Medicare Home Health Prospective Payment System: Case-Mix Methodology Refinements

Overview of the Home Health Groupings Model

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Exhibits

Acronyms

ADL	Activity of daily living
AHA	American Hospital Association
AHRQ	Agency for Healthcare Research and Quality
BLS	Bureau of Labor Statistics
CBSA	Core-based Statistical Area
CC	Complications or Comorbidities
CCS	Clinical Classification Software
CMS	The Centers for Medicare & Medicaid Services
CPM + NRS	Cost per Minute plus Non-Routine Supplies
CWG	Clinical Workgroup
CY	Calendar Year
DOT/I	Diagnosis on Top with an Index Model
DRG	Diagnosis-Related Group
GI	Gastrointestinal
GU	Genitourinary
HCC	Hierarchical Condition Categories
HCPCS	Healthcare Common Procedure Coding System
HCRIS	Healthcare Cost Report Information System (HCRIS)
HH PPS	Home Health Prospective Payment System
HHA	Home Health Agency
HHGM	Home Health Groupings Model
HHRG	Home Health Resource Group
HIC	Health Insurance Claim
HSRV	Hospital Specific Relative Value
ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
IMPACT Act	Improving Medicare Post-Acute Care Transformation Act of 2014

IPPS	Inpatient Prospective Payment System
IV	Intravenous
LPN	Licensed practical nurse
LUPA	Low-Utilization Payment Adjustment
MCC	Major Complications or Comorbidities
MCE	Medicare Code Edits
MCR	Medicare Cost Reports
MedPAC	Medicare Payment Advisory Commission
MMTA	Medication management, teaching, and assessment
NAICS	North American Industry Classification System
NRS	Non-Routine Supplies
OASIS	Outcome and Assessment Information Set
OLS	Ordinary Least Squares
OT	Occupational therapy/therapist
PEP	Partial Episode Payment
POS	Provider of Services
PT	Physical therapy/therapist
RAP	Request for Anticipated Payment
RN	Registered nurse
SAF	Standard Analytic File
SLP	Speech-language pathologist
SOC	Standard Occupation Classification
TPN	Total Parenteral Nutrition
TWG	Technical Workgroup
WWMC	Wage Weighted Minutes of Care

1. Chapter 1 – Overview of the Home Health Groupings Model

The Centers for Medicare & Medicaid Services (CMS) contracted with Abt Associates (Abt) to reassess the current Home Health Prospective Payment System (HH PPS) and develop potentially large-scale payment methodology changes to better align payment with patient needs, to address payment incentives and vulnerabilities in the current system, and to respond to the concerns laid out in the prior 3131(d) Home Health Study Report to Congress and by the Medicare Payment Advisory Commission (MedPAC). This chapter provides a brief overview of one potential alternative payment model that Abt and CMS have developed for the HH PPS, which we call the Home Health Groupings Model (HHGM). The remainder of this report explains the model in more detail.

The HHGM was developed to address numerous criticisms of the current payment system and draws upon extensive research that paved the way for reform efforts by examining how the current payment system is used. Section 3131(d) of the Patient Protection and Affordable Care Act (Pub. L. 111-148), as amended by the Health Care and Education Reconciliation Act of 2010 (Pub. L. 111-152, referred to as "The Affordable Care Act"), directed 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. As part of the study, CMS was also authorized to analyze methods to potentially revise the HH PPS.
- Submit a Report to Congress on the study findings and recommendations by March 1, 2014.

In the 3131(d) Home Health Study Report to Congress,[1] produced in response to this mandate, the research team identified vulnerable patient populations whose home health care may be associated with lower margins under the HH PPS. The patient populations that may be associated with lower margins under the HH PPS include those: needing parenteral nutrition, with traumatic wounds or ulcers, requiring substantial assistance in bathing, admitted to home health following an acute or post-acute stay, having a high Hierarchical Condition Category (HCC) score, having certain poorly controlled clinical conditions, or beneficiaries that were dual eligible for both Medicare and Medicaid.

MedPAC's annual reports in 2011 and 2015 also contained a number of findings and recommendations regarding the HH PPS.[2,3] For example, MedPAC:

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1 *Report to Congress. Medicare Home Health Study: An Investigation on Access to Care and Payment for Vulnerable Patient Populations.* Available via: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/Downloads/HH-Report-to-Congress.pdf.

2 Medicare Payment Advisory Commission. 2011. Report to the Congress: Medicare payment policy. Washington, DC: MedPAC. Available via: http://www.medpac.gov/docs/default-source/reports/Mar11_EntireReport.pdf.

3 Medicare Payment Advisory Commission. 2015. Report to the Congress: Medicare payment policy. Washington, DC: MedPAC. Available via: http://www.medpac.gov/docs/default-source/reports/mar2015_entirereport_revised.pdf.

- Noted that policymakers have long struggled to define the role of the home health benefit in Medicare.
- Recommended that home health payment should be determined by patient characteristics and not by the amount of therapy provided during an episode.
- Noted that including therapy provision in payment determination is counter to the goals of prospective payment, since therapy levels are under the control of the provider.
- Demonstrated that after the implementation of the refinements to the HH PPS in 2008, the distribution of therapy visits within an episode changed so that HHAs were more likely to receive higher payments from providing therapy at or above the higher paying therapy thresholds.
- Noted an increasing share of episodes do not have a prior hospitalization or post-acute care stay within the 15 days prior to home health admission, with patients instead admitted directly from the community.

In 2013, CMS began to develop options, in alignment with the Agency's strategic goals, to address the concerns raised and the findings presented in the 3131(d) Home Health Study Report to Congress and MedPAC's annual reports. It was determined that any options developed should:

- Support the Medicare home health program as articulated in existing statutory, regulatory, and guidance documents
- Promote and protect access to home health services for eligible beneficiaries
- Support the provision of care that meets beneficiaries' clinical needs at home
- Promote efficient care that aligns payment with high-quality services
- Allow for a payment structure that is responsive to changes in utilization patterns and resource use[4]
- Minimize vulnerabilities that may lead to unintended consequences

In a 2016 report, MedPAC also noted the importance of developing a unified payment system for post-acute care that based payment on the needs of the patient rather than the setting of care.[5] In its report, MedPAC also acknowledged that the timeline for implementing a unified payment system for post-acute care is years away and that CMS should move forward with existing MedPAC recommendations to refine individual payment systems to better align payments with costs, eliminate known biases in the payment systems, and help ensure access for beneficiaries with varying health care needs.

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4 "Resource use" is an estimate of the cost of an episode. It is measured by multiplying the number of minutes of services that occur during an episode by a wage rate for the disciplines providing the care.

5 Medicare Payment Advisory Commission. 2016. Report to the Congress: Medicare and the Health Care Delivery System. Washington, DC: MedPAC. Available via: http://www.medpac.gov/docs/default-source/reports/chapter-3-mandated-report-developing-a-unified-payment-system-for-post-acute-care-june-2016-report-.pdf?sfvrsn=0

Abt performed several initial analyses to help develop options for refining payments under the current home health payment system. After conducting that work and assessing the strengths and weaknesses of the potential alternate payment methodologies, Abt worked with CMS to further develop an alternative payment system option called the HHGM. The HHGM model is briefly described in this chapter. The strengths and weaknesses of that model as well as other potential modifications to the model are also discussed.

1.1 Structure of the Home Health Groupings Model

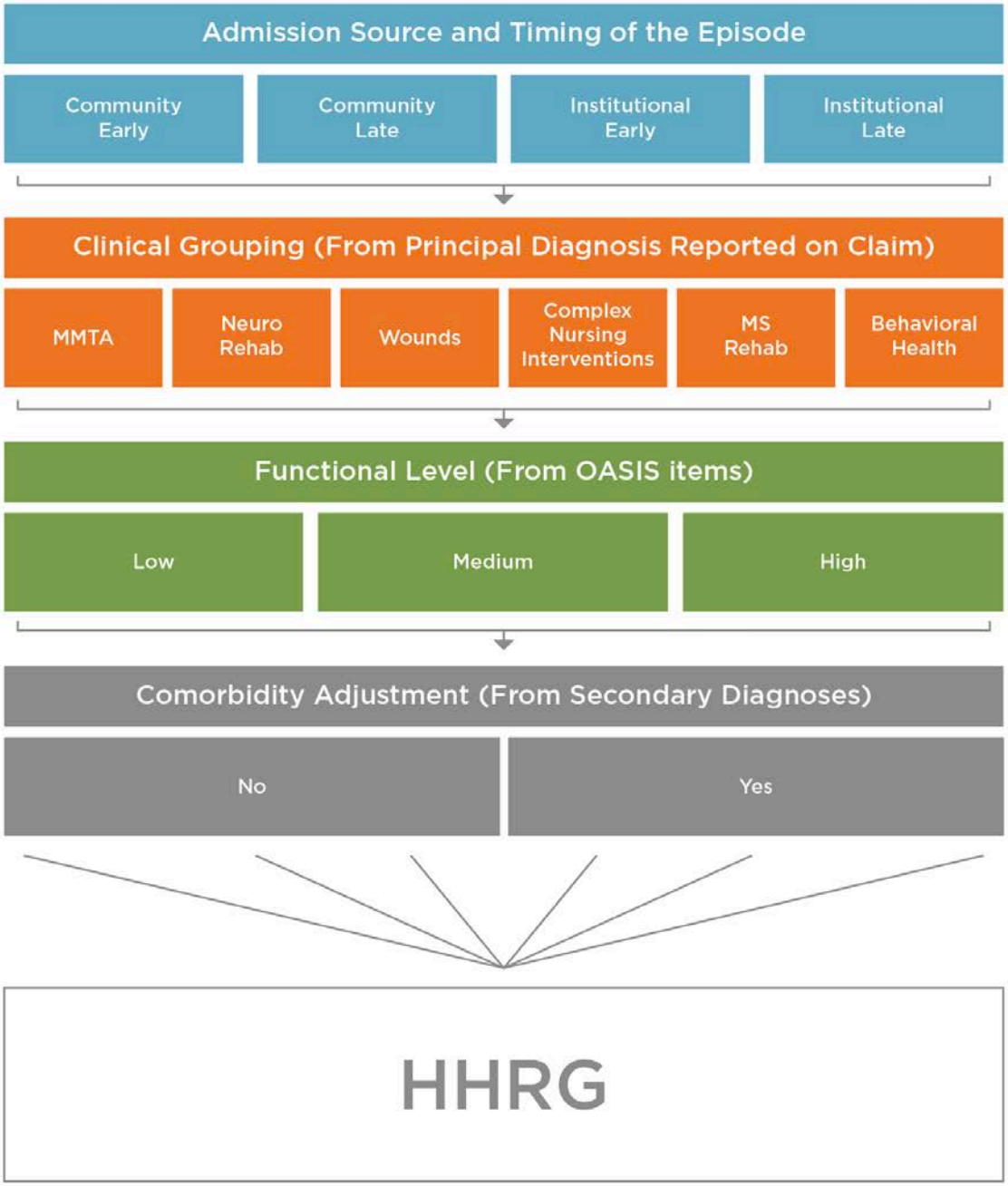
In this section, we describe the structure of the HHGM. Exhibit 1-1 below provides an overview of how home health episodes are grouped for payment in the HHGM. In particular, episodes are placed into different subgroups for each of the following broad categories:

- **Episode timing (two groups):** early or late
- **Admission source (two groups):** community or institutional admission source
- **Clinical grouping (six groups):** musculoskeletal rehabilitation; neuro/stroke rehabilitation; wounds; medication management, teaching, and assessment (MMTA); behavioral health; or complex nursing interventions
- **Functional level (two or three groups, depending on clinical group):** If the clinical group is behavioral health or musculoskeletal rehabilitation then the potential functional levels are low or high; if the assigned clinical group is MMTA, complex nursing interventions, neuro/stroke rehabilitation, or wounds then the potential functional levels are low, medium, or high
- **Comorbidity adjustment (two groups): "**Yes" or "No" based on secondary diagnoses

In total, there are 2*2*(4*3+2*2)*2 = 128 possible different payment groups an episode can be grouped into under the HHGM. Unlike the current payment model, the HHGM does not rely on the number of therapy visits provided to influence payment.

The remainder of this chapter reviews each HHGM grouping category in more detail.

Exhibit 1-1: Structure of the Home Health Groupings Model



Under the Home Health Groupings Model, an episode is grouped into one (and only one) subcategory under each larger colored category. An episode's combination of subcategories groups the episode into one of 128 different payment groups.

Episodes in the MS Rehab and Behavioral Health clinical groups can only be grouped in the low or high functional level.

The Complex Nursing Interventions clinical group uses a mix of principal diagnoses and OASIS items to group episodes.

1.1.1 Resource Use

To construct the case-mix weights for the HHGM payment model, the costs of providing care during a home health episode needs to be determined. In the current payment system, costs are proxied by the concept of resource use – which measures the costs associated with visits performed during a home health episode. The research team explored various methods for determining resource use for the HHGM. We explored using the Wage Weighted Minutes of Care (WWMC) approach that is used in the current payment system and uses data from the Bureau of Labor Statistics (BLS). We also explored the Cost per Minute plus Non-Routine Supplies (CPM + NRS) approach, which uses information from the Medicare Cost Report. The research team decided on the CPM + NRS approach as it incorporated a wider variety of costs compared to the BLS estimates and the costs were more HHA specific compared to the aggregated BLS costs.

1.1.2 Length of Episode

However, in order to better account for the relationship between episode characteristics and episode cost, we have modeled all episodes as two 30 day periods within a 60 day episode of care, instead of a single 60 day episode as in the current payment system. In the event that a 60 day episode of care only contains 30 days or less, it would be considered a single 30 day period under the HHGM. This change accounts for differences in the number of visits that typically occur near the beginning versus the end of a 60 day episode under the current system. That is, if visits are more front-loaded in the first 30-days of a 60 day episode, dividing a single 60 day episode into two periods would allow payments to be more accurately apportioned as early periods would likely receive increased payments that reflect the increased resource use. There is wide variation in the length of episodes in the current HH PPS and that variation is related to admission source and the reason for entering home health. Overall, we found that the average length of an episode of care was equal to 46.1 days in our sample.[6]. Those episodes that were identified as coming from the community had an average length equal to 49.1 days. Those episodes that had a hospital stay in the seven days prior to the start of the episode had an average length equal to 37.8 days; however this varied by DRG. For example, those episodes that had a hospital stay in the seven days prior to the start of the episode where the Diagnosis Related Group (DRG) was either 469 or 470 (major joint replacement or reattachment of lower extremity) had an average length equal to 23.7 days.

1.1.3 Episode Timing

Similar to the current payment system, episodes under the HHGM are classified as “early” or “late” depending on when they occur within a sequence of episodes. Under the current HH PPS, the first two episodes of a sequence of adjacent episodes are considered early, while the third episode of that sequence and any subsequent episodes are considered late.

Under the HHGM, the first 30 day period is classified as early. All subsequent 30 day periods in the sequence (second or later) are classified as late. While there are two 30 day periods in the 60 day episode of care, the comprehensive assessment would be completed within 5 days of the start of care date and completed no less frequently than during the last 5 days of every 60 days beginning with the start of care date, as currently required by the Medicare Conditions of Participation at 42 CFR 484.55.

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[6] Median length of stay is equal to 57 days. Nearly half of episodes last a full 60 days.

As a result, any information obtained from the OASIS used to set case-mix in the HHGM does not change over the two thirty day periods the OASIS covers.

1.1.4 Admission Source

Under the HHGM, each episode is classified into one of two admission source categories – community or institutional – depending on what healthcare setting was utilized in the 14 days prior to home health admission. Beneficiaries admitted to home health from the community or an institutional setting of care (i.e., an acute or post-acute care setting) each have different care needs, and under the HHGM, episodes would be paid differently depending on the admission source. Episodes that are early would be classified into a community or institutional admission source depending on if the patient received any institutional care in the 14 days prior to being admitted to home health. Late episodes are always classified as an admission from community unless there was an acute hospitalization in the 14 days prior to the late home health episode. A post-acute stay in the 14 days prior to a late home health episode would not be classified as an admission from an institutional setting.

1.1.5 Clinical Grouping

The HHGM groups episodes into payment categories based on a variety of patient characteristics. Within the HHGM, one of the steps in establishing an episode payment includes grouping episodes into one of six clinical groups based on the principal diagnosis listed on the Outcome and Assessment Information Set-C (OASIS) for each episode and also based on certain OASIS items (e.g., M1030 – provision of intravenous (IV) therapy, parenteral nutrition, enteral nutrition; M1410 – types of respiratory treatments utilized at home; and M1630 – ostomy for bowel elimination). The principal diagnosis reported would provide information to describe the primary reason for which patients are receiving home health services under the Medicare home health benefit. Recognizing that not all care needs can be identified by a diagnosis alone, additional case mix adjustments are made within the HHGM as described further below and in the various chapters of this technical report.

The six clinical groups are described in the exhibit below. These groups are designed to capture the most common types of care that HHAs provide. The HHGM groups home health episodes to mirror how clinicians differentiate between beneficiaries and would help explain the primary reason why the beneficiary is receiving home health. The clinical groups help to better define the Medicare home health benefit, which is not readily apparent in the current HH PPS. Abt, CMS, and 3M clinical and coding staff reviewed all International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes and assigned each code into one of the following clinical groups:

Exhibit 1-2: HHGM Clinical Groups

Clinical Group	Primary Reason for Home Health Encounter is to Provide:
Musculoskeletal Rehabilitation	Therapy (PT/OT/SLP) for a musculoskeletal condition
Neuro/Stroke Rehabilitation	Therapy (PT/OT/SLP) for a neurological condition or stroke
Wounds - Post-Op Wound Aftercare and Skin/Non-Surgical Wound Care	Assessment, treatment and evaluation of a surgical wound(s); assessment, treatment and evaluation of non-surgical wounds, ulcers burns and other lesions

Clinical Group	Primary Reason for Home Health Encounter is to Provide:
Complex Nursing Interventions (Based on diagnosis codes and answers to OASIS item M1030, M1410, and M1630 and certain V-codes)	Assessment, treatment and evaluation of complex medical and surgical conditions including IV, TPN, enteral nutrition, ventilator, and ostomies as well as the presence of certain V-codes as the primary diagnosis
Behavioral Health Care	Assessment, treatment and evaluation of psychiatric and substance abuse conditions
Medication Management, Teaching and Assessment (MMTA)	Assessment, evaluation, teaching, and medication management for a variety of medical and surgical conditions not classified in one of the above listed groups.

Not every ICD-9-CM diagnosis code was assigned to one of the clinical groups as described above. Episodes with certain principal diagnosis codes were considered questionable encounters for home health services. A more descriptive narrative regarding the development of the clinical groups, the process of reviewing the ICD-9-CM diagnosis codes, and the rationale for questionable encounters is included in Chapter 6 of this report.

1.1.6 Functional Level

As part of the development of the HHGM, Abt examined the relationship between every OASIS-C item and resource use. Each OASIS item was evaluated using clinical review and analytical methods. The OASIS items below were associated with resource use and were considered clinically relevant. A number of the OASIS items examined had clinically counterintuitive relationships with resource use (meaning a worse outcome was correlated with lower resource use) and therefore, were not included in the model. These items may be re-assessed for inclusion at a future date if their relationship with resource use changes.

The HHGM designates a functional level for each episode based on the following OASIS items[7]:

- M1800: Grooming
- M1810: Current ability to dress upper body safely
- M1820: Current ability to dress lower body safely
- M1830: Bathing
- M1840: Toilet transferring
- M1850: Transferring
- M1860: Ambulation and locomotion
- M1032: Risk for hospitalization

Using home health episodes from 2013, Abt estimated a regression model that determines the relationship between the responses for the above listed OASIS items and average episode resource use. Similar to the current payment system, the coefficients from the regression are used to assign points to a home health episode. The points are then summed up and thresholds are applied to

[7] As described later in Chapter 5, All OASIS items that pertain to a 30 day period would be established using an OASIS assessment that covered a 60 day episode (or two 30 day periods). There would not be an increase in reporting burden associated with the OASIS due to this change.

determine whether an episode is placed into a low, medium, or high functional level. Each clinical group is assigned a separate set of thresholds. Episodes in the low level have responses for the above OASIS items that are associated with the lowest resource use on average. Episodes in the high level have responses on the above OASIS items that are associated with the highest resource use on average.

1.1.7 Comorbidity Adjustment

Exploratory analyses determined that comorbidities – i.e., secondary diagnoses – provide additional information that can further explain resource use differences across episodes even after controlling for the primary diagnosis. The HHGM includes a comorbidity adjustment category based on the presence of secondary diagnoses. CMS clinicians conducted a comprehensive literature review examining articles that included findings on conditions that impacted resource use at home. Then the list was evaluated by Abt and CMS clinicians to further refine the conditions that truly can impact resource use at home. After reviewing the literature and comorbidity adjustments in alternate care settings, Abt and CMS clinicians developed a list of comorbidities that may impact the home health plan of care in terms of increased resource needs in the home health setting. Individual comorbidities were combined into multiple clinically-related categories that were further divided into related subcategories. These broad clinical categories are described below. Each broad category also contained several related subcategories (See Appendix Exhibit A9-2). In total there are 116 subcategories.

- Heart Disease (11 subcategories)
- Respiratory Disease (9 subcategories)
- Circulatory Disease and Blood Disorders (12 subcategories)
- Cerebral Vascular Disease (4 subcategories)
- Gastrointestinal Disease (9 subcategories)
- Neurological and Associated Conditions (11 subcategories)
- Endocrine Disease (6 subcategories)
- Neoplasms (24 subcategories)
- Genitourinary and Renal Disease (5 subcategories)
- Skin Disease (5 subcategories)
- Musculoskeletal Disease or Injury (5 subcategories)
- Behavioral Health (11 subcategories)
- Infectious Diseases (4 subcategories)

A regression model was used to determine the relationship between the above 116 subcategories and resource use. Subcategories that had a positive coefficient that was at least as high as the median of all the non-negative coefficients associated with the subcategories were defined to be comorbidity groups that would receive a comorbidity adjustment. There were 58 subcategories that met that definition. If an episode had at least one secondary diagnosis that fell into one of the 58

subcategories, that episode would receive a higher payment to account for the higher costs associated with the comorbidities.

1.1.8 Estimating Case-Mix Weights for the Home Health Groupings Model

The case-mix weight for each of the 128 different HHGM payment groups was determined by estimating a regression where the dependent variable is episode resource use and the independent variables are categorical indicators representing the five dimensions of the model described above (episode timing, admission source, clinical group, functional level, and comorbidities). This was estimated using home health episodes that occurred in 2013. The results of the model were used to predict the resource use of each episode based on these five characteristics. Next, the predicted resource use of each episode was divided by the overall average resource use of all 2013 episodes. This produces an average case-mix weight for all of the episodes within a particular payment group (i.e., each combination of the subgroups within the five main groups). That case-mix weight is then used to adjust the national, standardized 60 day episode payment rate, published annually in the *Federal Register*, to then determine each episode's payment.

The research team estimated resource use using cost report specific information for each home health agency, combining information on the costs of Non-Routine Supplies (NRS) with cost-per-visit information. In the current HH PPS, all episodes without a low-utilization payment adjustment (LUPA) receive payment for NRS, regardless of whether or not the HHA provided NRS during that episode. NRS payment amounts are determined through a separate payment model from the one used to construct the episode's case-mix weight. The current payment system determines NRS payment using the presence of clinical factors from the OASIS that are associated with NRS provision. It is unclear how effective this model is as prior analyses have documented that two-thirds of episodes do not indicate that NRS is provided, yet all those episodes still receive some NRS payment by design of the current payment system. A simpler payment approach may be to eliminate the separate payment for NRS and instead include NRS costs along with the costs-per-visit when calculating an episode's case-mix weight.

1.2 Conclusion

In collaboration with CMS, Abt has designed the HHGM to address vulnerabilities in the current payment system that Abt and others have identified through examination of patterns of care within the home health benefit. In some respects, the structure of the HHGM is similar to the structure of the current payment system. For example, both the HHGM and the current payment system include point scoring for functional items and different payments depending on the timing of the episode. However, removing components of the current payment system, such as the therapy thresholds, will strengthen the system by eliminating problematic financial incentives. Additionally, the HHGM better describes the reasons for which patients are receiving home health services under the Medicare home health benefit in a way that is more intuitive to clinicians, HHAs, beneficiaries, payers, and the general public.

1.2.1 Advantages and Disadvantages of the Home Health Groupings Model

Some *advantages* of this model include:

- From the clinical groups, clinicians can more easily identify the types of patients they see in home health. Furthermore, the clinical group will help CMS to better understand the reason for a home care episode.
- Therapy thresholds are eliminated, removing the incentive to overprovide therapy (and addressing a stated concern from MedPAC).
- The structure of the HHGM is very flexible and adaptable, and additional payment categories could be added (or subtracted) without impacting the general framework of the model. The research team already anticipates that certain aspects of the model will be revised to accommodate broader changes that are occurring within Medicare. For example, we will need to update the HHGM clinical groups to account for ICD-10-CM diagnoses. Additionally, we will need to update the functional level calculation to account for changes to the OASIS tool as required by the Improving Medicare Post-Acute Care Transformation (IMPACT) Act.
- The HHGM addresses findings from 3131(d) Home Health Study Report to Congress on the Home Health benefit, which found lower margins among episodes with the presence of such beneficiary characteristics as parenteral nutrition, traumatic wounds, whether bathing assistance is needed, and admission source.

Some *disadvantages* of this model include that:

- The information to determine episode admission source may not be available during the initial adjudication of a claim. This time lag may result in payment adjustments determined after the initial claim.
- There is a potential for "up-coding". Home health patients rarely have just one medical condition and given a choice there will be a financial incentive to select higher paying diagnoses or OASIS items.

1.2.2 Home Health Grouping Model Report

The remainder of the report will focus on the following topics

- Provide background on the HH PPS (Chapter 2).
  - Describe how the current HH PPS works and criticisms of the current model.
  - Provide an overview of the initial analytic work completed by Abt to inform how best to reform the current HH PPS.
  - Describe feedback from clinical and payment system experts that aided in the development of payment reform options.
- Discuss data used to create new payment reform options for the HH PPS (Chapter 3).
- Describe how estimated costs were measured that were associated with a home health episode (Chapter 4).
- Describe the steps in estimating case-mix weights for a new payment model for the HH PPS, the HHGM:

  - Describe how 30 day periods are created from 60 day episodes to better measure the costs incurred during an episode (Chapter 5).
  - Describe how episodes are categorized into clinical groups to help with case-mix adjustment (Chapter 6).
  - Describe how an episode's functional level was created to help with case-mix adjustment (Chapter 7).
  - Describe other variables used in the HHGM to case-mix adjust episode payment (Chapters 8 and 9).
  - Describe how a payment regression was used to estimate the case-mix weights for the HHGM (Chapter 10).
- Describe the payment impacts of using the HHGM compared with the current payment system (Chapter 11).

2. Chapter 2 – Background on the Home Health Prospective Payment System

Under the current HH PPS, HHAs are paid a national, standardized 60 day episode payment for all covered home health services, adjusted for case-mix and area wage differences. Payments to HHAs for episodes of care with four or fewer visits are paid a national per-visit amount for the type of visits provided. For episodes of care requiring five or more visits, payments are based on expected resource use. Expected resource use is an estimate of episode cost based on the length, number, and types of visits that occur during an episode. If the same payment was provided to all episodes (regardless of the differences in characteristics used to control for case-mix), HHAs would have a financial incentive to treat only patients that required the fewest resources and avoid patients who were costly. The case-mix system allows for different payments for different expected patient needs.

To determine expected resource use for payment purposes, patients are categorized into one of 153 home health resource groups (HHRGs) based on information from the OASIS and from home health claims. Each HHRG has a unique associated case-mix weight, which allows differential payments for episodes of care that cover patients with differing needs. Each of the HHRGs combines a clinical severity level (derived from diagnosis codes and other selected OASIS variables), a functional severity level (derived from activities of daily living OASIS variables), and a service use severity level (derived from the number of therapy visits received during the episode). The HHRGs also take into account episode timing information. The first and second episodes in a sequence of adjacent episodes are considered early and the third and later episodes in a sequence of adjacent episodes are considered late. A sequence of adjacent episodes is defined as episodes for which there is no more than a 60 day gap between the start of an episode and the end of the previous episode. The national, standardized 60 day episode payment rate is then multiplied by the case-mix weight for the HHRG, adjusted for area wage differences, and further payment adjustments are then applied as appropriate. These payment adjustments include outlier payments, partial episode payment (PEP) adjustments, LUPAs, rural add-ons, and penalties for not reporting quality measures. Payments for NRS are made separately outside of the national, standardized 60 day episode payment rate and there is a separate case-mix system for NRS.

The process of creating (or recalibrating) the payment weights involves several steps. The first step involves predicting an episode's resource use in dollars based on the number of therapy visits, the timing of the episode, clinical indicators (e.g., pressure ulcer stage), and functional indicators (e.g., limitation in bathing). The estimates from this process are then used to assign points to certain primary and secondary diagnoses codes and OASIS item responses. These points are totaled to determine each episode's clinical and functional levels (low, medium, or high).

These clinical and functional levels (along with episode timing and therapy use) are used to predict episodes' resource use. The estimates from this process are then used to create case-mix weights for the 153 HHRGs. When estimating the payment weights using CY 2015 data with the complete set of predictors, including therapy use, the adjusted R-squared statistic (a measure of predictive power from 0 to 1 where "1" indicates perfect data fit) equals 0.5007. However, after excluding therapy use the model's R-squared statistic drops to 0.0577, indicating that therapy utilization explains the great majority of variation in resource use under the current payment system.

The next section of the report will discuss critiques of the current HH PPS in order to provide context for the initial analyses exploring potential payment reform options.

2.1 Impetus for Payment Reform and Criticisms of the HH PPS

Several recent reports have shown how incentives in the current payment system have led to undesirable, unintended consequences and have recommended home health payment reform. MedPAC has repeatedly called for home health payment reform through a series of annual Reports to Congress that provide recommendations regarding all Medicare Fee-for-Service benefits.[8] CMS also published a Report to Congress summarizing the findings and recommendations from the study on payment and access to care for vulnerable Medicare home health beneficiaries.[9]

The reports collectively suggested that the current payment system may have financial incentives to provide therapy services and financial disincentives to provide non-therapy services. In addition, there may be financial disincentives to treat certain types of vulnerable patients, such as medically complex patients. Below, we describe the key criticisms and recommendations made by MedPAC and CMS through their Report to Congress.

2.1.1 MedPAC Criticisms and Recommendations

MedPAC has repeatedly stated that the Medicare home health benefit is ill-defined and that it allows for a broad range of services, leading to potential misuse. The work described in this report is in part based on comments from their 2011 through 2015 reports. In these reports, MedPAC examined how the home health benefit is currently being utilized and in light of those findings, made recommendations for ensuring that Medicare payments are commensurate with HHA costs. Two recommendations that were relevant to payment reform were:

- *Remove the number of therapy visits as a payment factor:* By examining home health utilization over time, MedPAC demonstrated a trend towards an increasing share of therapy services relative to non-therapy services. The payment system "encourages providers to base therapy regimens on financial incentives and not patient characteristics." MedPAC has consistently recommended removing the number of therapy visits from the payment system and using only patient characteristics when setting payment.
- *Introduce beneficiary cost sharing for episodes not preceded by a hospitalization or post-acute stay:* MedPAC noted that an increasing share of episodes do not have a prior hospitalization or post-acute care stay within the 15 days prior to home health admission, with patients instead admitted directly from the community. MedPAC stated that the growth in home health admissions for patients residing in the community suggests that there is significant potential for overuse; the commission recommended instituting a per-episode copay for episodes that are not preceded by a hospitalization or post-acute care.

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[8] Medicare Payment Advisory Commission. 2015. Report to the Congress: Medicare payment policy. Washington, DC: MedPAC

[9] CMS, 2014, "Report to Congress on the Medicare Home Health Study: An Investigation on Access to Care and Payment for Vulnerable Patient Populations."

2.1.2 CMS Report to Congress on Section 3131(d) Home Health Study

Section 3131(d) of the Affordable Care Act required the Secretary to conduct a study on HHA costs for providing ongoing access to care to low-income Medicare beneficiaries, beneficiaries in medically underserved areas, and beneficiaries with high levels of severity of illness. Using HHA cost report and claims data, CMS investigated whether financial incentives exist in the current payment system to favor certain patients over others. The resulting Report to Congress found that HHA margins were lower for patients:

- Requiring parenteral nutrition or substantial assistance in bathing
- With traumatic wounds or ulcers
- With poorly controlled conditions including peripheral vascular disease, pulmonary disorders, diabetes, heart disease and severe visual impairment
- Who are dually eligible for Medicare and Medicaid
- Who lacked caregiver assistance with ADLs, medication administration, and/or procedures or treatments
- Who were residing in a low-income community
- Who did not use therapy services during the episode

The results from the report indicated that follow on research on the current payment system and potential payment reform are needed. The report noted that some of the factors that were found to be associated with lower profit margins were already in the current system, suggesting that payment reform should better account for the needs of these patients. In addition, the report contained a number of suggested payment changes that may be worth further exploring.

The report suggested that additionally adjusting for the following characteristics might improve the margin differences observed under the current home health payment system:

- *Disproportionate low income share HHAs:* The report suggested exploration of an adjustment for HHAs with disproportionate shares of low-income patients, similar to the disproportionate share payments that hospitals and Inpatient Rehabilitation Facilities receive.
- *Acute or post-acute care admissions in the 14 days prior to home health admission*: These episodes were associated with lower margins and adding a variable that captures admission source into the case-mix model for payment determination may decrease the margin differences for these patients.
- *Hierarchical Condition Categories (HCCs):* Patients with high HCC scores (higher risk) were found to be associated with lower profit margins and therefore should be considered for inclusion in the model. This indicates that comorbidities may need to be more closely considered in future home health payment models.
- *Presence of a "poor control of condition":* These conditions were associated with lower profit margins. This indicates that comorbidities or other information that captures the severity of the patient may be needed.

The MedPAC and CMS reports emphasized the need for home health payment reform and provided some suggestions. These reports and their findings served as foundational background that assisted Abt in the follow-on work on payment reform. The initial background work that Abt conducted is described in the next section.

2.2 Description of Initial Analytic Work

The previous findings from CMS and MedPAC helped Abt determine which initial analyses should be performed to better understand what improvements could be made to the current payment system that would address the criticisms. First, Abt and CMS developed a set of Guiding Principles that described the key aspects of how the HH PPS should be constructed. These principles were considered as reform options were discussed. Then, Abt conducted several analyses related to findings from the CMS and MedPAC reports as well as other areas for improvement identified jointly by Abt and CMS. These included: examining utilization patterns of dually eligible beneficiaries, determining how additional OASIS items could be incorporated into the payment model, exploring alternative payment approaches used in other Medicare payment systems, and comparing how resource use differs when calculated from the Bureau of Labor Statistics (BLS) wage-weighted minutes data versus information from the Medicare home health agency cost reports.

2.2.1 Guiding Principles

The guiding principles for payment reform that Abt and CMS developed are listed here. Abt and CMS identified and considered payment reform options with these principles in mind. Higher weight was given to payment reform options that satisfied most or all of the principles:

Guiding Principles: A Home Health Payment System Should

1. Support the Medicare home health program as articulated in existing statutory, regulatory, and guidance documents
2. Promote and protect access to home health services for eligible beneficiaries
3. Support the provision of care that meets beneficiaries' clinical needs at home
4. Promote efficient care that aligns payment with high-quality services
5. Allow for a payment structure that is responsive to changes in utilization patterns and resource use
6. Minimize vulnerabilities that may lead to unintended consequences

2.2.2 Assessment of OASIS-C and Other Items for Inclusion in the Payment System

The CMS Report to Congress identified several patient characteristics that are not currently used in the payment system that were associated with margin differences. Therefore, in this background analysis we attempted to determine which other OASIS items might be most appropriate to use in an updated payment system. Before 2015, the most recent version of OASIS was OASIS-C, released in 2009. However, the current HHRGs, introduced in 2008, are based on items from the previous version of OASIS, OASIS-B1. Therefore, a major component of identifying potential changes to the HH PPS was to identify OASIS-C items that could be appropriate to use in a refined payment system. Appropriateness was based on a combination of statistical, clinical, and incentive-related factors, as

we sought to incorporate items that were associated with differences in the estimated costs of providing care to patients, made clinical sense to include in the payment system, and provided incentives to deliver high quality care. Regardless of the exact structure of a reformed home health payment system, it is likely that it would use OASIS-C items that are associated with cost differences and that are considered clinically appropriate for payment purposes.

Abt therefore systematically examined the relationship between individual OASIS-C items and estimated episode costs in order to identify OASIS-C items that are potentially appropriate to use in the payment system. The research team included almost all OASIS-C items in our initial analyses, thereby including many items that are not used in the current payment system either because they were not available at the time the current system was created or because they were not thought to be a good predictor of resource cost.

The research team additionally explored relevant non-OASIS-C items in the analysis that could be used in a new payment system. For example, we considered two systems of grouping patients into diagnosis categories (using the primary and payment diagnoses on OASIS-C assessments): 1) CMS's HCC model and 2) the Agency for Healthcare Research and Quality's (AHRQ's) Clinical Classification Software (CCS). The research team also explored how cost relationships differ for patients who enter home health from a community versus an institutional setting. The research team additionally examined the relationship between episode costs and dual eligibility status. Finally, we analyzed non-therapy and therapy costs separately to determine whether the model would have better predictive power if those costs were modeled independently.

Findings and recommendations from our analysis of OASIS-C and other items for inclusion in the payment system are as follows:

- **Inclusion of OASIS-C items associated with cost differences**. A number of OASIS-C variables are correlated with resource cost. Therefore, we may want to consider including OASIS-C items that are associated with cost differences in the payment system, regardless of whether they are used in the current system, as long as the items are clinically and policy appropriate.
- **Therapy versus non-therapy costs.** For many items, the relationship between non-therapy and therapy costs differs, suggesting that a payment model that considers each type of cost separately or better groups patients by therapy versus non-therapy needs may improve model performance. However, a payment system that considers costs separately will be more complex.
- **Patient diagnosis category groupings.** While the HCC community score (which is based on claims observed across multiple settings of care) is a predictor of therapy and non-therapy costs, HCC variables defined using diagnosis information from OASIS-C are of limited usefulness, as many ICD-9-CM codes are not used in the HCC model. The CCS is more comprehensive than HCC, and models using diagnosis groups based on CCS had superior statistical performance as compared with models that used HCC-based diagnosis groups.
- **Community versus institutional admission source.** While the statistical performance of our models tended to be better for those entering home health from a community setting, many of the coefficients in these models were similar to coefficients in the parallel models for patients entering home health from an institutional setting. Univariate analysis showed that average resource use was roughly $350 higher for those patients entering home health from an

institutional setting versus a community setting. Additionally, the multivariate models showed statistically significant differences in resource use for episodes preceded by an institutional stay compared with those not preceded by an institutional stay. These results suggest that incorporating admission source may be an important part of payment models.

- **Dual eligibility status.** The research team found that episodes where the patient is not dually eligible for Medicaid and Medicare (i.e. is enrolled in Medicare only) were associated with higher average resource utilization than episodes where a patient is dually eligible for Medicare and Medicaid. However, dual eligibles have higher rates of grouper variables (i.e. variables that would increase the episode's functional and clinical score) coded per episode, on average. This indicates that dual eligibles may be sicker, but are receiving fewer services (as measured by resource use). These findings imply that if a goal of the payment system is to ensure that patients with similar clinical needs receive the same type of treatment, incentives need to be developed so that dual eligibles receive treatment similar to that of their non-dual counterparts, or more work is needed to distinguish any unobserved difference between duals and non-duals within an HHRG and pay based on those differences.

2.2.3 Strengths and Weaknesses of a Regression versus Non-Regression Payment Model

In the current 153 group HH PPS, a regression (specifically what we call "the payment regression") is used to construct the case-mix weights associated with each HHRG. As part of our analyses attempting to improve the payment system, we considered whether any approaches could be used that did not rely on a regression framework. For example, we attempted to implement an approach called the Hospital Specific Relative Value (HSRV) methodology, which is used in the Inpatient Rehabilitation Facility PPS. Instead of using a regression that simultaneously estimates the relationship between the factors that make up the 153 HHRGs (i.e. therapy visits, episode timing, clinical and functional level) and resource use, the HSRV relies on an iterative approach that compares provider specific costs within a payment group to overall costs and compares that ratio to nationwide costs within a payment group to overall costs in order to construct a case-mix weight. Based on the analyses, it was determined the HSRV methodology is more important for providers that may specialize in a particular set of patients rather than having a broad general pool of patients.

One major difference between a regression and non-regression approach is that a regression approach can better structure the coefficients in the model and thereby produce more intuitive results. A non-regression approach may provide results that vary widely across payment groups in an unintuitive manner, particularly for payment groups represented by very few episodes. Under a non-regression approach, case-mix weights are calculated by taking the total resource costs associated with all episodes within a particular HHRG and dividing that amount by the total resource costs associated with all episodes (across all HHRGs). For example, with this approach the change in the case-mix weight going from early timing to late timing could differ based on the other characteristics of the episode and produce unintuitive results. That is, the change in the case-mix weight could be positive for low clinical and low functional episodes and it could be negative for high clinical and high functional episodes.

Another strength of using regression models is that this approach allows us to easily control for a variety of patient characteristics that may be correlated with resource use. Many of the models we have explored use fixed effects regression with which we control for agency fixed effects. The fixed effects allow us to control for both observable and unobservable characteristics of the agency that

may be correlated with resource use. The fixed effects model accounts for the average variation in resource use within a particular agency as opposed to accounting for the variation across all agencies. Although this approach controls for agency-level characteristics, payment would not differ based on those characteristics. Ultimately, the regression sets case-mix weights that differ based on differences in costs due to patient characteristics.

2.2.4 Comparison of BLS and Cost Report Information

Although it was not a concern that was brought up by MedPAC or the previous CMS Report to Congress, some of our initial work explored alternative approaches to calculating resource use. Using alternative approaches to measure resource use has the potential to produce different case-mix weight values. For this analysis, we explored how the BLS data on wage and fringe rates used in the current payment system corresponds to cost per visit information derived from Medicare home health cost reports that are used to construct the national, standardized 60 day episode payment rate and per-visit rates in the current payment methodology.

The BLS rates allow for the inclusion of information on visit duration as reported on home health claims when computing the HH PPS case-mix weights. In addition, the BLS rates reflect the mix of healthcare disciplines (RN versus LPN and therapy assistants versus therapists) that may visit a patient. However, the wage-weighted minutes derived from BLS rates may not reflect the true average cost of an episode, as they only describe costs from labor associated with patient visits, and not other costs such as travel costs or work time not directly spent with a patient. Information taken from Medicare home health cost reports may be more indicative of the actual cost of an episode as these fuller costs are represented. In addition, the use of Medicare home health cost report data in developing the HH PPS case-mix weights may allow incorporation of other costs such as NRS costs that are not reflected in the BLS hourly wage plus fringe rates.

Abt's background work extended to topics beyond the work mentioned here. This section was not intended to be comprehensive but rather intended to highlight some of the work that helped to shape the payment reform work Abt later conducted. The work was conducted to better understand how the home health benefit is being used and to provide context to some of the published criticisms of the current payment system. Abt described some of this work to clinical home health experts to receive their feedback and determine how to best transform these findings into payment reform options for the home health benefit. This work is described in the next section.

2.3 Description of Initial Stakeholder Outreach

In order to gather feedback on some of the initial findings described in the previous sections, Abt convened a Clinical Workgroup (CWG) comprised of clinicians with expertise in the home health care benefit. This group met for an all-day meeting on June 25, 2014. The purpose of the CWG meeting was to acquire clinical insight into the Medicare home health benefit, including the goals of home health and opportunities for more accurately capturing patient characteristics. A very concise review of some of the input provided during that meeting is as follows:

- The clinicians agreed that many of the OASIS items Abt found to be associated with high cost were also associated with high clinical resource use.

- The clinicians stated that there are too many HHRGs in the current payment system, considering the relatively limited fluctuations in the dollar amount that providers end up being reimbursed. In terms of scope, the HHRG system is more complicated than necessary.
- The clinicians noted that it is important to take into account a patient's admission source, as beneficiaries with recent institutional stays are different from those that enter home health directly from the community.
- The clinicians said that the provision of behavioral health services is an important, but not well understood, component of the home health benefit. Additionally, medication management is another important, but not well appreciated, component of the home health benefit.
- Lastly, the clinicians offered that episode timing is important to consider. Problematically, in the current system an episode could be classified as late but could actually represent a new set of health needs for the patient (and therefore be unrelated to previous episodes).

This feedback, along with the findings from the initial analysis, influenced the development of three payment reform options. The next section describes those payment reform options further.

2.4 Model Development

Abt had completed numerous analyses for the purpose of supporting payment reform and assessing the concerns associated with the current home health prospective payment system. Abt then used findings from these analyses and also feedback from the CWG to develop several potential payment reform options that CMS could adopt in order to improve the performance of the payment system and address the criticisms of the current payment model. The options included the Diagnosis on Top with an Index Model (DOT/I), the Predicted Therapy Model, and the Home Health Groupings Model. This section provides background on each model.

