issues cited by physicians overlapped somewhat with those reported by HHAs (see Table 12). Medical issues, including the inability of a patient to qualify for the Medicare home health benefit (27.7%) and severity of a patient's medical condition (26.7%), were among the most important factors reported by physicians. The category patient and/or family caregiver being unable to provide the necessary support (24.7%) was also rated as important.

Table 12. Factors in Being Unable to Place Medicare FFS Patients with HHA, All Physicians

Factors	N	Mean Rating	Percent Rating Always/Sometimes an Important Factor
Issues related to HHA			
Nursing staff with needed skill set not available	223	2.1	16.0
Therapy staff not available	228	2.2	18.3
Staff not experienced with medical condition(s)	220	1.9	12.7
Required equipment/supplies not available	223	1.9	11.3
Reimbursement not sufficient	160	2.3	16.7
Medical issues related to patient			
Severity/complexity of patient's medical condition	240	2.6	26.7
More than two 60 day periods (episodes) of care expected	223	2.4	17.7
Two or more visits per day expected	235	2.2	16.0
Routine evening or weekend care expected	235	2.3	17.3
Patient does not qualify for Medicare home health benefit	236	2.9	27.7
Non-medical issues related to patient			
Patient living conditions or local area unsafe	229	2.3	18.0
Patient located in hard-to-reach area or travel distance/time too great	235	2.0	14.7
Patient/family/caregiver cannot be or is unwilling to be trained	239	2.5	18.3
Family/caregiver is unable to provide necessary support	243	2.7	24.7
Language barrier/communication problems	245	2	13.7
Patient or family refused services	240	2.4	16.0

Note: mean rating and denominator for percent rating include only non-missing values Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Factors Contributing to Delays

Since the delays in care can also indicate potential access to care issues, the surveys explored factors contributing to delays in referrals and HHA and key physicians' perception of patients' ability to obtain home health services. From the perspective of the HHAs, the reason cited most often as a factor in causing delays with the start of care was that the patient or family refused services (46 percent; see Table 13). Other issues noted as always or very often important were: no available caregiver (26.3%); patient history of non-compliance with the medical regimen (25.1%); therapy staff not available (24.2%); patient/family/caregiver cannot be or is unwilling to be trained (23.8%); and family/caregiver unable to provide necessary support (21.7%).

Comparing factors noted in causing delays and those cited as contributing to HHAs' inability to admit patients, there are some commonalities and some differences. In common, the patient or family refusing services was noted as important in causing delays and inability to admit by almost half of HHA respondents. While the vast majority of the response categories offered were the same for these two questions, there were two differences. First, having no available caregiver was considered an important factor in delays for many HHAs but was not a response option related to inability to admit a patient. Conversely, the patient not qualifying for the Medicare home health benefit was the most frequently cited factor in the inability to admit patients but was not a response option for delays.

Table 13: Factors in Causing Delays in Start of Care for Medicare FFS Patients, All HHAs

All HHAs			
Factors	N	Mean rating	Percent Rating Always/Sometimes Important
Issue related to HHA			
Nursing staff with needed skill set not available	420	1.7	13.6
Therapy staff not available (e.g., PT, OT, ST)	424	2.3	24.2
Staff not experienced with medical condition (s)	418	1.3	4.5
Required equipment/supplies not available	418	1.5	8.2
Reimbursement not sufficient	416	1.5	7.7
Medical issue related to Patient			
Severity/complexity of Patient 's medical condition	416	1.8	12.6
Patient history of non-compliance with medical regimen	417	2.4	25.1
More than two episodes of care expected	416	1.4	5.9