2.4.1 The Diagnosis on Top with an Index Model

The objective of a Diagnosis on Top model is to develop and assign separate payment weights to episodes for patients with different diagnoses. The objective of an Index Model is to maximize the payment system's statistical performance by adjusting episode payments using a severity score derived from claims- and OASIS-based items. The DOT/I combines both features.

The research team used diagnosis groupings (Orthopedic, Neurological, Diabetes, Cancer, Skin Wounds and Lesions, Cardiovascular, Pulmonary, Gastrointestinal, Genito-Urinary, and Mental/Emotional Disorders) which Abt had previously developed (along with the assistance of clinical input) for analyses of the original home health payment system in 2002. Admission sources were categorized as being from the community, an acute care hospital, or a post-acute care facility. Episode timing (early/late) was defined as under the current payment system. The index model severity scores were calculated as predicted episode resource use from a regression with covariates being facility type, patient gender, age, non-start of care flag, Medicaid dual eligibility, admission source, HCC risk adjustment groups, and numerous OASIS items. Therapy provision was not included in the model. These predicted scores were then assigned into ranked severity levels (where a higher level indicates greater expected resource use based on observed episode characteristics).

Within each grouping – diagnosis, admission source, timing, and where applicable, severity level – a new case-mix weight was calculated as the average resource use among episodes within the grouping

to all episodes in the entire sample. For example, a grouping with twice the national average resource use would be assigned a new case-mix weight of "2.00". The research team used these new case-mix weights to calculate what episode payments would be under a DOT/I refinement to the home health payment system. Because the model was an index model, episodes weren't grouped into a discrete number of payment groups. Instead, possible case-mix weights were continuous over a certain range of values and this could mean that each episode would have a different weight and payment under this model. Then, we compared these new payments to those paid to the same episodes under the current payment system.

A strength of the DOT/I model is that tying payment to diagnoses might be conceptually better aligned with how clinicians plan for patient care and this could also be a more intuitive payment model for the public to understand. Additionally, the DOT/I model would remove the financial incentive to over-provide therapy since therapy utilization is taken out of the model. A limitation of the DOT/I model is the potential for up-coding: the clinical reality is that home health patients usually suffer from multiple conditions, and when clinicians are required to select a single primary diagnosis (to assign an episode to a diagnosis group), the DOT/I system would incentivize selecting the diagnosis that leads to a higher payment given a choice. Another limitation is that the Index Model's severity adjustment may be hard to explain to providers and other stakeholders, and moreover the results suggested that the Index Model's additional complexity did not substantially change payment.

2.4.2 The Predicted Therapy Model

One of the main criticisms of the home heath payment system is its use of actual therapy visits provided to patients as one of the determinants of payment. Since 2011, MedPAC has repeatedly recommended that CMS redesign the home health payment system to rely on patient characteristics rather than the number of services provided (MedPAC 2011; MedPAC 2012; MedPAC 2015b). To address these concerns, we explored basing episode payment on *predicted* therapy utilization levels rather than *actual* visits provided during an episode. This refinement would preserve the essential structure of the current payment system while addressing concerns about basing payment on services provided.

Forty percent of all home health episodes do not include therapy. Therefore, we used a two-part model that separated the decision to provide therapy, and then when therapy is predicted to be provided, the decision on the number of therapy visits to provide. The first stage used a logistic regression to estimate whether or not the episode received any therapy visits. The second stage used a truncated negative binomial regression (truncated at zero) to estimate the number of therapy visits, conditional on providing any therapy. The research team used a set of patient and provider characteristics derived from OASIS, home health claims and Provider of Services (POS) files as explanatory variables in the prediction model. The research team then assessed the impact of substituting predicted therapy visits for actual therapy visits in the home health prospective payment system by simulating the case-mix weights and resulting payments and comparing them to payments under the current system.

In aggregate, we find mostly minor differences between payments made using actual therapy visits (i.e., the current system) and payments generated using predicted therapy visits. However, when comparing at the episode-level, we concluded that the ability of the model to predict a patient's need for therapy was poor. Fewer than 10% of episodes had payments that were within $100 of each other

when comparing predicted with actual therapy. Fewer than half of episodes were within $500 of each other when comparing predicted and actual therapy use.

Replacing actual therapy with predicted therapy is a conceptually appealing solution to one of the criticisms of the home health payment system – that payment is driven by the level of services that HHAs provided rather than the needs of the patient. However, we found that our model was unlikely to predict the levels of therapy visits that we observe in the data.

At the same time, the actual therapy use seen in recent data – our prediction objective – is unlikely the correct target. Actual therapy use observed in recent data is likely distorted by the current system's incentives to over-provide therapy services. Therefore, our predictions may be based from information that does not accurately describe patient need. If this new predicted therapy system were adopted, the incentives for the over-utilization of therapy would be removed and future therapy use could begin to move closer to actual need, not over-provided levels. As this process takes place, we could recalibrate our models with updated information.

There are other drawbacks to replacing actual with predicted therapy use. The current system estimates the relationship between clinical, functional and service use characteristics on resource use in order to obtain an episode's clinical and functional level, which is then later used in part to determine the episode's payment group. Replacing actual service use with predicted service use led to some inconsistencies in the resulting clinical and functional scores. That is, average resource use was not always smooth and increasing like is in the current payment system when the clinical and functional scores increase. This outcome makes it difficult to determine the thresholds needed to assign an episode to high, medium, or low clinical and functional levels. Thus, replacing actual therapy service use with predicted therapy use – while preserving the structure of the current payment system – is unlikely to be an optimal solution for reform.

2.4.3 The Home Health Groupings Model

Another reform option, a variation based upon the Diagnosis on Top model concept and called the HHGM, was also developed. Further information about the HHGM will be presented over the remainder of this report. This section serves to describe initial planning in the development of the HHGM.

As it was originally envisioned, the HHGM would not only rely on diagnoses to group episodes, it would additionally utilize services provided to the patient during the episode in order to better resemble how a clinician would group home health patients in terms of the types of treatment they require. The CWG provided clinical insight about the most common types of home health interventions that are provided to patients. The group also confirmed that diagnoses are commonly understood across care settings and developing a model that uses diagnoses to clinically group patients by interventions is intuitive to clinicians. They also stated that because episode payment is driven by the data reported on the OASIS, a clinically intuitive payment model may help to align payment with the provision of home health services. The CWG input helped to develop the clinical groupings where the episode is grouped based on the primary home health services that would be provided based on the reported principal diagnosis. During the initial planning of the HHGM, we felt there were strengths to this model that were similar to those of the DOT/I model described above. In many ways, the HHGM is an enhanced version of the DOT/I model because it takes into account

more information when constructing patient groupings. The patient groupings in this model are intended to reflect clinically meaningful patient groups with distinct treatment and utilization patterns.

Additionally, groupings usually do not happen in isolation, and the groupings may need to be refined to better account for patient comorbidities. For example, a patient may have heart failure, diabetes, depression, and anemia – any of which could be used to group the patient. One way to address comorbidities would be to adjust payment weights based on other diagnoses reported in OASIS-C item M1022. In addition, some patients may group into multiple clinical groups (e.g., a patient may have wounds and other complex medical needs), and we would need to develop an approach for assigning these patients.

After developing three potential reform options, we shared models with outside experts to solicit their input and to get feedback and suggestions for further development. The next section describes the feedback we received.

2.5 Additional Stakeholder Outreach and Selection of the HHGM Model for Further Investigation

Abt convened two separate workgroups during this stage of the project. The CWG was comprised of clinicians with expertise in the home health care benefit. This group met for an all-day meeting on June 25, 2014 to discuss preliminary analyses, as described above, and another all-day meeting on October 16, 2015 to discuss alternative payment model options developed in the interim. Abt also convened a Technical Workgroup (TWG) that met for an all-day meeting on January 8, 2015. The TWG was comprised of health policy experts and health services researchers who were knowledgeable regarding various Medicare's prospective payment systems.

The purpose of the CWG meeting was to acquire additional clinical insight into the Medicare home health benefit and potential reform options, including the goals of home health care payment reform and the important features of a desirable home health prospective payment system, and opportunities for more accurately capturing patient characteristics. For the TWG meeting, we were primarily interested in feedback on modeling and data issues. A very concise review of some of the input provided during the meetings is as follows:

- The HHGM was well received by both the CWG and the TWG. The DOT/I was not as well received given concerns that patients fall into multiple diagnoses groups. There were concerns with the predicted therapy model option given the discrepancies between predicted and actual number of therapy visits at the episode level and the current incentives in the payment system.
- It may be important to look back 30 days instead of 14 to determine the admission source of the patient.
- The current payment system disincentivizes caring for complex patients, even though the top 3-5% of the sickest patients have the most potential for cost savings.
- Paying on a broader set of functional and cognitive OASIS items will discourage agencies' from focusing on particular items that boost reimbursements.
- The panel expressed concern that there needs to be a better measure of patients with multiple comorbidities.

- The TWG liked the HHGM's clinically intuitive structure, its ability to recognize the complexity of the patient, and that while the primary diagnosis is a contributing factor; it is not the only or most important one in considering what home health services a patient might need.

The feedback we received from both the CWG and TWG was used to further the development of the HHGM.

2.6 Conclusion

Criticisms of the current home health prospective payment system have led CMS to partner with Abt to develop a payment reform option called the HHGM, which groups home health episodes in a manner that mirrors how clinicians differentiate between different types of beneficiaries, helps to explain why the beneficiary is receiving home health, and addresses criticisms of the current payment system. Through our initial work, we conducted a thorough analysis of how the Medicare home health benefit is utilized and we used those results and the criticisms of the current payment system to develop several possible payment system reform options. The research team shared these ideas with clinical experts and payment policy experts in the home health field. Based in part on their feedback we selected the HHGM as the payment model option warranting further investigation and development. The research team feels that the HHGM is an improvement on the current model for a variety of reasons:

- It eliminates the use of therapy thresholds in determining payments
- It groups episodes into clinical groups that clearly describe the purpose of the episode thereby increasing transparency in justifying the episode of care
- It includes additional information, from both OASIS and non-OASIS items, in the case-mix system
- It measures resource use using the cost per minute approach that allows us to combine the NRS payment rate with the episode base payment rate with and therefore reduces the complexity of the model.

In the chapters that follow, we will discuss in detail our methodology for constructing the HHGM, the data we use to generate new case mix weights, and patterns of impacts in the payment differences that may result were the HHGM adopted.

3. Chapter 3 – Data and File Construction

Analyses conducted in developing the HHGM, as described in this report, used analytic data files developed from a variety of source data files, mainly CMS administrative records. In this section, the construction of the analytic files is summarized, the linking and data cleaning logic described, and the implications for the resulting data are noted.

3.1 Claims Data

In order to create the HHGM and related analyses, a data file based on home health episodes of care as reported in Medicare home health claims was utilized. The claims data provide episode-level data (e.g., episode From and Through Dates, total number of visits, HHRG, diagnoses) as well as visit-level data (visit date, visit length in 15-minute units, discipline of the staff, etc.). The claims also provide data on whether NRS was provided during the episode and total charges for NRS.

Data Acquisition

The core file for most of the analyses includes 100% of home health episode claims with Through Dates in Calendar Year (CY) 2013, processed by June 30, 2014, which were included in the CMS Standard Analytic File (SAF). Original or adjustment claims processed after June 30, 2014, would not be reflected in the core file.

The SAF-based file was supplemented with additional claims-based variables that were obtained from the CMS Datalink file. The Datalink file is an episode-level file that links a variety of data sources including home health claims, OASIS assessments, and information from Part A and Part B administrative data. The Datalink file was prepared for CMS by Fu Associates and was made available to Abt staff through the CMS Data Center.

The 2013 SAF files were acquired and the data were cleaned by processing any remaining adjustments and by excluding duplicates and claims that were Requests for Anticipated Payment (RAP). In addition, visit-level variables needed for the analysis were extracted from the revenue center trailers (i.e., the line items that describe the visits) and downloaded as a separate visit-level file, with selected episode-level variables merged onto the records for visits during those episodes.

A set of data cleaning exclusions were applied to the episode-level file, which resulted in the exclusion of:

- Episodes with no covered visits
- Episodes with any missing units or visit data
- Episodes with zero or negative payments
- Episodes with no charges
- Non-LUPA episodes missing an HHRG

Little additional processing of the Datalink file was needed, as the file is received as a cleaned and processed SAS file.

In order to add variables from the Datalink file to the analysis file, the episodes needed to be linked across the two files. This linking was done using an equated Health Insurance Claim (HIC) number, Medicare provider number, and the From Date from a claim.

To account for potential data entry errors, the visit-level variables for visit length were top-censored at eight hours.[10]

3.2 Assessment Data

The analysis file also includes data on patient characteristics obtained from the OASIS assessments conducted by HHA staff at the start of each episode. The assessment data are electronically submitted by home health agencies to state repositories that feed a central CMS repository.

In constructing the core data file, Abt staff obtained 100% of the OASIS assessments submitted October 2011 through January 2014 from the CMS repository and linked them with CY 2013 episodes using an algorithm developed to be analogous to that used for constructing the Datalink file (utilizing multiple patient identifiers, dates and other relevant variables from both the OASIS assessment and the claim, and the State and Resident ID variables created in the OASIS data processing system). Episodes that could not be linked with an OASIS assessment were excluded from the analysis file, as they included insufficient patient-level data to create the HHGM.

3.3 Wage Data and Cost Report Data

To construct measures of resource use (discussed further in Chapter 4), a variety of data sources were used. First, BLS data on average wages and fringe benefits were used to produce one version of the wage-weighted cost per minute for each home health discipline. The wage data are for North American Industry Classification System (NAICS) 621600 – Home Health Care Services. The wage data are broken down by the following occupations:

Exhibit 3-1: BLS Standard Occupation Classification (SOC) Codes for Home Health Providers

Standard Occupation Code (SOC) Number	Occupation Title
29-1141	Registered Nurses
29-2061	Licensed Practical and Licensed Vocational Nurses
29-1123	Physical Therapists
31-2021	Physical Therapist Assistants
31-2022	Physical Therapist Aides
29-1122	Occupational Therapists
31-2011	Occupational Therapist Assistants
31-2012	Occupational Therapist Aides
29-1127	Speech-Language Pathologists
21-1022	Medical and Public Health Social Workers

[10] Less than 0.1% of all visits were recorded as having greater than 8 hours of service

Standard Occupation Code (SOC) Number	Occupation Title
21-1023	Mental Health and Substance Abuse Social Workers
31-1011	Home Health Aides

Wage rates for 2013 were obtained from: http://www.bls.gov/oes/2013/may/naics4_621600.htm#29-0000

Fringe benefit rates were obtained from Table 14 in:
http://www.bls.gov/news.release/archives/ecec_03122014.pdf

For visits where the service provided – as indicated by the Healthcare Common Procedure Coding System (HCPCS) code – can be provided by only a single Standard Occupation Classification (SOC) code; e.g., establishment or review of a plan of care by a registered nurse (RN; HCPCS = G0162), the wage (and fringe) rate for that SOC is used to cost out the minutes for the visit. For visits where the service provided can potentially be provided by different SOCs, such as direct care by an RN or a Licensed Practical Nurse (LPN; HCPCS= G0154), a blended rate is applied, with the rate for each SOC code weighted by the total home health employment for that SOC code. The employment data are available from the same BLS table as the wage data. Further information on how the wage and fringe information is calculated is available in Chapter 4 of this report.

Home Health Agency Medicare Cost Report (MCR) data were also used to construct a measure of resource use after trimming out HHAs whose costs were outliers (also as discussed in Chapter 4). These data are used to provide a representation of the average costs of visits provided by HHAs in the six Medicare home health disciplines: skilled nursing, physical therapy, occupational therapy, speech-language pathology, medical social services, and home health aide services. Cost report data are publicly available via https://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Cost-Reports/. The cost reports used in these analyses, which included data for both freestanding and facility-based HHAs, were in part acquired through that site and also provided to Abt Associates by CMS.

3.4 File Construction and Additional Variables

The 2013 SAF file included 6,740,498 episodes. Of these, 182,353 (2.7%) were excluded because they could not be linked to OASIS assessments or because of the reasons listed in section 3.1.2. This yielded an analysis file including 6,558,145 episodes. Those episodes are 60-day episodes under the current payment system, but for the HHGM those 60 day episodes were converted into two 30 day periods. This yielded a final HHGM analytic file that included 11,372,676 30-day periods. This process, and the rationale for doing so, is explained further in Chapter 5 of this report. Certain 30 day periods were excluded for the following reasons, with an exclusion summary shown in Exhibit 3-2, below:

- Periods required a diagnosis that linked to a clinical group to case-mix adjust the period's payment. The concept of the clinical group is discussed in Chapter 6.
  - Excluded periods that did not merge to a clinical group or merged to a "questionable encounter" code (discussed in chapter 6; after exclusions, n = 11,068,029).
- Periods need to be merged to certain OASIS items in order to create the episode's functional level that is used for risk adjustment. This is discussed further in Chapter 7. Analysis of OASIS items included items only asked on Start of Care and Resumption of Care assessments (e.g., M1700). If a period was linked to a follow-up assessment, there would not be information for that particular

item on the follow-up assessment. Therefore, for all the periods in the analytic file, there was a look- back through CY 2012 for a Start of Care or Resumption of Care assessment that preceded the period being analyzed and was in the same sequence of periods. If such an assessment was found, it was used to impute responses for OASIS items that were not included in the follow-up assessment. Periods which did not link to a Start of Care or Resumption of Care assessment were dropped (after exclusions, n = 10,227,891).

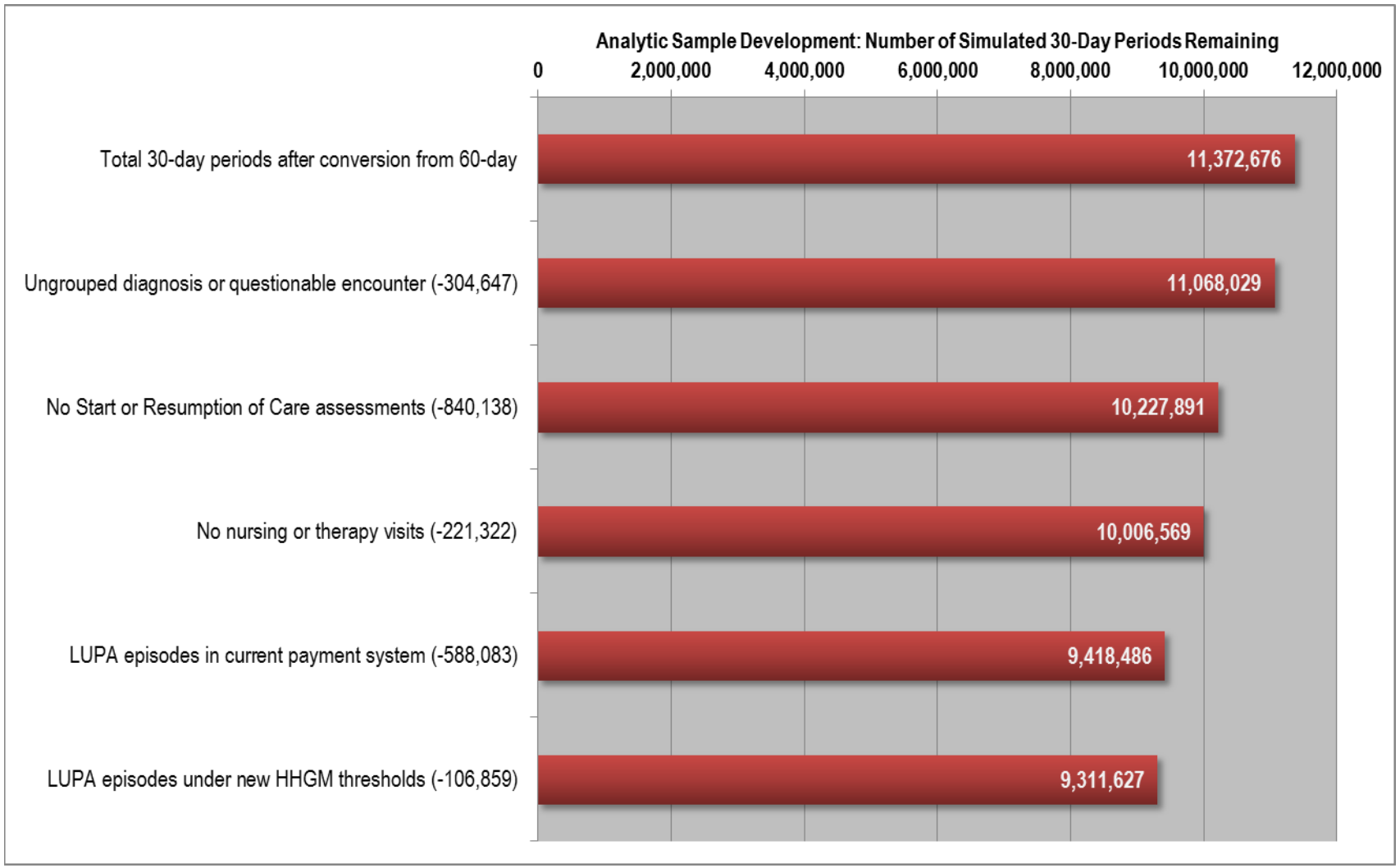
- Periods were excluded with no nursing visits or therapy visits as these periods would not be paid under the current HH PPS (after exclusions, n = 10,006,569).
- LUPAs were excluded from the analysis. Periods that are identified as LUPAs in the current payment system are excluded in the creation of the functional score (Chapter 7). Following the creation of the score (and the corresponding levels), case-mix group specific LUPA thresholds were created and episodes were excluded that were at or below the new LUPA threshold when computing the case-mix weights.[11]
  - Excluded periods which were LUPAs in the current payment system for analyses related to the functional score (see Chapter 7; after exclusions, n = 9,418,486).
  - Excluded periods falling under new LUPA thresholds (See Chapters 10 and 11; after exclusions, n = 9,311,627) for analyses related to the payment regression and impacts.[12]

Therefore, the final analytic sample included 9,311,627 30 day periods that were used in for the analyses presented in this report.

[11] The case-mix group specific LUPA thresholds were determined using episodes that were considered LUPAs under the current payment system.

[12] Some periods that were kept were LUPAs under the current payment system.

Exhibit 3-2: Simulated 30 Day Period Analytic Sample Development – Progressive Exclusions on Various Criteria



4. Chapter 4 – Resource Use

To construct the case-mix weights for the HHGM payment model, the costs of providing care during a home health episode needs to be determined. The research team explored various methods for determining resource use. This section describes the two most promising methods for estimating resource use under the HHGM. The first is referred to as the Wage Weighted Minutes of Care (WWMC) approach that is used in the current payment system and uses data from the BLS. The second is the Cost per Minute plus Non-Routine Supplies (CPM + NRS) approach, which uses information from MCR. The section below summarizes the data sources and the methodology for calculating these measures of resource use. The average estimated episode resource costs in 2013 using these methods are presented as well as a discussion of the limitations of these resource use measures.

4.1 Data Sources

BLS Wage Estimates: For the WWMC method of calculating home health episode resource use, Abt obtained wage and fringe data from the BLS by industry code from the NAICS and occupation code from the SOC. These data provide nationwide average wage rates and the average value of fringe benefits per hour of work for specific occupations.

Home Health Cost Report Data: All Medicare-certified HHAs must report their own costs through publicly-available home health cost reports maintained by the Healthcare Cost Report Information System (HCRIS). Freestanding HHAs report HHA-specific cost reports while HHAs that are hospital-based report on the HHA component of the hospital cost reports. These cost reports enable estimation of the cost per visit by provider and the estimated NRS cost to charge ratios. In order to obtain a more robust estimate of cost, a trimming process was applied to remove cost reports with missing or questionable data and extreme values.[13]

Home Health Claims Data: Medicare home health claims data are used in both the WWMC and CPM+NRS methods to obtain minutes of care by discipline of care.

4.2 Episode Costs

Wage Weighted Minutes of Care (WWMC) Approach

Used in the current payment system, this approach determines resource use for each episode by multiplying utilization (in the terms of number of minutes of direct patient care provided by each discipline) by the corresponding opportunity cost of that care (represented by wage and fringe rates from the BLS).[14] Exhibit 4-1 below shows the occupational titles and corresponding mean hourly

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[13] The trimming methodology is described in the report "Analyses in Support of Rebasing & Updating Medicare Home Health Payment Rates" (Morefield, Christian, and Goldberg 2013) https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HomeHealthPPS/Downloads/Analyses-in-Support-of-Rebasing-and-Updating-the-Medicare-Home-Health-Payment-Rates-Technical-Report.pdf

[14] Opportunity costs represent the foregone resources from providing each minute of care versus using the resources for another purpose (the next best alternative). Generally, opportunity costs represent more than the monetary costs, but in these analyses, they are proxied using hourly wage rates.

wage rates from the BLS. The opportunity cost shown in the last column is calculated by applying the fringe benefit rates from the BLS (generally around 37% of wages) to obtain the employer cost per hour worked. For home health disciplines that include multiple occupations (such as skilled nursing), the opportunity cost is generated by weighting the employer cost by the proportions of the labor mix.[15] Otherwise, the opportunity cost is the same as the employer cost per hour.

Exhibit 4-1: Occupational Employment and Wages Provided by the Federal Bureau of Labor Statistics

Occupation Title	National Employment Counts	Mean Hourly Wage	Estimate of Benefits as a % of Wages	Estimated Employer Cost per Hour Worked	Labor Mix	Home Health Discipline	Opportunity Cost*
Registered Nurses	66,910	$32.17	38.97%	$44.71	0.68	Skilled Nursing	$40.07
Licensed Practical and Licensed Vocational Nurses	77,290	$21.62	38.97%	$30.04	0.32		
Physical Therapists	23,970	$43.84	38.35%	$60.65	0.78	Physical Therapy	$55.93
Physical Therapist Assistants	6,270	$29.57	35.98%	$40.21	0.20		
Physical Therapist Aides	420	$15.67	35.98%	$21.31	0.01		
Occupational Therapists	10,000	$42.07	38.35%	$58.20	0.86	Occupational Therapy	$55.57
Occupational Therapist Assistants	1,540	$29.98	35.98%	$40.77	0.13		
Occupational Therapist Aides	120	$19.56	35.98%	$26.60	0.01		
Speech-Language Pathologists	4,760	$43.52	38.35%	$60.21	N/A	Speech Therapy	$60.21

[15] Labor mix represents the percentage of employees with a particular occupational title (as obtained from the BLS) within a home health discipline.

Occupation Title	National Employment Counts	Mean Hourly Wage	Estimate of Benefits as a % of Wages	Estimated Employer Cost per Hour Worked	Labor Mix	Home Health Discipline	Opportunity Cost*
Medical and Public Health Social Workers	16,770	$27.59	38.35%	$38.17	0.98	Medical Social Service	$38.25
Mental Health and Substance Abuse Social Workers	420	$29.85	38.35%	$41.30	0.02		
Home Health Aides	332,480	$10.50	35.98%	$14.28	N/A	Home Health Aide	$14.28

*Represents the employer cost for each hour worked for the occupations that comprise each discipline.

Source: May 2013 National Industry-Specific Occupational Employment and Wage Estimates NAICS 621600 - Home Health Care Services.

For each home health episode, the number of minutes of care provided (obtained from the home health claims) is weighted by the corresponding opportunity cost for each discipline providing the minutes. The resulting wage-weighted minutes of care are summed for the episode to obtain total episode costs. Exhibit 4-2 shows these costs overall for 30 day periods (n = 9,311,627). On average, total episode costs are $354.16. The distribution ranges from a 5th percentile value of $70.12 to a 95th percentile value of $886.41.

Exhibit 4-2: Distribution of Average Resource Use Using WWMC Approach (30 Day Periods)

Statistics	Mean	N	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Average Resource Use (WWMC)	$354.16	9,311,627	$70.12	$90.16	$149.47	$272.93	$487.41	$718.61	$886.41

4.3 Cost per Minute plus NRS Approach (CPM + NRS)

In the current HH PPS, all episodes without a LUPA payment receive payment for NRS, regardless of whether or not the HHA provided NRS during that episode. NRS payment amounts are determined through a payment model separately from the one used to construct the episode's case-mix weight. The current payment system determines NRS payment using the presence of clinical factors associated with NRS provision from the OASIS. It is unclear how effective this model is given that two thirds of episodes do not include provision of NRS, yet those episodes still receive an NRS payment.

A simpler approach to payment is to eliminate the separate payment model for NRS and instead include NRS payments along with the episode base payment weight. Incorporating the NRS cost

into the episode resource use (i.e., the dependent variable of the payment model) requires adjusting the NRS charges submitted on claims based on the NRS cost-to-charge ratio from cost report data.

The following steps are used to generate episode costs under this approach:

1. From the cost reports, obtain total costs for each of the six home health disciplines for each HHA.

2. From the cost reports, obtain the number of visits by each of the six home health disciplines for each HHA.

3. Calculate discipline-specific cost per visit values by dividing total costs [1] by number of visits [2] for each discipline for each HHA. For HHAs that did not have a cost report available (or a cost report that was trimmed from the sample), imputed values were used as follows:

    - A state-level mean was used if the HHA was not hospital-based. The state-level mean was computed using all non-hospital based HHAs in each state.
    - An urban nation-wide mean was used for all hospital-based HHAs located in a Core-based Statistical Area (CBSA). The urban nation-wide mean was computed using all hospital-based HHAs located in any CBSA.
    - A rural nation-wide mean was used for all hospital-based HHAs not in a CBSA. The rural nation-wide mean was computed using all hospital-based HHAs not in a CBSA.

4. From the home health claims data, obtain the average number of minutes of care provided by each discipline across all episodes for a HHA.

5. From the home health claims data, obtain the average number of visits provided by each discipline across all episodes for each HHA.

6. Calculate a ratio of average visits to average minutes by discipline by dividing average visits provided [5] by average minutes of care [4] by discipline for each HHA.

7. Calculate costs per minute by multiplying the HHA's cost per visit [3] by the ratio of average visits to average minutes [6] by discipline for each HHA.

8. Obtain episode costs by multiplying costs per minute [7] by the total number of minutes of care provided during an episode by discipline. Then, sum these costs across the disciplines for each episode.

This approach accounts for variation in the length of a visit by discipline. NRS costs are added to episode costs calculated in [8] in the following way:

9. From the cost reports, determine the NRS cost-to-charge ratio for each HHA. The NRS ratio is trimmed if the value falls in the top or bottom 1% of the distribution across all HHAs from the trimmed sample. Imputation for missing or trimmed values is done in the same manner as it was done for cost per visit (see [3] above).

10. From the home health claims data, obtain NRS charges for each episode.

11. Obtain NRS costs for each episode by multiplying charges from the home health claims data [10] by the cost-to-charge ratio from the cost reports [9] for each HHA.

Resource use is then obtained by:

12. Summing episode costs from [8] with NRS costs from [11] for each episode.

Exhibit 4-3 shows these costs overall for 30 day periods (n = 9,311,627). On average, total episode costs are $1,553.73. The distribution ranges from a 5th percentile value of $ 298.93 to a 95th percentile value of $3,884.53.

Exhibit 4-3: Distribution of Average Resource Use Using CPM + NRS Approach (30 day Periods)

Statistics	Mean	N	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Average Resource Use (CPM + NRS)	$1,553.73	9,311,627	$298.93	$393.74	$647.67	$1,207.50	$2,096.43	$3,111.95	$3,884.53

4.4 Comparison of Approaches

The distributions and magnitude of the estimates of costs for the two methods are very different. The differences arise because the CPM + NRS method incorporates HHA-specific costs that represent the total costs incurred during an episode (including overhead costs), while the WWMC provide an estimate of only the labor costs (wage + fringe) related to direct patient care from patient visits that are incurred during an episode. Those costs are not HHA-specific and do not account for any non-labor costs (such as transportation costs) or the non-visiting services labor costs.

Because the episode costs estimated using the two approaches are measuring different items, they cannot be directly compared. However, if the true cost of an episode is correlated with the labor that is provided during visits, the two approaches should be highly correlated. The correlation coefficient between the two approaches to calculating resource use is equal to 0.8153 (n = 9,311,627). Therefore, since the relationship in relative costs is similar between the two methods, there should not be a large impact on the analyses in the rest of this report depending on which method was picked. An advantage of the WWMC method is that it incorporates the distribution of the labor categories into the cost per minute estimates (i.e., for skilled nursing, it incorporates percentage of visits provided by LPNs versus RNs). In addition, the BLS data is made available more quickly than cost report data. For instance, for the CY 2016 final rule, 2015 claims data and 2014 BLS data were used, while only 2013 cost report data was complete enough to be used.

One advantage of using cost report data to develop case-mix weights is that it more evenly weights skilled nursing services and therapy services than BLS data. Exhibit 4-4 shows the ratios between the estimated costs per hour for each of the home health disciplines compared with skilled nursing resulting from the CPM +NRS versus WWMC methods. Under the CPM+NRS methodology, the ratio for physical therapy costs per hour to skilled nursing is 1.18 compared with 1.40 using the WWMC method. In the past, as noted in Chapter 2, MedPAC has expressed concerns that the payment system over-values therapy services and under-values skilled nursing services. Thus, using

cost report data may better align the case-mix weights with the total relative cost for treating various patients. In addition, using cost report data allows us to incorporate NRS into the case-mix system, rather than maintaining a separate payment system. As noted above, the separate NRS payments made under the current system have resulted in a significant number of episodes being reimbursed for NRS despite not reporting any NRS charges on the claim.

Exhibit 4-4: Relative Values in Costs per Hour by Discipline (Skilled Nursing is Base)

Estimated Cost per Hour	Skilled Nursing	Physical Therapy	Occupational Therapy	Speech Therapy	Medical Social Service	Home Health Aide
CPM+NRS	1.00	1.18	1.18	1.24	1.36	0.39
WWMC	1.00	1.40	1.39	1.50	0.95	0.36

A limitation of both approaches is the dependency upon the accuracy of the reported episode visit minutes.

The results in this report are presented primarily using the CPM+NRS method, which allows for a simplified payment system and reflects the costs of Medicare HHAs. To show the differences in results caused by the selection of the CPM+NRS method versus the WWMC method, results using both approaches are shown for certain analyses in the Payment Regression chapter (Chapter 10).

5. Chapter 5 – Creation of 30 Day Periods from 60 Day Episodes

In the HH PPS, HHAs are paid for each 60 day episode of home health care provided. Through examination of the resources within a 60 day episode of care, we identified differences in resources between the first 30 day period within a 60 day episode and the second 30 day period within a 60 day episode. This difference in resources between the first and second 30 day period within a 60 day episode led to the development of 30 day periods for the HHGM model. For the HHGM analyses, two 30 day periods are simulated using the 60 day episodes that HHAs currently bill to Medicare. In this chapter, the methods used to simulate the 30 day periods are outlined and the resulting distributions of episode length and resource use are described. Through examination of the resources within a 60 day episode of care, differences in resources between the first 30 day period within a 60 day episode and the second 30 day period within a 60 day episode were identified. This difference in resources between the first and second 30 day period within a 60 day episode led to the development of 30 day periods for the HHGM. As explained in this chapter, switching to 30 day periods improves the fit of the model, as described in Chapter 10, and also would align home health reimbursement with reimbursement for hospices and skilled nursing facilities (SNFs), which currently bill on a monthly basis.

5.1 Methodology

Simulated 30 day periods were constructed by using two segments of the current 60 day episodes:

1. A 30 day period comprised of days 1-30 of a current 60 day episode where “day 1” is the current 60 day episode’s From Date.

2. A second period comprised of days 31 and above of a current 60 day episode. This period would be 30 days in length if the current episode was 60 days (from the From Date of the episode to the Through Date of the episode) and some lesser length if the current episode were fewer than 60 days.

That is, a typical 60 day episode would be broken down into two simulated portions: a first 30 day period and a second 30 day period consisting of the remaining days. For example, if the current episode was 58 days then the first period would be 30 days and the second period would be comprised of the remaining 28 days. Resource utilization was calculated for each 30 day period based on the discipline visits that occur within each respective 30 day time span. The OASIS information that is applied to the two simulated 30 day periods (e.g., OASIS information) is established by the same OASIS that is linked to the current 60 day episode.

There are three primary benefits to switching to 60 day episodes with two 30 day periods:

- The HHGM’s fit statistics (e.g., R-squared) improve due to less resource use variation when a shorter, more constrained time period is examined. This in turn improves the accuracy of the case-mix weights that are generated using 30 day periods instead of 60 day episodes.
- A 30 day period may promote HHAs to more frequently review their patients’ status and thereby be more diligent in providing a level of care that best suits patients’ needs.
- Additionally, creating a 30 day period would reduce, if not eliminate, the need for partial, preemptive payments of 50-60% of expected total payments (i.e., RAPs) – that occur in the

current payment system. Home health agencies would bill on a monthly basis, similar to hospices and SNFs, and thus receive final payment sooner.

Resource use was calculated for the simulated 30 day periods using counts of each episode's visits by discipline in 15-day increments that were constructed in the course of the analytic file development along with 15-minute unit information from the claims and cost per visit information from Medicare cost report data. Using this information, the 30 day period's resource use was calculated using the same CPM+NRS wage information that was used to calculate 60 day episodes' resource use as described in Chapter 4.

5.2 Distribution of Resource Use in 60 Day Episodes

Exhibit 5-1 shows the average number of visits by discipline and resource use estimates during 15-day periods in a 60 day episode. The objective of this table is to investigate whether visit patterns differ over the course of a 60 day episode. Across all labor categories there is a decline in visits as the episode proceeds; in total there are 6.9 visits on average in days 1-15 and 2.5 visits on average in days 46-60, a 63.8% decline from the first 15 days of care in a 60 day episode to the last 15 days of care in a 60 day episode. Exhibit 5-2 shows the average number of visits and resource use estimates by discipline during 15-day periods in a 60 day episode, but now only among those episodes that are first in a sequence of episodes and last a full 60 days. A sequence of episodes contains episodes where no more than 60 days elapse from the end of one episode to the start of the next. Therefore, first episodes are those where the beneficiary has not had home health in the 60 days prior to the start of the first episode. Even among this subset of episodes there is a decline in average visits by quarter as the episode proceeds.

These results show that there is variation in average resource use across 60 day episodes. By moving to two 30 day periods within a 60 day episode (or a single 30 day period if the 60 day episode contains 30 or fewer days), the HH PPS weights may better align with the resource use patterns across the current 60 day episode. Though the analyses presented in this chapter are based on two 30 day periods in a 60 day episode, this would not necessarily mean a change in the requirements for completing the comprehensive assessment. Under the HHGM, the comprehensive assessment would still be required roughly every 60 days as is required under the current HH PPS.

Exhibit 5-1: Average Visits per 15 Days During a 60 Day Episode
n = 5,585,396

	Days 1-15	Days 16-30	Days 31-45	Days 46-60
Average Resource Use	$252.97	$155.56	$101.93	$80.60
Average Skilled Nursing Visits	3.5	2.1	1.6	1.5
Average PT Visits	2.1	1.6	0.9	0.5
Average OT Visits	0.5	0.4	0.2	0.1
Average SLP Visits	0.1	0.1	0.1	0.0
Average Aide Visits	0.6	0.6	0.5	0.4
Average MSS Visits	0.1	0.0	0.0	0.0
Average Total Visits	6.9	4.8	3.2	2.5

Exhibit 5-2: Average Visits Per 15 Days During a 60 Day Episode (Only First Episodes in a Sequence of Episodes that Last a Full 60 Days) n = 836,815

	Days 1-15	Days 16-30	Days 31-45	Days 46-60
Average Resource Use	$307.45	$210.89	$166.23	$153.81
Average Skilled Nursing Visits	4.2	2.6	2.3	2.3
Average PT Visits	2.4	2.1	1.5	1.2
Average OT Visits	0.7	0.6	0.4	0.3
Average SLP Visits	0.1	0.1	0.1	0.1
Average Aide Visits	0.7	0.7	0.6	0.5
Average MSS Visits	0.1	0.1	0.0	0.0
Average Total Visits	8.1	6.3	5.0	4.5

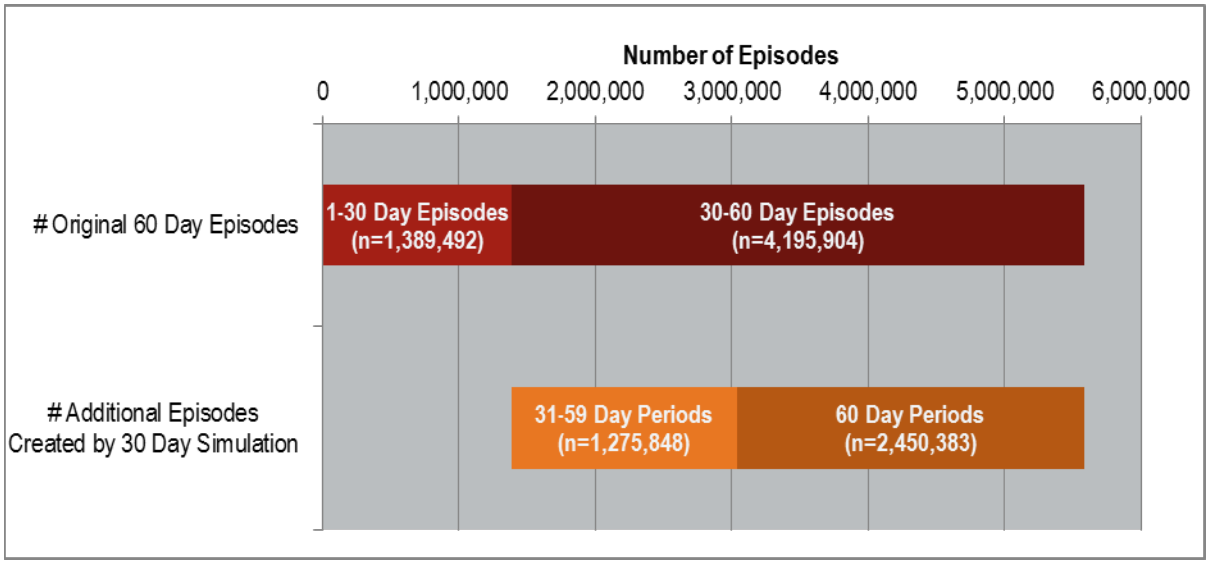
5.3 Distribution of Episode Length

As summarized in Exhibit 5-3, overall, there were 5,585,396 60 day episodes, 1,389,492 (24.9%) of which were 30 days or fewer, and would therefore produce no second 30 day period under the HHGM. These episodes – 30 days or fewer each – will convert to only one 30 day period each; any 60 day episode that is 31 days or more will produce two 30 day periods: a first period comprised of 30 days in length and then a second period with the remaining days in the 60 day episode. Of the 5,585,396 60 day episodes, there were 4,195,904 episodes (75.1%) that were more than 30 days.

Overall, after conversion from 60 day episodes, there were 9,311,627 30 day periods:

- There were 1,389,492 30 day periods that could potentially be one-to-one conversions from 60 day episodes that were 30 days or fewer in length.
- Additionally, there were 4,195,904 60 day episodes that were between 31 and 60 days in length in which two 30 day periods could be produced. That is, those 60 day episodes could produce up to 8,391,808 30 day periods.
- However, from the above episodes (which were used to create the 30 day periods), there was 469,673 periods that had no visits included or was considered a LUPA under the HHGM (see Chapter 7) and therefore was excluded.

Exhibit 5-3: Total Numbers of 60 Day Episodes and 30 Day Simulated Home Health Periods



Exhibits 5-4 and 5-5, below, show the frequency of episode length in days and estimates of resource use among the original, 60 day episodes and the corresponding distribution of episode length and resource use estimates among the simulated 30 day periods. Again, these results show differences between episodes by the length of the episode. By shortening the unit of time that CMS pays for within the HH PPS (from 60 day episodes to 30 day periods), payment will more accurately relate to the variation in costs seen across episodes. Moving to a 30 day period should not cause any changes to agency cash flow given the payment per 30 day period will be similar to how HHAs are paid in the current HH PPS with a RAP and then a final amount at the end of the 60 day episode upon claim submission.

Exhibit 5-4: Frequency of Length of 60 Day Episodes and Average Resource Use for Episodes of a Certain Length

Length of Episode in Days	Number of Episodes	Percent of Episodes	Average Resource Use	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
1	273	0.0%	$424.05	$248.04	$374.60	$256.03	$509.14
2	2,011	0.0%	$591.96	$350.40	$517.69	$358.96	$752.38
3	6,208	0.1%	$681.02	$390.28	$605.90	$430.31	$838.95
4	8,864	0.2%	$744.61	$414.24	$674.24	$479.81	$916.90
5	13,566	0.2%	$820.01	$469.50	$732.92	$518.52	$1,007.34
6	16,618	0.3%	$844.70	$475.78	$754.89	$539.77	$1,039.37
7	23,579	0.4%	$907.50	$507.29	$815.39	$576.70	$1,112.42
8	27,438	0.5%	$940.21	$539.17	$837.63	$597.39	$1,152.77
9	27,381	0.5%	$993.94	$560.00	$887.29	$625.03	$1,237.28
10	33,285	0.6%	$1,050.10	$590.95	$934.55	$653.71	$1,301.81
11	38,370	0.7%	$1,104.64	$621.73	$992.48	$687.40	$1,384.45
12	42,452	0.8%	$1,177.86	$650.54	$1,059.31	$735.85	$1,479.00
13	47,841	0.9%	$1,226.80	$687.32	$1,096.46	$753.99	$1,556.38
14	57,311	1.0%	$1,300.81	$719.37	$1,166.26	$800.00	$1,652.84
15	63,335	1.1%	$1,313.49	$732.56	$1,174.93	$805.42	$1,660.36
16	54,089	1.0%	$1,353.20	$762.44	$1,206.76	$819.17	$1,722.56
17	56,783	1.0%	$1,405.61	$796.68	$1,252.86	$848.18	$1,795.85
18	58,317	1.0%	$1,460.42	$835.81	$1,306.39	$872.40	$1,869.26
19	57,831	1.0%	$1,530.17	$867.29	$1,373.89	$912.46	$1,968.51
20	61,696	1.1%	$1,584.49	$901.45	$1,422.93	$941.98	$2,039.77
21	69,579	1.2%	$1,662.82	$930.34	$1,498.19	$994.56	$2,138.02
22	75,850	1.4%	$1,709.33	$967.68	$1,521.80	$1,022.21	$2,195.25
23	64,434	1.2%	$1,763.08	$1,000.85	$1,580.02	$1,046.81	$2,265.31
24	65,674	1.2%	$1,821.66	$1,027.90	$1,638.95	$1,089.50	$2,342.89
25	65,089	1.2%	$1,886.66	$1,059.89	$1,710.55	$1,124.28	$2,439.81
26	64,311	1.2%	$1,953.55	$1,114.80	$1,778.83	$1,156.26	$2,525.15
27	70,222	1.3%	$2,032.01	$1,148.81	$1,863.46	$1,209.93	$2,636.11
28	74,201	1.3%	$2,077.73	$1,166.00	$1,896.10	$1,239.84	$2,689.93
29	78,310	1.4%	$2,075.50	$1,165.33	$1,881.11	$1,233.76	$2,689.93
30	64,574	1.2%	$2,158.98	$1,234.65	$1,957.60	$1,269.83	$2,794.50
31	59,273	1.1%	$2,067.94	$1,242.18	$1,871.55	$1,180.28	$2,697.69
32	54,338	1.0%	$2,111.47	$1,289.17	$1,909.58	$1,178.34	$2,771.96
33	50,125	0.9%	$2,179.21	$1,349.13	$1,968.11	$1,212.25	$2,846.97
34	51,601	0.9%	$2,242.71	$1,392.62	$2,026.51	$1,254.14	$2,933.11
35	58,747	1.1%	$2,357.88	$1,405.45	$2,186.73	$1,344.57	$3,030.30
36	72,252	1.3%	$2,499.49	$1,380.57	$2,470.62	$1,519.74	$3,091.22
37	50,557	0.9%	$2,462.28	$1,493.09	$2,276.11	$1,412.88	$3,145.13
38	46,591	0.8%	$2,508.65	$1,542.95	$2,271.49	$1,433.91	$3,221.16
39	44,321	0.8%	$2,533.91	$1,576.17	$2,289.82	$1,436.29	$3,263.60
40	43,116	0.8%	$2,614.70	$1,624.54	$2,370.75	$1,495.70	$3,348.76
41	46,770	0.8%	$2,680.85	$1,627.02	$2,460.23	$1,549.51	$3,432.93
42	46,723	0.8%	$2,693.53	$1,676.70	$2,444.13	$1,538.31	$3,458.69
43	47,426	0.8%	$2,704.21	$1,676.37	$2,434.82	$1,551.93	$3,473.26
44	39,319	0.7%	$2,744.57	$1,744.55	$2,464.82	$1,555.83	$3,530.52
45	37,593	0.7%	$2,803.89	$1,785.21	$2,511.10	$1,584.93	$3,607.71
46	35,587	0.6%	$2,817.44	$1,834.97	$2,506.60	$1,552.61	$3,634.17
47	33,857	0.6%	$2,870.40	$1,860.70	$2,562.08	$1,588.44	$3,696.64

Length of Episode in Days	Number of Episodes	Percent of Episodes	Average Resource Use	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
48	35,821	0.6%	$2,913.41	$1,882.93	$2,593.77	$1,625.30	$3,744.71
49	38,600	0.7%	$2,970.95	$1,929.51	$2,636.98	$1,649.58	$3,825.93
50	40,942	0.7%	$2,964.41	$1,879.99	$2,639.51	$1,675.19	$3,810.28
51	35,170	0.6%	$3,026.46	$1,940.33	$2,691.55	$1,675.06	$3,903.89
52	35,704	0.6%	$3,025.06	$1,962.37	$2,684.45	$1,657.65	$3,904.33
53	38,097	0.7%	$3,016.81	$2,009.14	$2,659.72	$1,615.35	$3,905.58
54	41,953	0.8%	$3,043.70	$2,014.49	$2,683.33	$1,647.45	$3,945.66
55	55,088	1.0%	$3,014.31	$2,004.31	$2,645.48	$1,598.82	$3,925.05
56	126,426	2.3%	$2,690.20	$1,893.79	$2,327.94	$1,283.38	$3,610.87
57	128,988	2.3%	$2,863.16	$1,975.21	$2,504.44	$1,431.50	$3,791.22
58	120,581	2.2%	$2,920.55	$2,048.97	$2,545.40	$1,422.65	$3,876.68
59	132,059	2.4%	$2,999.71	$2,121.96	$2,590.72	$1,454.90	$3,983.84
60	2,548,279	45.6%	$3,039.73	$2,540.84	$2,385.96	$1,292.51	$4,002.37
Total	5,585,396	100.0%	$2,580.14	$2,121.23	$2,025.30	$1,168.40	$3,351.24

Exhibit 5-5: Frequency of Length of 30-Day Periods and Average Resource Use for Episodes of a Certain Length

Length of Episode in Days	Number of Episodes	Percent of Episodes	Average Resource Use	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
1	3,860	0.0%	$320.01	$214.71	$221.49	$286.01	$363.10
2	9,418	0.1%	$399.10	$302.47	$246.43	$324.71	$456.83
3	18,800	0.2%	$488.77	$362.09	$283.15	$391.37	$583.63
4	26,978	0.3%	$527.47	$405.77	$295.13	$424.93	$644.32
5	40,964	0.4%	$573.00	$414.32	$323.65	$468.39	$700.87
6	60,183	0.6%	$597.47	$399.32	$360.85	$504.36	$713.54
7	53,577	0.6%	$681.15	$483.48	$367.98	$561.64	$845.27
8	60,438	0.6%	$724.84	$509.59	$393.75	$610.79	$918.89
9	60,660	0.7%	$763.91	$541.78	$404.93	$638.15	$971.85
10	67,071	0.7%	$835.99	$578.61	$444.97	$708.71	$1,068.02
11	76,099	0.8%	$887.49	$603.39	$475.52	$767.68	$1,143.61
12	80,407	0.9%	$944.74	$642.55	$501.89	$808.59	$1,222.67
13	87,052	0.9%	$989.00	$675.62	$521.02	$835.99	$1,287.69
14	90,218	1.0%	$1,095.71	$726.34	$589.31	$937.41	$1,434.15
15	96,377	1.0%	$1,138.04	$737.24	$632.20	$983.00	$1,475.51
16	85,735	0.9%	$1,161.56	$765.66	$628.14	$997.17	$1,508.56
17	87,196	0.9%	$1,217.68	$801.09	$656.47	$1,047.99	$1,585.42
18	90,846	1.0%	$1,259.63	$836.59	$670.78	$1,083.37	$1,655.15

Length of Episode in Days	Number of Episodes	Percent of Episodes	Average Resource Use	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
19	93,183	1.0%	$1,304.78	$868.71	$687.71	$1,119.34	$1,722.31
20	99,424	1.1%	$1,344.73	$895.83	$707.26	$1,151.64	$1,773.71
21	102,175	1.1%	$1,451.77	$934.82	$781.23	$1,258.51	$1,912.47
22	109,393	1.2%	$1,508.45	$968.70	$822.97	$1,301.09	$1,976.41
23	100,485	1.1%	$1,516.47	$1,001.51	$798.61	$1,303.09	$1,994.56
24	105,552	1.1%	$1,547.23	$1,028.18	$803.55	$1,334.36	$2,047.31
25	117,905	1.3%	$1,530.70	$1,052.71	$754.86	$1,302.40	$2,053.77
26	185,410	2.0%	$1,310.15	$1,034.06	$551.53	$1,035.51	$1,785.68
27	194,521	2.1%	$1,409.89	$1,077.12	$614.70	$1,140.77	$1,923.57
28	190,634	2.0%	$1,493.26	$1,118.03	$662.69	$1,224.06	$2,030.45
29	206,205	2.2%	$1,545.46	$1,126.89	$711.91	$1,285.16	$2,087.15
30	6,710,861	72.1%	$1,676.91	$1,362.52	$687.51	$1,326.47	$2,274.14
Total	9,311,627	100.0%	$1,553.73	$1,274.92	$647.67	$1,207.50	$2,096.43

6. Chapter 6 – Clinical Groups

Chapters 6–9 of this report describe each of the categories used to group episodes into the different HHGM home health resource groups. In particular, this chapter describes how diagnosis codes are used to group episodes into their clinical groups. Under the HHGM, each home health episode is assigned to a clinical group which best describes the primary reason for home health services based on the HH-reported principal diagnosis.

The HHGM was developed to be in alignment with the ICD-9-CM codes and their associated coding guidelines and conventions. Diagnosis codes were used for several reasons:

- A diagnosis is a standardized, universal way to categorize patient conditions across health care settings, so it is a common language recognized among health care providers;
- Diagnoses support medical necessity for services provided;
- They are required to be reported on the OASIS and HH claims;
- Diagnoses provide information for establishing the home health plan of care.

Using diagnosis codes as a component of determining episode payment has several benefits. It creates a more clinically-intuitive payment system, where clinicians can more easily identify the types of patients they treat in home health. It also provides clarity and transparency in the payment system since the diagnosis codes are clearly described and reported on claims and other care tools. Stakeholders such as HHAs, clinicians, payers, researchers, patients and others will be able to understand the clinical rationale for the provision of care. Moreover, since the clinical groups indicate the primary reason for home health services, CMS can better understand the reason for a home care episode. Lastly, it assigns episodes with similar care needs, and therefore resource use, into a related group that can then be further case-mix adjusted.

An extensive review of every ICD-9-CM diagnosis code was conducted to identify the primary reason for home health services based on the principal diagnosis reported. A full list of the ICD-9-CM diagnosis codes along with their assigned clinical group can be found on the CMS HHA Center webpage at the following link: https://www.cms.gov/center/provider-Type/home-Health-Agency-HHA-Center.html

6.1 Clinical Groupings

As part of the analyses to inform changes to the HH PPS (described in chapter 2), the research team held a clinical workgroup to discuss home health payment reform and potential payment models that would address the vulnerabilities discussed in the 3131(d) home health study. The clinical workgroup helped to inform the development of the clinical groups as one part of the HHGM. In order to establish clinical groups based on information learned from the workgroup's clinicians and from an extensive review of existing research, the research team developed broad guiding principles for establishing the clinical groups. These included:

- Clinical groups will reflect the primary reason for home health services based on the HH-reported principal diagnosis or condition.

- Clinical groups will be clinically relevant and will provide a better understanding of the characteristics of home health beneficiaries and home health services being provided.
- Clinical groups will support ICD-9-CM coding guidelines and conventions.

Using these guiding principles, along with the information learned from the clinical workgroup, six clinical groups were developed for the HHGM (Exhibit 6-1).

Exhibit 6-1: Clinical Groups Used in the Home Health Grouping Model

Clinical Group	Primary Reason for Home Health Encounter is to Provide:
Musculoskeletal Rehabilitation	Therapy (PT/OT/SLP) for a musculoskeletal condition
Neuro/Stroke Rehabilitation	Therapy (PT/OT/SLP) for a neurological condition or stroke
Wounds - Post-Op Wound Aftercare and Skin/Non-Surgical Wound Care	Assessment, treatment and evaluation of a surgical wound(s); assessment, treatment and evaluation of non-surgical wounds, ulcers burns and other lesions
Complex Nursing Interventions (Based on diagnosis codes and answers to OASIS item M1030, M1410, and M1630 and certain V-codes)	Assessment, treatment and evaluation of complex medical and surgical conditions including IV, TPN, enteral nutrition, ventilator, and ostomies as well as the presence of certain V-codes as the primary diagnosis
Behavioral Health Care	Assessment, treatment and evaluation of psychiatric and substance abuse conditions
Medication Management, Teaching and Assessment (MMTA)	Assessment, evaluation, teaching, and medication management for a variety of medical and surgical conditions not classified in one of the above listed groups.

Episodes were assigned to one of six clinical groups based on the principal diagnosis reported on the OASIS (see Chapter 3 for information on the analytic sample). The ICD-9-CM coding guidelines for the selection of the principal diagnosis were used to help assign diagnoses to the clinical groups (see Exhibit 6-2). Additionally, a comprehensive clinical review was conducted by clinical and coding staff at Abt, 3M, and CMS. ICD-9-CM diagnosis codes were assigned to the clinical group that best described the primary reason for HH services for a patient with that principal diagnosis reported. Exhibit 6-2 lists the ICD-9 chapters and the associated disease classifications.

Exhibit 6-2: ICD-9 Disease Classification: Tabular List of Diseases

(001-139): infectious and parasitic diseases
(140-239): neoplasms
(240-279): endocrine, nutritional, and metabolic diseases and immunity disorders
(280-289): diseases of the blood and blood-forming organs
(290-319): mental, behavioral and neurodevelopmental disorders
(320-389): diseases of the nervous system and sense organs
(390-459): diseases of the circulatory system
(460-519): diseases of the respiratory system
(520-579): diseases of the digestive system

(580-629): diseases of the genitourinary system
(630-679): complications of pregnancy, childbirth, and the puerperium
(680-709): diseases of the skin and subcutaneous tissue
(710-739): diseases of the musculoskeletal system and connective tissue
(740-759): congenital anomalies
(760-779): certain conditions originating in the perinatal period
(780-799): symptoms, signs, and ill-defined conditions
(800-999): injury and poisoning
V-codes: symptoms, signs and ill-defined conditions
E-codes: injury and poisoning

According to ICD 9-CM coding guidelines, E-codes can never be reported as a principal diagnosis; therefore no E-codes were linked to a clinical group. Episodes with ICD-9-CM codes that could not be assigned to a clinical group were considered "questionable encounters" for home health services. Diagnosis codes could not be used to assign episodes to a clinical group for the following reasons:

- Too vague, meaning the code does not provide adequate information to support the need for home health services and more information is needed in order to provide HH services (e.g. 959.9 Injury site-NOS);
- A non-home health service meaning, based on ICD-9-CM, American Hospital Association (AHA) Coding Clinic, or Medicare Code Edits (MCE), the diagnosis is as such that it would not be a Medicare-covered service in other settings (e.g. dental codes);
- Manifestation code where coding guidelines require an etiology code to be reported as principal diagnosis (e.g. 421.1 Acute endocarditis in other diseases);
- Unlikely to require HH services, meaning the diagnosis is such that it does not require skilled services in the home health setting or that a referral for HH services would be unlikely (e.g. 780.99 Other general symptoms);
- Too acute, meaning the reporting of the diagnosis is restricted to the acute care setting per ICD-9/AHA Coding Clinic Guidance, or the diagnosis indicates death as the outcome (e.g. 427.5 Cardiac arrest); or
- Code first, meaning the diagnosis is subject to sequencing conventions under ICD-9-CM (e.g. 366.41 Diabetic cataract).

The review of home health claims and OASIS data from CY 2013 found that roughly 23.4 percent episodes could not be assigned to a clinical group based on the principal diagnosis alone. If an episode's principal diagnosis was not assigned to a clinical group and thus was a "questionable encounter," the other diagnosis codes listed on the OASIS assessment associated with the episode were examined to attempt to place the episode into a clinical group. As a result of examining the reported secondary diagnoses, most episodes were assigned to a clinical group with 0.4 percent remaining as "questionable encounters" for the reasons described above (See Chapter 3). Exhibit 6-3 shows the distribution of episodes across the six clinical groups after looking at the other reported diagnoses on the OASIS to group those episodes considered "questionable encounters."

Exhibit 6-3: Frequency of Clinical Groups

Clinical Group	Average Resource Use	N	Percent	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Behavioral Health	$1,167.98	281,167	3.0%	$962.86	$478.70	$856.63	$1,583.78
MMTA	$1,455.50	5,935,434	63.7%	$1,193.98	$601.75	$1,112.64	$1,982.92
Complex Nursing Interventions	$1,709.16	323,792	3.5%	$1,581.14	$684.69	$1,236.38	$2,203.60
Musculoskeletal Rehabilitation	$1,540.85	1,018,811	10.9%	$1,083.21	$720.70	$1,293.40	$2,109.54
Neuro Rehabilitation	$1,793.19	765,114	8.2%	$1,340.94	$800.75	$1,478.82	$2,427.93
Wound	$2,030.83	987,309	10.6%	$1,640.41	$920.44	$1,583.10	$2,620.83
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

For the analysis done in this report, secondary diagnoses were used in cases where the primary diagnosis led to a questionable encounter. However, if the HHGM was implemented, the secondary diagnosis would not be used to group episodes. Instead, under the HHGM, if an episode is not grouped based on the HH-reported principal diagnosis (i.e., a "questionable encounter") the claim for that episode would be returned to the provider for more accurate or definitive coding. The claim could then be resubmitted for processing.

As the exhibit shows, the majority of episodes are classified as MMTA (63.7 percent) while the fewest are classified as Complex Nursing Interventions (3.5 percent) and Behavioral Health (3.0 percent). It is reasonable that MMTA, the largest group, serves as the "default" clinical group. It is not unexpected that MMTA would encompass the majority of episodes as skilled nursing visits make up the majority of episodes under the current payment system. G-codes are used to delineate between the types of nursing services provided during a home health episode. In addition to the G-code that identifies direct nursing services (G0299 and G0300), there are also G-codes describing skilled services by a licensed nurse (RN only) for management and evaluation of the plan of care (G0162), skilled services of a licensed nurse (LPN or RN) for the observation and assessment of the patient's condition (G0163), and skilled services of a licensed nurse (LPN or RN), in the training and/or education of a patient or family member (G0164). These codes describe the services included under MMTA. As shown in Exhibit 6-1, MMTA covers all episodes related to assessment, evaluation, teaching, and medication management for all conditions not classified into one of the other groups. The group with the lowest average resource use is Behavioral Health ($1,167.98) and the group with the highest is Wound ($2,030.83). Differences in average resource use across most groups are at least $100.

Recognizing that home health beneficiaries often have multiple health conditions and that the HHA reports secondary diagnoses that affect the home health plan of care, the HHGM makes additional adjustments based on diagnoses to account for resource variation among episodes both across the clinical groups and within the same clinical group (see Chapter 10). Thus, the assignment of episodes into the six clinical groups is only one step in the overall grouping model.

7. Chapter 7 – Functional Level

Chapters 6–9 of this report describe the broad categories used to group episodes into the 128 different payment groups used within the HHGM. In particular, this chapter describes how OASIS items are used to group episodes into their functional level.

Using OASIS items to set payment produces several benefits. OASIS items can be used to quickly calculate the functional level of a patient in part, which conveys the functional status and health of the patient. Additionally, the functional level is a useful case-mix adjustor. This chapter demonstrates that patients with a higher functional level (i.e. reduced functional status and health) on average have higher resource use compared with patients with a lower functional level. Therefore, categorizing patients by functional level allows CMS to pay more for patients with greater functional and health needs. This approach is similar to the 4-equation model used in the current payment system but has been simplified so that the HHGM is more transparent and clinically intuitive.

7.1 Review of OASIS Items

The HHGM risk adjusts payment using different patient characteristics, including information from the OASIS assessment tied to the episode. The goal of risk adjustment – otherwise known as case-mix adjustment – is to account for differences in resource use associated with observable differences in patient characteristics.

The research team conducted a preliminary examination to determine OASIS items that were correlated with resource use and could potentially be used to help construct case-mix weights for the HHGM. The examination encompassed all OASIS items, including items that are not used in the current payment system and those that may be inappropriate for use in the payment system because of clinical or incentive-related factors. In general, for each OASIS item, the clinician or therapist who administers the OASIS picks a numbered checkbox that best describes the patient. For example, for the grooming question (M1800), one of four responses could be picked:

- 0 – Able to groom self-unaided, with or without the use of assistive devices or adapted methods.
- 1 – Grooming utensils must be placed within reach before able to complete grooming activities.
- 2 – Someone must assist the patient to groom self.
- 3 – Patient depends entirely upon someone else for grooming needs.

Generally the higher numbered options correspond to being less able to perform the task, having diminished neurological, emotional, and behavioral status, or having a higher risk of hospitalization. Appendix Exhibit A7-1 lists the OASIS-C item frequencies and associations with resource use estimated using an Ordinary Least Squares (OLS) regression of resource use (using the WWMC method to define resource use). Positive coefficients indicate that an OASIS item response was related to higher resource use compared with the excluded category (of least or no impairment). Negative coefficients indicate that an OASIS item response was related to lower resource use compared with the excluded category (of least or no impairment).

Next, the list of OASIS items shown in Appendix Exhibit A7-1 was narrowed based on analyses of statistical factors (e.g., the relationship of the item with resource use), clinical factors (e.g., clinical

appropriateness of using the item for payment purposes) and incentive factors (e.g., potential for unintended consequences such as rewarding poor quality care). The research team then obtained feedback from clinical experts through the CWG (described in Chapter 2) on the narrowed list of OASIS items. CWG members were comprised of physicians and other home health providers with substantial clinical expertise.

The CWG was presented with information on the relationship between resource use and each OASIS item and asked to help the research team determine which OASIS items to include in the HHGM. Although the CWG generally favored the inclusion of many of the OASIS items under consideration regardless of the relationship with resource use, the research team felt that counterintuitive relationships may have the unintended consequence of discouraging HHAs to provide the appropriate amount of care to the patients who needed it the most. Based on CWG feedback and additional analyses by the research team, the following decisions were made regarding the narrowed list of OASIS items (item numbers come from OASIS-C):

- **M0066, M0110:** Age, Episode timing – Both age and episode timing were determined to be appropriate for the HHGM, but both items can be accurately obtained directly from the home health claims data compared with the OASIS.[16]
- **M1018, M1030:** Selected prior conditions and types of therapies a patient receives – These items were not used in the HHGM because the clinical groups (described in Chapter 6) account for these conditions.
- **M1200: Vision:** While this item is used in the current HH PPS, there are no longer "points" associated with this item for the clinical domain because there is no additional resource use need related to this item. Additionally, this item was negatively associated with resource use in the HHGM analysis and therefore determined to have a counterintuitive relationship.
- **M1220, M1230:** Understanding of verbal content, speech and oral – These items were deemed to be unclear questions for the purpose of assigning payment.
- **M1242: Pain:** While this item is used in the current HH PPS this was shown to have only a minimal relationship with resource use in the current payment model. Additionally, CMS clinicians agreed that this one item alone may not be robust enough to fully capture the pain presentation of the patient and its impact on resource utilization and therefore it was dropped from consideration
- **M1302, M1308, M1320, M1322, M1324, M1332, M1334, and M1340: Ulcers and wounds:** These items were not used in the HHGM because the clinical groups (described in Chapter 6) account for these conditions.
- **M1400: Shortness of breath** – This item was not used in the HHGM because the clinical groups (described in Chapter 6) account for this condition that could cause dyspnea.

[16] Both age and episode timing information can be obtained from the Datalink file, which is based on claims data and therefore more accurate and less subject to errors in recall compared with the OASIS data source. Timing is discussed further in Chapter 8

- **M1700 – M1750: Cognitive items** – These items were initially determined to be clinically appropriate for inclusion in the HHGM but were later removed due to a negative relationship with resource use.
- **M1800 – M1890: Functional items** – Most of these items were determined to be appropriate for inclusion in the HHGM. M1870-M1890 were excluded due to some responses having a negative relationship with resource use.
- **M2030: Management of injectable medications** – This item was not used in the HHGM because the clinical groups (described in Chapter 6) account for this OASIS item.

In addition to these items, the CWG discussed M2110 (types and sources of assistance). CWG members agreed that the availability of non-agency caregiver assistance can be an important determinant of home health care needs. The research team explored interactions between this item with functional status and the presence of certain conditions, and will continue to do so. Ultimately, caregiver assistance was not included due to concerns regarding the accuracy of the response and potential misunderstanding of the item by agencies. The research team also considered OASIS item M0120-M1024 where providers can input whether the condition symptoms are poorly controlled. These items will be further explored when more data using ICD-10 diagnosis codes are available. The following items were further considered for inclusion in the HHGM. These items were deemed to be good indicators of cognitive and functional status as evidenced by their impact on resource use. OASIS item M1032 was included to provide a measure of frailty – whether a patient was recorded as having four or more potential risk factors for hospitalization.

- M0066: Age[17]
- M1032: Risk of Hospitalization
- M1220: Understanding of Verbal Content
- M1230: Speech and Oral (Verbal) Expression of Language
- M1700: Cognitive functioning
- M1710: Confusion indicator
- M1720: Anxiety indicator
- M1740: Cognitive, behavioral, and psychiatric symptoms
- M1745: Frequency of disruptive behavior symptoms
- M1750: Receipt of psychiatric nursing services
- M1800: Grooming
- M1810: Current ability to dress upper body safely
- M1820: Current ability to dress lower body safely
- M1830: Bathing

[17] Although age is available from the OASIS, age of the patient as provided on the Datalink file was used for better accuracy.

- M1840: Toilet Transferring
- M1845: Toileting Hygiene
- M1850: Transferring
- M1860: Ambulation/Locomotion

Detailed information about each OASIS item from the above list and their responses is available in Appendix Exhibit A7-2. -The next section describes further statistical analysis conducted to assess these items for inclusion in the HHGM.

7.1.1 Methodology

The analysis examines 30 day periods as described in Chapter 5. Specifically, the sample consists of 9,418,486 30 day periods (i.e. it drops periods for episodes that are considered LUPAs in the current payment system).

One difficulty in using certain OASIS items (e.g., M1700) to examine relationships with resource use is that they are only asked on the Start of Care and Resumption of Care assessments, and not on follow-up assessments. Of the 9,418,486 30 day periods mentioned above, 62.8% (n = 5,909,774) were associated with a Start of Care or Resumption of Care assessment and the remainder were associated with a follow-up assessment that does not include all OASIS items. Therefore, for episodes in CY 2013 linked only to follow-up assessments, Abt looked back through the start of CY 2012 for the most recent episode in the same sequence of episodes that was linked to a Start of Care or Resumption of Care assessment, and carried forward the information from that assessment to the subsequent episodes.[18] For some sequences of episodes, no Start of Care or Resumption of Care assessments were conducted in either CY 2012 or CY 2013. As described in Chapter 3, those episodes were excluded from the analyses.

7.1.2 Univariate Results

Next, for each OASIS item in the analysis, the mean resource use by response category was calculated. Exhibit 7-1 provides detailed information and reports the number of episodes associated with each response, the average resource use of those episodes, and different points along the distribution of resource use.[19]

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[18] This was only done for items that were not asked on follow-up assessments. Items that were asked on follow-up assessments were not carried forward.

[19] In an initial analysis not reported here, the research team looked at adding together the numbers associated with each response to an OASIS item to come up with a composite score for each episode. This approach was determined to be too simplistic and that the scale used for each OASIS item differed, such that it did not make sense to add responses together.

Exhibit 7-1: Summary Statistics of Resource Use by OASIS Item and Response

Item	Response	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Age Category	74 and under	$1,515.75	3,651,930	38.8%	$1,318.13	$609.02	$1,148.58	$2,043.59
	75 +	$1,539.52	5,766,556	61.2%	$1,260.64	$626.64	$1,216.69	$2,107.03
M1800: Grooming	0	$1,394.47	1,457,186	15.5%	$1,181.63	$581.79	$1,084.92	$1,865.85
	1	$1,467.52	4,056,194	43.1%	$1,219.27	$595.83	$1,142.74	$2,013.31
	2	$1,604.51	3,020,860	32.1%	$1,321.78	$646.41	$1,262.76	$2,197.50
	3	$1,788.60	884,246	9.4%	$1,522.53	$727.43	$1,379.52	$2,388.53
M1810: Current Ability to Dress Upper Body	0	$1,340.64	1,191,764	12.7%	$1,166.31	$556.02	$1,023.62	$1,774.07
	1	$1,406.17	3,834,796	40.7%	$1,178.88	$571.73	$1,083.31	$1,920.51
	2	$1,645.38	3,466,859	36.8%	$1,325.42	$675.75	$1,321.57	$2,258.36
	3	$1,857.95	925,067	9.8%	$1,550.04	$771.18	$1,454.44	$2,486.67
M1820: Current Ability to Dress Lower Body	0	$1,296.12	863,684	9.2%	$1,149.32	$534.44	$978.78	$1,700.24
	1	$1,284.86	2,109,034	22.4%	$1,109.84	$531.56	$959.24	$1,724.30
	2	$1,576.01	4,905,575	52.1%	$1,268.50	$649.48	$1,265.87	$2,168.49
	3	$1,852.11	1,540,193	16.4%	$1,514.82	$775.10	$1,478.40	$2,491.45
M1830: Bathing	0	$1,192.75	201,188	2.1%	$1,126.48	$490.48	$871.29	$1,524.92
	1	$1,175.06	767,277	8.1%	$1,062.69	$491.28	$851.04	$1,536.64
	2	$1,323.41	2,302,502	24.4%	$1,133.76	$541.70	$985.09	$1,794.95
	3	$1,569.86	3,787,861	40.2%	$1,262.65	$650.30	$1,259.17	$2,151.75
	4	$1,651.40	557,870	5.9%	$1,302.30	$726.49	$1,368.60	$2,224.17
	5	$1,844.41	1,039,586	11.0%	$1,414.71	$825.26	$1,548.40	$2,493.52
	6	$1,888.33	762,202	8.1%	$1,591.63	$783.38	$1,463.56	$2,513.89

Item	Response	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1840: Toilet Transferring	0	$1,379.95	2,773,599	29.4%	$1,190.50	$566.29	$1,047.21	$1,850.90
	1	$1,525.89	4,729,841	50.2%	$1,244.59	$620.29	$1,207.76	$2,100.64
	2	$1,622.28	995,672	10.6%	$1,301.86	$662.66	$1,307.14	$2,228.32
	3	$1,843.36	137,286	1.5%	$1,484.18	$774.07	$1,496.92	$2,489.43
	4	$1,918.18	782,088	8.3%	$1,623.28	$791.34	$1,479.71	$2,550.76
M1845: Toileting Hygiene	0	$1,399.34	1,899,668	20.2%	$1,176.27	$583.36	$1,092.80	$1,877.39
	1	$1,440.64	3,722,174	39.5%	$1,203.19	$584.79	$1,109.98	$1,977.22
	2	$1,620.48	2,798,540	29.7%	$1,315.29	$657.43	$1,294.14	$2,225.63
	3	$1,861.07	998,104	10.6%	$1,569.26	$765.76	$1,443.37	$2,485.29
M1850: Transferring	0	$1,286.41	859,739	9.1%	$1,165.42	$533.78	$956.22	$1,672.58
	1	$1,459.88	5,805,966	61.6%	$1,217.68	$593.41	$1,130.50	$1,997.01
	2	$1,691.89	1,930,162	20.5%	$1,323.96	$710.59	$1,395.50	$2,316.91
	3	$1,863.29	556,078	5.9%	$1,521.44	$776.50	$1,485.46	$2,500.17
	4	$1,961.01	73,800	0.8%	$1,673.96	$801.48	$1,511.74	$2,601.76
	5	$1,995.61	192,741	2.0%	$1,778.26	$813.55	$1,475.03	$2,596.82
M1860: Ambulation and Locomotion	0	$1,200.69	332,259	3.5%	$1,144.78	$492.30	$870.91	$1,524.13
	1	$1,183.04	1,229,851	13.1%	$1,076.05	$499.64	$839.95	$1,535.71
	2	$1,456.10	3,552,136	37.7%	$1,218.54	$591.34	$1,126.66	$1,990.68
	3	$1,649.78	3,107,209	33.0%	$1,267.34	$712.95	$1,377.08	$2,257.06
	4	$1,827.89	543,035	5.8%	$1,517.08	$766.66	$1,444.73	$2,433.37
	5	$1,918.97	509,190	5.4%	$1,583.23	$801.77	$1,503.19	$2,573.61
	6	$2,009.80	144,806	1.5%	$1,769.51	$822.82	$1,496.29	$2,617.96

Item	Response	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1700: Cognitive Functioning	0	$1,546.74	4,381,515	46.5%	$1,277.28	$640.36	$1,231.05	$2,098.54
	1	$1,495.31	3,484,828	37.0%	$1,270.95	$594.44	$1,131.52	$2,047.53
	2	$1,546.21	1,136,876	12.1%	$1,304.03	$615.56	$1,187.67	$2,107.37
	3	$1,603.89	329,001	3.5%	$1,356.29	$659.40	$1,241.28	$2,155.11
	4	$1,618.43	86,266	0.9%	$1,471.08	$660.64	$1,195.05	$2,094.10
M1710: When Confused	0	$1,553.21	3,749,116	39.8%	$1,280.83	$645.98	$1,236.67	$2,104.95
	1	$1,501.75	4,109,485	43.6%	$1,279.88	$597.02	$1,139.76	$2,052.36
	2	$1,548.56	198,445	2.1%	$1,295.18	$616.97	$1,186.88	$2,124.01
	3	$1,552.80	1,071,876	11.4%	$1,291.09	$624.52	$1,209.57	$2,118.46
	4	$1,543.17	289,564	3.1%	$1,317.79	$635.49	$1,194.22	$2,060.64
M1720: When Anxious	0	$1,551.60	4,344,028	46.1%	$1,280.61	$640.21	$1,228.25	$2,106.54
	1	$1,514.56	2,986,816	31.7%	$1,284.07	$606.58	$1,161.62	$2,068.73
	2	$1,510.88	1,922,961	20.4%	$1,288.68	$601.87	$1,151.87	$2,056.06
	3	$1,480.68	164,681	1.7%	$1,267.32	$585.15	$1,125.91	$2,008.49
M1740: Memory Deficit	0	$1,528.00	7,648,478	81.2%	$1,283.07	$618.98	$1,188.37	$2,079.84
	1	$1,540.25	1,770,008	18.8%	$1,284.17	$622.10	$1,197.53	$2,098.64
M1740: Impaired Decision Making	0	$1,541.38	7,083,343	75.2%	$1,285.73	$626.83	$1,208.53	$2,098.68
	1	$1,496.70	2,335,143	24.8%	$1,275.28	$598.17	$1,133.61	$2,034.87
M1740: Verbal Disruption	0	$1,531.63	9,273,437	98.5%	$1,283.51	$620.25	$1,191.78	$2,085.53
	1	$1,445.05	145,049	1.5%	$1,266.25	$576.73	$1,079.60	$1,932.06
M1740: Physical Aggression	0	$1,531.23	9,348,630	99.3%	$1,283.56	$619.93	$1,191.11	$2,084.87
	1	$1,406.25	69,856	0.7%	$1,240.63	$567.67	$1,049.78	$1,863.34
M1740: Disruptive Behavior	0	$1,531.83	9,334,249	99.1%	$1,283.56	$620.37	$1,192.00	$2,085.59
	1	$1,361.38	84,237	0.9%	$1,241.80	$536.64	$980.01	$1,801.62

Item	Response	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1740: Delusional Behavior	0	$1,533.72	9,271,061	98.4%	$1,284.08	$622.00	$1,194.35	$2,087.72
	1	$1,315.49	147,425	1.6%	$1,213.01	$500.35	$931.40	$1,765.39
M1745: Frequency of Disruptive Behavior	0	$1,542.93	7,525,614	79.9%	$1,288.98	$627.52	$1,207.07	$2,099.77
	1	$1,425.81	286,460	3.0%	$1,229.90	$579.10	$1,059.88	$1,933.65
	2	$1,427.37	73,458	0.8%	$1,230.94	$576.22	$1,053.43	$1,929.48
	3	$1,433.43	313,786	3.3%	$1,231.36	$584.42	$1,053.47	$1,939.37
	4	$1,465.13	412,078	4.4%	$1,245.90	$581.25	$1,110.65	$1,996.75
	5	$1,529.98	807,090	8.6%	$1,287.21	$601.94	$1,184.66	$2,087.24
M1750: Patient Receiving Psychiatric Nursing Services?	0	$1,536.29	9,245,543	98.2%	$1,285.57	$623.38	$1,197.31	$2,091.00
	1	$1,209.95	172,943	1.8%	$1,108.49	$464.59	$834.07	$1,607.77
M1220: Understanding of Verbal Content	0	$1,560.57	4,735,879	50.3%	$1,287.24	$646.32	$1,243.13	$2,117.86
	1	$1,489.71	3,783,464	40.2%	$1,268.74	$590.91	$1,125.12	$2,038.26
	2	$1,531.68	792,892	8.4%	$1,294.40	$619.17	$1,166.52	$2,076.54
	3	$1,540.73	59,439	0.6%	$1,381.59	$633.22	$1,145.19	$2,010.67
M1230: Speech and Oral (Verbal) Expression of Language	0	$1,550.39	4,812,167	51.1%	$1,276.86	$642.93	$1,235.76	$2,106.17
	1	$1,480.53	3,448,739	36.6%	$1,260.54	$587.37	$1,115.96	$2,025.86
	2	$1,558.41	787,409	8.4%	$1,324.05	$619.22	$1,186.04	$2,119.85
	3	$1,669.82	240,732	2.6%	$1,422.72	$672.48	$1,272.08	$2,248.55
	4	$1,658.61	82,946	0.9%	$1,479.60	$669.40	$1,222.61	$2,160.10
	5	$1,715.51	46,493	0.5%	$1,587.34	$686.07	$1,235.77	$2,205.47

Item	Response	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1032: Risk of Hospitalization	3 or fewer items	$1,508.79	8,232,034	87.4%	$1,269.02	$611.78	$1,169.89	$2,052.61
	4 or more items	$1,679.53	1,186,452	12.6%	$1,368.95	$686.45	$1,340.35	$2,291.66
Total	-	$1,530.30	9,418,486	100.0%	$1,283.29	$619.40	$1,190.01	$2,083.35

For several of the OASIS items, particularly the functional items, worsening status is associated with higher resource use, indicating that these items may be useful as adjustors to construct case-mix weights for the HHGM.

However, Exhibit 7-1 shows that several responses within individual OASIS items have very similar average resource use. For example, for item M1820, 7-1 shows that the average resource use for episodes with response 0 is $1,296.12 and the average resource use for episodes with response 1 is $1,284.86. Also, the results in Exhibit 7-1 indicate that some of the responses are picked relatively infrequently. For example, only 0.8% of episodes have a response of 4 for item M1850.

Due to the lack of variation in resource use across certain responses and because certain responses were infrequently chosen, certain responses were combined into larger response categories to better capture the relationship between worse outcomes on each item and resource use. Responses on these OASIS items were combined together using the methodology described below:

1. Responses that corresponded to a small numbers of episodes were combined with responses that corresponded to a larger number of episodes and;

2. Responses that had similar average resource use were combined together.

Responses were combined based on of the findings shown in Exhibit 7-1. Responses associated with similar average resource use were grouped together. The resulting combinations for each item are described in Exhibit 7-2. For example, Exhibit 7-2 shows that for item M1220, there are four possible responses (0, 1, 2, and 3). After combining responses in the manner described above, there are only two possible responses ("0" or "1, 2, 3"). Similar information is provided for each OASIS item examined from the analysis.

Exhibit 7-2: Combination of Responses for OASIS Items – Each line represents a different response category – Responses on a given line before and after combination are not necessarily equivalent

	Possible Responses Before Responses are Combined	Possible Responses After Responses are Combined
M1220: Understanding of Verbal Content	0	0
	1	1,2,3
	2	-
	3	-
M1230: Speech and Oral (Verbal) Expression of Language	0	0,1
	1	2,3,4,5
	2	-
	3	-
	4	-
	5	-

	Possible Responses Before Responses are Combined	Possible Responses After Responses are Combined
M1700: Cognitive Functioning	0	0,1
	1	2, 3, 4
	2	-
	3	-
	4	-
M1710: When Confused	0	0, 1
	1	2, 3, 4
	2	-
	3	-
	4	-
M1720: When Anxious	0	0
	1	1, 2, 3
	2	-
	3	-
M1740: Memory Deficit	0	0
	1	1
M1740: Impaired Decision Making	0	0
	1	1
M1740: Verbal Disruption	0	0
	1	1
M1740: Physical Aggression	0	0
	1	1
M1740: Disruptive Behavior	0	0
	1	1
M1740: Delusional Behavior	0	0
	1	1
M1745: Frequency of Disruptive Behavior	0	0
	1	1, 2, 3, 4, 5
	2	-
	3	-
	4	-
	5	-
M1750: Patient Receiving Psychiatric Nursing Services?	0	0
	1	1

	Possible Responses Before Responses are Combined	Possible Responses After Responses are Combined
M1800: Grooming	0	0, 1
	1	2, 3
	2	-
	3	-
M1810: Current Ability to Dress Upper Body	0	0,1
	1	2,3
	2	-
	3	-
M1820: Current Ability to Dress Lower Body	0	0,1
	1	2
	2	3
	3	-
M1830: Bathing	0	0,1
	1	2
	2	3, 4
	3	5, 6
	4	-
	5	-
	6	-
M1840: Toilet Transferring	0	0,1
	1	2,3,4
	2	-
	3	-
	4	-
M1845: Toileting Hygiene	0	0,1,2
	1	3
	2	-
	3	-
M1850: Transferring	0	0
	1	1
	2	2,3,4,5
	3	-
	4	-
	5	-

	Possible Responses Before Responses are Combined	Possible Responses After Responses are Combined
M1860: Ambulation and Locomotion	0	0,1
	1	2
	2	3
	3	4,5,6
	4	-
	5	-
	6	-

After making these combinations, the newly combined OASIS items and resource use were analyzed to again determine if OASIS items could be used to help case-mix adjust episodes within the HHGM. Exhibit 7-3 reports the number of episodes associated with each response, the average resource use of those episodes, and different points along the distribution of resource use.