All HHAs			
Factors	N	Mean rating	Percent Rating Always/Sometimes Important
Two or more visits per day expected	416	1.9	15.9
Routine evening or weekend care expected	415	1.6	8.5
Non-medical issue related to Patient			
Patient living conditions or local area unsafe	414	2.2	19.0
Patient located in hard-to-reach area or travel distance/time too great	415	1.9	16.0
Patient /family/caregiver cannot be or is unwilling to be trained	415	2.4	23.8
No available caregiver	411	2.5	26.3
Family/caregiver is unable to provide necessary support	413	2.3	21.7
Language barrier/communication problems	414	1.6	6.7
Patient or family refused services	414	3.2	46.0

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

There was some variation in the importance of issues by HHA characteristics (Table 14). Those serving a larger proportion of members of vulnerable patient populations were more likely to cite expectations of more than two episodes of care and patient/family/caregiver cannot be or is unwilling to be trained as important factors in causing delays. Compared to urban HHAs, rural HHAs were more likely to report that therapy staff being unavailable and patients requiring more care (either two or more visits per day or routine evening or weekend care) were factors contributing to delays. Voluntary, non-profit HHAs were less likely than proprietary HHAs to indicate that lack of availability of therapy staff, insufficient reimbursement, or expecting more than two episodes of care were important factors.

Table 14. Factors in Causing Delays in Start of Care for Medicare FFS Patients, All HHAs, by Subpopulation

Factors	% Vulnerable patient population <50 vs. % Vulnerable patient population ≥50	Urban vs. Rural	Government vs. Proprietary vs. Not-for-Profit	Free- Standing vs. Provider- based
Therapy staff not available	--	20.9 vs. 37.8*	27.4 vs. 20.1 vs. 2.4*	22.1 vs. 36.9*
Reimbursement not sufficient	--	--	18.6 vs. 9.0 vs. 2.0**	--
More than two 60 day periods (episodes) of care expected	2.4 vs. 8.6*	--	3.0 vs. 7.8 vs. 1.3*	--
Two or more visits per day expected	--	13.3 vs. 27.0*	--	--
Routine evening or weekend care expected	--	6.7 vs. 16.4*	--	--
Patient/family/caregiver cannot be or is unwilling to be trained	16.1 vs. 29.4*	--	--	--

Note: Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Table 15 shows factors causing delays in placing Medicare FFS patients with an HHA, according to physician respondents. These factors included: the patient and/or family caregiver being unable to provide the necessary support (36.1%), the severity of a patient's medical condition (32.9%), and lack of available therapy staff (29.7%). Almost four in ten physicians indicated the lack of available caregivers as an important factor contributing to delays in home health placement (38%) and approximately one-third cited a history of patient non-compliance with the medical regimen (33.5%).

Table 15. Factors in Causing Delays in Placing a Medicare FFS Patient, All Physicians

Factors	N	Mean Rating	Percent Rating Always/Sometimes an Important Factor
Issues related to HHA			
Nursing staff with needed skill set not available	136	2.7	26.0
Therapy staff not available	138	2.7	29.7
Staff not experienced with medical condition(s)	134	2.2	13.3
Required equipment/supplies not available	135	2.2	13.9
Reimbursement not sufficient	106	2.7	22.2
Medical issues related to patient			
Severity/complexity of patient's medical condition	139	2.8	32.9
Patient history of non-compliance with medical regimen	139	2.9	33.5
More than two 60 day periods (episodes) of care expected	128	2.5	24.1
Two or more visits per day expected	133	2.5	21.5
Routine evening or weekend care expected	134	2.6	22.8
Non-medical issues related to patient			
Patient living conditions or local area unsafe	133	2.4	20.9
Patient located in hard-to-reach area or travel distance/time too great	137	2.3	21.5
Patient/family/caregiver cannot be or is unwilling to be trained	135	2.6	22.2
No available caregiver	142	3.1	38.0
Family/caregiver is unable to provide necessary support	140	3.0	36.1
Language barrier/communication problems	136	2.1	13.3
Patient or family refused services	140	2.5	19.6

Note: mean rating and denominator for percent rating include only non-missing value. Percentages for HHA survey data were weighted, see text or Appendix H for details. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Factors Contributing to Inability to Provide All Ordered Services

For those HHAs unable to provide all ordered services, the most common reason given was that a specific type of staff was not available (60.5%, Table 16). Over two-thirds of physicians also cited lack of availability of specific type of staff as the most common reason for their referred patients not getting all ordered services. Only a small percentage of responses by HHAs (7.8%) and physicians (13.6%) indicated that not having staff available to travel to a patient's residence prevented their ability to provide or obtain services. Among the "other" reasons given were patient refusal and unwillingness of caregiver.