Exhibit 7-3: Summary Statistics of Resource Use by OASIS Item and Response (After Combining Responses)

Item and Response	-	Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Age Category	1	$1,515.75	3,651,930	38.8%	$1,318.13	$609.02	$1,148.58	$2,043.59
	2	$1,539.52	5,766,556	61.2%	$1,260.64	$626.64	$1,216.69	$2,107.03
M1800: Grooming	0	$1,448.21	5,513,380	58.5%	$1,209.87	$591.81	$1,126.16	$1,973.51
	1	$1,646.20	3,905,106	41.5%	$1,371.98	$663.54	$1,288.94	$2,238.78
M1810: Current Ability to Dress Upper Body	0	$1,390.64	5,026,560	53.4%	$1,176.24	$568.02	$1,068.14	$1,885.55
	1	$1,690.15	4,391,926	46.6%	$1,378.51	$693.91	$1,349.22	$2,303.45
M1820: Current Ability to Dress Lower Body	0	$1,288.13	2,972,718	31.6%	$1,121.47	$532.40	$964.77	$1,717.14
	1	$1,576.01	4,905,575	52.1%	$1,268.50	$649.48	$1,265.87	$2,168.49
	2	$1,852.11	1,540,193	16.4%	$1,514.82	$775.10	$1,478.40	$2,491.45
M1830: Bathing	0	$1,178.74	968,465	10.3%	$1,076.28	$491.10	$855.34	$1,534.34
	1	$1,323.41	2,302,502	24.4%	$1,133.76	$541.70	$985.09	$1,794.95
	2	$1,580.33	4,345,731	46.1%	$1,268.10	$659.06	$1,273.94	$2,161.68
	3	$1,862.99	1,801,788	19.1%	$1,492.27	$805.90	$1,513.38	$2,501.37
M1840: Toilet Transferring	0	$1,471.94	7,503,440	79.7%	$1,226.90	$599.12	$1,143.85	$2,010.83
	1	$1,758.97	1,915,046	20.3%	$1,461.44	$719.86	$1,389.75	$2,369.59
M1845: Toileting Hygiene	0	$1,491.09	8,420,382	89.4%	$1,239.21	$606.14	$1,162.56	$2,038.90
	1	$1,861.07	998,104	10.6%	$1,569.26	$765.76	$1,443.37	$2,485.29

Item and Response		Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1850: Transferring	0	$1,286.41	859,739	9.1%	$1,165.42	$533.78	$956.22	$1,672.58
	1	$1,459.88	5,805,966	61.6%	$1,217.68	$593.41	$1,130.50	$1,997.01
	2	$1,754.99	2,752,781	29.2%	$1,415.46	$734.10	$1,421.64	$2,375.14
M1860: Ambulation and Locomotion	0	$1,186.79	1,562,110	16.6%	$1,091.05	$498.07	$846.36	$1,533.00
	1	$1,456.10	3,552,136	37.7%	$1,218.54	$591.34	$1,126.66	$1,990.68
	2	$1,649.78	3,107,209	33.0%	$1,267.34	$712.95	$1,377.08	$2,257.06
	3	$1,888.64	1,197,031	12.7%	$1,578.92	$788.35	$1,475.26	$2,513.29
M1700: Cognitive Functioning	0	$1,546.74	4,381,515	46.5%	$1,277.28	$640.36	$1,231.05	$2,098.54
	1	$1,516.00	5,036,971	53.5%	$1,288.32	$603.79	$1,153.14	$2,069.00
M1710: When Confused	0	$1,526.30	7,858,601	83.4%	$1,280.59	$618.29	$1,187.43	$2,078.47
	1	$1,550.47	1,559,885	16.6%	$1,296.61	$625.60	$1,203.46	$2,108.09
M1720: When Anxious	0	$1,551.60	4,344,028	46.1%	$1,280.61	$640.21	$1,228.25	$2,106.54
	1	$1,512.07	5,074,458	53.9%	$1,285.29	$603.98	$1,156.69	$2,062.14
M1740: Memory Deficit	0	$1,528.00	7,648,478	81.2%	$1,283.07	$618.98	$1,188.37	$2,079.84
	1	$1,540.25	1,770,008	18.8%	$1,284.17	$622.10	$1,197.53	$2,098.64
M1740: Impaired Decision Making	0	$1,541.38	7,083,343	75.2%	$1,285.73	$626.83	$1,208.53	$2,098.68
	1	$1,496.70	2,335,143	24.8%	$1,275.28	$598.17	$1,133.61	$2,034.87
M1740: Verbal Disruption	0	$1,531.63	9,273,437	98.5%	$1,283.51	$620.25	$1,191.78	$2,085.53
	1	$1,445.05	145,049	1.5%	$1,266.25	$576.73	$1,079.60	$1,932.06
M1740: Physical Aggression	0	$1,531.23	9,348,630	99.3%	$1,283.56	$619.93	$1,191.11	$2,084.87
	1	$1,406.25	69,856	0.7%	$1,240.63	$567.67	$1,049.78	$1,863.34
M1740: Disruptive Behavior	0	$1,531.83	9,334,249	99.1%	$1,283.56	$620.37	$1,192.00	$2,085.59
	1	$1,361.38	84,237	0.9%	$1,241.80	$536.64	$980.01	$1,801.62
M1740: Delusional Behavior	0	$1,533.72	9,271,061	98.4%	$1,284.08	$622.00	$1,194.35	$2,087.72
	1	$1,315.49	147,425	1.6%	$1,213.01	$500.35	$931.40	$1,765.39
M1745: Frequency of Disruptive Behavior	0	$1,542.93	7,525,614	79.9%	$1,288.98	$627.52	$1,207.07	$2,099.77
	1	$1,480.11	1,892,872	20.1%	$1,259.17	$589.20	$1,121.58	$2,015.17

Item and Response		Mean	N	%	Standard Deviation	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
M1750: Patient Receiving Psychiatric Nursing Services?	0	$1,536.29	9,245,543	98.2%	$1,285.57	$623.38	$1,197.31	$2,091.00
	1	$1,209.95	172,943	1.8%	$1,108.49	$464.59	$834.07	$1,607.77
M1220: Understanding of Verbal Content	0	$1,560.57	4,735,879	50.3%	$1,287.24	$646.32	$1,243.13	$2,117.86
	1	$1,499.69	4,682,607	49.7%	$1,278.55	$597.07	$1,133.83	$2,045.86
M1230: Speech and Oral (Verbal) Expression of Language	0	$1,521.23	8,260,906	87.7%	$1,270.54	$617.27	$1,187.46	$2,074.10
	1	$1,595.07	1,157,580	12.3%	$1,369.11	$635.79	$1,209.34	$2,152.33
M1032: Risk of Hospitalization	0	$1,508.79	8,232,034	87.4%	$1,269.02	$611.78	$1,169.89	$2,052.61
	1	$1,679.53	1,186,452	12.6%	$1,368.95	$686.45	$1,340.35	$2,291.66
Total		$1,530.30	9,418,486	100.0%	$1,283.29	$619.40	$1,190.01	$2,083.35

Exhibit 7-3 shows decreasing functional status, increasing age, and increasing hospitalization risk tend to be associated with higher resource use, while worsening cognitive status tends to be associated with lower resource use.

7.1.3 Multivariate Results

To further explore the relationship between these OASIS items and resource use, the research team estimated an OLS regression in which the dependent variable was resource use and the independent variables of interest were dummy variables that corresponded to the response categories from Exhibit 7-3. Additional independent variables included other items from the HHGM (episode timing, admission source, and clinical group). HHA-level fixed effects were included.

Full results of the regression are shown in Appendix Exhibit A7-3 and A7-4. To facilitate interpretation of the full regression results, the coefficients from the Appendix exhibit were converted into a table of points that can be used to calculate the functional score of an episode (Exhibit 7-4). This approach is similar to that used in the current payment system when the 4-equation model is used to calculate the functional score and clinical score for each episode. Points for each item are calculated by dividing the coefficient from the regression by 10 and rounding to the nearest integer.

Exhibit 7-4: OASIS Points Table

Variable	Response Category[20]	Points
Age	Age is 75+	0
M1800: Grooming	1	5
M1810: Current Ability to Dress Upper Body	1	5
M1820: Current Ability to Dress Lower Body	1	6
	2	13
M1830: Bathing	1	6
	2	17
	3	26
M1840: Toilet Transferring	1	4
M1845: Toileting Hygiene	1	-2
M1850: Transferring	1	7
	2	13
M1860: Ambulation/Locomotion	1	12
	2	16
	3	27
M1700: Cognitive Functioning	1	1
M1710: When Confused	1	-5
M1720: When Anxious	1	3
M1740: Memory Deficit	Yes	-4
M1740: Impaired Decision Making	Yes	0
M1740: Verbal Disruption	Yes	-4
M1740: Physical Aggression	Yes	-13
M1740: Disruptive Behavior	Yes	-9
M1740: Delusional Behavior	Yes	-3
M1745: Frequency of Disruptive Behavior	1	-1
M1750: Patient Receiving Psychiatric Nursing Services?	Yes	-3
M1220: Understanding of Verbal Content	1	-1
M1230: Speech and Oral (Verbal) Expression of Language	1	-5
M1032: Risk of Hospitalization	4 or more items checked	13

Exhibit 7-4 shows that, after controlling for each OASIS variable (as well as other components of the HHGM), the general trends from the univariate analysis hold. That is, worsening cognitive status is generally associated with less resource use, worsening functional status is generally associated with increased resource use, increased risk of hospitalization is associated with increased resource use, and age is not associated with either increased or decreased resource use.

[20] The excluded category for age is "Age is 74 or below". The excluded category for M1800 – M1860, M1700-M1720, M1745, M1220, and M1230 is response category 0. The excluded category for M1740 and M1750 is "No". The excluded category for M1032 is "3 or fewer items checked".

On the basis of these findings, all cognitive items[21], functional items with a negative relationship with resource use (M1845: Toileting Hygiene), and age were removed and the model was re-estimated. Results from the new regression are shown in Exhibit 7-5. These items will be revisited when enough data are collected; thus, the cognitive and other items may be included in the model in future iterations.

Exhibit 7-5: OASIS Points Table with a Reduced Set of OASIS Items

Variable	Response Category[22]	Points
M1800: Grooming	1	3
M1810: Current Ability to Dress Upper Body	1	4
M1820: Current Ability to Dress Lower Body	1	7
	2	10
M1830: Bathing	1	6
	2	17
	3	25
M1840: Toilet Transferring	1	4
M1850: Transferring	1	7
	2	13
M1860: Ambulation/Locomotion	1	13
	2	17
	3	27
M1032: Risk of Hospitalization	4 or more items checked	12

Exhibit 7-5 shows that each OASIS item included in the final regression has a positive relationship with resource use. That is, as functional status declines (as measured by a higher response category), episodes have more resource use on average. Additionally, episodes with a higher risk of hospitalization (four or more items checked on M1032) are associated with higher resource use compared with episodes with a lower risk of hospitalization. This indicates that these items could be used to help risk adjust an episode's payment and help determine case-mix weights for the HHGM.

7.1.4 Functional Score, Thresholds, and Functional Levels

The points generated in Exhibit 7-5 were used to create a functional score for each episode in the HHGM. That is, an episode receives points based on the responses associated with OASIS items

[21] Although M1720 had a positive relationship with resource use, Abt and CMS agreed to remove it from the regression because of the subjective nature of the question. There is potential for HHAs to game that item and report anxiety when none is present.

[22] The excluded category for M1800 – M1860 is response category 0. The excluded category for M1032 is 3 or fewer items checked.

shown in Exhibit 7-5. Then, functional score is used by the HHGM to group episodes into a functional level.

The number of functional levels and associated thresholds vary by clinical group. For the MMTA, Complex, Neuro Rehabilitation, and Wound clinical groups, three different levels were created (low, medium, and high) resulting in roughly a third of episodes from each of those clinical groups within each level. For Behavioral Health and Musculoskeletal Rehabilitation, two different levels were created (low and high) resulting in roughly half of episodes from each clinical group within each level.

To determine the number of functional levels for each clinical group, the research team balanced ensuring meaningful differentiation in predicted resource use between levels with mitigating the incentive to upcode patients into a higher level (worse functional status) than their true status. Thus, the number of levels for each clinical group was selected to achieve approximately even increases in predicted resource use going from a low to medium level or when going from medium to high level using the results of the payment regression estimated in Chapter 10. That is, the variation in predicted average resource use was smaller for Behavioral Health and Musculoskeletal Rehabilitation compared to the other clinical groups.

Exhibit 7-6 shows the number of episodes assigned to each functional level by clinical group, the thresholds for those levels, and the average resource use of episodes in those levels.

Exhibit 7-6: Thresholds for Functional Levels by Clinical Group

Clinical Group	Level	Points	Average Resource Use	N	% Within Clinical Group	Overall %
MMTA	Low	0-36	$1,177.34	1,987,235	33.2%	21.1%
	Medium	37-55	$1,467.31	2,138,844	35.7%	22.7%
	High	56+	$1,668.97	1,867,502	31.2%	19.8%
Behavioral Health	Low	0-44	$961.73	140,456	50.6%	1.5%
	High	45+	$1,378.51	137,114	49.4%	1.5%
Complex	Low	0-33	$1,430.58	106,673	33.8%	1.1%
	Medium	34-60	$1,795.29	102,305	32.4%	1.1%
	High	61+	$1,960.16	106,570	33.8%	1.1%
Musculoskeletal Rehabilitation	Low	0-48	$1,396.39	573,591	55.1%	6.1%
	High	49+	$1,639.45	468,173	44.9%	5.0%
Neuro Rehabilitation	Low	0-48	$1,512.02	262,566	33.8%	2.8%
	Medium	49-67	$1,793.74	252,592	32.5%	2.7%
	High	68+	$1,986.97	261,104	33.6%	2.8%
Wound	Low	0-41	$1,759.76	346,257	34.2%	3.7%
	Medium	42-65	$1,993.35	332,204	32.8%	3.5%
	High	66+	$2,207.39	335,300	33.1%	3.6%

Appendix Exhibit A7-5 shows the average resource use and number of episodes for each possible score within each clinical group.

7.1.5 LUPAs

The regression and corresponding points table (Exhibit 7-5) were calculated after excluding episodes that were LUPAs (4 or fewer visits in the current system) in the current payment system from the sample (n = 9,418,486). While the HHGM still includes LUPAs, the approach to calculating the LUPA thresholds needed to change in the HHGM because of the switch to 30 day periods from 60 day episodes. The 30 day periods have substantially more episodes with four or fewer visits than 60 day episodes. To create LUPA thresholds, episodes (including those that were LUPAs in the current payment system) were grouped into the 128 different HHGM payment groups that were first mentioned in Chapter 1 of this report. For each payment group, the 5th percentile value of visits was used to create a payment group specific LUPA threshold. For example, for episodes in the payment group corresponding to "MMTA– Functional Level Medium – Early Timing – Institutional Admission", the threshold is four visits. If episodes assigned to that particular payment group had four or fewer visits they would be paid using LUPA rates instead of the using the HHGM case-mix system. The threshold for each payment group was set at the 5th percentile in order to classify a similar number of episodes as LUPA episodes as in the current payment system however Abt and CMS are continuing to explore other thresholds and the 5th percentile threshold should just be considered a starting point in this process. After excluding episodes using these thresholds the number of 30 day periods remaining was 9,311,627. These episodes are used for analysis in the remainder of this report.

8. Chapter 8 – Creation of Other Variables Used in the Payment Regression

In order to advance the goals of better aligning payment with patient needs, addressing payment incentives and vulnerabilities, as well as responding to concerns articulated by stakeholders, Abt and CMS thoroughly pursued and vetted various options for meaningful patient groupings while developing the HHGM. In addition to clinical groups (Chapter 6) and functional level (Chapter 7), the HHGM also sorts episodes into payment groups by their admission source and timing. While developing the HHGM, the research team also explored including dual eligibility status as an additional grouping variable. This chapter discusses these additional grouping variables and the supporting analyses conducted in assessing their potential for inclusion in the HHGM.

8.1 Admission Source

Under the HHGM, each episode is classified into one of two admission source categories depending on certain services the beneficiary received within 14 days prior to being admitted to home health. Beneficiaries with any inpatient acute care hospitalizations, skilled nursing facility stays, inpatient rehabilitation facility stays, or long term care hospital stays within the prior 14 days were designated as institutional admissions. All other beneficiaries were designated as community admissions.[23] Claims for beneficiaries in these two admission categories will be paid differently under the HHGM due to their different care needs. The differences in care needs during home health episodes are evidenced in the figures presented in Exhibit 8-1, which shows the distribution of admission sources, as well as, average resource use for episodes by admission source. Institutional admissions have significantly higher average resource use compared with community admissions.

Exhibit 8-1: Average Resource Use by Admission Source (14 day look-back)

Admission Source	Average Resource Use	Number of Episodes	Percent of Episodes	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Institutional	$2,114.39	2,339,944	25.1%	$1,340.60	$1,161.28	$1,850.11	$2,729.50
Community	$1,365.55	6,971,683	74.9%	$1,194.51	$557.96	$1,004.14	$1,811.20
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

[23] If an inpatient stay occurred within the 14 days prior to an episode, but within a previous home health episode, the next home health episode that follows the inpatient stay was considered to have an institutional admission source. However, if a post-acute stay occurred in the prior 14 days prior to an episode, we considered the next home health episode to have a community admission source. Post-acute stays that occur within a home health stay may not be desirable and we did not want to create incentives for such stays. Moreover, these situations are rare. Only 0.7% (n = 60,649) episodes had an intervening hospitalization and 0.2% (n = 20,183) episodes had an intervening post-acute stay within the 14 days prior to the start of the next episode of care.

Additionally, the research team considered what the distribution would look like if the look-back period for determining the admission source was longer than 14 days. Exhibit 8-2 shows the distribution of episodes and average resource utilization with admission source categories now defined by service use for beneficiaries in the 30 days prior instead of 14 days prior.[24] In general, results are similar to those for the 14 day look-back period, although the 30 day look-back produces a higher proportion of institutional episodes. Care provided during a 14 day look-back period is more likely to be directly related to the patients' need for home health care than during a 30 day look-back. Thus, it was ultimately decided to use the 14 day look-back period to better categorize those beneficiaries with a relatively short transition between institutional care and home health. HHAs will be familiar with this concept, because payment has been based on the related OASIS item in the past.

Exhibit 8-2: Average Resource Use by Admission Source (30 day look-back)

Admission Source	Average Resource Use	Number of Episodes	Percent of Episodes	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Institutional	$2,071.95	2,618,285	28.1%	$1,345.37	$1,114.41	$1,802.72	$2,687.53
Community	$1,352.39	6,684,302	71.9%	$1,186.36	$552.90	$991.41	$1,792.23
Total	$1,554.92	9,302,587	100.0%	$1,274.94	$648.89	$1,208.86	$2,097.58

8.2 Timing

In the current payment system, 60 day episodes are classified as early if they are 1st or 2nd in a sequence of episodes, and late if they are the 3rd or later in the sequence. Episodes are defined as being in the same sequence if there are no more than 60 days between the end of one episode and the start of the next. This definition was kept for the HHGM and 30 day periods. That is, 30 day periods are in the same sequence as long as no more than 60 days passes between the end of one period and the start of the next. In the HHGM, only the 1st 30 day period in a sequence of periods is defined as early. The second 30 day period is considered late, as are all episodes falling 2nd or later in a sequence of periods. This change is supported by the data presented in Exhibit 8-3, which shows that resource use in the first 30 day period within a series is substantially higher than in subsequent periods. Therefore, isolating the first 30 day period for purposes of payment more accurately reflects the differing and increased intensity of resource needs during that first 30 day period.

[24] Using a 30 day lookback caused certain episodes to have different admission sources compared with the 14 day lookback. Therefore, this causes the number of episodes in each payment group to differ and caused the payment group specific LUPA thresholds to differ slightly. Those different LUPA thresholds caused the number of episodes to differ slightly between Exhibit 8.1 and 8.2

Exhibit 8-3: Average Resource Use by Sequence Number (30 Day Periods)

Period Sequence Number	Average Resource Use	Number of Episodes	Percent of Episodes	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
1	$2,054.92	2,881,389	30.9%	$1,255.20	$1,152.50	$1,808.09	$2,646.46
2	$1,221.09	1,533,230	16.5%	$1,062.03	$514.38	$908.73	$1,592.21
3	$1,569.90	925,829	9.9%	$1,256.90	$664.28	$1,241.35	$2,125.79
4	$1,171.71	650,142	7.0%	$1,073.82	$491.21	$835.34	$1,504.33
5	$1,477.42	460,914	4.9%	$1,267.36	$578.40	$1,103.49	$2,016.24
6	$1,179.31	365,853	3.9%	$1,110.93	$488.35	$822.12	$1,507.22
7	$1,428.41	285,084	3.1%	$1,276.06	$548.22	$1,025.34	$1,934.65
8	$1,192.32	240,093	2.6%	$1,141.35	$492.85	$820.30	$1,512.95
9	$1,394.20	198,864	2.1%	$1,287.42	$525.22	$968.25	$1,875.25
10	$1,197.76	173,358	1.9%	$1,156.96	$493.29	$818.39	$1,512.35
11	$1,370.50	147,391	1.6%	$1,288.76	$518.18	$937.22	$1,825.39
12	$1,197.26	131,173	1.4%	$1,166.26	$491.04	$806.42	$1,509.90
13	$1,356.14	115,518	1.2%	$1,299.74	$505.81	$912.76	$1,792.66
14	$1,209.88	104,799	1.1%	$1,192.34	$495.16	$816.26	$1,513.01
15 or more	$1,389.79	1,097,990	11.8%	$1,409.93	$530.94	$907.41	$1,760.42
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

Exhibit 8-4 provides summary information on resource use by early and late period timing according to the HHGM definition using 30 day periods. Again, early periods (meaning the first 30 day period in a sequence of 30 day periods) have substantially higher average resource use than late periods, further supporting the definition of early as the first 30 day period.

Exhibit 8-4: Average Resource Use by Timing (30 Day Periods)

Timing	Average Resource Use	Number of Episodes	Percent of Episodes	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Early Episodes	$2,054.92	2,881,389	30.9%	$1,255.20	$1,152.50	$1,808.09	$2,646.46
Late Episodes	$1,329.14	6,430,238	69.1%	$1,218.51	$531.52	$943.75	$1,738.65
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

As described in Chapter 10 "Payment Regression," the admission source variable and episode timing variable will be combined in the risk adjustment model in order to better capture differences in resource use between early and late episodes by admission source. Exhibit 8-5 shows the distribution of episodes by timing and admission source.

Exhibit 8-5: Timing by Admission Source (30 Day Periods)

Admission Source				
Timing		Institutional	Community	Total
Early	N	1,696,798	1,184,591	2,881,389
	Cell %	18.2%	12.7%	30.9%
	Average Resource Use	$2,150.95	$1,917.37	$2,054.92
Late	N	643,146	5,787,092	6,430,238
	Cell %	6.9%	62.1%	69.1%
	Average Resource Use	$2,017.93	$1,252.60	$1,329.14
Total	N	2,339,944	6,971,683	9,311,627
	Cell %	25.1%	74.9%	100.0%
	Average Resource Use	$2,114.39	$1,365.55	$1,553.73

8.3 Dual Eligibility

As noted in Chapter 2, the 3131(d) report and several MedPAC annual reports have noted differential resource use for beneficiaries dually eligible for both Medicare and Medicaid ("dual eligibles"). In response to these concerns, the research team investigated the difference in resource use between dual eligibles and non-dual eligibles in order to assess the potential for including a variable identifying dual eligibles as an additional risk adjustor in the HHGM.

For this analysis, dual eligibles were divided into two categories, "Full Duals" and "Partial Duals," based on the level of Medicaid benefits received.[25] Information on dual eligibility was obtained from the Medicare Enrollment Database.

Exhibit 8-6 below shows average resource use by dual eligibility status. In particular, the exhibit shows that non-dual eligibles have higher average resource use than dual eligibles ($1,603.76 for non-duals versus $1,331.94 for partial duals and $1,499.04 for full duals). As such, if dual eligibility status were used as an adjustor in the HHGM, this could have the unintended consequence of a financial disincentive for HHAs to accept dual eligibles because of the lower payment. On average, dual eligibles receive more skilled nursing visits and less therapy visits. To avoid this potential for unintended incentives (and based on further work shown in Chapter 10 using a multivariate model), the research team elected not to directly include dual eligibility status as an adjustor in the HHGM. While dual eligibles now seem to have less resource use than non-dual eligibles (perhaps because of

[25] Full versus partial dual eligibles were identified using the logic described at https://www.resdac.org/cms-data/variables/Dual-Status-Code-occurs-12-times

incentives in the existing payment system), CMS plans to monitor the resource use associated with dual eligibility and may consider adding this variable to the payment system in the future.

Exhibit 8-6: Average Resource Use by Dual Eligibility Status

Dual Eligibility Status	Average Resource Use	Number of Episodes	Percent of Episodes	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
Not a Dual	$1,603.76	6,063,636	65.1%	$1,261.46	$692.98	$1,289.61	$2,159.27
Partial Dual	$1,331.94	762,009	8.2%	$1,166.97	$531.76	$959.66	$1,806.43
Full Dual	$1,499.04	2,478,195	26.6%	$1,327.89	$603.98	$1,079.26	$2,005.89
Unknown	$1,701.85	7,787	0.1%	$1,545.82	$725.93	$1,322.64	$2,190.75
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

9. Chapter 9 – Comorbidity Group

Chapters 6–9 of this report describe the broad categories used to group episodes into the 128 different payment groups used within the HHGM. This chapter describes how diagnosis codes are used to group episodes for the purposes of comorbidity adjustment.

A comorbidity is most often defined as two or more coexisting medical conditions or disease processes that are in addition to an initial diagnosis.[26] Typically, a comorbidity is a condition(s) in which there is no direct correlation in the treatment of the principal diagnosis but the presence of that condition(s) may impact the plan of care in terms of resource utilization. Comorbid conditions can exacerbate or worsen other existing conditions, as well as, other conditions can exacerbate or worsen existing comorbidities. Generally, comorbidity is tied to worse health outcomes, the need for more complex treatment and disease management, and higher health care costs.[27] Beneficiaries with comorbidities tend to be high users of home health visits and overall Medicare spending increases with the number of chronic conditions.[28] Chronic conditions are the leading cause of death and disability in the United States, and treating patients with multiple comorbid, chronic conditions can be costly.[29]

Exploratory analyses determined that secondary diagnoses (comorbidities) provide additional information that can predict resource use even after controlling for the episode's clinical group. The research team looked at several ways to include comorbidities associated with increased resource use as part of the overall payment for the HHGM episode:

- Reported secondary diagnoses on the OASIS and home health claims;
- Diagnoses on the IPPS Major Complications and Comorbidities (MCC) and Complications and Comorbidities (CC) list that map to home health reported diagnoses; and
- A home health specific list of comorbidities.

9.1 Other Reported Secondary Diagnoses

The research team analyzed the reported secondary diagnoses on the OASIS and home health claims. However, OASIS instructions for reporting diagnoses can sometimes result in the reporting of vague principal diagnoses (e.g., V58.4, other aftercare following surgery). This may result in the reported secondary diagnoses as further descriptors of the principal diagnosis, and not an actual comorbidity (e.g., 592.9, urinary calculus, unspecified is reported as principal and 595.9, cystitis, is reported as

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26 Mosby's Medical Dictionary, 9th edition. © 2009, Elsevier.

27 Starfield, B., Lemke, K., Bernhardt, T., Foldes, S., Forrest, C., Weiner, J. (2003). "Comorbidity: Implications for the Importance of Primary Care in 'Case" Management". Annals of Family Medicine. 8-14.

28 http://www.cdc.gov/chronicdisease/about/multiple-chronic.html

29 Center for Healthcare and Transformation. (2010). *Health Care Cost Drivers: Chronic Disease, Comorbidity and Health Risk Factors in the U.S. and Michigan.* Center for Healthcare and Transformation.

secondary). Additionally, in the current HH PPS, certain diagnoses are associated with clinical points that make up the HHRG and thus, adjust the episode payment. Not all secondary diagnoses are associated with clinical points in the current HH PPS. As such, there is no financial incentive for reporting those conditions, even if they exist, as they do not affect the episode payment. Recognizing that home health beneficiaries may have more comorbidities than what is being reported on the OASIS and home health claims, we looked at claims from prior settings 90 days before the home health start of each home health episode (60 day) and took all the diagnoses from inpatient and physician claims that ended during that 90 day period. Certain diagnoses were dropped if they were too closely related to the diagnosis used to group the home health episode into a clinical group. The research team dropped episodes that were LUPAs. The research team kept all diagnoses that were associated with at least 1.0% of home health episodes and were associated with home health episodes that had above average resource use. However, results were mixed. Diagnosis reporting was not as robust as hypothesized, especially in Part B physician claims where diagnoses reported appeared to be specific to only the condition for which the patient sought care.

Exhibit 9-1 shows information on which comorbidities were reported when looking at inpatient and physician claims prior to a home health episode. The analysis looked 90 days before the start of each home health episode and takes all the diagnoses from inpatient and physician claims that ended during that 90 day period. Certain diagnoses were dropped if they were too closely related to the diagnosis used to group the home health episode into a clinical group. Exhibit 9-2 shows the same type of information but only looks at reported diagnoses from the home health episode using the OASIS.

Exhibit 9-1: Five Most Commonly Occurring Comorbidities Present on Claims Prior to Home Health Episode

Diagnosis	Diagnosis Description	% of Home Health Episodes with This Diagnosis on a Prior Inpatient or Physician Claim	Average Resource Use of Episodes with This Diagnosis on a Prior Inpatient or Physician Claim
401.9	hypertension nos	54.4%	$596.74
272.4	hyperlipidemia nec/nos	35.8%	$592.30
401.1	benign hypertension	27.9%	$594.01
250.00	dmii wo cmp nt st uncntr	26.3%	$593.07
285.9	anemia nos	23.9%	$618.67

Exhibit 9-2: Five Most Commonly Occurring Comorbidities Present on Home Health Episodes Using OASIS

Secondary Diagnosis	Diagnosis Description	% of Episodes with Secondary Diagnosis within This HHGM	Average Resource Use of Episodes with Secondary Diagnosis within This HHGM
250.00	dmii wo cmp nt st uncntr	18.51%	$580.24
403.9	hy kid nos w cr kid i-iv	5.16%	$581.91
427.31	atrial fibrillation	10.06%	$597.03
728.87	muscle weakness-general	18.50%	$675.43
781.2	abnormality of gait	12.07%	$679.27
V15.88	personal history of fall	6.88%	$622.96

Because the diagnoses reported on the OASIS and other non-home health claims included many vague, non-specific diagnoses, the research team looked at other approaches to a comorbidity adjustment. Additionally, it appeared as if the secondary diagnoses being reported were geared towards payment maximization in the current payment system and didn't necessarily reflect the conditions the literature review suggested were important in impacting resource use in the home.

9.2 Major Complication or Comorbidity and Complication or Comorbidity Diagnoses

The current HH PPS uses a clinical score derived from responses reported on the OASIS as one step the case mix adjustment in the HHRG. In preliminary work, we examined other payment systems and the way comorbidities are used in payment adjustment. We considered grouping episodes into a comorbidity adjustment based on the kind and amount of diagnoses associated with a MCC and/or CC that were coded on the OASIS. Within the IPPS, payments can be adjusted by the presence of a secondary diagnosis that corresponds with the MCC or CC list of comorbidities. The acute care hospital setting is paid based on the MS-DRG associated with the inpatient stay. Under MS-DRGs, CMS identified those diagnoses whose presence as a secondary diagnosis leads to substantially increased hospital resource use. These secondary diagnoses are categorized into two different levels of severity as follows:

- Major complications or comorbidities (MCCs) reflect the highest level of severity. Examples include 040.0-Gas Gangrene and 348.39-Encephalopathy, NOS.
- Complications or Comorbidities (CCs) represent the next level of severity. Examples include: 344.1-Paraplegia, NOS and 599.0-urinary tract infection, site not specified.

Some diagnoses are excluded as MCCs and CCs because they are too closely related to the principal diagnoses. This is called the CC Exclusion List and identifies conditions that will not be considered a CC or MCC for a given principal diagnosis. For example, primary cardiomyopathy (425.4) is not a CC for congestive heart failure (428.0). The research team looked at the diagnoses on the IPPS MCC/CC list for use as a possible proxy for resource utilization in the home health setting. Like the CC Exclusion List, we excluded those diagnoses that were too closely related to the principal diagnosis.

Exhibit 9-3 shows the most commonly occurring secondary diagnoses from home health episodes (using the OASIS) that could be linked to a CC or MCC.

Exhibit 9-3: Five Most Commonly Occurring Secondary Diagnoses Linked to a Complication or Comorbidity or a Major Complication or Comorbidity

Secondary Diagnosis	Diagnosis Description	Type	Percent of Secondary Diagnoses with this Diagnosis
491.21	obs chr bronc w(ac) exac	CC	0.7%
585.6	end stage renal disease	MCC	0.5%
599	urin tract infection nos	CC	0.5%
403.91	hyp kid nos w cr kid v	CC	0.3%
438.21	late ef-hemplga dom side	CC	0.2%

Because the CC and MCC lists were developed specifically for the IPPS, many of the diagnoses considered CCs and MCCs are conditions that may be resolved or stabilized before a patient would be discharged to home. When examining secondary diagnoses on the OASIS that would be a CC or MCC in the inpatient setting, we found that there was a very low prevalence of CC or MCC codes being reported. We therefore considered other options for a comorbidity adjustment within the HHGM.

9.3 Home Health Specific List

After looking at the methods for risk adjusting for comorbidities as described above, we examined the development of a home health specific comorbidity list. Abt and CMS examined diagnoses that potentially could affect resource utilization if reported as secondary diagnoses on the OASIS. CMS clinicians conducted a review of the research literature to identify those comorbid conditions associated with increased resource use. The citations for this review are found in Appendix Exhibit A9-1. After a review of the literature, a home health specific list of potential comorbidities was created under guidance from clinicians from CMS. Initial work looked at controlling for the presence of individual diagnoses, but often analyses showed counterintuitive patterns with resource use. When combining the diagnoses into larger comorbidity categories the counterintuitive relationships lessened. The research team categorized comorbidities utilizing the body systems as a clinically intuitive way to consider what diagnoses potentially could impact the home health plan of care and resource utilization.

The broad categories used to categorize comorbidities within the HHGM included the following:

- Heart Disease (11 subcategories)
- Respiratory Disease (9 subcategories)
- Circulatory Disease and Blood Disorders (12 subcategories)
- Cerebral Vascular Disease (4 subcategories)
- Gastrointestinal Disease (9 subcategories)
- Neurological and Associated Conditions (11 subcategories)
- Endocrine Disease (6 subcategories)
- Neoplasms (24 subcategories)

- Genitourinary and Renal Disease (5 subcategories)
- Skin Disease (5 subcategories)
- Musculoskeletal Disease or Injury (5 subcategories)
- Behavioral Health (11 subcategories)
- Infectious Diseases (4 subcategories)

Each broad category listed above contains several subcategories that are made up of multiple ICD-9 codes. There are 116 subcategories in total. The complete comorbidity list is shown in Appendix Exhibit A9-2.

All secondary diagnoses listed on the OASIS are used to identify whether an episode falls into one or more comorbidity subcategories.[30] Some secondary diagnoses might be closely related to the diagnosis used to group the episode into a clinical group, and we do not use those secondary diagnoses to assign the episode into comorbidity subcategories. If the secondary diagnosis falls into the same ICD-9 category as the diagnosis used to assign the episode into a clinical group then the secondary diagnosis is not considered a comorbidity for a payment adjustment. For example, if 493.12 Intrinsic asthma with (acute) exacerbation is reported as principal and 493.10 Intrinsic asthma, unspecified is reported as secondary, the secondary diagnosis is not considered a comorbidity since asthma is already reported as principal and both diagnoses are included in the "Chronic and Obstructive Pulmonary Disease and Allied Conditions" section (ICD-9 codes 490-496).

Additionally, some secondary diagnoses would not be considered a comorbidity if paired with certain V-codes. For example, if the principal diagnosis is V54.89, other orthopedic aftercare, the reported diagnosis 812.00, closed fracture of unspecified part of the upper end of humerus would not be considered a comorbidity as this diagnosis explains the reason for the aftercare. We are utilizing this approach to minimize the unintended consequence of providers reporting comorbidities that are duplicative of the principal diagnosis which could potentially overestimate the actual resources needed for a home health episode, and hence, result in inaccurate payment.

For the purposes of evaluating the comorbidities for inclusion in the HHGM, we assigned each episode to a comorbidity subcategory and subsequently dropped any subcategories that consist of less than 0.1% of episodes. This was done because low volume leads to instability in our estimates of how resource use is related to the comorbidity. The research team then estimated a regression (Appendix Exhibit A9-3) where the dependent variable is an episode's resource use and the independent variables are binary indicators for each comorbidity subcategory and the other components of the HHGM (e.g., functional level, clinical group, timing, and admission source). The research team then considered the coefficients associated with each comorbidity subcategory and selected those with positive coefficients, indicating a direct relationship between the comorbidity subcategory and resource utilization. The research team then determined the median subcategory coefficient ($35.65) amongst all the non-negative subcategory coefficients and assigned all of the

[30] If a secondary diagnosis (instead of the primary diagnosis) is used to group the episode into a clinical group then the secondary diagnosis used to assign the clinical group would not be used to assign an episode to a particular comorbidity subcategory.

comorbidity subcategories with a coefficient at or above the median to the comorbidity adjustment group. Finally, we labeled each episode by whether the period had:

- At least one comorbidity classified to a comorbidity adjustment group, or
- No comorbidity classified to a comorbidity adjustment group

Exhibit 9-4 below shows information on resource use for episodes assigned to each comorbidity group.

Exhibit 9-4: Frequency of Comorbidity Groups and Distribution of Average Resource Use

Comorbidity Group	Mean Resource Use	Frequency of Periods	Percent of Periods	Standard Deviation of Resource Use	25th Percentile of Resource Use	Median Resource Use	75th Percentile of Resource Use
No Comorbidity Adjustment	$1,507.19	7,231,600	77.7%	$1,214.06	$631.76	$1,180.26	$2,047.80
Comorbidity Adjustment	$1,715.54	2,080,027	22.3%	$1,455.44	$704.08	$1,307.01	$2,274.33
Total	$1,553.73	9,311,627	100.0%	$1,274.92	$647.67	$1,207.50	$2,096.43

We recognize that this home health specific comorbidity list is fluid. If the HHGM is implemented, we would expect that this list may change and adapt to capture resource utilization associated with these conditions.

10. Chapter 10 – Payment Regression

The HHGM sorts episodes into different payment groups based on five categories: their clinical group (Chapter 6), functional level (Chapter 7), admission source (Chapter 8), episode timing (Chapter 8), and comorbidity group (Chapter 9). In combination, this yields a total of 128 HHGM payment groups, a moderate reduction from the 153 payment groups under the current HH PPS.

10.1 Methodology

The research team determines the case-mix weight for each of the different HHGM payment groups by regressing resource use on a series of indicator variables for each of the categories discussed previously. The regression measures resource use using the CPM + NRS approach discussed in Chapter 4. The research team estimated five variations of the model, with and without fixed effects as well as with and without controls for dual eligibility status and/or comorbidities. Exhibit 10-1 details differences across those models.

Exhibit 10-1: Variations of Payment Regression Models

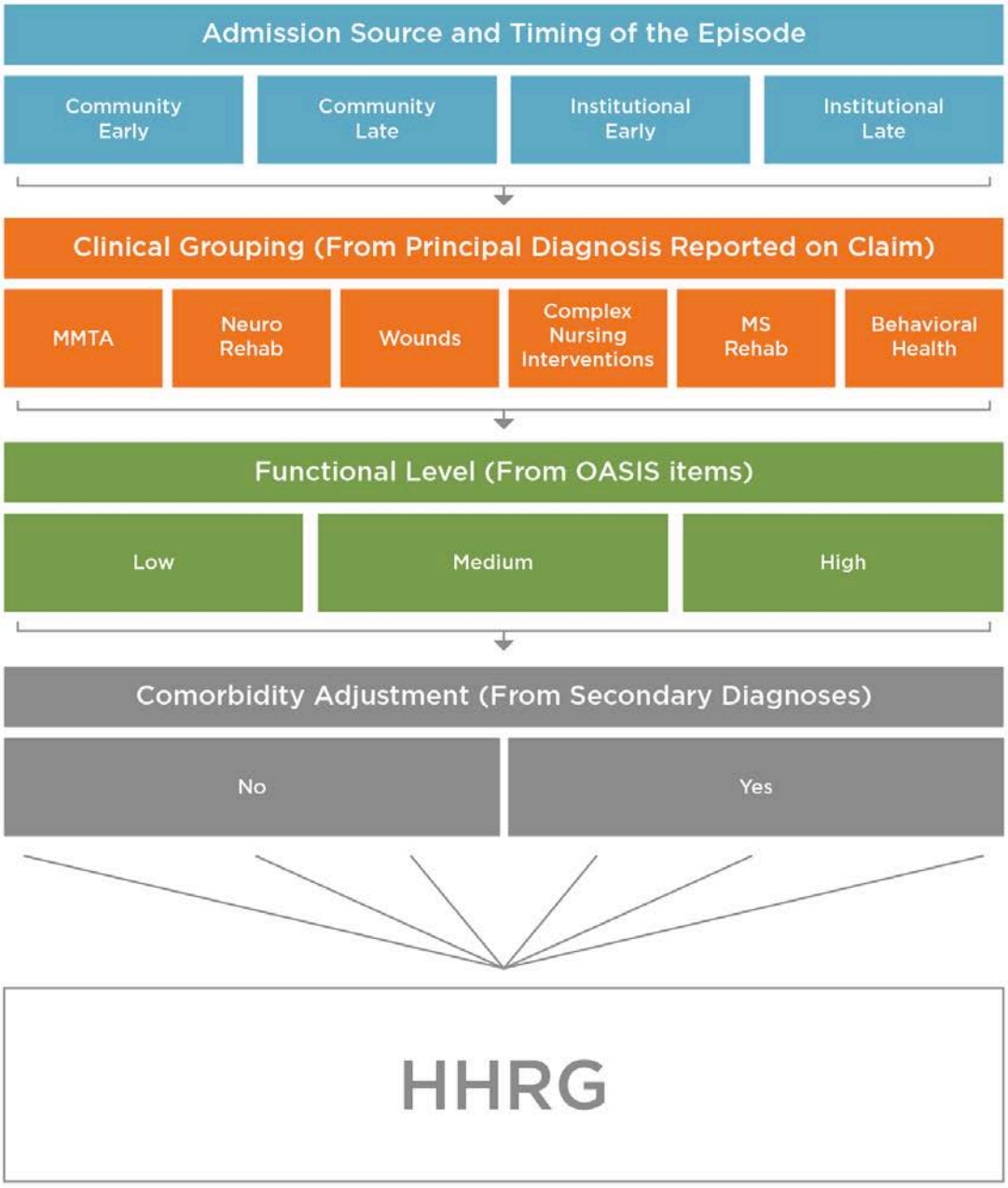
All models include controls for clinical group, functional level, admission source, and episode timing

	Controls for Dual Eligibility	Controls for Comorbidities	Includes Agency Fixed Effects
Model 1	-	X	-
Model 2	X	-	X
Model 3	X	X	X
Model 4	-	-	X
Model 5	-	X	X

Model 5 is used in the HHGM payment regression, as it generates outcomes that are statistically significant and consistent with findings from previous chapters, but the results are similar across all five variations. For example, higher functional levels are associated with high resource use. Having a comorbidity is associated with higher resource use. Early episodes and institutional episodes are associated with higher resource use. The inclusion of the fixed effect terms controls for agency characteristics that don't vary across the episodes the agency provides, which may be correlated with the variables that determine an episode's payment group. For example, if the age of the agency was correlated with admission source, not including the fixed effect when estimating the model would cause the coefficients of the model to be biased.

After fitting this model on home health episodes from 2013, the research team then uses the estimated coefficients of the model to predict the expected average resource use of each episode based on the five HHGM categories. The research team then divides the regression-predicted resource use of each episode by the overall average resource use of all episodes used to estimate the model in order to calculate the case-mix weight of all episodes within a particular payment group, where each payment group is defined as the unique combination of the subgroups within the five main groups (Exhibit 10-2). That case-mix weight is then used to adjust the base payment rate to determine each episode's payment. Exhibit 10-3 shows estimates of the regression used to generate the weights.

Exhibit 10.2: Home Health Groupings Model



Under the Home Health Groupings Model, an episode is grouped into one (and only one) subcategory under each larger colored category. An episode's combination of subcategories groups the episode into one of 128 different payment groups.

Episodes in the MS Rehab and Behavioral Health clinical groups can only be grouped in the low or high functional level.

The Complex Nursing Interventions clinical group uses a mix of principal diagnoses and OASIS items to group episodes.

10.2 Results

Exhibit 10-3: Coefficients of Payment Regression (Using CPM + NRS to Calculate Resource Use)

	Model 1	Model 2	Model 3	Model 4	Model 5	Average Value of Independent Variables for Episodes Used to Estimate Models
Clinical Group and Functional Level (MMTA - Low is excluded)						
MMTA – Medium	$259.19	$283.13	$280.20	$284.37	$281.58	0.22
MMTA – High	$452.97	$526.36	$510.49	$527.14	$511.49	0.20
Behavioral Health – Low	-$121.39	-$90.61	-$70.80	-$95.45	-$76.25	0.02
Behavioral Health – High	$238.81	$287.67	$295.25	$289.24	$296.89	0.01
Complex - Low	$122.58	$135.09	$122.03	$135.61	$122.72	0.01
Complex - Medium	$488.32	$539.87	$517.50	$540.82	$518.74	0.01
Complex - High	$664.64	$750.47	$698.29	$745.91	$693.83	0.01
MS Rehab - Low	$271.03	$189.07	$199.56	$190.29	$200.80	0.06
MS Rehab - High	$482.35	$489.30	$491.01	$491.27	$493.15	0.05
Neuro Rehab – Low	$340.93	$327.96	$341.77	$330.98	$344.94	0.03
Neuro Rehab – Medium	$638.33	$656.10	$666.03	$659.45	$669.60	0.03
Neuro Rehab – High	$829.49	$865.26	$859.20	$865.02	$859.01	0.03
Wound - Low	$611.67	$623.10	$585.54	$623.80	$586.66	0.04
Wound - Medium	$875.35	$911.93	$870.87	$913.02	$872.45	0.03
Wound - High	$1,118.20	$1,148.35	$1,112.75	$1,145.40	$1,109.88	0.04
Admission Source With Timing (Community Early excluded)						
Community Late	-$677.67	-$593.40	-$603.37	-$594.11	-$604.05	0.62
Institutional Early	$264.76	$269.29	$270.97	$272.75	$274.72	0.18
Institutional Late	$43.65	$95.92	$81.68	$94.28	$80.03	0.07
Comorbidity Adjustment (No Comorbidity Adjustment Group is excluded)						
Comorbidity Adjustment Group	$199.94	-	$210.45	-	$208.47	0.22
Medicaid Dual Eligibility Status (Not Dual is excluded)						
Partial Dual	-	-$51.57	-$56.39	-	-	0.08
Full Dual	-	-$63.80	-$69.53	-	-	0.27
Unknown	-	-$53.64	-$57.95	-	-	0.001

	Model 1	Model 2	Model 3	Model 4	Model 5	Average Value of Independent Variables for Episodes Used to Estimate Models
Constant	$1,533.99	$1,521.10	$1,490.10	$1,499.14	$1,466.46	-
N	9,311,627	9,311,627	9,311,627	9,311,627	9,311,627	-
Agency Fixed Effects	No	Yes	Yes	Yes	Yes	-
Adjusted R2	0.1496	0.2665	0.2709	0.2661	0.2704	-
Average Resource Use	$1,553.73	$1,553.73	$1,553.73	$1,553.73	$1,553.73	-

In order to normalize the results, Exhibit 10-4 shows the coefficients divided by average resource use. There are some differences between the models with and without fixed effect terms, but these are minor. In particular, the coefficients related to the variables tend to be slightly more negative in models without fixed effects compared with those with fixed effects (i.e. Community Late has a value of -$674.85 in the model without fixed effects and a value of -$601.33 in Model 5 – which includes fixed effects). Within the various model specifications that include fixed effects, the results are similar across models regardless of whether controls for dual eligibility or comorbidities are included.