Table 16. Most Common Reason All Ordered Services Were Not Provided

Reasons	HHAs		Physicians	
	N	Percent	N ⁺	Percent
Specific type of staff not available	101	60.5	137	68.8
Staff not available to travel to patient's residence	13	7.8	27	13.6
Other	53	31.7	35	17.6
Total	167	100.0	199	100.0

Note: N+ refers to the number of responses, not the number of total HHAs responding, since HHAs were able to select more than one response. Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

In terms of specific types of staff, therapy staff shortage was cited by three-quarters of HHAs, with only 10.3 percent of responses by HHAs citing a shortage in nursing staff and home health aides (Table 17). By contrast, only about one-third of responses by physicians indicated that lack of availability of therapy staff was the reason all ordered services were not obtained. Physicians also commonly cited lack of availability of home health aides (29.9%) and nursing staff (20.7%).

Table 17. Specific Type of Staff Not Available

Type of Staff	HHAs		Physicians	
	N	Percent	N	Percent
Nursing staff	12	10.3	38	20.7
Therapy staff	87	75.0	67	36.4
Social work staff	5	4.3	24	13.0
Home health aide	12	10.3	55	29.9
Total	116	100.0	184	100.0

Note: N+ refers to the number of responses, not the number of total HHAs responding, since HHAs were able to select more than one response. Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Factors Related to High Cost of Care Relative to Payment

In order to better understand the patient characteristics associated with high costs, HHA respondents were asked to assess the costs of care for a hypothetical patient. The following scenario was presented:

Suppose you have been asked to provide home health services for a patient with a chronic condition such as poorly controlled diabetes, heart failure or COPD, and the patient has other comorbidities. The patient is homebound, in need of skilled services, and has a caregiver.

With this hypothetical patient in mind, respondents were then asked to indicate the extent to which the presence of selected additional factors would affect the cost of caring for the patient relative to current reimbursement levels. Respondents were asked to indicate whether the cost of caring for such a patient, taking into account each of the additional factors, would be within the current payment amount, somewhat higher than the current amount, or much higher than the current amount. A final option was to indicate that the HHA could not take the patient regardless of the payment. The percentage of HHAs reporting that the cost of care would be much higher than payment is shown in Table 18.

Slightly more than seventy percent of HHAs indicated that care for the hypothetical patient plus the need for complex wound treatments would make the cost of care for such a patient much higher than current payment (71.6%). More than three in five HHAs said that the timing, frequency and/or duration of services could contribute to the cost of care being much higher than payment (63.5%) and just over half of HHAs indicated that the patient's need for IV administration would have such an impact (53.3%). Two other factors that HHAs reported as contributing to the cost of care being much higher than reimbursement were dependence on a mechanical ventilator (45.6%) and severe ADL/IADL limitations (44.7%). A patient's oxygen or dialysis dependence, living conditions or local area unsafe, and language or communication barriers were cited by less than 15 percent of HHAs as contributing to cost of care being much higher than reimbursement.