Exhibit 10-4: Coefficients of Payment Regression Divided by Average Resource Use (Using CPM + NRS to Calculate Resource Use)

	Model 1	Model 2	Model 3	Model 4	Model 5
Clinical Group and Functional Level (MMTA - Low is excluded)					
MMTA – Medium	0.167	0.182	0.180	0.183	0.181
MMTA – High	0.292	0.339	0.329	0.339	0.329
Behavioral Health - Low	-0.078	-0.058	-0.046	-0.061	-0.049
Behavioral Health – High	0.154	0.185	0.190	0.186	0.191
Complex - Low	0.079	0.087	0.079	0.087	0.079
Complex - Medium	0.314	0.347	0.333	0.348	0.334
Complex - High	0.428	0.483	0.449	0.480	0.447
MS Rehab - Low	0.174	0.122	0.128	0.122	0.129
MS Rehab - High	0.310	0.315	0.316	0.316	0.317
Neuro Rehab – Low	0.219	0.211	0.220	0.213	0.222
Neuro Rehab – Medium	0.411	0.422	0.429	0.424	0.431
Neuro Rehab – High	0.534	0.557	0.553	0.557	0.553
Wound - Low	0.394	0.401	0.377	0.401	0.378
Wound - Medium	0.563	0.587	0.561	0.588	0.562
Wound - High	0.720	0.739	0.716	0.737	0.714

	Model 1	Model 2	Model 3	Model 4	Model 5
Admission Source With Timing (Community Early excluded)					
Community Late	-0.436	-0.382	-0.388	-0.382	-0.389
Institutional Early	0.170	0.173	0.174	0.176	0.177
Institutional Late	0.028	0.062	0.053	0.061	0.052
Comorbidity Group (low level is excluded)					
High	0.129	-	0.135	-	0.134
Medicaid Dual Eligibility Status (Not Dual is excluded)					
Partial Dual	-	-0.033	-0.036	-	-
Full Dual	-	-0.041	-0.045	-	-
Unknown	-	-0.035	-0.037	-	-
Constant	$0.99	$0.98	$0.96	$0.96	$0.94
N	9,311,923	9,311,923	9,311,923	9,311,923	9,311,923
Agency Fixed Effects	No	Yes	Yes	Yes	Yes
Adjusted R2	0.1506	0.2687	0.2721	0.2683	0.2716
Average Resource Use	$1,553.38	$1,553.38	$1,553.38	$1,553.38	$1,553.38

Exhibits 10-5 and 10-6 show the same models but were estimated when resource use is calculated using the BLS approach. The normalized coefficients in this model (see Exhibit 10-6), are very similar to those in Exhibit 10-5 (CPM + NRS) in most cases. The largest differences occur with the Complex and Wound clinical groups. The inclusion of NRS into the calculation of resource use likely drives the case-mix weight as NRS is used more frequently for beneficiaries in the Wound and Complex groups.

Exhibit 10-5: Coefficients of Payment Regression (Using BLS to Calculate Resource Use)

	Model 1	Model 2	Model 3	Model 4	Model 5	Average Value of Independent Variables for Episodes Used to Estimate Models
Clinical Group and Functional Level (MMTA - Low is excluded)						
MMTA – Medium	$65.84	$69.83	$68.83	$70.19	$69.23	0.19
MMTA – High	$105.78	$120.01	$117.29	$120.34	$117.68	0.21
Behavioral Health - Low	-$14.35	-$27.21	-$24.30	-$28.63	-$25.85	0.02
Behavioral Health – High	$80.16	$74.21	$74.97	$74.73	$75.50	0.01
Complex - Low	-$32.01	-$30.10	-$29.52	-$30.01	-$29.44	0.01
Complex - Medium	$58.66	$67.09	$65.16	$67.38	$65.50	0.01
Complex - High	$98.64	$117.55	$110.72	$116.37	$109.59	0.01

	Model 1	Model 2	Model 3	Model 4	Model 5	Average Value of Independent Variables for Episodes Used to Estimate Models
MS Rehab - Low	$64.05	$58.89	$60.67	$59.24	$61.00	0.06
MS Rehab - High	$120.44	$127.88	$128.06	$128.51	$128.73	0.05
Neuro Rehab – Low	$110.16	$97.40	$99.30	$98.22	$100.13	0.03
Neuro Rehab – Medium	$190.72	$184.77	$185.85	$185.63	$186.73	0.03
Neuro Rehab – High	$212.76	$214.28	$213.50	$214.34	$213.59	0.02
Wound - Low	$55.01	$52.33	$45.92	$52.40	$46.11	0.04
Wound - Medium	$126.64	$126.27	$118.87	$126.47	$119.22	0.03
Wound - High	$153.55	$155.13	$149.71	$154.60	$149.23	0.03
Admission Source With Timing (Community Early excluded)						
Community Late	-$162.62	-$149.94	-$151.24	-$150.16	-$151.45	0.62
Institutional Early	$75.09	$72.59	$73.20	$73.58	$74.25	0.18
Institutional Late	$9.36	$12.60	$10.67	$12.09	$10.17	0.07
Comorbidity Adjustment (No Comorbidity Adjustment Group is excluded)						
Comorbidity Adjustment Group	$33.91	-	$36.20	-	$35.54	0.22
Medicaid Dual Eligibility Status (Not Dual is excluded)						
Partial Dual	-	-$16.35	-$17.27	-	-	0.08
Full Dual	-	-$18.33	-$19.46	-	-	0.27
Unknown	-	-$6.03	-$6.55	-	-	0.001
Constant	$361.59	$364.24	$358.89	$357.81	$352.18	-
N	9,292,162	9,292,162	9,292,162	9,292,162	9,292,162	-
Agency Fixed Effects	No	Yes	Yes	Yes	Yes	-
Adjusted R2	0.1635	0.2773	0.2799	0.2766	0.2791	-
Average Resource Use	$354.76	$354.76	$354.76	$354.76	$354.76	-

Exhibit 10-6: Coefficients of Payment Regression Divided by Average Resource Use (Using BLS to Calculate Resource Use)

	Model 1	Model 2	Model 3	Model 4	Model 5
Clinical Group and Functional Level (MMTA - Low is excluded)					
MMTA – Medium	0.186	0.197	0.194	0.198	0.195
MMTA – High	0.298	0.338	0.331	0.339	0.332
Behavioral Health - Low	-0.040	-0.077	-0.068	-0.081	-0.073
Behavioral Health – High	0.226	0.209	0.211	0.211	0.213
Complex - Low	-0.090	-0.085	-0.083	-0.085	-0.083
Complex - Medium	0.165	0.189	0.184	0.190	0.185
Complex - High	0.278	0.331	0.312	0.328	0.309
MS Rehab - Low	0.181	0.166	0.171	0.167	0.172
MS Rehab - High	0.339	0.360	0.361	0.362	0.363
Neuro Rehab – Low	0.311	0.275	0.280	0.277	0.282
Neuro Rehab – Medium	0.538	0.521	0.524	0.523	0.526
Neuro Rehab – High	0.600	0.604	0.602	0.604	0.602
Wound - Low	0.155	0.148	0.129	0.148	0.130
Wound - Medium	0.357	0.356	0.335	0.356	0.336
Wound - High	0.433	0.437	0.422	0.436	0.421
Admission Source With Timing (Community Early excluded)					
Community Late	-0.458	-0.423	-0.426	-0.423	-0.427
Institutional Early	0.212	0.205	0.206	0.207	0.209
Institutional Late	0.026	0.036	0.030	0.034	0.029
Comorbidity Group (low level is excluded)					
High	0.096	-	0.102	-	0.100
Medicaid Dual Eligibility Status (Not Dual is excluded)					
Partial Dual	-	-0.046	-0.049	-	-
Full Dual	-	-0.052	-0.055	-	-
Unknown	-	-0.017	-0.018	-	-
Constant	$1,536.25	$1,517.10	$1,491.66	$1,494.83	$1,467.84
N	9,311,923	9,311,923	9,311,923	9,311,923	9,311,923
Agency Fixed Effects	No	Yes	Yes	Yes	Yes
Adjusted R2	0.1506	0.2687	0.2721	0.2683	0.2716
Average Resource Use	$1,553.38	$1,553.38	$1,553.38	$1,553.38	$1,553.38

Exhibit 10-7 below presents the case-mix weight for each payment group in Model 5 (Exhibits 10-3 and 10-4). Weights are determined by first calculating the predicted resource use for episodes with a particular combination of admission source, episode timing, comorbidity group, clinical group, and functional level. That combination-specific calculation is then divided by the average resource use of all the episodes that were used to estimate Model 5 ($1,536.25). The resulting ratio represents the case-mix weight for that particular combination of admission source, episode timing, comorbidity group, clinical group, and functional level.

As noted above, there are 128 different payment groups under the HHGM shown in Exhibit 10-6. There are 10 payment groups that represent roughly 50.8% of episodes. There are 29 payment groups that represent roughly 1.0% of episodes. The payment group with the smallest weight has a weight of 0.5060 (community - late, no comorbidity adjustment, Behavioral Health - Low). The payment group with the largest weight has a weight of 1.9692 (institutional early, comorbidity adjustment, wound - High).

In the next chapter, Chapter 11, the research team uses these weights to determine the difference in payments that certain types of home health agencies would receive under the HHGM as compared with the existing HH PPS.

Exhibit No 10-7: Table of Weights from Model 5 (CPM + NRS)

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
672	Yes	Behavioral Health - Low	Institutional - Late	0.01%	$1,366.15	$1,126.92	0.825	1.0804
890	Yes	Behavioral Health - Low	Institutional - Early	0.01%	$1,682.08	$1,048.21	0.623	1.2057
1299	Yes	Behavioral Health - High	Institutional - Late	0.01%	$1,999.15	$1,311.69	0.656	1.3206
1,504	Yes	Behavioral Health - Low	Community - Early	0.02%	$1,549.13	$1,014.89	0.655	1.0289
1,685	Yes	Neuro - Low	Institutional - Late	0.02%	$2,047.48	$1,331.05	0.650	1.3515
1,755	Yes	Behavioral Health - High	Institutional - Early	0.02%	$2,335.92	$1,356.50	0.581	1.4459
1,947	Yes	Complex - Medium	Community - Early	0.02%	$1,932.54	$1,460.84	0.756	1.4119
2,337	Yes	Complex - High	Community - Early	0.03%	$2,230.44	$1,909.36	0.856	1.5246
2,449	Yes	Neuro - Medium	Institutional - Late	0.03%	$2,534.44	$1,461.58	0.577	1.5605
2,527	Yes	Complex - Low	Community - Early	0.03%	$1,591.80	$1,351.28	0.849	1.157
2,568	Yes	Behavioral Health - High	Community - Early	0.03%	$2,067.90	$1,147.75	0.555	1.2691
2,678	Yes	Complex - Low	Institutional - Late	0.03%	$1,839.10	$1,618.53	0.880	1.2085
2,882	Yes	MS Rehab - Low	Institutional - Late	0.03%	$1,977.88	$1,328.48	0.672	1.2588
3,986	Yes	Neuro - Low	Community - Early	0.04%	$2,059.28	$1,140.43	0.554	1.3
4,067	No	Complex - High	Community - Early	0.04%	$2,026.06	$1,529.43	0.755	1.3904
4,127	Yes	Complex - Medium	Institutional - Late	0.04%	$2,268.59	$1,772.74	0.781	1.4634
4,469	Yes	Neuro - Medium	Community - Early	0.05%	$2,393.90	$1,233.25	0.515	1.509
4,868	Yes	Neuro - Low	Institutional - Early	0.05%	$2,402.87	$1,364.77	0.568	1.4768
5,168	Yes	Neuro - High	Institutional - Late	0.06%	$2,747.08	$1,818.53	0.662	1.6824
5,233	Yes	MS Rehab - High	Institutional - Late	0.06%	$2,493.58	$1,498.95	0.601	1.4469
5,568	Yes	Neuro - Medium	Institutional - Early	0.06%	$2,904.59	$1,520.89	0.524	1.6858

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
5,611	No	Behavioral Health - Low	Institutional - Late	0.06%	$1,200.10	$958.96	0.799	0.9463
5,957	No	Complex - Medium	Community - Early	0.06%	$1,800.05	$1,342.55	0.746	1.2777
6,167	No	Behavioral Health - High	Institutional - Late	0.07%	$1,866.28	$1,210.09	0.648	1.1864
6,328	Yes	Complex - Low	Institutional - Early	0.07%	$1,989.85	$1,646.17	0.827	1.3338
6,498	Yes	Neuro - High	Community - Early	0.07%	$2,571.39	$1,525.16	0.593	1.6309
6,791	Yes	MS Rehab - Low	Institutional - Early	0.07%	$2,155.17	$1,213.61	0.563	1.3841
7,044	Yes	Complex - Medium	Institutional - Early	0.08%	$2,595.85	$1,832.72	0.706	1.5887
7,073	Yes	Complex - High	Institutional - Early	0.08%	$2,903.22	$2,056.17	0.708	1.7014
7,119	Yes	Neuro - High	Institutional - Early	0.08%	$3,305.24	$1,894.35	0.573	1.8077
7,360	Yes	Wound - Low	Institutional - Late	0.08%	$2,322.28	$1,796.35	0.774	1.5071
7,744	Yes	Complex - High	Institutional - Late	0.08%	$2,578.27	$2,065.10	0.801	1.5761
8,002	No	Complex - Low	Institutional - Late	0.09%	$1,670.71	$1,552.40	0.929	1.0743
8,595	Yes	Wound - High	Institutional - Early	0.09%	$3,256.15	$2,100.45	0.645	1.9692
8,974	No	Complex - Medium	Institutional - Late	0.10%	$2,104.04	$1,757.25	0.835	1.3292
9,157	No	Complex - High	Institutional - Late	0.10%	$2,313.80	$1,855.50	0.802	1.4419
9,430	No	Neuro - Low	Institutional - Late	0.10%	$1,977.79	$1,230.93	0.622	1.2174
9,532	Yes	MS Rehab - High	Institutional - Early	0.10%	$2,618.73	$1,453.59	0.555	1.5722
9,552	Yes	Wound - Medium	Institutional - Late	0.10%	$2,653.80	$1,949.93	0.735	1.691
9,698	Yes	Behavioral Health - Low	Community - Late	0.10%	$941.99	$741.60	0.787	0.6402
9,849	No	Complex - Low	Community - Early	0.11%	$1,470.32	$1,168.10	0.794	1.0228
10,175	No	Behavioral Health - Low	Institutional - Early	0.11%	$1,494.74	$978.47	0.655	1.0716
10,381	Yes	Wound - High	Community - Early	0.11%	$2,526.51	$1,722.54	0.682	1.7923
11,410	No	Wound - Low	Institutional - Late	0.12%	$2,090.18	$1,619.77	0.775	1.3729

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
11,609	No	Neuro - Medium	Institutional - Late	0.12%	$2,327.17	$1,350.05	0.580	1.4263
12,053	Yes	Wound - High	Institutional - Late	0.13%	$2,943.51	$2,171.07	0.738	1.8438
12,073	No	Behavioral Health - High	Institutional - Early	0.13%	$2,069.36	$1,180.58	0.571	1.3117
12,116	Yes	MS Rehab - High	Community - Early	0.13%	$2,274.56	$1,177.04	0.517	1.3954
12,271	Yes	Wound - Low	Institutional - Early	0.13%	$2,338.46	$1,663.73	0.711	1.6324
12,327	Yes	Wound - Medium	Institutional - Early	0.13%	$2,799.28	$1,776.71	0.635	1.8163
12,572	No	Complex - High	Institutional - Early	0.14%	$2,739.75	$1,833.74	0.669	1.5672
13,002	Yes	MS Rehab - Low	Community - Early	0.14%	$2,065.71	$1,078.21	0.522	1.2072
13,098	No	MS Rehab - Low	Institutional - Late	0.14%	$1,816.88	$1,160.70	0.639	1.1246
13,571	No	Wound - Medium	Institutional - Late	0.15%	$2,466.32	$1,729.75	0.701	1.5569
13,727	No	Neuro - High	Institutional - Late	0.15%	$2,511.89	$1,553.32	0.618	1.5482
13,746	Yes	Behavioral Health - High	Community - Late	0.15%	$1,206.91	$967.90	0.802	0.8803
14,040	Yes	Wound - Medium	Community - Early	0.15%	$2,431.89	$1,635.72	0.673	1.6395
15,184	Yes	Complex - Low	Community - Late	0.16%	$1,187.21	$1,271.49	1.071	0.7682
15,879	No	Wound - High	Institutional - Early	0.17%	$3,062.72	$1,951.98	0.637	1.835
15,975	Yes	Wound - Low	Community - Early	0.17%	$2,130.81	$1,485.98	0.697	1.4556
16,554	Yes	Complex - Medium	Community - Late	0.18%	$1,408.99	$1,366.95	0.970	1.0231
17,460	No	MS Rehab - High	Institutional - Late	0.19%	$2,161.06	$1,297.50	0.600	1.3127
17,489	No	Wound - High	Institutional - Late	0.19%	$2,742.51	$2,017.52	0.736	1.7097
20,012	No	Behavioral Health - Low	Community - Early	0.21%	$1,411.96	$930.93	0.659	0.8948
20,449	Yes	Neuro - Low	Community - Late	0.22%	$1,284.16	$1,053.86	0.821	0.9112
20,886	No	Complex - Medium	Institutional - Early	0.22%	$2,428.68	$1,716.00	0.707	1.4545
21,547	No	Complex - Low	Institutional - Early	0.23%	$1,860.53	$1,470.54	0.790	1.1996

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
21,669	Yes	MMTA - Low	Institutional - Late	0.23%	$1,630.90	$1,251.81	0.768	1.1295
21,794	Yes	Neuro - Medium	Community - Late	0.23%	$1,580.40	$1,158.79	0.733	1.1202
23,714	No	Behavioral Health - High	Community - Early	0.25%	$1,812.32	$1,050.87	0.580	1.1349
24,376	No	Wound - Medium	Institutional - Early	0.26%	$2,673.87	$1,665.03	0.623	1.6822
25,340	No	Wound - High	Community - Early	0.27%	$2,330.08	$1,605.88	0.689	1.6582
26,089	No	Wound - Low	Institutional - Early	0.28%	$2,189.63	$1,515.58	0.692	1.4982
28,200	No	Neuro - High	Institutional - Early	0.30%	$3,073.84	$1,686.47	0.549	1.6735
29,463	No	Wound - Medium	Community - Early	0.32%	$2,195.32	$1,416.96	0.645	1.5054
31,336	Yes	Complex - High	Community - Late	0.34%	$1,600.60	$1,503.67	0.939	1.1358
31,792	No	Neuro - High	Community - Early	0.34%	$2,303.68	$1,348.11	0.585	1.4967
34,249	Yes	MMTA - Medium	Institutional - Late	0.37%	$1,989.17	$1,400.67	0.704	1.3107
34,946	No	Wound - Low	Community - Early	0.38%	$1,919.35	$1,326.46	0.691	1.3214
35,353	No	Complex - High	Community - Late	0.38%	$1,463.97	$1,372.40	0.937	1.0016
35,455	Yes	MMTA - Low	Community - Early	0.38%	$1,672.73	$1,132.05	0.677	1.078
36,225	No	Neuro - Medium	Community - Early	0.39%	$2,173.25	$1,154.89	0.531	1.3748
36,869	No	Neuro - Medium	Institutional - Early	0.40%	$2,765.36	$1,434.84	0.519	1.5516
37,084	No	Complex - Medium	Community - Late	0.40%	$1,346.16	$1,329.26	0.987	0.8889
38,417	Yes	Neuro - High	Community - Late	0.41%	$1,870.17	$1,473.17	0.788	1.2421
39,405	No	Neuro - Low	Community - Early	0.42%	$1,847.01	$1,070.98	0.580	1.1658
39,419	Yes	MMTA - Medium	Community - Early	0.42%	$1,988.48	$1,218.74	0.613	1.2592
41,144	Yes	MMTA - High	Community - Early	0.44%	$2,174.51	$1,377.15	0.633	1.4072
41,882	No	Neuro - Low	Institutional - Early	0.45%	$2,253.19	$1,256.49	0.558	1.3427
45,465	No	Complex - Low	Community - Late	0.49%	$1,087.08	$1,171.38	1.078	0.634

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
46,109	Yes	MMTA - Low	Institutional - Early	0.50%	$1,805.36	$1,167.80	0.647	1.2548
55,037	Yes	MMTA - High	Institutional - Late	0.59%	$2,266.52	$1,570.46	0.693	1.4587
55,386	Yes	MS Rehab - High	Community - Late	0.59%	$1,521.15	$1,140.18	0.750	1.0066
57,553	No	MS Rehab - High	Institutional - Early	0.62%	$2,219.87	$1,171.73	0.528	1.438
59,319	Yes	MS Rehab - Low	Community - Late	0.64%	$1,249.15	$978.26	0.783	0.8185
60,714	No	MS Rehab - Low	Institutional - Early	0.65%	$1,893.85	$1,009.96	0.533	1.2499
68,363	Yes	MMTA - Medium	Institutional - Early	0.73%	$2,253.77	$1,242.16	0.551	1.4361
75,469	No	MS Rehab - High	Community - Early	0.81%	$2,072.51	$1,031.73	0.498	1.2612
76,286	No	Behavioral Health - High	Community - Late	0.82%	$1,084.49	$862.82	0.796	0.7461
79,292	Yes	MMTA - High	Institutional - Early	0.85%	$2,582.00	$1,439.57	0.558	1.584
84,270	No	MMTA - Low	Institutional - Late	0.90%	$1,494.55	$1,091.91	0.731	0.9953
85,610	Yes	Wound - Medium	Community - Late	0.92%	$2,014.75	$1,658.73	0.823	1.2508
87,001	Yes	Wound - High	Community - Late	0.93%	$2,200.49	$1,815.56	0.825	1.4036
87,361	Yes	Wound - Low	Community - Late	0.94%	$1,808.81	$1,518.41	0.839	1.0668
94,997	No	Behavioral Health - Low	Community - Late	1.02%	$773.92	$669.44	0.865	0.506
101,656	No	MS Rehab - Low	Community - Early	1.09%	$1,923.65	$985.23	0.512	1.0731
114,720	No	MMTA - Medium	Institutional - Late	1.23%	$1,829.94	$1,196.62	0.654	1.1766
124,594	No	MMTA - High	Institutional - Late	1.34%	$2,061.15	$1,339.46	0.650	1.3245
127,223	No	Neuro - Medium	Community - Late	1.37%	$1,393.93	$1,063.56	0.763	0.986
127,384	No	Neuro - High	Community - Late	1.37%	$1,562.76	$1,254.77	0.803	1.1079
130,641	No	Wound - Medium	Community - Late	1.40%	$1,750.19	$1,416.00	0.809	1.1166
138,898	No	Neuro - Low	Community - Late	1.49%	$1,182.66	$919.38	0.777	0.7771
145,757	No	Wound - Low	Community - Late	1.57%	$1,534.90	$1,359.87	0.886	0.9326

Number of Episodes	Comorbidity Adjustment?	Clinical Group and Level	Admission Source and Timing	% of Episodes	Average Resource Use	Standard Deviation of Resource Use	Coefficient of Variation Resource Use	Weight
146,484	No	MMTA - High	Community - Early	1.57%	$2,076.70	$1,185.08	0.571	1.273
149,822	No	Wound - High	Community - Late	1.61%	$2,003.72	$1,670.70	0.834	1.2694
189,629	No	MMTA - Medium	Community - Early	2.04%	$1,876.84	$1,086.96	0.579	1.1251
203,215	No	MMTA - Low	Community - Early	2.18%	$1,509.56	$1,000.69	0.663	0.9438
224,561	No	MS Rehab - High	Community - Late	2.41%	$1,317.51	$985.37	0.748	0.8725
280,146	Yes	MMTA - Medium	Community - Late	3.01%	$1,318.63	$1,241.86	0.942	0.8705
282,791	Yes	MMTA - Low	Community - Late	3.04%	$1,054.37	$1,082.93	1.027	0.6892
304,039	No	MS Rehab - Low	Community - Late	3.27%	$1,140.08	$870.79	0.764	0.6843
309,314	No	MMTA - High	Institutional - Early	3.32%	$2,317.90	$1,219.68	0.526	1.4499
310,085	Yes	MMTA - High	Community - Late	3.33%	$1,518.09	$1,354.34	0.892	1.0184
313,848	No	MMTA - Low	Institutional - Early	3.37%	$1,652.95	$1,010.61	0.611	1.1206
420,896	No	MMTA - Medium	Institutional - Early	4.52%	$2,068.49	$1,090.36	0.527	1.3019
768,754	No	MMTA - High	Community - Late	8.26%	$1,241.69	$1,088.44	0.877	0.8843
945,808	No	MMTA - Medium	Community - Late	10.16%	$1,096.15	$997.23	0.910	0.7363
1,020,143	No	MMTA - Low	Community - Late	10.96%	$927.42	$910.71	0.982	0.5551

11. Chapter 11 – Impacts

This section illustrates how the HHGM would determine episode payments were such a refinement implemented. The impacts of this refinement are quantified using simulated episode payments under a HHGM system. The simulated HHGM payments are compared with the payments received under the current HH PPS in order to determine if there are particular trends or patterns in payment differences between the two systems across several episode characteristics. Of particular interest are the episode characteristics identified in the *CMS Report to Congress on Section 3131(d) Home Health Study* that were associated with low episode margins.

The primary difference between the HHGM and the existing HH PPS would be the new episode groups and payment weights that were discussed in Chapter 10. Under the existing HH PPS, weights are based on the relative resource utilization (i.e., wage-weighted minutes of care, the conceptual measure of episode cost) of groups of episodes with the same episode timing, clinical level, functional level, and therapy utilization. The HHGM, were it implemented, would group episodes for weight determination based on their timing, admission source, clinical group, functional level, and comorbidity adjustment. An additional difference between the two payment systems is the current system establishes payments for NRS separately from the discipline costs while the HHGM bundles the NRS costs with the discipline costs. Under the HHGM, NRS costs are bundled with the overall episode payment so that no separate NRS payment determination is necessary. For this evaluation exercise, the research team will impose an adjustment on the HHGM payments such that the average nationwide episode payment will be equal to the nationwide episode payment under the current system. Thereby, there will be zero impact of the refinement for the average episode – the average payment is the same under both systems by construction.

As part of the analysis of the HHGM, the determination of whether particular types of episodes disproportionately gain or lose in terms of potential payments under the HHGM refinement, and whether the largest payment differences are disproportionately clustered within particular characteristics of episodes, was examined. The research team expected some payment realignment given the HHGM's design, since the HHGM weights are based upon a different set of episode characteristics compared with the current HH PPS. For example, clinical group determine payment weights in the HHGM but not the current model, and so thereby it might be expected for payments to shift in alignment along clinical groups. Similarly, therapy utilization determines weights (and thereby payment) in the current system but not the HHGM, so some change in payment based upon therapy utilization from the current model to the simulated HHGM when therapy is removed as a factor for payment is expected.

Such changes are more predictable because they involve certain characteristics that are direct factors in weight determination; however, the research team may find other trends or patterns among characteristics that are not direct determinants of the payment weight calculation but are correlated with direct payment factors. This might include, for example, particular agency characteristics. These impacts are important for CMS to consider while evaluating and potentially employing the HHGM.

11.1 Methodology: Simulated Model Payments Calculation and Comparison

Under the current home health payment system, 60 day episode payments are calculated from payment weights in several steps. First, the base payment amount ($2,137.73 in CY 2013) is both wage-index adjusted (by an amount corresponding to the beneficiary's CBSA) and case-mix adjusted (corresponding to the episode's clinical level, functional level, timing, and therapy utilization). Additional NRS and outlier payments are separately applied to this adjusted base payment.

The HHGM payment system refinement would feature new episode weights that are determined by a different process than the current HH PPS. Specifically the episode weights are based upon different grouping characteristics: episode timing, admission source, clinical group, functional severity level, and comorbidity severity. These weights will similarly case-mix adjust the base payment amount, which will also be wage-index adjusted as in the current model. Because variation in NRS costs is already incorporated into the determination of the HHGM payment weights, there will be no need for a separate NRS payment in the HHGM payment determination.

As described in Chapter 5, for this simulation, the "episodes" are separated into 30 day periods. To simulate 30 day payments, we halve the payment amounts the episodes would receive were they 60 day episodes. This is done for both simulated HHGM payments and payments under the current model.[31]

As a final step in HHGM payment calculation, a neutrality adjustment is applied: specifically, each individual episode's HHGM payment amount is multiplied by the ratio of the national average HHGM payment to the national average current model payment. Mathematically, this ensures that the overall average episode payments are equal between the current payment model and HHGM payment estimates. The reason for this is to ensure a clear baseline for comparison between the two models.

At this point, two different payments for each home health episode in the sample have been calculated[32]: a 30 day payment under the current HH PPS, and a 30 day payment under the HHGM. Of interest is how different the two payment amounts are under each calculation for the same episode, whether there are any episodes with especially large differences, and whether any certain types of episodes tend to earn considerably more or less under the HHGM than the current payment model.

To better conceptualize a payment difference, the "impact ratio" as a simple metric for average payment change under the HHGM is introduced. The impact ratio is simply the ratio of average simulated payments under the HHGM to average actual payments under the current payment system among episodes of a particular characteristic. For example, if under the current payment system the average episode payment for episodes serviced to male patients was $3,000 and under the HHGM we simulate those same episodes to have average payments of $3,600, then the impact ratio for male

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[31] That is, for our simulation an episode that lasts 30 days or less would be paid at half its usual payment when calculating payments under the current payment system. That was done to make the payments easier to compare under the current payment system and HHGM.

[32] A small number of episodes were dropped compared with what was used to estimate the payment regression in Chapter 10. In Chapter 10, 9,311,627 episodes were used to estimate the payment regression. For this chapter we excluded 2,742 episodes that did not have variables that matched

patients is 1.200 ($3,600/$3,000 = 1.200). Note that an impact ratio of 1.000 would result from a one-to-one payment match – no change at all under an HHGM implementation. As mentioned above, by design, the nationwide overall average for episodes will have the same payments under both the current model and the HHGM, as ensured by the neutrality adjustment. Therefore, there will be an overall impact ratio of 1.000 when looking at all episodes overall. However, the impact ratio will vary when looking at subsets of different episode characteristics.

11.2 Impact Results

The average 30 day payment amount (under either system's weights) is $1,519.22. However, as mentioned earlier, only the average is expected to be equal across both systems (per construction of the HHGM); we expect payments for individual episodes to vary across the two systems.

Exhibit 11-1 (below) details payment estimates at different points in the two payment systems' distributions. The HHGM appears to produce slightly higher payments than the current model at the lower-center of the distribution. For example, the HHGM median payment is $1,435.43 versus $1,325.18 in the current model, the HHGM 25th percentile payment is $1,093.36 versus $1,325.05 in the current model. In contrast, the payments of the HHGM are slightly lower than the current model's payments at the upper portion of the distributions: the HHGM 75th percentile payment is $1,861.19 versus $1,888.38 in the current model and the HHGM 99th percentile payment is $3,104.359 versus $3,352.76 in the current model.

Exhibit 11-1: HHGM Impacts – Comparing Percentile Points of 30 Day Period Payments under Actual Paid Weights and Weights Simulated Under HHGM Model; 2013 Episodes

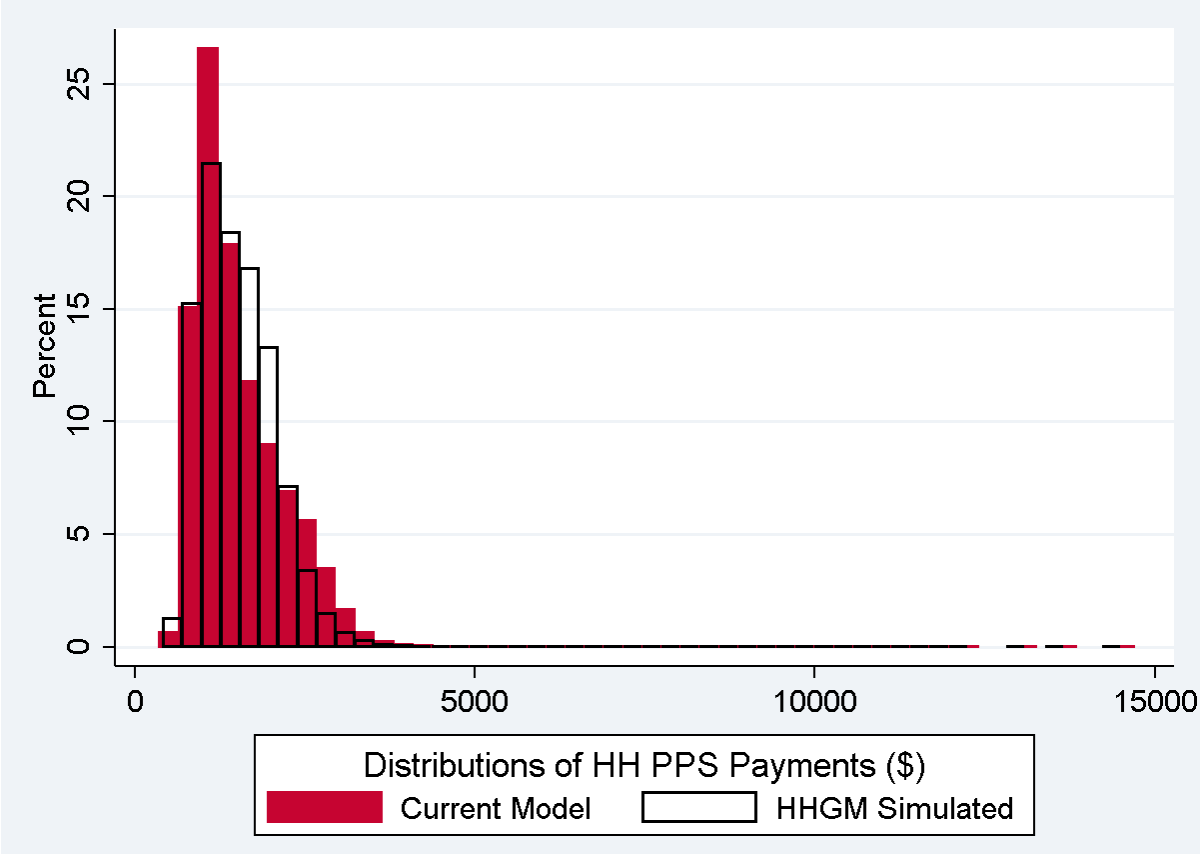
Percentile	Episode Payments Under Actual Paid Weights	Episode Payments Under HHGM Simulated Weights
1st Percentile	$667.21	$697.50
5th Percentile	$789.39	$768.52
10th Percentile	$857.52	$874.54
25th Percentile	$1,032.05	$1,093.36
50th Percentile	$1,325.18	$1,435.43
Average	$1,519.22	$1,519.22
75th Percentile	$1,888.38	$1,861.19
90th Percentile	$2,474.81	$2,232.49
95th Percentile	$2,767.26	$2,476.01
99th Percentile	$3,352.76	$3,104.35

Source: Abt Associated analysis of 100% Medicare Home Health files (2013)

Exhibit 11-2 (below) displays histograms showing the full distributions of payments superimposed: payments for the current model are in the histogram shaded red and simulated payments for the HHGM are in the unshaded histogram. The distributions largely follow the same shape. The slight differences are that there are fewer episodes near the modal payment for the HHGM as opposed to the current (note the tallest spike is greater for the current model's distribution compared with the HHGM

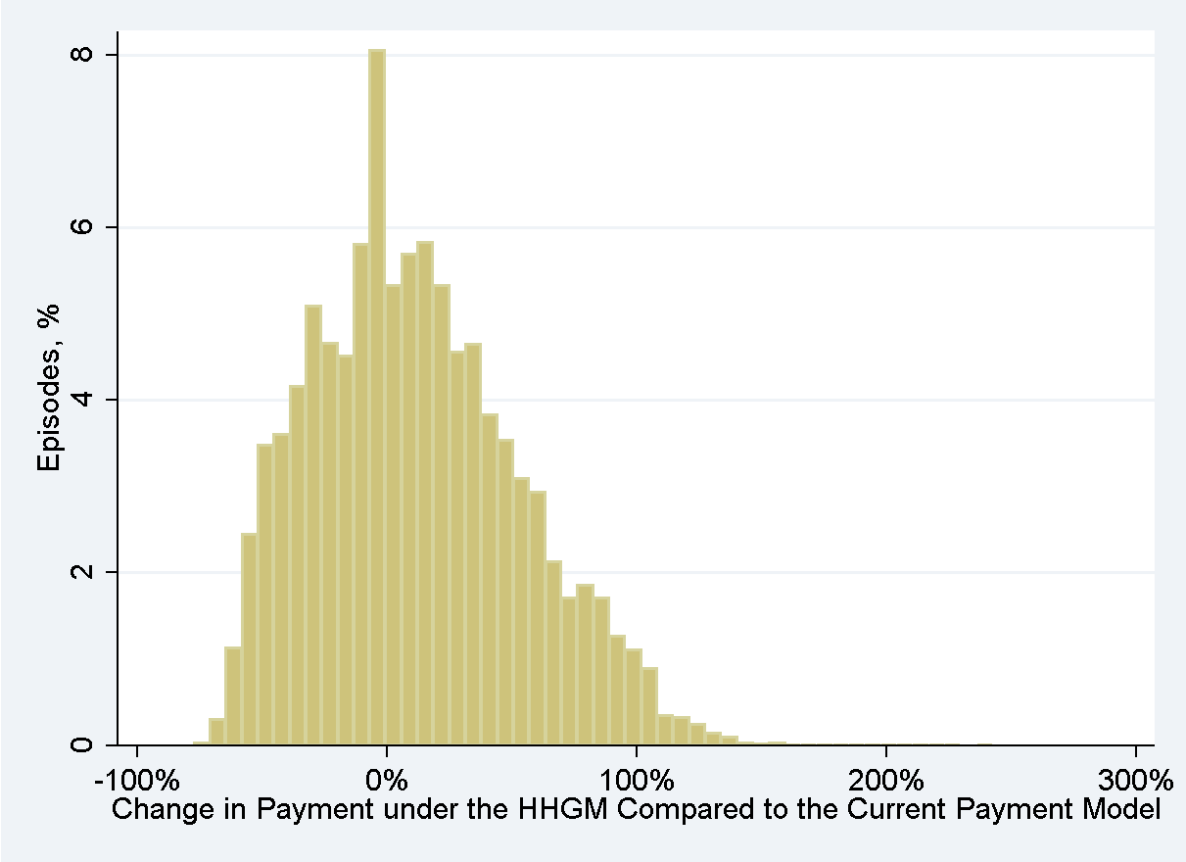
payment distribution). In terms of other changes in the distribution, the HHGM now has a relatively larger percentage of episodes just above average, with relatively fewer episodes in the extremes of the distribution (i.e., with payments a large amount above average) compared with the current model.

Exhibit 11-2: HHGM Impacts - Comparing Distributions of 30 Day Period Payments under Actual Paid Weights and Weights Simulated Under HHGM Model; 2013 Episodes



Although the distributions of episode payments are on the whole fairly similar per Exhibit 11-1 and Exhibit 11-2 above, each individual episode may have payments that vary more widely across the two payment systems. To illustrate this, Exhibit 11-3 (below) plots a histogram showing the distribution of percentage differences between the HHGM and current payment systems. The percentage difference is calculated as the difference between the HHGM and current model payment divided by the current model payment; a positive value means the HHGM payment is greater than the current model payment and vice-versa if the value is negative. While the main mass of the distribution is centered near zero (percentage difference between the HHGM and current system), there are some rare but extreme differences in the tails.

Exhibit 11.3: HHGM Impacts - Comparing Individual 30 Day Periods' Payment Differences between the Home Health Grouping Model and Current Payment System Amounts in Percentage Terms; 2013 Episodes



For each characteristic examined, Exhibit 11.4 (below) presents estimates of the total numbers of associated episodes, beneficiaries, home health agencies; average episode payments under the current payment model and simulated under the HHGM; and the impact ratio of simulated HHGM payments to actual paid amounts. Overall, the sample includes 9,308,885 simulated 30 day periods serviced to 3,118,580 beneficiaries by 11,733 home health agencies.

Findings from Table 11.4 are highlighted below:

- On average, episodes serviced by facility-based HHAs would receive a little more under a HHGM refinement ($1,642.79 HHGM versus $1,428.48 current; impact ratio=1.150) while episodes serviced by freestanding HHAs would receive a little less ($1,505.64 HHGM versus $1,529.19 current; impact ratio=0.985)
- On average, episodes serviced by non-profit HHAs would receive more under a HHGM refinement ($1,715.47 HHGM versus $1,519.64 current; impact ratio=1.129) while episodes serviced by for-profit HHAs would receive a little less ($1,454.20 HHGM versus $1,525.47 current; impact ratio=0.953)
- On average, episodes serviced by HHAs in the Northeast in particular would receive a little more under a HHGM refinement ($1,817.07 HHGM versus $1,644.02 current; impact ratio=1.105)

while episodes serviced by HHAs in the South would receive a little less ($1,374.23 HHGM versus $1,448.01 current; impact ratio=0.949)

- Episodes serviced by older HHAs would receive more and new HHAs would receive less under the HHGM on average – for instance, the impact ratio among episodes serviced by HHAs certified in the 1960s is 1.124 ($1,793.88 HHGM versus $1,595.69 current) while the impact ratio among episodes serviced by HHAs certified in the 2010s is 0.926 ($1,474.91 HHGM versus $1,593.19 current)
- Episodes would receive higher payments under the HHGM if they were in the Wound (impact ratios=1.290, 1.249, and 1.296 for the low, medium, and high functional levels, respectively) or Complex nursing interventions (impact ratios=1.139, 1.181, and 1.150 for the low, medium, and high functional levels, respectively) clinical groups and would receive less – exceeding 10% less on average – under the HHGM if they were Behavioral Health (impact ratios=0.828 and 0.876 for the low and high functional levels, respectively)
- Episodes which were admissions from an institutional setting would receive more under a HHGM refinement ($2,070.10 HHGM versus $1,598.59 current if early with an impact ratio=1.295; $1,965.20 HHGM versus $1,615.46 current if late with an impact ratio=1.216) while episodes that were admissions from the community would receive less ($1,246.44 HHGM versus $1,468.15 current; impact ratio=0.849)
- Episodes which did not provide therapy would receive relatively more under a HHGM refinement ($1,353.93 HHGM versus $1,082.47 current; impact ratio=1.251) while episodes that did provide therapy would receive relatively less ($1,630.21 HHGM versus $1,812.47 current; impact ratio=0.899)
- Episodes serviced by agencies located in rural counties would receive slightly more under a HHGM refinement ($1,324.39 HHGM versus $1,296.92 current; impact ratio=1.021) while episodes serviced by agencies located in urban counties would receive slightly less ($1,570.99 HHGM versus $1,578.29 current; impact ratio=0.995)
- Among the *Report to Congress* variables of interest, episodes would receive more if they were associated with parenteral nutrition ($1,698.98 HHGM versus $1,373.72 current; impact ratio=1.164) or surgical wounds ($1,719.58 HHGM versus $1,563.40 current; impact ratio=1.100)
- Several other characteristics were also associated with higher payments under an HHGM refinement (e.g., poorly-controlled cardiac dysrhythmia impact ratio=1.039; open wound/lesion impact ratio=1.084)

These impact outcomes do not result from direct design efforts; rather, they are simply the result of re-weighting all the episodes with a particular characteristic (e.g., episodes with an institutional admission source). Under the HHGM, episodes with a particular characteristic may have higher payments on average compared with that same set of episodes under the current payment system. For example, episodes in the Northeast receive more payment under the HHGM not because the model was designed to redirect payments to the Northeast, but instead because the HHGM gives more weight (on average) to episodes from the Northeast. That is, episodes from the Northeast are more likely to be placed into higher weight payment groups under the HHGM compared with the current HH PPS.