Table 18. Patient Characteristics Contributing to High Cost Relative to Payment

<i>Suppose you have been asked to provide home health services for a patient with a chronic condition such as poorly controlled diabetes, heart failure or COPD, and the patient has other comorbidities. The patient is homebound, in need of skilled services, and has a caregiver.</i>		All HHAs	
How does the cost of care compare to the current reimbursement for the hypothetical patient who also <i>has or requires...</i>		Cost of Care Much Higher Than Reimbursement	
		N	%
State of mind			
Developmental and/or intellectual disabilities		192	23.1
Mental illness		222	29.1
Dementia or severe cognitive impairment		268	32.0
State of body			
Morbid obesity		243	27.3
Severe ADL/IADL limitations		360	44.7
Substance/alcohol abuse		163	22.5
Dialysis dependence		105	14.2
Dependence on mechanical ventilator		234	45.6
Oxygen dependence		61	8.7
Incontinence		102	13.7
Bed/wheelchair bound		181	24.1
Frequency/complexity of procedures			
Use of multiple or high risk medications		169	22.0
IV Administration		386	53.3
Timing, frequency and/or duration of services		511	63.5
Complex wound treatments		582	71.6
Non-medical factors			
History of non-adherence/non-compliance		231	27.9
Language barriers/communication problems		111	14.0
Patient living conditions or local area unsafe		86	12.1
Patient located in hard to reach area		199	32.1

Note: Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Table 19 shows differences in the factors contributing to higher cost by HHA characteristics. HHAs serving a smaller proportion of vulnerable patients were more likely to indicate that patients with mental illness or a history of non-compliance would make the cost of care much higher than payment. Rural HHAs were more likely than urban HHAs to cite timing, frequency, or duration of services as an issue. Compared to proprietary HHAs, voluntary/not-for-profit HHAs were more likely to report the following factors as contributing to higher cost: dementia or severe cognitive impairment, complex wound treatments, history of non-compliance. There were also several differences between freestanding and provider-based HHAs. Provider-based HHAs were more likely to cite timing, frequency or duration of services and complex wound treatments as factors but less likely to indicate that non-compliance was an important problem.

Table 19. Patient Characteristics Contributing to High Cost Relative to Payment, by Subpopulation

Characteristics	% Vulnerable Patient Population <50 vs. % Vulnerable Patient Population ≥50	Urban vs. Rural	Government vs. Proprietary vs. Not-for-Profit	Free- Standing vs. Provider- Based
Mental illness	39.4 vs. 22.4**	--	--	--
Dementia or severe cognitive impairment	--	--	24.8 vs. 30.1 vs. 41.3*	--
Timing, frequency and/or duration of services	--	61.1 vs 73.2*	--	61.6 vs. 76.1**
Complex wound treatments	--	--	80.4 vs. 68.9 vs. 78.8*	70.1 vs. 81.4**
History of non-adherence/non-compliance	35.2 vs. 23.3*	--	31.0 vs. 23.0 vs. 43.9†	59.4 vs. 40.6**

*Note: A * symbol indicates statistically significant differences at $p < 0.05$; ** indicates statistically significant differences at $p < 0.01$; † indicates statistically significant differences at $p < 0.0001$. Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.*

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

Other Results

Table 20 shows where HHAs and physicians reported their Medicare FFS patients were most likely to go for care if they were unable to be placed with or start care with the referred HHA. A similar proportion of HHAs-- less than one-third each-- indicated their patients would either go to another HHA or home with no formal care. Almost one-quarter of HHAs said that such patients would instead be placed in a nursing home or SNF, while 13.2 percent of HHAs said the patient would remain in the hospital. In contrast, nearly three-quarters of physicians reported another HHA as the most likely alternative.

Table 20. Where Patient Is Most Likely to Go for Needed Care if Unable to Start Care/Be Placed

Locations	HHAs		Physicians	
	N	Percent	N	Percent
Another HHA	179	31.4	165	74.0
Nursing home or skilled nursing facility	134	23.5	29	13.0
Hospital	75	13.2	7	3.1
Home, with no formal care	182	31.9	22	9.9
Total	570	100.0	223	100.0

Note: Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

As shown in Table 21, when asked to rate the level of access to home care health care for Medicare beneficiaries in their local area, the vast majority of HHAs and physicians reported access as excellent or good (81.5 percent and 90.5 percent, respectively). Only a very small percentage of HHAs and no physicians indicated that access was poor.

Table 21. Rating of Access to Home Health Care for Medicare FFS Patients in Local Area

Ratings	HHAs		Physicians	
	Unweighted N	Percent	N	Percent
Excellent	340	42.5	141	47.6
Good	295	39.0	127	42.9
Fair	54	8.6	21	7.1
Poor	9	2.2	0	0.0
Varies within the local area where patient lives	50	7.4	7	2.4
Total	748	100.0	296	100.0

Note: Percentages for HHA survey data were weighted, see text for detail. Due to rounding percentages may not sum to 100%.

Source: Survey of Access to Home Health Services for Medicare Beneficiaries. This survey was administered in 2012 to HHAs that submitted claims for services in 2010 and to physicians for whom at least half of all referrals were for members of the vulnerable population.

6. Discussion and Next Steps

Most HHAs and physicians reported that access to home health care for Medicare FFS patients in their local area was excellent or good. Only two percent of HHAs and no physicians indicated access was poor. This finding is similar to MedPAC's statement on access in their March 2014 Report to the Congress, "Access to home health care is generally adequate: Over 99 percent of beneficiaries live in a ZIP code where a Medicare home health agency operates, and 97 percent live in a ZIP code with two or more agencies." In addition, the vast majority of HHAs and physicians reported experiencing relatively few delays in starting care for Medicare FFS patients and nearly all HHAs and most physicians reported only five or fewer referrals for which care was started but the HHA did not provide all ordered services.

With regard to the inability to admit or place patients into home health, HHAs reported different results than physicians. Approximately one-quarter of HHAs (26%) reported that they were able to admit all referrals while a slightly greater proportion of HHAs (32%) reported that they were unable to admit more than 20 percent of beneficiary referrals. In contrast, two-thirds of physicians who were surveyed reported that they 'rarely or never' were unable to find a placement and fewer than five percent of physicians were unable to find a placement for more than 10 percent of their Medicare FFS referrals.

When survey respondents reported access issues, specifically their inability to place or admit Medicare fee-for-service patients into home health, the most common reason was that the patients did not qualify for the Medicare home health benefit. In addition, almost half of HHAs indicated patient or family refusal of services as an important contributing factor. These results suggest that a significant proportion of the incidents where the HHAs or physicians reported the inability to admit or place patients may have been because Medicare home health services may not have been appropriate (including lack of qualification for the benefit under Medicare) for the patient.

When reporting factors contributing to the inability to place or admit patients, physicians placed more emphasis on the patient's medical condition than HHAs. However, there was some overlap in the factors contributing to admission issues reported by HHAs and physicians. HHAs and physicians both cited family/caregiver issues as an important contributing factor in the inability of HHAs to admit patients. About 32 percent of HHAs and 25 percent of physicians reported the inability of the patient/family/caregiver to provide necessary support as an important factor contributing to admission issues-- suggesting that the presence of a caregiver may play a role in access to home health. In addition, 27 percent of HHAs and 18 percent of physicians reported patient living conditions or local area safety as an important factor contributing to admission

issues. Compared to the reasons for denied admissions just outlined, insufficient reimbursement appeared to be important for smaller numbers of respondents (17% of HHAs and 17% of physicians).

With regard to the question about the cost of care relative to payment for the hypothetical patient, slightly more than seventy percent of HHAs indicated that care for the hypothetical patient plus the need for complex wound treatments would make the cost of care for such a patient much higher than current reimbursement (72%). More than three in five HHAs said that the timing, frequency and/or duration of services could contribute to the cost of care being much higher than reimbursement (64%) and just over half of HHAs indicated that the patient's need for IV administration would have such an impact (53%). Two other frequently reported factors were dependence on a mechanical ventilator (46%) and severe ADL/IADL limitations (45%). Although living conditions or local area safety was important in HHAs' inability to admit patients, it was one of the factors cited by the fewest number of HHAs as contributing to the cost of care being much higher than payment.