Exhibit 11-4: Home Health Grouping Model Impacts - Comparing Total 30 Day Period Payments Under Actual Paid Weights and Weights Simulated under the Home Health Grouping Model; 2013 Episodes

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
Overall Episodes						
All Episodes Simulated Under Home Health Groupings Model	9,308,885	3,118,580	11,733	$1,519.22	$1,519.22	1.000
HHA Facility Type						
Facility-Based	921,424	447,420	1,137	$1,428.48	$1,642.79	1.150
Freestanding	8,387,054	2,708,701	10,568	$1,529.19	$1,505.64	0.985
Missing	407	236	28	$1,673.23	$1,703.55	1.018
HHA Ownership						
Non-Profit	2,293,110	1,085,966	1,829	$1,519.64	$1,715.47	1.129
For-Profit	6,773,990	2,011,022	9,242	$1,525.47	$1,454.20	0.953
Government-Owned	241,378	101,775	634	$1,339.89	$1,479.52	1.104
Missing	407	236	28	$1,673.23	$1,703.55	1.018
HHA Census Region						
Northeast	1,303,149	570,534	876	$1,644.02	$1,817.07	1.105
Midwest	1,878,002	667,664	3,152	$1,488.46	$1,487.44	0.999
South	4,916,228	1,413,469	5,694	$1,448.01	$1,374.23	0.949
West	1,194,668	468,988	1,963	$1,732.07	$1,847.43	1.067
Outlying Territories	16,838	6,294	48	$984.48	$1,061.15	1.078
HHA Size (Total 2013 Episodes)						
1-49 Episodes	52,406	20,504	1,694	$1,461.37	$1,467.27	1.004
50-99 Episodes	130,829	46,640	1,208	$1,481.15	$1,443.68	0.975
100-299 Episodes	953,119	311,114	3,410	$1,505.65	$1,448.65	0.962

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
300-599 Episodes	1,594,869	520,913	2,508	$1,515.39	$1,465.65	0.967
600-1,199 Episodes	2,038,866	722,039	1,660	$1,499.86	$1,499.52	1.000
1,200-3,999 Episodes	3,164,683	1,166,381	1,101	$1,525.81	$1,535.33	1.006
4,000+ Episodes	1,374,113	540,252	152	$1,552.49	$1,631.68	1.051
HHA Medicare Certification Date						
1960s	964,763	442,654	523	$1,595.69	$1,793.88	1.124
1970s	827,400	327,136	579	$1,442.02	$1,504.01	1.043
1980s	1,972,508	806,736	1,487	$1,483.68	$1,548.68	1.044
1990s	1,811,710	627,333	1,982	$1,469.34	$1,481.06	1.008
2000s	3,138,000	912,200	4,895	$1,553.19	$1,450.68	0.934
2010s	594,097	188,623	2,239	$1,593.19	$1,474.91	0.926
Missing	407	236	28	$1,673.23	$1,703.55	1.018
Patient Primary Diagnosis Group and Functional Outcome						
Behavioral Health, Low Functional	143,412	56,794	6,611	$1,149.36	$952.22	0.828
Behavioral Health, High Functional	137,571	65,988	6,379	$1,572.87	$1,378.38	0.876
MMTA, Low Functional	2,006,793	848,586	11,367	$1,227.09	$1,152.24	0.939
MMTA, Medium Functional	2,092,717	986,806	11,299	$1,502.17	$1,478.66	0.984
MMTA, High Functional	1,834,197	794,689	11,096	$1,670.91	$1,699.94	1.017
Complex, Low Functional	111,551	56,105	6,647	$1,192.31	$1,358.43	1.139
Complex, Medium Functional	102,558	53,263	6,686	$1,496.14	$1,767.46	1.181
Complex, High Functional	109,613	46,306	6,913	$1,650.55	$1,898.49	1.150

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
Musculoskeletal Rehab, Low Functional	561,257	271,582	10,675	$1,558.98	$1,312.25	0.842
Musculoskeletal Rehab, High Functional	457,245	225,725	10,212	$1,782.93	$1,613.68	0.905
Neuro Rehab, Low Functional	260,534	128,033	9,373	$1,637.95	$1,474.62	0.900
Neuro Rehab, Medium Functional	246,154	121,078	9,012	$1,917.29	$1,792.59	0.935
Neuro Rehab, High Functional	258,254	109,300	9,066	$1,999.00	$1,975.25	0.988
Wound, Low Functional	341,074	147,999	9,162	$1,328.22	$1,713.35	1.290
Wound, Medium Functional	319,508	143,747	8,915	$1,601.46	$2,000.96	1.249
Wound, High Functional	326,447	119,167	8,893	$1,693.78	$2,195.83	1.296
Episode Timing and Patient Admission Source						
Institutional Admission, Early	1,696,263	1,631,171	10,955	$1,598.59	$2,070.10	1.295
Institutional Admission, Late	642,899	490,593	10,997	$1,615.46	$1,965.20	1.216
Community Admission, Early	1,184,274	1,102,453	11,508	$1,602.85	$1,820.72	1.136
Community Admission, Late	5,785,449	1,916,268	11,674	$1,468.15	$1,246.44	0.849
Comorbidity Adjustment Status						
Not in Comorbidity Adjustment Group	7,229,394	2,680,866	11,692	$1,508.83	$1,470.02	0.974
In Comorbidity Adjustment Group	2,079,491	732,734	11,297	$1,555.37	$1,690.30	1.087
Patient Medicaid Status						
Medicare Only	5,891,244	2,187,981	11,460	$1,550.73	$1,556.64	1.004
Dual-Eligibility	3,417,641	930,599	11,533	$1,464.91	$1,454.74	0.993

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
Episode Therapy Usage						
Therapy Provided	5,569,427	2,436,186	11,445	$1,812.47	$1,630.21	0.899
No Therapy Provided	3,739,458	1,190,977	11,550	$1,082.47	$1,353.93	1.251
HHA Urban/Rural Status						
Urban County	7,354,751	2,519,984	10,594	$1,578.29	$1,570.99	0.995
Rural County	1,954,134	614,611	4,934	$1,296.92	$1,324.38	1.021
Parenteral Nutrition						
No Parenteral Nutrition	9,292,968	3,115,586	11,733	$1,519.47	$1,519.09	1.000
Yes Parenteral Nutrition	15,917	5,553	2,598	$1,373.72	$1,598.98	1.164
Surgical Wounds						
No Known Surgical Wound	7,805,884	2,441,556	11,707	$1,510.72	$1,480.65	0.980
Yes Known Surgical Wound	1,503,001	871,540	10,635	$1,563.40	$1,719.58	1.100
Ulcers						
No Ulcers Recorded	8,757,499	3,017,748	11,721	$1,508.21	$1,491.70	0.989
Positive Number of Ulcers Recorded	551,386	198,721	9,879	$1,694.15	$1,956.40	1.155
Bathing						
Able to bathe with some independence	7,536,172	2,631,385	11,687	$1,475.27	$1,447.23	0.981
Cannot bathe independently	1,772,713	743,835	11,077	$1,706.07	$1,825.27	1.070

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
HCC Community Score Quartile						
1st Quartile HCC Community Score (Score=0.117 to 1.106)	2,130,149	930,217	11,349	$1,487.46	$1,510.95	1.016
2nd Quartile HCC Community Score (Score=1.107 to 1.887)	2,221,806	765,368	11,364	$1,513.86	$1,475.89	0.975
3rd Quartile HCC Community Score (Score=1.888 to 3.146)	2,276,867	681,429	11,368	$1,520.87	$1,499.68	0.986
4th Quartile HCC Community Score (Score=3.147 to 17.699)	2,379,640	616,576	11,370	$1,553.38	$1,580.27	1.017
Poorly-Controlled Cardiac Dysrhythmia						
No Poorly-Controlled Cardiac Dysrhythmia	8,924,842	3,028,022	11,731	$1,523.70	$1,521.31	0.998
Yes Poorly-Controlled Cardiac Dysrhythmia	384,043	169,068	8,201	$1,415.18	$1,470.88	1.039
Poorly-Controlled Diabetes						
No Poorly-Controlled Diabetes	8,218,508	2,904,027	11,710	$1,522.01	$1,521.85	1.000
Yes Poorly-Controlled Diabetes	1,090,377	386,765	10,343	$1,498.21	$1,499.44	1.001
Poorly-Controlled Peripheral Vascular Disease						
No Poorly-Controlled Peripheral Vascular Disease	9,188,655	3,098,349	11,730	$1,520.19	$1,518.86	0.999
Yes Poorly-Controlled Peripheral Vascular Disease	120,230	48,402	6,974	$1,445.64	$1,546.97	1.070

Characteristics of Provider, Patient, and Episode	Associated Number of:			Current Model Average Episode Payments	HHGM Simulated Average Episode Payments	Impact Ratio: HHGM Simulated Average Payments to Current Model Average Payments
	30 day periods	Beneficiaries	HHAs			
Poorly-Controlled Pulmonary Disorder						
No Poorly-Controlled Pulmonary Disorder	8,564,117	2,954,467	11,722	$1,528.58	$1,527.30	0.999
Yes Poorly-Controlled Pulmonary Disorder	744,768	291,222	9,776	$1,411.67	$1,426.36	1.010
Open Wound/Lesion						
No Open Wound/Lesion	7,288,432	2,619,311	11,703	$1,516.38	$1,480.82	0.977
Yes Open Wound/Lesion	2,020,453	865,402	10,841	$1,529.50	$1,657.78	1.084
Temporary Health Risk						
No Temporary Health Risk	6,104,184	1,920,141	11,628	$1,448.89	$1,446.52	0.998
Yes Temporary Health Risk	3,204,701	1,791,277	11,432	$1,653.20	$1,657.71	1.003
Fragile/Serious Overall Status						
No Fragile/Serious Health Risk	7,290,219	2,471,353	11,678	$1,475.51	$1,454.79	0.986
Has Fragile/Serious Health Risk	2,018,666	1,102,570	10,857	$1,677.12	$1,751.92	1.045
Caregiver Assistance						
No Caregiver Assistance	4,002,937	1,079,593	11,460	$1,320.63	$1,300.49	0.985
Has Caregiver Assistance	5,305,948	2,747,512	11,617	$1,669.05	$1,684.24	1.009
Episodes with Skilled Nursing Services						
No Skilled Nursing Services in Episode	652,934	391,155	7,218	$1,862.60	$1,529.12	0.821
Yes Skilled Nursing Services in Episode	8,655,951	2,858,433	11,720	$1,493.32	$1,518.48	1.017

Source: Abt Associated analysis of 100% Medicare Home Health files (2013)

12. Appendix Exhibits

Appendix Exhibit A7-1: Clinical Assessment of OASIS-C Items Excludes LUPA, PEP, and outlier episodes – Uses data from 2012

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M0110- Episode timing- Early	Yes	67.70%	31.72	<.0001
M1000: Discharged from LTC nursing facility	No	0.66%	113.95	<.0001
M1000: Discharged from long-term care hospital	No	0.49%	78.82	<.0001
M1000: Discharged from short-stay acute hospital	No	25.27%	-44.51	<.0001
M1000: Discharged from psychiatric hospital	No	0.20%	-35.60	<.0001
M1000: Discharged from IRF	No	4.24%	145.09	<.0001
M1000: Discharged from other	No	0.20%	14.90	0.0112
M0069: Female	No	64.06%	1.11	0.1424
M066: Age 65-74	No	24.18%	17.54	<.0001
M066: Age 75-84	No	32.58%	41.97	<.0001
M066: Age 85+	No	28.68%	42.14	<.0001
M1018: Urinary incontinence	No	22.35%	-6.33	<.0001
M1018: Indwelling/suprapubic catheter	No	1.21%	25.17	<.0001
M1018: Intractable pain	No	8.54%	-6.78	<.0001
M1018: Impaired decision-making	No	10.73%	-4.33	0.0005
M1018: Disruptive/socially inappropriate behavior	No	0.96%	-24.97	<.0001
M1018: Memory loss	No	7.65%	4.61	0.0012
M1018: No inpatient discharge and no change in medical regimen	No	3.94%	-3.08	0.0416
M1018: Unknown	No	0.52%	42.96	<.0001
M1030: IV or infusion therapy	Yes	1.98%	-4.88	0.0421
M1030: Parenteral nutrition	Yes	0.16%	40.31	<.0001
M1030: Enteral nutrition	Yes	1.41%	84.22	<.0001
M1032: Risk for Hospitalization- Recent decline	No	8.82%	28.36	<.0001
M1032: Risk for Hospitalization- Multiple hospitalizations	No	18.53%	38.42	<.0001
M1032: Risk for Hospitalization- History of falls	No	19.26%	68.35	<.0001
M1032: Risk for Hospitalization-Five or more medications	No	52.74%	15.02	<.0001
M1032: Risk for Hospitalization- Frailty indicators	No	19.13%	9.02	<.0001
M1032: Risk for Hospitalization- Other	No	7.75%	-11.21	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1034: Overall Status: Stable	No	55.76%	-3.20	0.0048
M1034: Overall Status: Temporarily facing high health risks	No	28.59%	-10.55	<.0001
M1034: Overall Status: Likely to remain in fragile health	No	4.29%	-55.03	<.0001
M1034: Overall Status: Serious progressive conditions	No	0.20%	38.11	<.0001
M1036: Risk factors: Alcohol dependency	No	2.72%	-11.30	<.0001
M1036: Risk factors: Drug dependency	No	1.11%	-6.88	0.0339
M1036: Risk factors: Obesity	No	19.08%	13.75	<.0001
M1036: Risk factors: Smoking	No	15.56%	-15.14	<.0001
M1100: Patient lives alone	No	26.05%	14.04	<.0001
M1100: Patient with other person in home	No	63.30%	5.36	<.0001
M1100: Availability of assistance- Regular daytime	No	4.27%	-17.61	<.0001
M1100: Availability of assistance- Regular nighttime	No	4.79%	-7.10	<.0001
M1100: Availability of assistance- Occasional/short-term	No	12.50%	-18.06	<.0001
M1100: Availability of assistance- No assistance available	No	0.76%	-24.19	<.0001
M1200 Vision: Partially impaired	Yes	32.72%	-15.91	<.0001
M1200 Vision: Severely impaired	Yes	2.22%	-29.80	<.0001
M1210: Ability to hear- Mildly to Moderately impaired	No	37.86%	-4.22	<.0001
M1210: Ability to hear- Mildly to Severely impaired	No	1.49%	-2.30	0.4285
M1210: Ability to hear- Mildly to Unable to Assess	No	0.22%	-25.99	0.0035
M1220: Understanding of verbal content: Usually understands	No	34.78%	-17.31	<.0001
M1220: Understanding of verbal content: Sometimes understands	No	7.34%	-59.65	<.0001
M1220: Understanding of verbal content: Rarely/Never understands	No	0.57%	-109.42	<.0001
M1220: Understanding of verbal content: Unable to assess	No	0.41%	-102.89	<.0001
M1230: Speech and Oral- Minimal difficulty	No	31.65%	26.24	<.0001
M1230: Speech and Oral- Moderate difficulty	No	7.16%	62.83	<.0001
M1230: Speech and Oral- difficulty	No	2.31%	93.11	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1230: Speech and Oral- Unable	No	0.78%	76.93	<.0001
M1230: Speech and Oral- Patient non-responsive	No	0.40%	45.88	<.0001
M1240: Formal pain assessment conducted- No severe pain	No	73.80%	-10.31	0.0006
M1240: Formal pain assessment conducted- Severe pain	No	24.89%	12.21	<.0001
M1242: Frequency of pain: Does not interfere	No	8.01%	-0.10	0.9451
M1242: Frequency of pain: Less often than daily	No	12.31%	-7.39	<.0001
M1242: Frequency of pain: Daily but not constantly	Yes	48.97%	-9.84	<.0001
M1242: Frequency of pain: All of the time	Yes	11.81%	-15.26	<.0001
M1300: Pressure ulcer risk assessment- Clinical factors	No	9.70%	-42.95	<.0001
M1300: Pressure ulcer risk assessment- Standardized tool	No	88.69%	-34.16	<.0001
M1302: Patient has risk of developing pressure ulcers	No	20.63%	32.06	<.0001
M1306: Patient has at least one unhealed Stage II or higher ulcer	No	5.52%	-6.74	0.5408
M1308: Number of Stage II ulcers- One	No	2.58%	19.30	0.0066
M1308: Number of Stage II ulcers- > 1	No	0.94%	24.10	0.0014
M1308: Number of Stage III ulcers- One	Yes	0.97%	-6.32	0.5863
M1308: Number of Stage III ulcers- > 1	Yes	0.24%	19.48	0.1516
M1308: Number of Stage IV ulcers- One	Yes	0.64%	34.56	0.06
M1308: Number of Stage IV ulcers- > 1	Yes	0.16%	7.07	0.7445
M1308: Number of unstageable ulcers (dressing) currently present- One	No	0.06%	55.12	0.0004
M1308: Number of unstageable ulcers (dressing) currently present- > 1	No	0.02%	45.58	0.0779
M1308: Number of unstageable ulcers (coverage of wound) currently present- One	No	0.48%	44.86	<.0001
M1308: Number of unstageable ulcers (coverage of wound) currently present- > 1	No	0.13%	51.84	<.0001
M1308: Number of suspected deep tissue injury ulcers- One	No	0.16%	35.18	<.0001
M1308: Number of suspected deep tissue injury ulcers- > 1	No	0.04%	16.35	0.3052

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1320: Status of most problematic pressure ulcer- Early/partial granulation	No	0.14%	64.47	<.0001
M1320: Status of most problematic pressure ulcer- Not healing	No	2.58%	40.70	<.0001
M1322: Number of Stage I Pressure Ulcers- One	No	1.73%	19.59	<.0001
M1322: Number of Stage I Pressure Ulcers- Two	No	0.36%	21.97	0.0011
M1322: Number of Stage I Pressure Ulcers- Three	No	0.06%	13.33	0.3565
M1322: Number of Stage I Pressure Ulcers- Four or more	No	0.05%	-22.16	0.1548
M1324: Stage of most problematic ulcer- Stage I	Yes	1.51%	24.29	<.0001
M1324: Stage of most problematic ulcer- Stage II	Yes	3.12%	-20.68	0.0097
M1324: Stage of most problematic ulcer- Stage III	Yes	1.01%	39.15	0.0021
M1324: Stage of most problematic ulcer- Stage IV	Yes	0.76%	61.62	0.0008
M1332: Number of stasis ulcers- One	No	0.92%	31.20	0.0468
M1332: Number of stasis ulcers- Two	No	0.46%	58.47	0.0003
M1332: Number of stasis ulcers- Three	No	0.18%	48.21	0.0069
M1332: Number of stasis ulcers- Four or more	No	0.28%	85.38	<.0001
M1334: Status of most problematic stasis ulcer- Fully granulating	No	0.11%	13.51	0.5129
M1334: Status of most problematic stasis ulcer- Early/partial granulation	Yes	0.56%	19.31	0.2436
M1334: Status of most problematic stasis ulcer- Not healing	No	1.11%	6.29	0.6923
M1340 AND M1342: Surgical wound present- Newly epithelialized	No	4.79%	0.08	0.9554
M1340 AND M1342: Surgical wound present- Fully granulating	No	1.37%	24.97	<.0001
M1340 AND M1342: Surgical wound present- Early/partial granulation	Yes	3.04%	13.11	<.0001
M1340 AND M1342: Surgical wound present- Not healing	Yes	6.02%	-19.83	<.0001
M1350: Skin lesion/open wound: Yes	No	19.22%	3.78	<.0001
M1400: Shortness of breath- When walking more than 20 feet	Yes	22.14%	-4.64	<.0001
M1400: Shortness of breath- With moderate exertion	Yes	34.40%	-11.64	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1400: Shortness of breath- With minimal exertion	Yes	16.32%	-23.72	<.0001
M1400: Shortness of breath- At rest	Yes	3.14%	-41.95	<.0001
M1410(1): Respiratory treatment- Oxygen	Yes	14.36%	9.74	<.0001
M1410(2): Respiratory treatment- Ventilator	No	0.09%	-8.00	0.4681
M1410(3): Respiratory treatment- CPAP	No	2.44%	24.31	<.0001
M1600: Urinary tract infection- Yes	No	9.40%	8.51	<.0001
M1600: Urinary tract infection- Patient on prophylactic treatment	No	0.70%	-23.70	<.0001
M1610: Urinary incontinence/catheter= Urinary catheter	No	5.19%	-0.66	0.7881
M1615: When urinary incontinence occurs- Timed voiding	No	2.67%	36.23	<.0001
M1615: When urinary incontinence occurs- Occasional stress incontinence	No	10.54%	11.66	<.0001
M1615: When urinary incontinence occurs- During the night only	No	1.29%	16.99	<.0001
M1615: When urinary incontinence occurs- During the day only	No	0.48%	21.29	<.0001
M1615: When urinary incontinence occurs- During the day and night	No	16.53%	17.85	<.0001
M1620: Bowel incontinence frequency- Less than once weekly	No	5.98%	1.43	0.3764
M1620: Bowel incontinence frequency- 1-3 times weekly	Yes	6.55%	-8.01	<.0001
M1620: Bowel incontinence frequency- 4-6 times weekly	Yes	2.35%	-18.30	<.0001
M1620: Bowel incontinence frequency- On a daily basis	Yes	3.65%	-14.29	<.0001
M1620: Bowel incontinence frequency- More often than once daily	Yes	0.76%	5.29	0.2265
M1630: Ostomy- Not related to an inpatient stay	No	1.31%	-3.73	0.2824
M1630: Ostomy- Related to an inpatient stay	Yes	0.53%	80.57	<.0001
M1700: Cognitive functioning- Requires prompting	No	32.63%	-8.04	<.0001
M1700: Cognitive functioning- Requires assistance	No	10.81%	-12.48	<.0001
M1700: Cognitive functioning- Requires considerable assistance	No	3.39%	-48.56	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1700: Cognitive functioning- Totally dependent	No	0.82%	-88.46	<.0001
M1710: When confused- New/complex situations only	No	39.19%	0.85	0.4037
M1710: When confused- On awakening or at night only	No	1.80%	-2.47	0.3625
M1710: When confused- During the day and evening	No	10.68%	-8.21	<.0001
M1710: When confused- Constantly	No	3.05%	-50.49	<.0001
M1710: When confused- Patient non-responsive	No	0.21%	-41.20	0.0003
M1720: When anxious- Less often than daily	No	29.42%	4.61	<.0001
M1720: When anxious- Daily but not constantly	No	18.56%	3.01	0.0036
M1720: When anxious- All of the time	No	1.66%	5.26	0.0577
M1720: When anxious- Patient non-responsive	No	0.24%	12.24	0.2203
M1730: Depression (Feeling down)- Several days	No	15.93%	18.97	<.0001
M1730: Depression (Feeling down)- More than half of the days	No	2.67%	22.49	<.0001
M1730: Depression (Feeling down)- Nearly every day	No	1.83%	27.07	<.0001
M1730: Depression (Feeling down)- Unable to respond	No	1.46%	30.19	0.0228
M1730: Depression (Lack interest- Several days	No	14.60%	-2.85	0.0567
M1730: Depression (Lack interest- More than half of the days	No	2.46%	-4.47	0.1849
M1730: Depression (Lack interest- Nearly every day	No	1.74%	-1.82	0.6888
M1730: Depression (Lack interest- Unable to respond	No	1.44%	-55.74	<.0001
M1740(1): Cognitive/behavioral symptoms- Memory deficit	No	17.48%	-1.44	0.248
M1740(2): Cognitive/behavioral symptoms- Impaired decision-making	No	21.01%	-7.31	<.0001
M1740(3): Cognitive/behavioral symptoms- Verbal	No	1.41%	-17.12	<.0001
M1740(4): Cognitive/behavioral symptoms- Physical	No	0.69%	-28.25	<.0001
M1740(5): Cognitive/behavioral symptoms- Socially inappropriate/Disruptive	No	0.77%	-17.97	<.0001
M1740(6): Cognitive/behavioral symptoms- Delusions	No	1.31%	-5.27	0.0958

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1745: Frequency of disruptive behavior symptoms- Once a month	No	0.56%	-9.74	0.0306
M1745: Frequency of disruptive behavior symptoms- < Several times each month	No	2.45%	-15.73	<.0001
M1745: Frequency of disruptive behavior symptoms- < Several times a week	No	3.48%	-14.14	<.0001
M1745: Frequency of disruptive behavior symptoms- At least daily	No	7.61%	-19.73	<.0001
M1750: Psychiatric nursing services	No	0.90%	9.95	0.0008
M1800: Grooming- Support required	No	43.66%	4.60	0.0004
M1800: Grooming- Requires assistance	No	27.97%	23.71	<.0001
M1800: Grooming- Totally dependent	No	7.59%	4.76	0.0922
M1810: Dressing (Upper)- Support required	No	40.63%	5.23	0.0042
M1810: Dressing (Upper)- Requires assistance	Yes	34.14%	30.79	<.0001
M1810: Dressing (Upper)- Totally dependent	Yes	9.57%	43.86	<.0001
M1820: Dressing (Lower)-Support required	No	23.03%	6.63	0.0011
M1820: Dressing (Lower)-Requires assistance	Yes	49.95%	29.48	<.0001
M1820: Dressing (Lower)-Totally dependent	Yes	15.56%	51.60	<.0001
M1830: Bathing- Independent with devices	No	9.28%	-6.75	0.0113
M1830: Bathing- Requires intermittent supervision	Yes	25.36%	12.50	<.0001
M1830: Bathing- Can bathe with another person present	Yes	38.23%	45.13	<.0001
M1830: Bathing- Able to bathe at sink	Yes	6.06%	31.26	<.0001
M1830: Bathing- Able to bathe at sink with support	Yes	10.40%	60.35	<.0001
M1830: Bathing- Totally dependent	Yes	8.02%	57.36	<.0001
M1840: Toilet transferring: Requires reminders/supervision	Yes	46.90%	-6.08	<.0001
M1840: Toilet transferring: Can use bedside commode but not toilet	Yes	9.36%	0.20	0.9037
M1840: Toilet transferring: Unable to get to toilet or bedside commode	Yes	1.25%	16.42	<.0001
M1840: Toilet transferring: Totally dependent	Yes	8.02%	15.99	<.0001
M1845: Toilet hygiene- Support required (laying out supplies)	No	38.77%	-5.49	<.0001
M1845: Toilet hygiene- Assistance required	Yes	26.08%	11.50	<.0001
M1845: Toilet hygiene- Totally dependent	Yes	8.49%	13.47	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1850: Transferring- Minimal assistance required	Yes	63.70%	30.48	<.0001
M1850: Transferring- Unable to transfer self/able to bear weight	Yes	17.31%	57.74	<.0001
M1850: Transferring- Unable to transfer self/unable to bear weight	Yes	5.17%	54.29	<.0001
M1850: Transferring- Bedfast/able to position self	Yes	0.79%	63.62	<.0001
M1850: Transferring-Bedfast/unable to position self	Yes	2.20%	44.97	<.0001
M1860: Ambulation- One-handed device required	Yes	15.12%	15.75	<.0001
M1860: Ambulation- Two-handed device required	Yes	39.49%	73.71	<.0001
M1860: Ambulation- Assistance required	Yes	28.84%	84.19	<.0001
M1860: Ambulation- Chairfast/able to wheel self	Yes	5.48%	113.51	<.0001
M1860: Ambulation- Chairfast/unable to wheel self	Yes	5.22%	121.68	<.0001
M1860: Ambulation- Bedfast	Yes	1.56%	86.86	<.0001
M1870: Feeding- Independent but supervision required	No	50.65%	1.26	0.1243
M1870: Feeding- Requires assistance	No	4.32%	3.83	0.0769
M1870: Feeding- Oral nutrients	No	0.40%	-0.08	0.991
M1870: Feeding- Nasogastric tube	No	0.70%	34.15	<.0001
M1870: Feeding- Unable to prepare any	No	0.10%	40.12	0.0004
M1880: Ability to prepare light meals- Unable to on a regular basis	No	42.80%	3.74	0.0007
M1880: Ability to prepare light meals- Unable to prepare any	No	39.50%	15.92	<.0001
M1890: Ability to use telephone-Uses specially adapted telephone	No	9.10%	2.63	0.0387
M1890: Ability to use telephone-difficulty placing calls	No	9.33%	10.88	<.0001
M1890: Ability to use telephone-Able to answer phone only some of the time	No	7.55%	7.09	<.0001
M1890: Ability to use telephone-Unable to answer phone	No	3.63%	10.86	<.0001
M1890: Ability to use telephone-Totally unable to use phone	No	4.86%	-28.42	<.0001
M1890: Ability to use telephone- Patient does not have a phone	No	1.88%	-32.50	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M1900: Prior Functioning ADL/IADL Self-care- Needed some help	No	49.79%	2.85	0.0152
M1900: Prior Functioning ADL/IADL Self-care- Dependent	No	9.45%	-8.35	0.0003
M1900: Prior Functioning ADL/IADL Ambulation- Needed some help	No	46.09%	14.31	<.0001
M1900: Prior Functioning ADL/IADL Ambulation- Dependent	No	8.65%	-5.98	0.0353
M1900: Prior Functioning ADL/IADL Transfer- Needed some help	No	41.56%	-3.84	0.0042
M1900: Prior Functioning ADL/IADL Transfer- Dependent	No	7.09%	-15.56	<.0001
M1900: Prior Functioning ADL/IADL Household tasks- Needed some help	No	44.09%	3.84	0.0006
M1900: Prior Functioning ADL/IADL Household tasks- Dependent	No	34.97%	4.07	0.0036
M1910: Falls assessment conducted- Yes, no risk for falls	No	11.06%	-47.11	<.0001
M1910: Falls assessment conducted- Yes, indicates risk for falls	No	83.43%	-2.08	0.1772
M2000: Drug regimen review- No problems found	No	80.28%	2.79	0.5666
M2000: Drug regimen review- Problems found	No	19.00%	16.67	0.0012
M2002: Medication follow-up- Yes	No	9.18%	-2.68	0.1659
M2010: Drug education- Yes	No	74.38%	-13.02	<.0001
M2010: Drug education- Not taking any high risk drugs	No	22.19%	-22.43	<.0001
M2020: Management of oral medications- Needs advance help	No	18.46%	13.86	<.0001
M2020: Management of oral medications- Needs reminders	No	9.57%	13.75	<.0001
M2020: Management of oral medications- Unable unless administered by someone else	No	16.40%	12.72	<.0001
M2020: Management of oral medications- No oral medications prescribed	No	0.28%	-30.62	<.0001
M2030: Management of injectable medications- Able to take independently	Yes	6.01%	-3.10	0.1591
M2030: Management of injectable medications- Needs advance help	No	4.10%	-4.84	0.0405

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M2030: Management of injectable medications- Needs reminders	No	2.16%	-10.60	0.0002
M2030: Management of injectable medications- Unable unless administered by someone else	No	11.70%	9.53	<.0001
M2040a: Prior medication management (Oral)- Needed some help	No	36.14%	-12.20	<.0001
M2040a: Prior medication management (Oral)- Needed some help	No	21.15%	-25.19	<.0001
M2040a: Prior medication management (Oral)- Not applicable	No	1.99%	71.99	<.0001
M2040b: Prior medication management (Injectable)- Needed some help	No	5.78%	-4.81	0.0423
M2040b: Prior medication management (Injectable)- Needed some help	No	6.74%	-8.74	0.0008
M2040b: Prior medication management (Injectable)- Not applicable	No	80.31%	-24.84	<.0001
M2100: ADL assistance- Caregiver assistance	No	65.65%	3.03	0.0678
M2100: ADL assistance- Caregiver needs training/support	No	18.05%	72.90	<.0001
M2100: ADL assistance- Caregiver needs training/support	No	1.95%	101.65	<.0001
M2100: ADL assistance- Unclear if caregiver will provide assistance	No	1.88%	80.86	<.0001
M2100: ADL assistance- Assistance needed but no caregiver available	No	3.37%	103.22	<.0001
M2100: IADL assistance- Caregiver assistance	No	85.13%	16.69	<.0001
M2100: IADL assistance- Caregiver needs training/support	No	7.59%	32.31	<.0001
M2100: IADL assistance- Caregiver needs training/support	No	0.69%	76.80	<.0001
M2100: IADL assistance- Unclear if caregiver will provide assistance	No	1.29%	45.69	<.0001
M2100: IADL assistance- Assistance needed but no caregiver available	No	2.51%	39.63	<.0001
M2100: Medication administration assistance- Caregiver assistance	No	55.28%	10.35	<.0001
M2100: Medication administration assistance- Caregiver needs training/support	No	16.09%	-18.43	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M2100: Medication administration assistance- Caregiver needs training/support	No	1.08%	-5.12	0.1675
M2100: Medication administration assistance- Unclear if caregiver will provide assistance	No	1.00%	-16.27	<.0001
M2100: Medication administration assistance- Assistance needed but no caregiver available	No	1.67%	17.83	<.0001
M2100: Medical procedures assistance- Caregiver assistance	No	18.66%	-8.09	<.0001
M2100: Medical procedures assistance- Caregiver needs training/support	No	11.98%	-27.87	<.0001
M2100: Medical procedures assistance- Caregiver needs training/support	No	3.71%	-31.76	<.0001
M2100: Medical procedures assistance- Unclear if caregiver will provide assistance	No	1.25%	-17.20	<.0001
M2100: Medical procedures assistance- Assistance needed but no caregiver available	No	3.04%	-58.71	<.0001
M2100: Management of equipment assistance- Caregiver assistance	No	19.46%	-0.10	0.9236
M2100: Management of equipment assistance- Caregiver needs training/support	No	6.92%	2.11	0.1928
M2100: Management of equipment assistance- Caregiver needs training/support	No	0.63%	25.95	<.0001
M2100: Management of equipment assistance- Unclear if caregiver will provide assistance	No	0.46%	-1.06	0.848
M2100: Management of equipment assistance- Assistance needed but no caregiver available	No	0.58%	42.74	<.0001
M2100: Supervision and safety assistance- Caregiver assistance	No	53.15%	-4.31	<.0001
M2100: Supervision and safety assistance- Caregiver needs training/support	No	9.90%	-19.57	<.0001
M2100: Supervision and safety assistance- Caregiver needs training/support	No	0.47%	17.64	0.0016
M2100: Supervision and safety assistance- Unclear if caregiver will provide assistance	No	0.89%	-12.15	0.007
M2100: Supervision and safety assistance- Assistance needed but no caregiver available	No	1.32%	-26.68	<.0001
M2100: Advocacy assistance- Caregiver assistance	No	85.48%	-10.42	<.0001

OASIS-C Item	Used in current payment system	Prevalence	R-squared:	0.106
			All Episodes- Wage-weighted minutes	
			Coefficient	P-value
M2100: Advocacy assistance- Caregiver needs training/support	No	4.92%	-29.75	<.0001
M2100: Advocacy assistance- Caregiver needs training/support	No	0.77%	-143.57	<.0001
M2100: Advocacy assistance- Unclear if caregiver will provide assistance	No	1.07%	-48.88	<.0001
M2100: Advocacy assistance- Assistance needed but no caregiver available	No	1.55%	-37.36	<.0001
M2110: Frequency of ADL/IADL Assistance- At least daily	No	82.98%	-10.59	0.0001
M2110: Frequency of ADL/IADL Assistance- 3+ times per week	No	8.13%	-9.07	0.0017
M2110: Frequency of ADL/IADL Assistance- 1-2 times per week	No	4.49%	-7.73	0.0099
M2110: Frequency of ADL/IADL Assistance- Less often than weekly	No	1.73%	-13.98	<.0001
M2110: Frequency of ADL/IADL Assistance- Unknown	No	0.30%	6.00	0.3632

Appendix Exhibit A7-2: OASIS Items Included in Chapter 7 Analysis

ADL/IADLs

(M1800) Grooming: Current ability to tend safely to personal hygiene needs (i.e., washing face and hands, hair care, shaving or make up, teeth or denture care, fingernail care).

- ☐ 0 - Able to groom self unaided, with or without the use of assistive devices or adapted methods.
- ☐ 1 - Grooming utensils must be placed within reach before able to complete grooming activities.
- ☐ 2 - Someone must assist the patient to groom self.
- ☐ 3 - Patient depends entirely upon someone else for grooming needs.

(M1810) Current **Ability to Dress Upper Body** safely (with or without dressing aids) including undergarments, pullovers, front-opening shirts and blouses, managing zippers, buttons, and snaps:

- ☐ 0 - Able to get clothes out of closets and drawers, put them on and remove them from the upper body without assistance.
- ☐ 1 - Able to dress upper body without assistance if clothing is laid out or handed to the patient.
- ☐ 2 - Someone must help the patient put on upper body clothing.
- ☐ 3 - Patient depends entirely upon another person to dress the upper body.

(M1820) Current **Ability to Dress Lower Body** safely (with or without dressing aids) including undergarments, slacks, socks or nylons, shoes:

- ☐ 0 - Able to obtain, put on, and remove clothing and shoes without assistance.
- ☐ 1 - Able to dress lower body without assistance if clothing and shoes are laid out or handed to the patient.
- ☐ 2 - Someone must help the patient put on undergarments, slacks, socks or nylons, and shoes.
- ☐ 3 - Patient depends entirely upon another person to dress lower body.

(M1830) Bathing: Current ability to wash entire body safely. **Excludes grooming (washing face, washing hands, and shampooing hair).**

- ☐ 0 - Able to bathe self in shower or tub independently, including getting in and out of tub/shower.
- ☐ 1 - With the use of devices, is able to bathe self in shower or tub independently, including getting in and out of the tub/shower.
- ☐ 2 - Able to bathe in shower or tub with the intermittent assistance of another person:
  (a) for intermittent supervision or encouragement or reminders, OR
  (b) to get in and out of the shower or tub, OR
  (c) for washing difficult to reach areas.
- ☐ 3 - Able to participate in bathing self in shower or tub, but requires presence of another person throughout the bath for assistance or supervision.
- ☐ 4 - Unable to use the shower or tub, but able to bathe self independently with or without the use of devices at the sink, in chair, or on commode.
- ☐ 5 - Unable to use the shower or tub, but able to participate in bathing self in bed, at the sink, in bedside chair, or on commode, with the assistance or supervision of another person throughout the bath.
- ☐ 6 - Unable to participate effectively in bathing and is bathed totally by another person.

(M1840) Toilet Transferring: Current ability to get to and from the toilet or bedside commode safely and transfer on and off toilet/commode.

- ☐ 0 - Able to get to and from the toilet and transfer independently with or without a device.
- ☐ 1 - When reminded, assisted, or supervised by another person, able to get to and from the toilet and transfer.
- ☐ 2 - Unable to get to and from the toilet but is able to use a bedside commode (with or without assistance).
- ☐ 3 - Unable to get to and from the toilet or bedside commode but is able to use a bedpan/urinal independently.
- ☐ 4 - Is totally dependent in toileting.

(M1845) Toileting Hygiene: Current ability to maintain perineal hygiene safely, adjust clothes and/or incontinence pads before and after using toilet, commode, bedpan, urinal. If managing ostomy, includes cleaning area around stoma, but not managing equipment.

- ☐ 0 - Able to manage toileting hygiene and clothing management without assistance.
- ☐ 1 - Able to manage toileting hygiene and clothing management without assistance if supplies/implements are laid out for the patient.
- ☐ 2 - Someone must help the patient to maintain toileting hygiene and/or adjust clothing.
- ☐ 3 - Patient depends entirely upon another person to maintain toileting hygiene.

(M1850) Transferring: Current ability to move safely from bed to chair, or ability to turn and position self in bed if patient is bedfast.

- ☐ 0 - Able to independently transfer.
- ☐ 1 - Able to transfer with minimal human assistance or with use of an assistive device.
- ☐ 2 - Able to bear weight and pivot during the transfer process but unable to transfer self.
- ☐ 3 - Unable to transfer self and is unable to bear weight or pivot when transferred by another person.
- ☐ 4 - Bedfast, unable to transfer but is able to turn and position self in bed.
- ☐ 5 - Bedfast, unable to transfer and is unable to turn and position self.

(M1860) Ambulation/Locomotion: Current ability to walk safely, once in a standing position, or use a wheelchair, once in a seated position, on a variety of surfaces.

- ☐ 0 - Able to independently walk on even and uneven surfaces and negotiate stairs with or without railings (i.e., needs no human assistance or assistive device).
- ☐ 1 - With the use of a one-handed device (e.g. cane, single crutch, hemi-walker), able to independently walk on even and uneven surfaces and negotiate stairs with or without railings.
- ☐ 2 - Requires use of a two-handed device (e.g., walker or crutches) to walk alone on a level surface and/or requires human supervision or assistance to negotiate stairs or steps or uneven surfaces.
- ☐ 3 - Able to walk only with the supervision or assistance of another person at all times.
- ☐ 4 - Chairfast, unable to ambulate but is able to wheel self independently.
- ☐ 5 - Chairfast, unable to ambulate and is unable to wheel self.
- ☐ 6 - Bedfast, unable to ambulate or be up in a chair.

NEURO/EMOTIONAL/BEHAVIORAL STATUS

(M1700) Cognitive Functioning: Patient's current (day of assessment) level of alertness, orientation, comprehension, concentration, and immediate memory for simple commands.

- ☐ 0 - Alert/oriented, able to focus and shift attention, comprehends and recalls task directions independently.
- ☐ 1 - Requires prompting (cuing, repetition, reminders) only under stressful or unfamiliar conditions.
- ☐ 2 - Requires assistance and some direction in specific situations (e.g., on all tasks involving shifting of attention), or consistently requires low stimulus environment due to distractibility.
- ☐ 3 - Requires considerable assistance in routine situations. Is not alert and oriented or is unable to shift attention and recall directions more than half the time.
- ☐ 4 - Totally dependent due to disturbances such as constant disorientation, coma, persistent vegetative state, or delirium.

(M1710) When Confused (Reported or Observed Within the Last 14 Days):

- ☐ 0 - Never
- ☐ 1 - In new or complex situations only
- ☐ 2 - On awakening or at night only
- ☐ 3 - During the day and evening, but not constantly
- ☐ 4 - Constantly
- ☐ NA - Patient nonresponsive

(M1720) When Anxious (Reported or Observed Within the Last 14 Days):

- ☐ 0 - None of the time
- ☐ 1 - Less often than daily
- ☐ 2 - Daily, but not constantly
- ☐ 3 - All of the time
- ☐ NA - Patient nonresponsive

(M1740) **Cognitive, behavioral, and psychiatric symptoms** that are demonstrated at least once a week (Reported or Observed): **(Mark all that apply.)**

- ☐ 1 - Memory deficit: failure to recognize familiar persons/places, inability to recall events of past 24 hours, significant memory loss so that supervision is required
- ☐ 2 - Impaired decision-making: failure to perform usual ADLs or IADLs, inability to appropriately stop activities, jeopardizes safety through actions
- ☐ 3 - Verbal disruption: yelling, threatening, excessive profanity, sexual references, etc.
- ☐ 4 - Physical aggression: aggressive or combative to self and others (e.g., hits self, throws objects, punches, dangerous maneuvers with wheelchair or other objects)
- ☐ 5 - Disruptive, infantile, or socially inappropriate behavior (**excludes** verbal actions)
- ☐ 6 - Delusional, hallucinatory, or paranoid behavior
- ☐ 7 - None of the above behaviors demonstrated

(M1745) **Frequency of Disruptive Behavior Symptoms (Reported or Observed)** Any physical, verbal, or other disruptive/dangerous symptoms that are injurious to self or others or jeopardize personal safety.

- ☐ 0 - Never
- ☐ 1 - Less than once a month
- ☐ 2 - Once a month
- ☐ 3 - Several times each month
- ☐ 4 - Several times a week
- ☐ 5 - At least daily

(M1750) Is this patient receiving **Psychiatric Nursing Services** at home provided by a qualified psychiatric nurse?

- ☐ 0 - No
- ☐ 1 - Yes

(M1220) Understanding of Verbal Content in patient's own language (with hearing aid or device if used):

- ☐ 0 - Understands: clear comprehension without cues or repetitions.
- ☐ 1 - Usually Understands: understands most conversations, but misses some part/intent of message. Requires cues at times to understand.
- ☐ 2 - Sometimes Understands: understands only basic conversations or simple, direct phrases. Frequently requires cues to understand.
- ☐ 3 - Rarely/Never Understands
- ☐ UK - Unable to assess understanding.

(M1230) Speech and Oral (Verbal) Expression of Language (in patient's own language):

- ☐ 0 - Expresses complex ideas, feelings, and needs clearly, completely, and easily in all situations with no observable impairment.
- ☐ 1 - Minimal difficulty in expressing ideas and needs (may take extra time; makes occasional errors in word choice, grammar or speech intelligibility; needs minimal prompting or assistance).
- ☐ 2 - Expresses simple ideas or needs with moderate difficulty (needs prompting or assistance, errors in word choice, organization or speech intelligibility). Speaks in phrases or short sentences.
- ☐ 3 - Has severe difficulty expressing basic ideas or needs and requires maximal assistance or guessing by listener. Speech limited to single words or short phrases.
- ☐ 4 - Unable to express basic needs even with maximal prompting or assistance but is not comatose or unresponsive (e.g., speech is nonsensical or unintelligible).
- ☐ 5 - Patient nonresponsive or unable to speak.

(M1034) Overall Status: Which description best fits the patient's overall status? **(Check one)**

- ☐ 0 - The patient is stable with no heightened risk(s) for serious complications and death (beyond those typical of the patient's age).
- ☐ 1 - The patient is temporarily facing high health risk(s) but is likely to return to being stable without heightened risk(s) for serious complications and death (beyond those typical of the patient's age).
- ☐ 2 - The patient is likely to remain in fragile health and have ongoing high risk(s) of serious complications and death.
- ☐ 3 - The patient has serious progressive conditions that could lead to death within a year.
- ☐ UK - The patient's situation is unknown or unclear.

Appendix Exhibit A7-3: Regression of Resource Use on OASIS Items

Variable	Coefficient	P-Value
Admission Source With Timing (Community Early excluded)		
Community Late	-$682.06	0
Institutional Early	$287.50	0
Institutional Late	$24.69	0
Clinical Group (MMTA Excluded)		
Behavioral Health	-$68.09	0
Complex	$225.29	0
Musculoskeletal Rehabilitation	$35.63	0
Neuro Rehabilitation	$246.15	0
Wound	$543.99	0
Age is 75+ (Excluded category is Age is 74 or less)	$3.64	0
OASIS Items (Response Category 0 or No is excluded category for each item)		
M1800: Grooming - Response Category 1	$45.45	0
M1810: Ability to Dress Upper Body - Response Category 1	$47.70	0
M1820: Ability to Dress Lower Body - Response Category 1	$63.17	0
M1820: Ability to Dress Lower Body - Response Category 2	$125.63	0
M1830: Bathing - Response Category 1	$59.64	0
M1830: Bathing - Response Category 2	$172.09	0
M1830: Bathing - Response Category 3	$258.41	0
M1840: Toilet Transferring - Response Category 1	$44.43	0
M1845: Toileting Hygiene - Response Category 1	-$21.89	0
M1850: Transferring - Response Category 1	$66.80	0
M1850: Transferring - Response Category 2	$125.40	0
M1860: Ambulation/Locomotion - Response Category 1	$124.74	0
M1860: Ambulation/Locomotion - Response Category 2	$164.52	0
M1860: Ambulation/Locomotion - Response Category 3	$270.57	0
M1700: Cognitive Functioning - Response Category 1	$7.41	0
M1710: When Confused - Response Category 1	-$54.64	0
M1720: When Anxious - Response Category 1	$30.50	0
M1740: Memory deficit - Yes	-$36.06	0
M1740: Impaired Decision Making - Yes	-$2.33	0.049
M1740: Verbal Disruption - Yes	-$44.26	0
M1740: Physical Aggression - Yes	-$134.59	0
M1740: Disruptive Behavior - Yes	-$92.21	0
M1740: Delusional - Yes	-$30.14	0
M1745: Frequency of Disruptive Behavior Symptoms - Response Category 1	-$14.98	0
M1750: Psychiatric Nursing Services - Yes	-$34.35	0
M1220: Understanding of Verbal Content - Response Category 1	-$7.93	0
M1230: Speech and Oral Expression of Language - Response Category 1	-$52.64	0
M1032: Risk of Hospitalization - 4 or more signs	$130.39	0
Constant	$1,358.97	0
N	9,418,486	-
Adjusted R-Squared	0.2748	-
Average Resource use	$1,530.30	-

Appendix Exhibit A7-4: Regression of Resource Use on a Reduced Set of OASIS Items

Variable	Coefficient	P-Value
Admission Source With Timing (Community Early excluded)		
Community Late	-$678.57	0
Institutional Early	$294.62	0
Institutional Late	$32.03	0
Clinical Group (MMTA Excluded)		
Behavioral Health	-$123.20	0
Complex	$226.71	0
Musculoskeletal Rehabilitation	$36.99	0
Neuro Rehabilitation	$227.40	0
Wound	$541.75	0
OASIS Items (Response Category 0 is Excluded for each Item)		
M1800: Grooming - Response Category 1	$27.22	0
M1810: Ability to Dress Upper Body - Response Category 1	$44.19	0
M1820: Ability to Dress Lower Body - Response Category 1	$65.74	0
M1820: Ability to Dress Lower Body - Response Category 2	$103.53	0
M1830: Bathing - Response Category 1	$57.30	0
M1830: Bathing - Response Category 2	$167.62	0
M1830: Bathing - Response Category 3	$246.62	0
M1840: Toilet Transferring - Response Category 1	$36.60	0
M1850: Transferring - Response Category 1	$69.99	0
M1850: Transferring - Response Category 2	$127.77	0
M1860: Ambulation/Locomotion - Response Category 1	$128.93	0
M1860: Ambulation/Locomotion - Response Category 2	$166.40	0
M1860: Ambulation/Locomotion - Response Category 3	$270.10	0
M1032: Risk of Hospitalization - 4 or more signs	$117.26	0
Constant	$1,359.90	0
N	9,418,486	-
Adjusted R-Squared	0.2734	-
Average Resource use	$1,530.30	-

Appendix Exhibit A7-5: Average Resource Use by Functional Score and Clinical Group

	MMTA 3 Levels		Behavioral Health 2 Levels		Complex 3 Levels		MS 2 Levels		Neuro 3 Levels		Wound 3 Levels	
Score	mean	N	mean	N	mean	N	mean	N	mean	N	mean	N
0	$1,028.59	162,051	$716.16	18,049	$1,264.52	21,085	$1,109.02	11,931	$1,209.21	8,832	$1,648.12	31,522
3	$900.94	6,078	$646.90	805	$1,111.10	526	$888.82	550	$1,046.06	506	$1,403.58	1,093
4	$1,182.87	741	$839.65	25	$1,281.07	108	$1,230.30	148	$1,229.73	64	$1,537.02	142
6	$1,129.74	59,973	$733.89	7,190	$1,413.41	6,228	$1,155.03	5,279	$1,320.46	4,176	$1,682.32	7,560
7	$978.56	164,131	$773.08	7,907	$1,304.86	7,875	$1,145.17	24,296	$1,249.98	7,555	$1,591.08	20,348
8	$447.29	3	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0
9	$999.12	5,298	$745.02	924	$1,299.83	343	$1,075.43	536	$1,129.95	544	$1,599.47	653
10	$869.04	12,931	$620.05	859	$1,262.14	709	$933.92	2,083	$1,085.34	720	$1,369.35	1,324
11	$1,176.93	1,545	$978.28	63	$1,292.57	174	$1,245.78	329	$1,547.10	123	$1,402.23	203
12	$1,058.85	7,031	$782.76	1,286	$1,194.69	1,013	$1,053.54	322	$1,197.23	470	$1,739.95	887
13	$1,068.40	219,873	$871.41	11,507	$1,376.46	11,327	$1,187.82	33,894	$1,311.29	12,813	$1,662.55	24,197
14	$1,092.31	9,632	$960.45	281	$1,441.08	403	$1,278.09	2,010	$1,496.74	388	$1,728.78	1,683
15	$900.08	846	$629.12	121	$1,323.33	95	$954.13	47	$1,222.70	87	$1,917.05	148
16	$927.57	21,628	$732.09	1,691	$1,058.56	829	$1,032.58	3,196	$1,084.12	1,723	$1,463.78	2,047
17	$1,251.69	36,870	$968.78	2,246	$1,551.75	5,418	$1,305.27	3,732	$1,357.04	2,506	$1,798.15	9,368
18	$1,152.80	5,128	$899.73	499	$1,553.41	487	$1,273.97	561	$1,269.33	384	$1,546.48	447
19	$1,213.77	55,822	$943.21	3,713	$1,457.45	3,261	$1,306.54	6,973	$1,414.53	4,135	$1,744.44	6,453
20	$1,189.25	203,433	$981.38	6,891	$1,480.07	7,404	$1,345.41	39,245	$1,394.82	12,481	$1,759.31	29,174
21	$1,144.17	3,496	$1,015.95	183	$1,361.51	341	$1,285.40	788	$1,216.33	233	$1,594.46	381
22	$1,006.52	6,134	$831.60	462	$1,359.62	283	$1,083.05	725	$1,264.14	515	$1,643.48	714
23	$1,050.72	24,807	$928.73	1,303	$1,338.74	881	$1,138.95	4,427	$1,288.42	1,962	$1,656.62	2,885
24	$1,241.89	90,670	$988.65	3,775	$1,497.32	6,065	$1,411.06	15,357	$1,454.98	6,847	$1,731.51	14,607
25	$1,164.58	15,905	$957.79	1,369	$1,440.47	1,586	$1,170.38	1,242	$1,355.84	1,088	$1,857.80	2,250
26	$1,249.45	314,377	$1,038.41	11,928	$1,548.66	11,276	$1,357.96	53,157	$1,499.89	22,855	$1,736.68	35,096
27	$1,255.09	45,078	$1,001.74	2,032	$1,536.25	1,713	$1,408.73	9,598	$1,440.12	3,437	$1,862.00	6,761
28	$1,199.25	9,296	$972.71	692	$1,523.63	927	$1,321.15	1,088	$1,353.75	848	$1,706.61	1,098
29	$1,061.04	41,140	$932.28	2,099	$1,451.72	1,385	$1,162.69	6,302	$1,301.01	3,474	$1,581.92	4,686
30	$1,342.84	98,455	$1,084.60	4,897	$1,582.83	4,593	$1,370.42	20,068	$1,540.69	11,176	$1,800.55	11,931
31	$1,282.15	47,398	$1,032.85	2,286	$1,650.08	2,795	$1,459.05	7,720	$1,438.17	3,669	$1,749.02	7,523
32	$1,268.98	27,692	$1,144.66	1,315	$1,613.28	1,875	$1,367.31	3,539	$1,488.52	2,049	$1,807.36	4,606
33	$1,359.63	193,477	$1,065.83	5,073	$1,675.42	5,668	$1,457.80	42,139	$1,549.52	12,231	$1,856.85	23,489
34	$1,287.25	21,868	$1,084.46	1,202	$1,620.44	1,254	$1,395.04	3,775	$1,466.27	2,536	$1,976.96	5,760
35	$1,289.26	26,844	$1,009.96	1,081	$1,465.27	1,438	$1,472.68	5,252	$1,509.07	2,340	$1,754.14	2,707
36	$1,239.15	47,584	$1,099.57	1,999	$1,529.28	1,834	$1,307.78	8,947	$1,434.48	4,269	$1,732.93	5,392
37	$1,412.15	289,045	$1,187.90	9,461	$1,701.88	10,931	$1,510.99	54,551	$1,625.60	23,874	$1,897.11	41,510
38	$1,316.71	64,730	$1,110.59	4,256	$1,630.27	3,008	$1,404.36	9,548	$1,495.30	6,843	$1,868.58	6,560
39	$1,310.31	21,725	$1,055.16	786	$1,657.46	1,160	$1,465.24	4,080	$1,405.06	1,540	$1,825.66	3,183
40	$1,328.77	102,199	$1,086.20	4,310	$1,639.42	3,222	$1,458.35	21,453	$1,540.46	10,389	$1,825.60	14,370
41	$1,408.05	122,919	$1,196.55	5,862	$1,655.77	4,930	$1,441.48	25,329	$1,655.00	15,568	$1,876.86	13,499
42	$1,380.31	15,694	$1,163.13	1,028	$1,638.38	836	$1,395.94	2,276	$1,566.67	1,574	$1,939.02	1,785

	MMTA 3 Levels		Behavioral Health 2 Levels		Complex 3 Levels		MS 2 Levels		Neuro 3 Levels		Wound 3 Levels	
Score	mean	N	mean	N	mean	N	mean	N	mean	N	mean	N
43	$1,395.11	35,870	$1,248.89	1,155	$1,764.11	1,447	$1,480.62	7,474	$1,587.98	3,333	$1,849.21	4,359
44	$1,487.42	255,538	$1,179.31	7,845	$1,839.24	9,033	$1,545.03	46,467	$1,645.84	19,683	$1,947.80	36,331
45	$1,467.93	40,553	$1,275.49	1,510	$1,791.79	2,449	$1,513.71	5,668	$1,649.30	3,211	$1,963.68	7,281
46	$1,374.59	21,286	$1,075.60	802	$1,606.45	1,004	$1,477.80	4,323	$1,608.46	2,242	$1,920.50	3,006
47	$1,378.54	83,043	$1,163.35	3,418	$1,698.53	2,789	$1,434.17	15,717	$1,593.23	8,966	$1,873.58	12,733
48	$1,518.38	287,927	$1,272.03	9,147	$1,813.05	10,029	$1,546.91	57,449	$1,700.13	28,307	$1,948.18	33,706
49	$1,507.30	44,636	$1,278.59	2,141	$1,793.76	2,450	$1,559.49	5,825	$1,683.41	4,292	$2,042.13	6,000
50	$1,385.09	45,466	$1,237.62	1,540	$1,794.37	1,451	$1,454.80	9,520	$1,690.93	4,629	$1,832.04	5,194
51	$1,486.68	228,668	$1,222.91	10,806	$1,806.44	7,542	$1,547.65	42,320	$1,657.18	28,502	$1,938.93	31,980
52	$1,552.24	151,717	$1,316.63	5,284	$1,846.52	6,729	$1,566.44	27,620	$1,770.03	18,364	$2,036.05	21,036
53	$1,517.64	24,052	$1,384.60	1,117	$1,800.82	1,092	$1,555.13	3,632	$1,703.77	3,198	$2,018.06	3,073
54	$1,558.30	102,319	$1,346.00	3,378	$1,800.89	2,864	$1,552.04	22,136	$1,763.81	11,772	$2,015.59	12,666
55	$1,557.10	201,457	$1,344.17	11,126	$1,884.82	7,367	$1,564.22	38,215	$1,792.76	36,237	$1,960.23	24,693
56	$1,614.07	84,479	$1,304.48	2,558	$1,997.73	4,470	$1,605.95	12,330	$1,790.54	6,918	$2,135.25	13,040
57	$1,536.61	49,117	$1,320.83	1,919	$1,954.33	1,640	$1,570.49	10,074	$1,756.79	6,337	$1,976.33	6,911
58	$1,571.16	116,903	$1,316.57	5,199	$1,857.92	3,957	$1,589.45	23,655	$1,814.35	18,665	$2,040.97	18,850
59	$1,556.66	69,390	$1,295.37	2,792	$1,976.49	3,785	$1,601.27	10,619	$1,737.37	7,955	$2,080.71	12,290
60	$1,637.47	67,261	$1,397.85	2,538	$2,049.53	3,594	$1,643.94	9,901	$1,846.52	7,700	$2,059.65	9,135
61	$1,580.05	141,575	$1,355.39	7,457	$1,856.22	4,551	$1,592.88	30,876	$1,880.74	27,245	$2,004.97	18,159
62	$1,574.18	66,315	$1,307.07	2,348	$1,870.47	2,637	$1,546.02	12,091	$1,753.15	8,584	$2,032.40	10,875
63	$1,622.88	89,601	$1,395.95	4,248	$2,017.48	4,913	$1,636.89	12,252	$1,830.92	11,887	$2,059.81	12,999
64	$1,694.62	68,915	$1,426.99	3,277	$1,922.29	2,966	$1,687.10	14,462	$1,934.97	14,109	$2,080.13	12,206
65	$1,525.87	101,529	$1,362.96	4,234	$1,884.98	3,703	$1,560.22	21,217	$1,804.87	17,274	$2,054.04	13,896
66	$1,700.97	60,779	$1,396.48	2,610	$2,097.67	3,065	$1,680.71	9,741	$1,834.55	8,675	$2,120.41	10,990
67	$1,650.88	57,368	$1,451.92	3,431	$2,013.94	2,629	$1,670.03	7,592	$1,878.07	10,249	$2,046.21	7,865
68	$1,632.54	61,068	$1,394.01	2,844	$1,943.64	2,574	$1,667.10	12,822	$1,868.17	13,291	$2,105.38	12,047
69	$1,726.38	51,655	$1,471.32	1,939	$2,078.24	2,603	$1,707.43	8,303	$1,955.66	7,610	$2,139.40	9,327
70	$1,666.72	45,151	$1,419.67	2,490	$1,990.65	2,295	$1,678.72	6,706	$1,854.14	8,351	$2,090.77	8,171
71	$1,676.85	32,186	$1,421.27	1,582	$1,954.93	1,643	$1,716.76	5,978	$1,918.28	8,576	$2,114.34	9,177
72	$1,792.30	41,385	$1,448.28	1,851	$2,208.74	2,167	$1,757.89	6,965	$1,967.02	8,631	$2,179.12	9,625
73	$1,686.87	73,031	$1,494.59	3,533	$2,046.88	3,544	$1,711.37	11,688	$1,981.92	13,725	$2,144.21	11,409
74	$1,710.41	22,014	$1,444.38	1,253	$1,866.05	1,182	$1,736.43	3,923	$1,918.82	6,507	$2,127.32	6,121
75	$1,676.85	35,388	$1,561.89	1,512	$1,957.52	2,134	$1,708.89	6,053	$1,926.20	8,663	$2,134.11	9,815
76	$1,761.11	81,271	$1,483.59	4,619	$2,157.93	4,736	$1,755.37	13,925	$1,966.12	21,466	$2,135.11	19,877
77	$1,637.79	24,652	$1,506.21	1,208	$2,089.22	884	$1,693.08	3,743	$1,898.50	4,412	$2,186.16	3,686
78	$1,725.19	33,690	$1,481.86	1,728	$1,931.17	2,525	$1,748.97	5,515	$1,949.85	12,109	$2,174.20	11,721
79	$1,797.50	14,033	$1,601.10	452	$2,104.93	846	$1,838.45	2,600	$2,018.45	3,233	$2,297.45	5,311
80	$1,755.30	22,498	$1,522.61	1,007	$1,951.17	1,215	$1,836.70	4,036	$2,020.95	5,117	$2,289.14	5,652
81	$1,842.10	11,386	$1,650.65	481	$2,200.23	722	$1,819.99	1,268	$2,098.84	1,789	$2,321.99	1,798
82	$1,792.83	14,792	$1,481.54	893	$2,138.26	968	$1,784.23	2,381	$2,010.47	4,525	$2,216.96	5,155
83	$1,756.88	41,536	$1,512.06	1,461	$1,957.17	3,403	$1,842.23	7,818	$2,016.77	11,811	$2,300.94	19,046
84	$1,890.93	10,398	$1,615.13	599	$2,328.53	630	$1,936.54	1,355	$2,056.28	2,321	$2,318.06	1,876

	MMTA 3 Levels		Behavioral Health 2 Levels		Complex 3 Levels		MS 2 Levels		Neuro 3 Levels		Wound 3 Levels	
Score	mean	N	mean	N	mean	N	mean	N	mean	N	mean	N
85	$1,826.19	11,676	$1,680.25	456	$2,376.54	722	$1,852.86	1,474	$2,102.37	1,945	$2,309.05	1,800
86	$1,726.25	170,390	$1,491.04	8,988	$1,798.18	35,858	$1,796.86	24,778	$1,961.60	85,244	$2,205.81	129,677
87	$1,757.24	5,024	$1,666.60	294	$1,839.38	223	$1,777.53	859	$2,086.93	1,156	$2,190.48	1,231
88	$1,875.10	25,383	$1,660.21	1,454	$2,288.30	1,811	$1,908.15	3,121	$2,056.50	6,420	$2,273.97	4,628
89	$1,894.67	344	$1,232.99	5	$2,368.26	32	$1,838.21	47	$2,129.73	51	$2,810.10	87
90	$1,851.29	5,957	$1,683.75	414	$2,048.36	404	$1,913.86	1,025	$2,161.65	2,148	$2,331.56	1,793
91	$1,993.12	2,358	$1,604.21	55	$2,116.95	156	$2,148.63	361	$2,293.64	441	$2,267.92	751
92	$1,917.81	1,290	$1,341.64	49	$2,077.99	150	$1,968.30	216	$2,118.39	226	$2,336.60	458
94	$2,011.16	2,695	$1,674.17	158	$2,153.17	168	$2,120.48	426	$2,225.36	755	$2,439.06	832
95	$1,962.02	7,644	$1,745.39	297	$2,325.61	685	$2,056.75	1,141	$2,259.37	1,838	$2,473.62	2,605
98	$1,978.46	45,375	$1,707.36	2,612	$2,229.86	7,826	$2,007.05	5,568	$2,257.41	18,743	$2,439.45	22,769
Total	$1,434.00	5,993,581	$1,167.61	277,570	$1,727.68	315,548	$1,505.63	1,041,764	$1,763.45	776,262	$1,984.36	1,013,761

Appendix Exhibit A9-1: Comorbidity References

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Appendix Exhibit A9-2: Home Health Comorbidity Groups

Category Name	ICD-9	Description
HEART DISEASE		
Heart1	402.01	mal hypert hrt dis w hf
Heart1	402.11	benign hyp ht dis w hf
Heart2	404.01	mal hyp ht/kd i-iv w hf
Heart2	404.03	mal hyp ht/kd stg v w hf
Heart2	404.11	ben hyp ht/kd i-iv w hf
Heart2	404.13	ben hyp ht/kd stg v w hf
Heart2	404.91	hyp ht/kd nos i-iv w hf
Heart3	411.0	post mi syndrome
Heart3	411.1	intermed coronary synd
Heart3	411.81	acute cor occlsn w/o mi
Heart3	411.89	ac ischemic hrt dis nec
Heart4	413.0	angina decubitus
Heart4	413.1	prinzmetal angina
Heart4	413.9	angina pectoris nec/nos
Heart5	414.00	cor ath unsp vsl ntv/gft
Heart5	414.01	crnry athrscl natve vssl
Heart5	414.02	crn ath atlg vn bps grft
Heart5	414.03	crn ath nonatlg blg grft
Heart5	414.04	cor ath artry bypas grft
Heart5	414.05	cor ath bypass graft nos
Heart5	414.06	cor ath natv art tp hrt
Heart5	414.07	cor ath bps graft tp hrt
Heart6	414.10	aneurysm of heart
Heart6	414.11	aneurysm of coronary vessels
Heart6	414.19	aneurysm of heart nec
Heart7	414.2	chr tot occlus cor artry
Heart7	414.3	cor ath d/t lpd rch plaq
Heart7	414.4	cor ath d/t calc cor lsn
Heart7	414.8	chr ischemic hrt dis nec
Heart7	414.9	chr ischemic hrt dis nos
Heart8	416.0	primary pulmonary hypertension
Heart8	416.1	kyphoscoliotic heart disease
Heart8	416.2	chronic pulmonary embolism
Heart8	416.8	other chronic pulmonary heart diseases
Heart8	416.9	chronic pulmonary heart disease unsp

Category Name	ICD-9	Description
Heart9	424.0	mitral valve disorder
Heart9	424.1	aortic valve disorder
Heart9	424.2	tricuspid valve disorder
Heart9	424.3	pulmonary valve disorder
Heart9	397.0	diseases of the tricuspid valve
Heart10	427.31	atrial fibrillation
Heart10	427.32	atrial flutter
Heart10	427.81	sinoatrial node dysfunction
Heart10	427.89	other specified cardiac dysrhythmias
Heart10	427.9	cardiac dysrhythmias unspecified
Heart11	428.0	chf nos
Heart11	428.1	left heart failure
Heart11	428.20	systolic hrt failure nos
Heart11	428.21	ac systolic hrt failure
Heart11	428.22	chr systolic hrt failure
Heart11	428.23	ac on chr syst hrt fail
Heart11	428.30	diastolc hrt failure nos
Heart11	428.31	ac diastolic hrt failure
Heart11	428.32	chr diastolic hrt fail
Heart11	428.33	ac on chr diast hrt fail
Heart11	428.40	syst/diast hrt fail nos
Heart11	428.41	ac syst/diastol hrt fail
Heart11	428.42	chr syst/diastl hrt fail
Heart11	428.43	ac/chr syst/dia hrt fail
Heart11	428.9	heart failure nos
Heart11	398.91	rheumatic heart failure
Heart12	429.2	Coronary Artery Disease
Heart12	429.89	heart disease other
RESPIRATORY DISEASE		
Resp1	327.23	obstructive sleep apnea
Resp2	480.0	Viral Pneumonia Due to Adenovirus
Resp2	480.1	Viral Pneumonia Due to Respiratory Syncytial Virus
Resp2	480.2	Viral Pneumonia Due to Parainfluenza Virus
Resp2	480.3	Pneumonia d/t SARS
Resp2	480.8	Viral Pneumonia Due to Other Virus NEC
Resp2	481	Pneumococcal Pneumonia
Resp2	482.0	Pneumonia Due to Klebsiella Pneumoniae

Category Name	ICD-9	Description
Resp2	482.1	Pneumonia Due to Pseudomonas
Resp2	482.2	Pneumonia Due to Hemophilus Influenzae
Resp2	482.30	Pneumonia Due to Streptococcus, Unspecified
Resp2	482.31	Pneumonia Due to Streptococcus; Group A
Resp2	482.32	Pneumonia Due to Streptococcus; Group B
Resp2	482.39	Pneumonia Due to Streptococcus; Other
Resp2	482.40	Pneumonia Due to Staphylococcus, Unspecified
Resp2	482.41	Methicillin susceptible pneumonia due to Staphylococcus aureus
Resp2	482.42	Methicillin resistant pneumonia due to Staphylococcus aureus
Resp2	482.49	Pneumonia Due to Staphylococcus, Other
Resp2	482.81	Pneumonia Due to Anaerobes
Resp2	482.82	Pneumonia Due to Escherichia coli
Resp2	482.83	Pneumonia d/t other gram negative bac
Resp2	482.84	Legionnaires' Disease
Resp2	482.89	Pneumonia d/t other specified bacteria
Resp2	482.9	Bacterial pneumonia, unspecified
Resp2	483.0	Mycoplasma pneumoniae
Resp2	483.1	Chlamydia pneumonia
Resp2	483.8	Pneumonia d/t other specified organism
Resp2	484.1	Pneumonia in cytomeaglic inclusion dx
Resp2	484.3	Pneumonia in whooping cough
Resp2	484.5	Pneumonia in anthrax
Resp2	484.6	Pneumonia in aspergillus
Resp2	484.7	Pneumonia in systemic mycoses
Resp2	484.8	Pneumonia in other infectious dxs
Resp2	485	Bronchopneumonia
Resp2	486	Pneumonia, organism unspecified
Resp3	487.0	Influenza w/ pneumonia
Resp3	487.1	Influenza w/other resp. manifestations
Resp3	487.8	Influenza w/other manifestations
Resp3	488.01	Influenza d/t avian flu w/pneumonia
Resp3	488.02	Influenza d/t avian flu w/other resp man
Resp3	488.09	Influenza d/t avian flu w/other manifest
Resp3	488.11	Influenza d/t H1N1 w/pneumonia
Resp3	488.12	Influenza d/t H1N1 w/resp manifest
Resp3	488.19	Influenza d/t H1N1 w/other manifes
Resp3	488.81	Influenza d/t novel influenza A w/pneu

Category Name	ICD-9	Description
Resp3	488.82	Influenza d/t novel A w/resp manifest
Resp3	488.89	Influenza d/t novel A w/other manifest
Resp4	490	bronchitis nos
Resp4	491.0	simple chronic bronchitis
Resp4	491.1	mucopurlulent chronic bronchitis
Resp4	491.20	obstructive chronic bronchitis w/o exab
Resp4	491.21	obstructive chronic bronchitis w/ exab
Resp4	491.22	obstructive chronic bronchitis w/acute bron
Resp4	492.0	Emphysema w/bleb
Resp4	492.8	Other emphysema
Resp5	493.00	extrinsic asthma nos
Resp5	493.01	ext asthma w status asth
Resp5	493.02	ext asthma w(acute) exac
Resp5	493.10	intrinsic asthma nos
Resp5	493.11	int asthma w status asth
Resp5	493.12	int asthma w (ac) exac
Resp5	493.20	chronic obst asthma nos
Resp5	493.21	ch ob asthma w stat asth
Resp5	493.22	ch obst asth w (ac) exac
Resp5	493.81	exercse ind bronchospasm
Resp5	493.82	cough variant asthma
Resp5	493.90	asthma nos
Resp5	493.91	asthma w status asthmat
Resp5	493.92	asthma nos w (ac) exac
Resp6	494.0	bronchiectasis w/o ac exac
Resp6	494.1	bronchiectasis w ac exac
Resp6	496	chr airway obstruct nec
Resp7	507.0	pneumonitis d/t food/vomitus
Resp7	514	pulmonary congestion
Resp8	515	postinflammatory pulmonary fibrosis
Resp8	516.31	Idiopathic pulmonary fibrosis
Resp9	518.0	pulmonary collapse/atelectasis
Resp9	518.1	Interstitial emphysema
Resp9	518.2	Compensatory emphysema
Resp9	518.82	other pulmonary insufficiency nec
Resp9	518.83	chronic respiratory failure
Resp9	518.84	acute and chronic respiratory failure

Category Name	ICD-9	Description
Resp9	518.89	other diseases of lung nec
CIRCULATORY DISEASE/BLOOD DISORDERS		
Circulatory1	280.0	chr blood loss anemia
Circulatory1	280.1	iron def anemia dietary
Circulatory1	280.8	iron defic anemia nec
Circulatory1	280.9	iron defic anemia nos
Circulatory1	281.0	pernicious anemia
Circulatory1	281.1	b12 defic anemia nec
Circulatory1	281.2	folate-deficiency anemia
Circulatory1	281.3	megaloblastic anemia nec
Circulatory1	281.4	protein defic anemia
Circulatory1	281.8	nutritional anemia nec
Circulatory1	281.9	deficiency anemia nos
Circulatory1	282.0	hereditary spherocytosis
Circulatory1	282.1	heredit elliptocytosis
Circulatory1	282.2	glutathione dis anemia
Circulatory1	282.3	enzyme defic anemia nec
Circulatory2	282.40	thalassemia, unspecified
Circulatory2	282.41	thlasema hb-s w/o crisis
Circulatory2	282.42	thlassemia hb-s w crisis
Circulatory2	282.43	alpha thalassemia
Circulatory2	282.44	beta thalassemia
Circulatory2	282.45	delta-beta thalassemia
Circulatory2	282.46	thalassemia minor
Circulatory2	282.47	hgb e-beta thalassemia
Circulatory2	282.49	thalassemia nec
Circulatory2	282.60	sickle cell disease nos
Circulatory2	282.61	hb-ss disease w/o crisis
Circulatory2	282.62	hb-ss disease w crisis
Circulatory2	282.63	hb-ss/hb-c dis w/o crsis
Circulatory2	282.64	hb-s/hb-c dis w crisis
Circulatory2	282.68	hb-s dis w/o crisis nec
Circulatory2	282.69	hb-ss dis nec w crisis
Circulatory2	282.7	hemoglobinopathies nec
Circulatory2	282.8	hered hemolytic anem nec
Circulatory2	282.9	hered hemolytic anem nos
Circulatory2	283.0	autoimmun hemolytic anem

Category Name	ICD-9	Description
Circulatory2	283.10	nonauto hem anemia nos
Circulatory2	283.11	hemolytic uremic synd
Circulatory2	283.19	oth nonauto hem anemia
Circulatory2	283.2	hemolytic hemoglobinuria
Circulatory2	283.9	acq hemolytic anemia nos
Circulatory2	284.01	constitution rbc aplasia
Circulatory2	284.09	const aplastc anemia nec
Circulatory2	284.11	antin chemo indcd pancyt
Circulatory2	284.12	oth drg indcd pancytopna
Circulatory2	284.19	other pancytopenia
Circulatory2	284.2	myelophthisis
Circulatory2	284.81	red cell aplasia
Circulatory2	284.89	aplastic anemias nec
Circulatory2	284.9	aplastic anemia nos
Circulatory2	285.0	sideroblastic anemia
Circulatory2	285.1	ac posthemorrhag anemia
Circulatory2	285.21	anemia in chr kidney dis
Circulatory2	285.22	anemia in neoplastic dis
Circulatory2	285.29	anemia-other chronic dis
Circulatory2	285.3	anemia d/t antineo chemo
Circulatory2	285.8	anemia nec
Circulatory2	285.9	anemia nos
Circulatory3	286.0	cong factor viii diord
Circulatory3	286.1	cong factor ix disorder
Circulatory3	286.2	cong factor xi disorder
Circulatory3	286.3	cong def clot factor nec
Circulatory3	286.4	von willebrand's disease
Circulatory3	286.52	acquired hemophilia
Circulatory3	286.53	antiphospholipid w hemor
Circulatory3	286.59	ot hem d/t circ anticoag
Circulatory3	286.6	defibrination syndrome
Circulatory3	286.7	acq coagul factor defic
Circulatory3	286.9	coagulat defect nec/nos
Circulatory4	403.00	mal hyp kid w cr kid unsp
Circulatory4	403.01	mal hyp kid w cr kid v
Circulatory4	403.10	ben hyp kid w cr kid unsp
Circulatory4	403.11	ben hyp kid w cr kid v

Category Name	ICD-9	Description
Circulatory4	403.90	unsp hyp kid cr kid
Circulatory4	403.91	hyp kid nos w cr kid v
Circulatory5	404.00	mal hy/kd st i-iv w/o hf
Circulatory5	404.01	mal hy ht/kd st i-iv w/ hf
Circulatory5	404.02	mal hy ht/kd st v w/o hf
Circulatory5	404.03	mal hyp ht/kd stg v w hf
Circulatory5	404.10	ben hy ht/kd st 1-1v w/o hf
Circulatory5	404.11	ben hy ht/kd st 1-iv w/hf
Circulatory5	404.12	ben hy ht/kd st v w/o hf
Circulatory5	404.13	ben hyp ht/kd stg v w hf
Circulatory5	404.90	hy ht/kd nos st 1-iv w/o hf
Circulatory5	404.91	hy ht/kd nos st i-iv w/hf
Circulatory5	404.92	hy ht/kd nos st v w/o hf
Circulatory5	404.93	hyp ht/kd nos st v w hf
Circulatory6	415.19	pulm embol/infarct nec
Circulatory7	440.0	aortic atherosclerosis
Circulatory7	440.1	renal artery atheroscler
Circulatory7	440.1	renal artery atheroscler
Circulatory7	440.20	athscl extrm ntv art nos
Circulatory7	440.21	ath ext ntv at w claudct
Circulatory7	440.22	ath ext ntv at w rst pn
Circulatory7	440.23	ath ext ntv art ulcrtion
Circulatory7	440.24	ath ext ntv gangrene
Circulatory7	440.9	generalized atherosclerosis
Circulatory8	441.2	thoracic aneurysm w/o rupture
Circulatory8	441.4	abdominal aneurysm w/o rupture
Circulatory8	441.7	thoracoabdominal ane w/o rupture
Circulatory8	441.9	aortic anuerysm w/o rupture
Circulatory8	443.9	pvd, unspecified
Circulatory9	453.0	budd-chiari syndrome
Circulatory9	453.1	thrombophlebitis migrans
Circulatory9	453.2	oth inf vena cava thromb
Circulatory9	453.3	renal vein thrombosis
Circulatory9	453.40	ac dvt/embl low ext nos
Circulatory9	453.41	ac dvt/emb prox low ext
Circulatory9	453.42	ac dvt/emb distl low ext
Circulatory9	453.50	ch dvt/embl low ext nos

Category Name	ICD-9	Description
Circulatory9	453.51	ch dvt/embl prox low ext
Circulatory9	453.52	ch dvt/embl dstl low ext
Circulatory9	453.6	embl suprfcl ves low ext
Circulatory9	453.71	ch emblsm suprfcl up ext
Circulatory9	453.72	ch dvt/embl up ext
Circulatory9	453.73	ch emblsm up ext nos
Circulatory9	453.74	ch emblsm axillary veins
Circulatory9	453.75	ch emblsm subclav veins
Circulatory9	453.76	ch embl internl jug vein
Circulatory9	453.77	ch embl thorac vein nec
Circulatory9	453.79	ch emblsm veins nec
Circulatory9	453.81	ac embl suprfcl up ext
Circulatory9	453.82	ac dvt/embl up ext
Circulatory9	453.83	ac emblsm up ext nos
Circulatory9	453.84	ac emblsm axillary veins
Circulatory9	453.85	ac embl subclav veins
Circulatory9	453.86	ac embl internl jug vein
Circulatory9	453.87	ac embl thorac vein nec
Circulatory9	453.89	ac embolism veins nec
Circulatory9	453.9	venous thrombosis nos
Circulatory10	454.0	varicose veins of LE w/ulcer
Circulatory10	454.1	varicose veins of LE w/dermatitis
Circulatory10	454.2	varicose veins of LE w/inf & ulcer
Circulatory10	456.1	esophageal varices w/o bleeding
Circulatory11	457.0	post-mastectomy lymphedema syndrome
Circulatory11	457.1	other lymphedema
Circulatory12	458.0	orthostatic hypotension
Circulatory12	458.8	other specified hypotension
Circulatory12	458.9	hypotension, unspecified
Circulatory12	459.8	chronic venous insufficicency
CEREBRAL VASCULAR DISEASE		
Cerebral1	433.10	ocl crtd art w/o infrct
Cerebral1	433.20	ocl vrtb art w/o infrct
Cerebral1	433.30	ocl mlt bi art w/o infrct
Cerebral1	433.80	ocl spcf art w/o infrct
Cerebral1	433.90	ocl art nos w/o infrct
Cerebral1	434.00	crbl thrmbs wo infrct

Category Name	ICD-9	Description
Cerebral1	434.10	crbl emblsm wo infrct
Cerebral1	434.90	crbl art oc nos wo infrc
Cerebral2	435.0	basilar artery syndrome
Cerebral2	435.1	vertebral artery syndrom
Cerebral2	435.3	vertbrobaslr artery synd
Cerebral2	435.8	trans cereb ischemia nec
Cerebral2	435.9	trans cereb ischemia nos
Cerebral3	437.0	cerebral atherosclerosis
Cerebral3	437.1	other generalized ischemic CVD
Cerebral4	438.0	Late effects of CVD-Cognitive Defects
Cerebral4	438.10	Late effects of CVD-Speech & Lang. Defects
Cerebral4	438.11	Aphasia
Cerebral4	438.12	Dysphasia
Cerebral4	438.13	Dysarthria
Cerebral4	438.14	Fluency Disorder
Cerebral4	438.19	Other speech and language defects
Cerebral4	438.21	late ef-hemplga dom side
Cerebral4	438.22	late ef-hemiplga non-dom
Cerebral4	438.30	late ef-mplga up lmb nos
Cerebral4	438.31	late ef-mplga up lmb dom
Cerebral4	438.32	lt ef-mplga uplmb nondom
Cerebral4	438.40	lte ef-mplga low lmb nos
Cerebral4	438.41	lte ef-mplga low lmb dom
Cerebral4	438.42	lt ef-mplga lowlmb nondm
Cerebral4	438.50	lt ef oth paral side nos
Cerebral4	438.51	lt ef oth paral dom side
Cerebral4	438.52	lt ef oth parals non-dom
Cerebral4	438.53	lt ef oth parals-bilat
Cerebral4	438.81	Apraxia
Cerebral4	438.82	Dysphagia
Cerebral4	438.84	Ataxia
Cerebral4	438.85	Vertigo
Cerebral4	438.89	Other late effects of CVD
GI DISEASE		
GI1	555.0	regional enteritis-small intestine
GI1	555.1	regional enteritis-large intestine
GI1	555.2	regional ileocolitis

Category Name	ICD-9	Description
GI1	555.9	Crohn's Disease nos
GI1	556.0	chronic ulcerative enterocolitis
GI1	556.1	chronic ulcerative ileocolitis
GI1	556.2	chronic ulcerative proctitis
GI1	556.3	chronic ulcerative proctosigmoiditis
GI1	556.4	pseudopolyposis of colon
GI1	556.5	left-sided chronic ulcerative colitis
GI1	556.6	universal chronic ulcerative colitis
GI1	556.8	other ulcerative colitis
GI1	556.9	ulcerative colitis unspecified
GI2	560.1	paralytic ileus
GI2	560.9	intestinal obstruct nos
GI3	564.00	constipation nos
GI4	571.0	alcoholic fatty liver
GI4	571.1	ac alcoholic hepatitis
GI4	571.2	alcohol cirrhosis liver
GI4	571.3	alcohol liver damage nos
GI4	571.40	chronic hepatitis unspecified
GI4	571.41	chronic persistent hepatitis
GI4	571.42	autoimmune hepatitis
GI4	571.49	other hepatitis
GI4	571.5	cirrhosis of liver nos
GI4	571.6	biliary cirrhosis
GI4	571.8	chronic liver dis nec
GI4	571.9	chronic liver dis nos
GI5	572.0	abscess of liver
GI5	572.1	portal pyemia
GI5	572.2	hepatic encephalopathy
GI5	572.3	portal hypertension
GI5	572.4	hepatorenal syndrome
GI5	572.8	oth sequela, chr liv dis
GI5	573.0	chr passiv congest liver
GI6	573.1	hepatitis in viral dis
GI6	573.2	hepatitis in oth inf dis
GI6	573.5	hepatopulmonary syndrome
GI6	573.8	liver disorders nec
GI7	574.20	gallstone w/o mention of cholecystitis w/o obst

Category Name	ICD-9	Description
GI7	575.10	cholecystitis unspecified
GI7	575.11	chronic cholecystitis
GI7	575.12	acute and chronic colecystitis
GI8	577.0	acute pancreatitis
GI8	577.1	chronic pancreatitis
GI9	579.0	celiac disease
NEUROLOGICAL & ASSOCIATED CONDITIONS		
Neuro1	290.0	senile dementia uncomp
Neuro1	290.10	presenile dementia
Neuro1	290.11	presenile delirium
Neuro1	290.12	presenile delusion
Neuro1	290.13	presenile depression
Neuro1	290.20	senile delusion
Neuro1	290.21	senile depressive
Neuro1	290.3	senile delirium
Neuro1	290.40	vascular dementia,uncomp
Neuro1	290.41	vasc dementia w delirium
Neuro1	290.42	vasc dementia w delusion
Neuro1	290.43	vasc dementia w depressn
Neuro2	293.0	Delirium d/t conds classified elsewhere
Neuro2	293.1	subacute delirium
Neuro3	294.0	amnestic disord oth dis
Neuro3	294.10	dementia w/o behav dist
Neuro3	294.11	dementia w behavior dist
Neuro3	294.20	demen nos w/o behv dstrb
Neuro3	294.21	demen nos w behav distrb
Neuro3	294.8	mental disor nec oth dis
Neuro4	331.0	Alzheimer's Disease
Neuro4	331.11	pick's disease
Neuro4	331.19	frontotemp dementia nec
Neuro4	331.2	senile degenerat brain
Neuro4	331.6	corticobasal degeneration
Neuro4	331.7	cereb degen in oth dis
Neuro4	331.82	Lewy body dementia
Neuro4	331.9	cerbral degeneration, unspecified
Neuro5	332.0	Parkinson's Disease
Neuro5	332.1	Secondary Parkinson's

Category Name	ICD-9	Description
Neuro6	341.0	neuromyelitis optica
Neuro6	341.1	schilder's disease
Neuro6	341.20	acute myelitis nos
Neuro6	341.21	acute myelitis oth cond
Neuro6	341.22	idiopathc trans myelitis
Neuro6	341.8	cns demyelination nec
Neuro6	341.9	cns demyelination nos
Neuro7	342.01	flaccid hemiplegia dominant side
Neuro7	342.02	flaccid hemiplegia nondominant side
Neuro7	342.11	spastic hemiplegia dominant side
Neuro7	342.12	spastic hemiplegia nondominant side
Neuro7	342.81	other specified hemiplegia domin side
Neuro7	342.82	other specified hemiplegia nondomin side
Neuro7	342.91	hemiplegia, unspec dominant side
Neuro7	342.92	hemiplegia, unspec nondominant side
Neuro7	344.00	quadriplegia unspec
Neuro7	344.01	C1-C4 complete
Neuro7	344.02	C1-C4 incomplete
Neuro7	344.03	C5-C7 complete
Neuro7	344.04	C5-C7 incomplete
Neuro7	344.09	Quadriplegia other
Neuro7	344.1	paraplegia
Neuro8	345.00	gen noncv ep w/o intr ep
Neuro8	345.01	gen nonconv ep w intr ep
Neuro8	345.10	gen cnv epil w/o intr ep
Neuro8	345.11	gen cnv epil w intr epil
Neuro8	345.80	epilep nec w/o intr epil
Neuro8	345.81	epilepsy nec w intr epil
Neuro8	345.90	epilep nos w/o intr epil
Neuro8	345.91	epilepsy nos w intr epil
Neuro9	348.39	Other encephalopathy
Neuro9	348.89	Other conditions of brain
Neuro10	356.9	heredity/idiopathic peripheral neurop
Neuro10	357.2	Polyneuropathy in diabetes
Neuro11	362.07	Diabetic macular edema
Neuro11	362.50	Macular Degeneration (senile), unspecified
Neuro11	362.51	Nonexudative senile macular degeneration