The surveys suggest that much of the variation in access to Medicare home health services is associated with social and personal conditions and therefore CMS' ability to improve access for certain vulnerable patient populations through payment policy may be limited. However, analysis of CY 2010 HHA payment and cost data suggests that margins may differ substantially across HHRGs, thereby indicating that there may be financial incentives in the HH PPS to select patients categorized into a particular HHRG group. Specifically, examination into the HHRGs indicated that episodes with high therapy utilization were associated with high margins and episodes with skilled nursing visits were associated with lower margins. In CY 2012, CMS recalibrated the case-mix weights, increasing the weights for no- or low-therapy episodes and lowering the weights for high-therapy episodes, so the margin difference between HHRGs with varying therapy levels may have been alleviated.

Particular beneficiary characteristics already used in the current HH PPS case-mix system also appear to be strongly associated with margin, and thus may create financial incentives to select certain patients over others. For example, margins were estimated to be distinctly lower in CY 2010 for patients who required parenteral nutrition, who had traumatic wounds or pressure ulcers, or required substantial assistance in bathing. These results complement the survey findings, which indicated that the need for complex wound treatments or IV administration or the presence of severe ADL/IADL limitations for a hypothetical patient may cause the cost of care to increase significantly. These characteristics are already incorporated in the HH PPS case-mix system, but CMS may need to complete further analysis to determine if modifications to the case-mix system may be able to reduce the variation of margins with these characteristics.

Currently, the case-mix system is based on statistical models predicting standardized resource costs per episode. Resource costs per episode are national-wage-weighted sums of the minutes of visit time from each discipline. Case-mix weights are based on relationships between patient and episode characteristics (independent variables) and standardized resource cost per episode (the dependent variable). In contrast, the dependent variable in this study is episode margin estimated using each HHA's cost per visit. One reason for the findings of residual effects from case-mix system variables could be that the costs from HHA cost reports provide cost information different from wage-weighted resource costs. Another possible reason is that the time periods of the statistical models in this study and the case mix system differ; effects of variables on cost or resource use could have changed between time periods. Finally, the case mix groups are structured from severity levels for clinical and functional and therapy visit variables. The process of summarizing coefficients of variables into case mix severity levels may result in a loss of sensitivity for identifying specific independent effects of some important characteristics on cost. These considerations argue for additional analysis of potential modifications to CMS' current HH PPS case-mix methodology.

Other results showed that in CY 2010, beneficiaries admitted after acute or post-acute stays, or who had high HCC scores, were also associated with substantially lower home health margins. CMS may consider further exploring the feasibility of adding these variables to the case-mix system to decrease margin differences between patients with and without these characteristics. It should be noted that a post-acute variable was previously included in the case-mix system, but was removed in part because of difficulties HHAs had establishing the type of post-acute institution from which beneficiaries were admitted to home health (72 FR 25361). Further work could explore adding a post-acute care variable back into the case-mix system, along with full consideration of administrative implications against today's background of information systems available to CMS and HHAs.

Certain poorly-controlled clinical conditions were associated with substantially lower home health margins. For example, poor control of diabetes, peripheral vascular disease, and pulmonary disorders were all associated with reduction of more than \$100 (more than 11 percent) in margin in both the OLS and fixed-effect models. While these results are reasonable and fairly consistent, adding variables like these to a payment system could be problematic unless the reliability and relative objectivity with which assessors determine a condition to be poorly controlled could be assured.

Other characteristics, such as those describing the provision of assistance by informal caregivers for ADL needs, were strongly associated with margins. These results corroborate the survey findings, where caregiver/family issues were cited as important factors contributing to an HHA's inability to admit patients. However, CMS has in the past voiced reservations about potential unintended consequences from adding information about caregiver/family status to the payment

system. Specifically, adding this type of variable may create unwanted incentives for HHAs to select for certain patients or for HHAs to discourage care by caregivers who currently provide care.

Socio-economic variables, such as indicators for patients living in low-income areas or for patients who were eligible for both Medicare and Medicaid, also seemed to be systematically associated with margins for normal and outlier episodes. In payment systems for other care settings, such as the Hospital Inpatient Prospective Payment System (IPPS) and Inpatient Rehabilitation Facility (IRF) PPS, payments are adjusted by the facility's share of low-income patients. If further analysis continues to indicate that there is a strong, consistent relationship between an HHA's share of low-income patients and margin in home health over time, CMS may consider making a similar adjustment to home health episode payments.

With regard to the analysis of outlier episodes, the results showed little indication of systematic differences in episode losses across the many patient characteristics examined, except in a few instances where very small numbers of cases suggested the circumstance or characteristic is rare or where the characteristic was strongly linked to a small number of HHAs. Therefore, the research team recommended that CMS focus its' efforts on reforming the payment system for normal episodes before considering the payment algorithm for outlier payments.

Exploration of potential payment methodology approaches indicated that accounting for additional variables in HH PPS case-mix system may decrease the difference in estimated margin between individuals in specific vulnerable patient population subgroups and those not in the subgroups, thereby potentially decreasing financial incentives to select certain types of patients over others. It should be noted that while the analysis suggested that the additional variables may improve payment equity for specific subgroups that were tested, lower margins for other subgroups -- patients with poorly controlled or clinically complex conditions -- would not be improved. CMS will examine the reasons for this result and look for ways to correct payment asymmetries affecting these vulnerable patient populations.

CMS plans to further explore margin differences across patient characteristics and possible payment methodology improvements suggested by results of this study. Given the recalibration of the case-mix weights in CY 2012, which increased case-mix weights of no- or low-therapy episodes and lowered weights associated with high-therapy episodes, the variation across the HHRGs seen in this study's analysis of CY 2010 data may have already been reduced. Analysis of 2012 cost and claims data is needed to determine the extent of the variation in margin across HHRGs in the current case-mix system. The 2012 data can also be linked to earlier data to examine the consistency of the relationship between patient characteristics and margin across the years. Any variables under consideration for incorporation into the payment system will need to

be assessed first to determine the added value of the variable when weighted against possible adverse incentives and issues of administrative feasibility that the payment change may create.

In summary, most HHAs and physicians reported that access to home health care for Medicare FFS patients in their local area was excellent or good. In addition, the survey findings suggest that much of the variation in access to Medicare home health services is associated with social and personal conditions and therefore CMS' ability to improve access for certain vulnerable patient populations through payment policy may be limited. While the presence of margin differences in the administrative data analyzed does not mean that there are access issues, the margin differences do indicate that there may be financial incentives to select certain types of patients over others. The analysis of HHA costs involved with providing ongoing access to care to low-income Medicare beneficiaries or beneficiaries in medically underserved areas found that there may be higher costs, relative to payment, associated with providing Medicare home health services to patients who are dually eligible. In addition, the analysis of HHA costs involved in treating beneficiaries with high levels of severity of illness found that there may be subsets of these patients who may have higher costs, relative to payment, such as patients with complex wound care needs, patients who required parenteral nutrition, patients who required substantial assistance in bathing, patients with high HCC scores, beneficiaries admitted after acute or post-acute stays, and patients with certain poorly-controlled conditions. However, given the recalibration of the case-mix weights in CY 2012, which adjusted the weights relative to one another, the margin differences observed in this study may have already been reduced and further analysis of 2012 cost and claims data is needed to determine the extent of the variation in margin in the current case-mix system. CMS plans to further explore margin differences across patient characteristics and possible payment methodology improvements suggested by results of this study. By decreasing margin variation within the payment system, CMS can more accurately pay for services and may decrease any potential incentives to selectively admit patients.