Category Name	ICD-9	Description
Neuro11	362.52	Exudative senile macular degeneration
Neuro11	362.53	Cystoid macular degeneration
Neuro11	362.54	Macular cyst, hole, or pseudohole
Neuro11	362.55	Toxic maculopathy
Neuro11	362.56	Macular puckering
Neuro11	362.57	Drusen (degenerative)
ENDOCRINE DISEASE		
Endrocrine1	244.0	postsurgical hypothyroid
Endrocrine1	244.1	postablat hypothyr nec
Endrocrine1	244.2	iodine hypothyroidism
Endrocrine1	244.3	iatrogen hypothyroid nec
Endrocrine1	244.8	acquired hypothyroid nec
Endrocrine1	244.9	hypothyroidism nos
Endrocrine2	249.00	sec dm wo cmp nt st uncn
Endrocrine2	249.01	sec dm wo comp uncontrld
Endrocrine2	249.10	sec dm keto nt st uncntr
Endrocrine2	249.11	sec dm ketoacd uncntrld
Endrocrine2	249.20	sec dm hpros nt st uncnr
Endrocrine2	249.21	sec dm hprosmlr uncntrld
Endrocrine2	249.30	sec dm ot cma nt st uncn
Endrocrine2	249.31	sec dm oth coma uncntrld
Endrocrine2	249.40	sec dm renl nt st uncntr
Endrocrine2	249.41	sec dm renal uncontrld
Endrocrine2	249.50	sec dm ophth nt st uncn
Endrocrine2	249.51	sec dm ophth uncontrld
Endrocrine2	249.60	sec dm neuro nt st uncn
Endrocrine2	249.61	sec dm neuro uncontrld
Endrocrine2	249.70	sec dm circ nt st uncntr
Endrocrine2	249.71	sec dm circ uncontrld
Endrocrine2	249.80	sec dm oth nt st uncontr
Endrocrine2	249.81	sec dm other uncontrld
Endrocrine2	249.90	sec dm unsp nt st uncon
Endrocrine2	249.91	sec dm unsp uncontrold
Endrocrine3	250.00	dmii wo cmp nt st uncntr
Endrocrine3	250.01	dmi wo cmp nt st uncntrl
Endrocrine3	250.02	dmii wo cmp uncntrld
Endrocrine3	250.03	dmi wo cmp uncntrld

Category Name	ICD-9	Description
Endrocrine3	250.10	dmii keto nt st uncntrld
Endrocrine3	250.11	dmi keto nt st uncntrld
Endrocrine3	250.12	dmii ketoacd uncontrold
Endrocrine3	250.13	dmi ketoacd uncontrold
Endrocrine3	250.20	dmii hprsm nt st uncntrl
Endrocrine3	250.21	dmi hprsm nt st uncntrld
Endrocrine3	250.22	dmii hprosmlr uncontrold
Endrocrine3	250.23	dmi hprosmlr uncontrold
Endrocrine3	250.30	dmii o cm nt st uncntrld
Endrocrine3	250.31	dmi o cm nt st uncntrld
Endrocrine3	250.32	dmii oth coma uncontrold
Endrocrine3	250.33	dmi oth coma uncontrold
Endrocrine3	250.40	dmii renl nt st uncntrld
Endrocrine3	250.41	dmi renl nt st uncntrld
Endrocrine3	250.42	dmii renal uncntrld
Endrocrine3	250.43	dmi renal uncntrld
Endrocrine3	250.50	dmii ophth nt st uncntrl
Endrocrine3	250.51	dmi ophth nt st uncntrld
Endrocrine3	250.52	dmii ophth uncntrld
Endrocrine3	250.53	dmi ophth uncntrld
Endrocrine3	250.60	dmii neuro nt st uncntrl
Endrocrine3	250.61	dmi neuro nt st uncntrld
Endrocrine3	250.62	dmii neuro uncntrld
Endrocrine3	250.63	dmi neuro uncntrld
Endrocrine3	250.70	dmii circ nt st uncntrld
Endrocrine3	250.71	dmi circ nt st uncntrld
Endrocrine3	250.72	dmii circ uncntrld
Endrocrine3	250.73	dmi circ uncntrld
Endrocrine3	250.80	dmii oth nt st uncntrld
Endrocrine3	250.81	dmi oth nt st uncntrld
Endrocrine3	250.82	dmii oth uncntrld
Endrocrine3	250.83	dmi oth uncntrld
Endrocrine3	250.90	dmii unspf nt st uncntrl
Endrocrine3	250.91	dmi unspf nt st uncntrld
Endrocrine3	250.92	dmii unspf uncntrld
Endrocrine3	250.93	dmi unspf uncntrld
Endrocrine4	262	other servere protein-calorie malnutrition

Category Name	ICD-9	Description
Endrocrine4	263.0	malnutrition of moderate degree
Endrocrine4	263.9	Unspecified protein-calorie malnutrition
Endrocrine5	274.9	gout
Endrocrine5	275.2	disorders of magnesium metabolism
Endrocrine5	275.3	disorders of phosperous metabolism
Endrocrine5	275.41	hypocalcemia
Endrocrine5	275.42	hypercalcemia
Endrocrine5	276	hyperosmolality/hypernatremia
Endrocrine5	276.1	hyposmolality/hyponatremia
Endrocrine5	276.50	volume depletion, unspecified
Endrocrine5	276.51	dehydration
Endrocrine5	276.69	fluid overload
Endrocrine5	276.7	hyperpotassemia
Endrocrine5	276.8	hypopotassemia
Endrocrine5	276.9	electrolyte and fluid disorders nec
Endrocrine5	278.01	morbid obesity
Endrocrine6	279.50	GVHD, unspecified
Endrocrine6	279.51	acute GVHD
Endrocrine6	279.52	chronic GVHD
Endrocrine6	279.53	acute on chronic GVHD
NEOPLASMS		
neoplasms1	140.0	Malignant neoplasm upper lip-vermillion border
neoplasms1	140.1	Malignant neoplasm lower lip-vermillion border
neoplasms1	140.3	Upper lip, inner aspect
neoplasms1	140.4	Lower lip, inner aspect
neoplasms1	140.6	Commissure of lip
neoplasms1	140.8	Other sites of lip
neoplasms1	141.0	Malignant neoplasm, base of tongue
neoplasms1	141.1	Dorsal surface of tongue
neoplasms1	141.2	Tip and lateral portion of tongue
neoplasms1	141.3	Ventral surface of tongue
neoplasms1	141.4	Anterior two-thirds of tongue
neoplasms1	141.5	Junctional zone
neoplasms1	141.6	Lingual tonsil
neoplasms1	141.8	Other sites of tongue
neoplasms1	141.9	Tongue, unspecified
neoplasms1	142.0	Malignant neoplasm parotid gland

Category Name	ICD-9	Description
neoplasms1	142.1	Submandibular gland
neoplasms1	142.2	Sublingual gland
neoplasms1	142.8	Other major salivary glands
neoplasms1	142.9	Salivary gland, unspecified
neoplasms1	143.00	Malignant neoplasm of upper gum
neoplasms1	143.1	Lower gum
neoplasms1	143.8	Other sites of gum
neoplasms1	143.9	Gum. Unspecified
neoplasms1	144.0	Malignant neoplasm of anterior portion of floor of mouth
neoplasms1	144.1	Lateral portion
neoplasms1	144.8	Other sites of floow of mouth
neoplasms1	144.9	Floor of mouth, unspecified
neoplasms1	145.0	Malignant neoplasm cheek mucosa
neoplasms1	145.1	Vestibule of mouth
neoplasms1	145.2	Hard palate
neoplasms1	145.3	Soft palate
neoplasms1	145.4	Uvula
neoplasms1	145.5	Palate, unspecified
neoplasms1	145.6	Retromolar area
neoplasms1	145.8	Other specified parts of mouth
neoplasms1	145.9	Mouth, unspecified
neoplasms1	146.0	Malignant neoplasm of tonsil
neoplasms1	146.1	Tonsillar fossa
neoplasms1	146.2	Tonsillar pillars
neoplasms1	146.3	Vallecula
neoplasms1	146.4	Anterior aspect of epiglottis
neoplasms1	146.5	Junctional region
neoplasms1	146.6	Lateral wall of oropharynx
neoplasms1	146.7	Posterior wall of oropharynx
neoplasms1	146.8	Other specified sites of oropharynx
neoplasms1	146.9	Oropharynx, unspecified
neoplasms1	147.0	Malignant neoplasm of nasopharynx-superior wall
neoplasms1	147.1	Posterior wall of nasopharynx
neoplasms1	147.2	Lateral wall of nasopharynx
neoplasms1	147.3	Anterior wall of nasopharynx
neoplasms1	147.8	Other specified sites of nasopharynx
neoplasms1	148.0	Malignant neoplasm of hypopharynx-postcricoid region

Category Name	ICD-9	Description
neoplasms1	148.1	Pyriform sinus
neoplasms1	148.2	Aryepiglottic fold
neoplasms1	148.3	Posterior hypopharyngeal wall
neoplasms1	148.8	Other specified sites of hypopharynx
neoplasms1	148.9	Hypopharynx, unspecified
neoplasms1	149.0	Malignant neoplasm of pharynx, unspecified
neoplasms1	149.1	Waldeyer's ring
neoplasms1	149.8	Other defined sites-POO cannot be assigned
neoplasms1	149.9	Ill-defined sitesof pharynx, oral cavity
neoplasms2	150.0	mal neo cervical esophag
neoplasms2	150.1	mal neo thoracic esophag
neoplasms2	150.2	mal neo abdomin esophag
neoplasms2	150.3	mal neo upper 3rd esoph
neoplasms2	150.4	mal neo middle 3rd esoph
neoplasms2	150.5	mal neo lower 3rd esoph
neoplasms2	150.8	mal neo esophagus nec
neoplasms2	150.9	mal neo esophagus nos
neoplasms2	151.0	mal neo stomach cardia
neoplasms2	151.1	malignant neo pylorus
neoplasms2	151.2	mal neo pyloric antrum
neoplasms2	151.3	mal neo stomach fundus
neoplasms2	151.4	mal neo stomach body
neoplasms2	151.5	mal neo stom lesser curv
neoplasms2	151.6	mal neo stom great curv
neoplasms2	151.8	malig neopl stomach nec
neoplasms2	151.9	malig neopl stomach nos
neoplasms2	152.0	malignant neopl duodenum
neoplasms2	152.1	malignant neopl jejunum
neoplasms2	152.2	malignant neoplasm ileum
neoplasms2	152.3	mal neo meckel's divert
neoplasms2	152.8	mal neo small bowel nec
neoplasms2	152.9	mal neo small bowel nos
neoplasms2	153.0	mal neo hepatic flexure
neoplasms2	153.1	mal neo transverse colon
neoplasms2	153.2	mal neo descend colon
neoplasms2	153.3	mal neo sigmoid colon
neoplasms2	153.4	malignant neoplasm cecum

Category Name	ICD-9	Description
neoplasms2	153.5	malignant neo appendix
neoplasms2	153.6	malig neo ascend colon
neoplasms2	153.7	mal neo splenic flexure
neoplasms2	153.8	malignant neo colon nec
neoplasms2	153.9	malignant neo colon nos
neoplasms2	154.0	mal neo rectosigmoid jct
neoplasms2	154.1	malignant neopl rectum
neoplasms2	154.2	malig neopl anal canal
neoplasms2	154.3	malignant neo anus nos
neoplasms2	154.8	mal neo rectum/anus nec
neoplasms3	155.0	mal neo liver, primary
neoplasms3	155.1	mal neo intrahepat ducts
neoplasms3	155.2	malignant neo liver nos
neoplasms3	156.0	malig neo gallbladder
neoplasms3	156.1	mal neo extrahepat ducts
neoplasms3	156.2	mal neo ampulla of vater
neoplasms3	156.8	malig neo biliary nec
neoplasms3	156.9	malig neo biliary nos
neoplasms4	157.0	mal neo pancreas head
neoplasms4	157.1	mal neo pancreas body
neoplasms4	157.2	mal neo pancreas tail
neoplasms4	157.3	mal neo pancreatic duct
neoplasms4	157.4	mal neo islet langerhans
neoplasms4	157.8	malig neo pancreas nec
neoplasms4	157.9	malig neo pancreas nos
neoplasms5	158.0	mal neo retroperitoneum
neoplasms5	158.8	mal neo peritoneum nec
neoplasms5	158.9	mal neo peritoneum nos
neoplasms6	162.0	malignant neo trachea
neoplasms6	162.2	malig neo main bronchus
neoplasms6	162.3	mal neo upper lobe lung
neoplasms6	162.4	mal neo middle lobe lung
neoplasms6	162.5	mal neo lower lobe lung
neoplasms6	162.8	mal neo bronch/lung nec
neoplasms6	162.9	mal neo bronch/lung nos
neoplasms6	163.0	mal neo parietal pleura
neoplasms6	163.1	mal neo visceral pleura

Category Name	ICD-9	Description
neoplasms6	163.8	malig neopl pleura nec
neoplasms6	163.9	malig neopl pleura nos
neoplasms6	164.0	malignant neopl thymus
neoplasms6	164.1	malignant neopl heart
neoplasms6	164.2	mal neo ant mediastinum
neoplasms6	164.3	mal neo post mediastinum
neoplasms6	164.8	mal neo mediastinum nec
neoplasms6	164.9	mal neo mediastinum nos
neoplasms7	170.0	mal neo skull/face bone
neoplasms7	170.1	malignant neo mandible
neoplasms7	170.2	malig neo vertebrae
neoplasms7	170.3	mal neo ribs/stern/clav
neoplasms7	170.4	mal neo long bones arm
neoplasms7	170.5	mal neo bones wrist/hand
neoplasms7	170.6	mal neo pelvic girdle
neoplasms7	170.7	mal neo long bones leg
neoplasms7	170.8	mal neo bones ankle/foot
neoplasms7	170.9	malig neopl bone nos
neoplasms8	171.0	mal neo soft tissue head
neoplasms8	171.2	mal neo soft tissue arm
neoplasms8	171.3	mal neo soft tissue leg
neoplasms8	171.4	mal neo soft tis thorax
neoplasms8	171.5	mal neo soft tis abdomen
neoplasms8	171.6	mal neo soft tis pelvis
neoplasms8	171.7	mal neopl trunk nos
neoplasms8	171.8	mal neo soft tissue nec
neoplasms8	171.9	mal neo soft tissue nos
neoplasms9	174.0	malig neo nipple
neoplasms9	174.1	mal neo breast-central
neoplasms9	174.2	mal neo breast up-inner
neoplasms9	174.3	mal neo breast low-inner
neoplasms9	174.4	mal neo breast up-outer
neoplasms9	174.5	mal neo breast low-outer
neoplasms9	174.6	mal neo breast-axillary
neoplasms9	174.8	malign neopl breast nec
neoplasms9	174.9	malign neopl breast nos
neoplasms9	175.0	mal neo male nipple

Category Name	ICD-9	Description
neoplasms9	175.9	mal neo male breast nec
neoplasms10	176.0	skin - kaposi's sarcoma
neoplasms10	176.1	sft tisue - kpsi's srcma
neoplasms10	176.2	palate - kpsi's sarcoma
neoplasms10	176.3	gi sites - kpsi's srcoma
neoplasms10	176.4	lung - kaposi's sarcoma
neoplasms10	176.5	lym nds - kpsi's sarcoma
neoplasms10	176.8	spf sts - kpsi's sarcoma
neoplasms10	176.9	kaposi's sarcoma nos
neoplasms11	182.0	malig neo corpus uteri
neoplasms11	183.0	malign neopl ovary
neoplasms11	185	malign neopl prostate
neoplasms12	189.0	malig neopl kidney
neoplasms12	189.1	malig neo renal pelvis
neoplasms12	189.2	malign neopl ureter
neoplasms12	189.3	malign neopl urethra
neoplasms12	189.4	mal neo paraurethral
neoplasms12	189.8	mal neo urinary nec
neoplasms12	189.9	mal neo urinary nos
neoplasms13	191.0	malign neopl cerebrum
neoplasms13	191.1	malig neo frontal lobe
neoplasms13	191.2	mal neo temporal lobe
neoplasms13	191.3	mal neo parietal lobe
neoplasms13	191.4	mal neo occipital lobe
neoplasms13	191.5	mal neo cereb ventricle
neoplasms13	191.6	mal neo cerebellum nos
neoplasms13	191.7	mal neo brain stem
neoplasms13	191.8	malig neo brain nec
neoplasms13	191.9	malig neo brain nos
neoplasms14	192.0	mal neo cranial nerves
neoplasms14	192.1	mal neo cerebral mening
neoplasms14	192.2	mal neo spinal cord
neoplasms14	192.3	mal neo spinal meninges
neoplasms14	192.8	mal neo nervous syst nec
neoplasms14	192.9	mal neo nervous syst nos
neoplasms15	194.0	malign neopl adrenal
neoplasms15	194.1	malig neo parathyroid

Category Name	ICD-9	Description
neoplasms15	194.3	malig neo pituitary
neoplasms15	194.4	malign neo pineal gland
neoplasms15	194.5	mal neo carotid body
neoplasms15	194.6	mal neo paraganglia nec
neoplasms15	194.8	mal neo endocrine nec
neoplasms15	194.9	mal neo endocrine nos
neoplasms16	196.0	mal neo lymph-head/neck
neoplasms16	196.1	mal neo lymph-intrathor
neoplasms16	196.2	mal neo lymph intra-abd
neoplasms16	196.3	mal neo lymph-axilla/arm
neoplasms16	196.5	mal neo lymph-inguin/leg
neoplasms16	196.6	mal neo lymph-intrapelv
neoplasms16	196.8	mal neo lymph node-mult
neoplasms16	196.9	mal neo lymph node nos
neoplasms17	197.0	secondary malig neo lung
neoplasms17	197.1	sec mal neo mediastinum
neoplasms17	197.2	second malig neo pleura
neoplasms17	197.3	sec malig neo resp nec
neoplasms17	197.4	sec malig neo sm bowel
neoplasms17	197.5	sec malig neo lg bowel
neoplasms17	197.6	sec mal neo peritoneum
neoplasms17	197.7	second malig neo liver
neoplasms17	197.8	sec mal neo gi nec
neoplasms18	198.0	second malig neo kidney
neoplasms18	198.1	sec malig neo urin nec
neoplasms18	198.2	secondary malig neo skin
neoplasms18	198.3	sec mal neo brain/spine
neoplasms18	198.4	sec malig neo nerve nec
neoplasms18	198.5	secondary malig neo bone
neoplasms18	198.6	second malig neo ovary
neoplasms18	198.7	second malig neo adrenal
neoplasms18	198.81	second malig neo breast
neoplasms18	198.82	second malig neo genital
neoplasms18	198.89	secondary malig neo nec
neoplasms19	199.0	malig neo disseminated
neoplasms19	199.2	malig neopl-transp organ
neoplasms20	200.0	reticulosarcoma*

Category Name	ICD-9	Description
neoplasms20	200.00	retclsrc unsp xtrndl org
neoplasms20	200.01	reticulosarcoma head
neoplasms20	200.02	reticulosarcoma thorax
neoplasms20	200.03	reticulosarcoma abdom
neoplasms20	200.04	reticulosarcoma axilla
neoplasms20	200.05	reticulosarcoma inguin
neoplasms20	200.06	reticulosarcoma pelvic
neoplasms20	200.07	reticulosarcoma spleen
neoplasms20	200.08	reticulosarcoma mult
neoplasms20	200.1	lymphosarcoma*
neoplasms20	200.10	lymphsrc unsp xtrndl org
neoplasms20	200.11	lymphosarcoma head
neoplasms20	200.12	lymphosarcoma thorax
neoplasms20	200.13	lymphosarcoma abdom
neoplasms20	200.14	lymphosarcoma axilla
neoplasms20	200.15	lymphosarcoma inguin
neoplasms20	200.16	lymphosarcoma pelvic
neoplasms20	200.17	lymphosarcoma spleen
neoplasms20	200.18	lymphosarcoma mult
neoplasms20	200.2	burkitt's tumor/lymphoma*
neoplasms20	200.20	brkt tmr unsp xtrndl org
neoplasms20	200.21	burkitt's tumor head
neoplasms20	200.22	burkitt's tumor thorax
neoplasms20	200.23	burkitt's tumor abdom
neoplasms20	200.24	burkitt's tumor axilla
neoplasms20	200.25	burkitt's tumor inguin
neoplasms20	200.26	burkitt's tumor pelvic
neoplasms20	200.27	burkitt's tumor spleen
neoplasms20	200.28	burkitt's tumor mult
neoplasms20	200.30	margnl zone lym xtrndl
neoplasms20	200.31	margin zone lym head
neoplasms20	200.32	margin zone lym thorax
neoplasms20	200.33	margin zone lym abdom
neoplasms20	200.34	margin zone lym axilla
neoplasms20	200.35	margin zone lym inguin
neoplasms20	200.36	margin zone lym pelvic
neoplasms20	200.37	margin zone lymph spleen

Category Name	ICD-9	Description
neoplasms20	200.38	margin zone lymph multip
neoplasms20	200.40	mantle cell lym xtrrndl
neoplasms20	200.41	mantle cell lymph head
neoplasms20	200.42	mantle cell lymph thorax
neoplasms20	200.43	mantle cell lymph abdom
neoplasms20	200.44	mantle cell lymph axilla
neoplasms20	200.45	mantle cell lymph inguin
neoplasms20	200.46	mantle cell lymph pelvic
neoplasms20	200.47	mantle cell lymph spleen
neoplasms20	200.48	mantle cell lymph multip
neoplasms20	200.50	primary cns lymph xtrndl
neoplasms20	200.51	primary cns lymph head
neoplasms20	200.52	primary cns lymph thorax
neoplasms20	200.53	primary cns lymph abdom
neoplasms20	200.54	primary cns lymph axilla
neoplasms20	200.55	primary cns lym inguin
neoplasms20	200.56	primary cns lymph pelvic
neoplasms20	200.57	primary cns lymph spleen
neoplasms20	200.58	primary cns lymph multip
neoplasms20	200.60	anaplastic lymph xtrndl
neoplasms20	200.61	anaplastic lymph head
neoplasms20	200.62	anaplastic lymph thorax
neoplasms20	200.63	anaplastic lymph abdom
neoplasms20	200.64	anaplastic lymph axilla
neoplasms20	200.65	anaplastic lymph inguin
neoplasms20	200.66	anaplastic lymph pelvic
neoplasms20	200.67	anaplastic lymph spleen
neoplasms20	200.68	anaplastic lymph multip
neoplasms20	200.70	large cell lymph xtrndl
neoplasms20	200.71	large cell lymphoma head
neoplasms20	200.72	large cell lymph thorax
neoplasms20	200.73	large cell lymph abdom
neoplasms20	200.74	large cell lymph axilla
neoplasms20	200.75	large cell lymph inguin
neoplasms20	200.76	large cell lymph pelvic
neoplasms20	200.77	large cell lymph spleen
neoplasms20	200.78	large cell lymph multip

Category Name	ICD-9	Description
neoplasms20	200.80	oth varn unsp xtrndl org
neoplasms20	200.81	mixed lymphosarc head
neoplasms20	200.82	mixed lymphosarc thorax
neoplasms20	200.83	mixed lymphosarc abdom
neoplasms20	200.84	mixed lymphosarc axilla
neoplasms20	200.85	mixed lymphosarc inguin
neoplasms20	200.86	mixed lymphosarc pelvic
neoplasms20	200.87	mixed lymphosarc spleen
neoplasms20	200.88	mixed lymphosarc mult
neoplasms21	201.00	hdgk prg unsp xtrndl org
neoplasms21	201.01	hodgkins paragran head
neoplasms21	201.02	hodgkins paragran thorax
neoplasms21	201.03	hodgkins paragran abdom
neoplasms21	201.04	hodgkins paragran axilla
neoplasms21	201.05	hodgkins paragran inguin
neoplasms21	201.06	hodgkins paragran pelvic
neoplasms21	201.07	hodgkins paragran spleen
neoplasms21	201.08	hodgkins paragran mult
neoplasms21	201.10	hdgk grn unsp xtrndl org
neoplasms21	201.11	hodgkins granulom head
neoplasms21	201.12	hodgkins granulom thorax
neoplasms21	201.13	hodgkins granulom abdom
neoplasms21	201.14	hodgkins granulom axilla
neoplasms21	201.15	hodgkins granulom inguin
neoplasms21	201.16	hodgkins granulom pelvic
neoplasms21	201.17	hodgkins granulom spleen
neoplasms21	201.18	hodgkins granulom mult
neoplasms21	201.20	hdgk src unsp xtrndl org
neoplasms21	201.21	hodgkins sarcoma head
neoplasms21	201.22	hodgkins sarcoma thorax
neoplasms21	201.23	hodgkins sarcoma abdom
neoplasms21	201.24	hodgkins sarcoma axilla
neoplasms21	201.25	hodgkins sarcoma inguin
neoplasms21	201.26	hodgkins sarcoma pelvic
neoplasms21	201.27	hodgkins sarcoma spleen
neoplasms21	201.28	hodgkins sarcoma mult
neoplasms21	201.40	lym-hst unsp xtrndl orgn

Category Name	ICD-9	Description
neoplasms21	201.41	hodg lymph-histio head
neoplasms21	201.42	hodg lymph-histio thorax
neoplasms21	201.43	hodg lymph-histio abdom
neoplasms21	201.44	hodg lymph-histio axilla
neoplasms21	201.45	hodg lymph-histio inguin
neoplasms21	201.46	hodg lymph-histio pelvic
neoplasms21	201.47	hodg lymph-histio spleen
neoplasms21	201.48	hodg lymph-histio mult
neoplasms21	201.50	ndr sclr unsp xtrndl org
neoplasms21	201.51	hodg nodul sclero head
neoplasms21	201.52	hodg nodul sclero thorax
neoplasms21	201.53	hodg nodul sclero abdom
neoplasms21	201.54	hodg nodul sclero axilla
neoplasms21	201.55	hodg nodul sclero inguin
neoplasms21	201.56	hodg nodul sclero pelvic
neoplasms21	201.57	hodg nodul sclero spleen
neoplasms21	201.58	hodg nodul sclero mult
neoplasms21	201.60	mxd celr unsp xtrndl org
neoplasms21	201.61	hodgkins mix cell head
neoplasms21	201.62	hodgkins mix cell thorax
neoplasms21	201.63	hodgkins mix cell abdom
neoplasms21	201.64	hodgkins mix cell axilla
neoplasms21	201.65	hodgkins mix cell inguin
neoplasms21	201.66	hodgkins mix cell pelvic
neoplasms21	201.67	hodgkins mix cell spleen
neoplasms21	201.68	hodgkins mix cell mult
neoplasms21	201.70	lym dplt unsp xtrndl org
neoplasms21	201.71	hodg lymph deplet head
neoplasms21	201.72	hodg lymph deplet thorax
neoplasms21	201.73	hodg lymph deplet abdom
neoplasms21	201.74	hodg lymph deplet axilla
neoplasms21	201.75	hodg lymph deplet inguin
neoplasms21	201.76	hodg lymph deplet pelvic
neoplasms21	201.77	hodg lymph deplet spleen
neoplasms21	201.78	hodg lymph deplet mult
neoplasms21	201.90	hdgk dis unsp xtrndl org
neoplasms21	201.91	hodgkins dis nos head

Category Name	ICD-9	Description
neoplasms21	201.92	hodgkins dis nos thorax
neoplasms21	201.93	hodgkins dis nos abdom
neoplasms21	201.94	hodgkins dis nos axilla
neoplasms21	201.95	hodgkins dis nos inguin
neoplasms21	201.96	hodgkins dis nos pelvic
neoplasms21	201.97	hodgkins dis nos spleen
neoplasms21	201.98	hodgkins dis nos mult
neoplasms22	202.00	ndlr lym unsp xtrndl org
neoplasms22	202.01	nodular lymphoma head
neoplasms22	202.02	nodular lymphoma thorax
neoplasms22	202.03	nodular lymphoma abdom
neoplasms22	202.04	nodular lymphoma axilla
neoplasms22	202.05	nodular lymphoma inguin
neoplasms22	202.06	nodular lymphoma pelvic
neoplasms22	202.07	nodular lymphoma spleen
neoplasms22	202.08	nodular lymphoma mult
neoplasms22	202.10	mycs fng unsp xtrndl org
neoplasms22	202.11	mycosis fungoides head
neoplasms22	202.12	mycosis fungoides thorax
neoplasms22	202.13	mycosis fungoides abdom
neoplasms22	202.14	mycosis fungoides axilla
neoplasms22	202.15	mycosis fungoides inguin
neoplasms22	202.16	mycosis fungoides pelvic
neoplasms22	202.17	mycosis fungoides spleen
neoplasms22	202.18	mycosis fungoides mult
neoplasms22	202.20	szry dis unsp xtrndl org
neoplasms22	202.21	sezary's disease head
neoplasms22	202.22	sezary's disease thorax
neoplasms22	202.23	sezary's disease abdom
neoplasms22	202.24	sezary's disease axilla
neoplasms22	202.25	sezary's disease inguin
neoplasms22	202.26	sezary's disease pelvic
neoplasms22	202.27	sezary's disease spleen
neoplasms22	202.28	sezary's disease mult
neoplasms22	202.30	mlg hist unsp xtrndl org
neoplasms22	202.31	mal histiocytosis head
neoplasms22	202.32	mal histiocytosis thorax

Category Name	ICD-9	Description
neoplasms22	202.33	mal histiocytosis abdom
neoplasms22	202.34	mal histiocytosis axilla
neoplasms22	202.35	mal histiocytosis inguin
neoplasms22	202.36	mal histiocytosis pelvic
neoplasms22	202.37	mal histiocytosis spleen
neoplasms22	202.38	mal histiocytosis mult
neoplasms22	202.40	lk rtctl unsp xtrndl org
neoplasms22	202.41	hairy-cell leukem head
neoplasms22	202.42	hairy-cell leukem thorax
neoplasms22	202.43	hairy-cell leukem abdom
neoplasms22	202.44	hairy-cell leukem axilla
neoplasms22	202.45	hairy-cell leukem inguin
neoplasms22	202.46	hairy-cell leukem pelvic
neoplasms22	202.47	hairy-cell leukem spleen
neoplasms22	202.48	hairy-cell leukem mult
neoplasms22	202.50	ltr-siwe unsp xtrndl org
neoplasms22	202.51	letterer-siwe dis head
neoplasms22	202.52	letterer-siwe dis thorax
neoplasms22	202.53	letterer-siwe dis abdom
neoplasms22	202.54	letterer-siwe dis axilla
neoplasms22	202.55	letterer-siwe dis inguin
neoplasms22	202.56	letterer-siwe dis pelvic
neoplasms22	202.57	letterer-siwe dis spleen
neoplasms22	202.58	letterer-siwe dis mult
neoplasms22	202.60	mlg mast unsp xtrndl org
neoplasms22	202.61	mal mastocytosis head
neoplasms22	202.62	mal mastocytosis thorax
neoplasms22	202.63	mal mastocytosis abdom
neoplasms22	202.64	mal mastocytosis axilla
neoplasms22	202.65	mal mastocytosis inguin
neoplasms22	202.66	mal mastocytosis pelvic
neoplasms22	202.67	mal mastocytosis spleen
neoplasms22	202.68	mal mastocytosis mult
neoplasms22	202.70	periph t cell lym xtrndl
neoplasms22	202.71	periph t cell lymph head
neoplasms22	202.72	periph t cell lym thorax
neoplasms22	202.73	periph t cell lym abdom

Category Name	ICD-9	Description
neoplasms22	202.74	periph t cell lym axilla
neoplasms22	202.75	periph t cell lym inguin
neoplasms22	202.76	periph t cell lym pelvic
neoplasms22	202.77	periph t cell lym spleen
neoplasms22	202.78	periph t cell lym multip
neoplasms22	202.8	lymphomas nec*
neoplasms22	202.80	oth lymp unsp xtrndl org
neoplasms22	202.81	lymphomas nec head
neoplasms22	202.82	lymphomas nec thorax
neoplasms22	202.83	lymphomas nec abdom
neoplasms22	202.84	lymphomas nec axilla
neoplasms22	202.85	lymphomas nec inguin
neoplasms22	202.86	lymphomas nec pelvic
neoplasms22	202.87	lymphomas nec spleen
neoplasms22	202.88	lymphomas nec mult
neoplasms22	202.9	mal neo lym/hist tis nec*
neoplasms22	202.90	unsp lym unsp xtrndl org
neoplasms22	202.91	lymphoid mal nec head
neoplasms22	202.92	lymphoid mal nec thorax
neoplasms22	202.93	lymphoid mal nec abdom
neoplasms22	202.94	lymphoid mal nec axilla
neoplasms22	202.95	lymphoid mal nec inguin
neoplasms22	202.96	lymphoid mal nec pelvic
neoplasms22	202.97	lymphoid mal nec spleen
neoplasms22	202.98	lymphoid mal nec mult
neoplasms22	203.00	mult mye w/o achv rmson
neoplasms22	203.01	mult myelm w remission
neoplasms22	203.02	mult myeloma in relapse
neoplasms22	203.10	pls cl leu w/o achv rmsn
neoplasms22	203.11	plsm cell leuk w rmson
neoplasms22	203.12	plsm cel leuk in relapse
neoplasms22	203.80	oth imno npl wo ach rmsn
neoplasms22	203.81	oth imnprfl npl w rmsn
neoplasms22	203.82	oth imnprlf neo-relapse
neoplasms22	204.00	ac lym leuk wo achv rmsn
neoplasms22	204.01	act lym leuk w rmsion
neoplasms22	204.02	act lymp leuk in relapse

Category Name	ICD-9	Description
neoplasms22	204.10	ch lym leuk wo achv rmsn
neoplasms22	204.11	chr lym leuk w rmsion
neoplasms22	204.12	chr lymp leuk in relapse
neoplasms22	204.20	sbac lym leu wo ach rmsn
neoplasms22	204.21	sbac lym leuk w rmsion
neoplasms22	204.22	sbac lym leuk in relapse
neoplasms22	204.80	oth lym leu wo achv rmsn
neoplasms22	204.81	oth lym leuk w rmsion
neoplasms22	204.82	oth lym leuk in relapse
neoplasms22	204.90	uns lym leu wo ach rmsn
neoplasms22	204.91	uns lym leuk w rmsion
neoplasms22	204.92	lymp leuk nos relapse
neoplasms22	205.00	ac myl leuk wo achv rmsn
neoplasms22	205.01	act myl leuk w rmsion
neoplasms22	205.10	ch myl leuk wo achv rmsn
neoplasms22	205.11	chr myl leuk w rmsion
neoplasms22	205.12	chr myel leuk in relapse
neoplasms22	205.20	sbac myl leu wo ach rmsn
neoplasms22	205.21	sbac myl leuk w rmsion
neoplasms22	205.22	sbac myl leuk in relapse
neoplasms22	205.30	myl sarcoma wo achv rmsn
neoplasms22	205.31	myl srcoma w rmsion
neoplasms22	205.32	myel sarcoma in relapse
neoplasms22	205.80	oth my leuk wo achv rmsn
neoplasms22	205.81	oth myl leuk w rmsion
neoplasms22	205.82	oth myel leuk in relapse
neoplasms22	205.90	uns my leu wo ach rmsn
neoplasms22	205.91	uns myl leuk w rmsion
neoplasms22	205.92	myel leuk nos in relapse
neoplasms22	206.00	ac mono leu wo achv rmsn
neoplasms22	206.01	act mono leuk w rmsion
neoplasms22	206.02	act mono leuk in relapse
neoplasms22	206.10	ch mono leu wo achv rmsn
neoplasms22	206.11	chr mono leuk w rmsion
neoplasms22	206.12	chr mono leuk in relapse
neoplasms22	206.20	sbac mno leu wo ach rmsn
neoplasms22	206.21	sbac mono leuk w rmsion

Category Name	ICD-9	Description
neoplasms22	206.22	sbac mono leu in relapse
neoplasms22	206.80	ot mono leu wo achv rmsn
neoplasms22	206.81	oth mono leuk w rmsion
neoplasms22	206.82	oth mono leuk in relapse
neoplasms22	206.90	uns mno leu wo ach rmsn
neoplasms22	206.91	uns mono leuk w rmsion
neoplasms22	206.92	mono leuk nos relapse
neoplasms22	207.00	ac erth/erlk wo ach rmsn
neoplasms22	207.01	act erth/erylk w rmson
neoplasms22	207.02	ac erth/erylk in relapse
neoplasms22	207.10	chr erythrm w/o ach rmsn
neoplasms22	207.11	chr erythrm w remision
neoplasms22	207.12	chr erythrmia in relapse
neoplasms22	207.20	mgkrcyt leuk wo ach rmsn
neoplasms22	207.21	mgkrycyt leuk w rmsion
neoplasms22	207.22	mgkrycyt leuk in relapse
neoplasms22	207.80	oth leuk w/o achv rmsn
neoplasms22	207.81	oth spf leuk w remsion
neoplasms22	207.82	oth spf leuk in relapse
neoplasms22	208.00	ac leu un cl wo ach rmsn
neoplasms22	208.01	act leuk uns cl w rmson
neoplasms22	208.02	ac leuk uns cl relapse
neoplasms22	208.10	ch leu un cl wo ach rmsn
neoplasms22	208.11	chr leuk uns cl w rmson
neoplasms22	208.12	ch leu uns cl in relapse
neoplasms22	208.20	sbc leu un cl wo ah rmsn
neoplasms22	208.21	sbac leuk uns cl w rmson
neoplasms22	208.22	sbac leu uns cl-relapse
neoplasms22	208.80	ot leu un cl wo ach rmsn
neoplasms22	208.81	oth leuk uns cl w rmson
neoplasms22	208.82	oth leuk uns cl-relapse
neoplasms22	208.90	leuk nos w/o achv rmsn
neoplasms22	208.91	leukemia nos w remission
neoplasms22	208.92	leukemia nos in relapse
neoplasms23	209.00	mal crcnoid sm intst nos
neoplasms23	209.01	malig carcinoid duodenum
neoplasms23	209.02	malig carcinoid jejunum

Category Name	ICD-9	Description
neoplasms23	209.03	malig carcinoid ileum
neoplasms23	209.10	mal crcnoid lg intst nos
neoplasms23	209.11	malig carcinoid appendix
neoplasms23	209.12	malig carcinoid cecum
neoplasms23	209.13	mal crcnoid ascend colon
neoplasms23	209.14	mal crcnoid transv colon
neoplasms23	209.15	mal carcinoid desc colon
neoplasms23	209.16	mal carcinoid sig colon
neoplasms23	209.17	malig carcinoid rectum
neoplasms23	209.20	mal crcnd prim site unkn
neoplasms23	209.21	mal carcinoid bronc/lung
neoplasms23	209.22	malig carcinoid thymus
neoplasms23	209.23	malig carcinoid stomach
neoplasms23	209.24	malig carcinoid kidney
neoplasms23	209.25	mal carcnoid foregut nos
neoplasms23	209.26	mal carcinoid midgut nos
neoplasms23	209.27	mal carcnoid hindgut nos
neoplasms23	209.29	malig carcinoid oth site
neoplasms23	209.30	malig neuroendo ca nos
neoplasms23	209.31	Merkel cell carcinoma of the face
neoplasms23	209.32	Merkel cell carcinoma of the of the scalp and neck
neoplasms23	209.33	Merkel cell of the upper limb
neoplasms23	209.34	Merkel cell of the lower limb
neoplasms23	209.35	Merkel cell of the trunk
neoplasms23	209.36	Merkel cell of other sites
neoplasms24	209.71	sec neuroend tu dist lym
neoplasms24	209.72	sec neuroend tumor-liver
neoplasms24	209.73	sec neuroendo tumor-bone
neoplasms24	209.74	sec neuroendo tu-periton
neoplasms24	209.79	sec neuroend tu oth site
GU/RENAL DISEASE		
renal 1	585.1	chro kidney dis stage i
renal 1	585.2	chro kidney dis stage ii
renal 1	585.3	chr kidney dis stage iii
renal 1	585.4	chr kidney dis stage iv
renal 1	585.5	chron kidney dis stage v
renal 1	585.6	end stage renal disease

Category Name	ICD-9	Description
renal 1	585.9	chronic kidney dis nos
renal 2	586	renal failure nos
renal 3	588.1	nephrogenic diabetes insipidus
renal 4	590.00	chronic pyelonephritis w/o lesion
renal 4	590.01	chronic pyelonephritis w/ lesion
renal 4	590.90	kidney infection, unspecified
renal 4	592.0	calculus of kidney
renal 4	593.9	unspecified disorder or kidney and ureter
renal 5	596.54	Neurogenic Bladder
renal 5	599.0	Urinary Tract Infection
renal 5	600.01	BPH w/LUTS
SKIN DISEASE		
skin 1	682.1	cellulitis of neck
skin 1	682.2	cellulitis of trunk
skin 1	682.3	cellulitis of arm
skin 1	682.4	cellulitis of hand
skin 1	682.5	cellulitis of buttock
skin 1	682.6	cellulitis of leg
skin 1	682.7	cellulitis of foot
skin 1	682.8	cellulitis, site nec
skin 1	682.9	cellulitis nos
skin 2	707.00	pressure ulcer, site nos
skin 2	707.01	pressure ulcer, elbow
skin 2	707.02	pressure ulcer, upr back
skin 2	707.03	pressure ulcer, low back
skin 2	707.04	pressure ulcer, hip
skin 2	707.05	pressure ulcer, buttock
skin 2	707.06	pressure ulcer, ankle
skin 2	707.07	pressure ulcer, heel
skin 2	707.09	pressure ulcer, site nec
skin 3	707.1	chronic ulcer of leg*
skin 3	707.10	ulcer of lower limb nos
skin 3	707.11	ulcer of thigh
skin 3	707.12	ulcer of calf
skin 3	707.13	ulcer of ankle
skin 3	707.14	ulcer of heel & midfoot
skin 3	707.15	ulcer other part of foot

Category Name	ICD-9	Description
skin 3	707.19	ulcer oth part low limb
skin 4	707.22	pressure ulcer, stage ii
skin 4	707.23	pressure ulcer,stage iii
skin 4	707.24	pressure ulcer, stage iv
skin 4	707.25	pressure ulcer,unstagebl
skin 5	707.8	chronic skin ulcer nec
skin 5	707.9	chronic skin ulcer nos
MUSCULOSKELETAL DISEASE OR INJURY		
ms1	710.0	Systemic luous erythematosus
ms2	714.0	Rheumatoid arthritis
ms2	714.1	Felty's syndrome
ms2	714.2	Other rheumatoid arthritis
ms3	719.41	joint pain-shoulder
ms3	719.42	joint pain-upper arm
ms3	719.43	joint pain-forearm
ms3	719.44	joint pain-hand
ms3	719.45	joint pain-pelvic region and thigh
ms3	719.46	joint pain-lower leg
ms3	719.47	joint pain-ankle and foot
ms3	719.48	joint pain-other specified sites
ms3	719.49	joint pain-multiple sites
ms4	724.00	spinal stenosis, unspecified
ms4	724.03	spinal stenosis, lumbar w/ neuro claudication
ms4	724.30	sciatica
ms5	733.00	osteoporosis nos
ms5	733.01	senile osteoporosis
ms5	733.02	idiopathic osteoporosis
ms5	733.03	disuse osteoporosis
ms5	733.09	osteoporosis nec
BEHAVIORAL HEALTH		
behavioral 1	295.30	paranoid schizo-unspec
behavioral 1	295.31	paranoid schizo-subchr
behavioral 1	295.32	paranoid schizo-chronic
behavioral 1	295.33	paran schizo-subchr/exac
behavioral 1	295.34	paran schizo-chr/exacerb
behavioral 1	295.35	paranoid schizo-remiss
behavioral 1	295.40	schizophreniform dis nos

Category Name	ICD-9	Description
behavioral 1	295.41	schizophrenic dis-subchr
behavioral 1	295.42	schizophren dis-chronic
behavioral 1	295.43	schizo dis-subchr/exacer
behavioral 1	295.44	schizophr dis-chr/exacer
behavioral 1	295.50	latent schizophren-unsp
behavioral 1	295.51	lat schizophren-subchr
behavioral 1	295.52	latent schizophren-chr
behavioral 1	295.53	lat schizo-subchr/exacer
behavioral 1	295.54	latent schizo-chr/exacer
behavioral 1	295.55	lat schizophren-remiss
behavioral 1	295.60	schizophr dis resid nos
behavioral 1	295.61	schizoph dis resid-subch
behavioral 1	295.62	schizophr dis resid-chr
behavioral 1	295.63	schizo resid subchr/exac
behavioral 1	295.64	schizoph resid-chro/exac
behavioral 1	295.70	schizoaffective dis nos
behavioral 1	295.71	schizoaffectv dis-subchr
behavioral 1	295.72	schizoaffective dis-chr
behavioral 1	295.73	schizoaff dis-subch/exac
behavioral 1	295.74	schizoafftv dis-chr/exac
behavioral 1	295.80	schizophrenia nec-unspec
behavioral 1	295.81	schizophrenia nec-subchr
behavioral 1	295.82	schizophrenia nec-chr
behavioral 1	295.83	schizo nec-subchr/exacer
behavioral 1	295.84	schizo nec-chr/exacerb
behavioral 1	295.90	schizophrenia nos-unspec
behavioral 1	295.91	schizophrenia nos-subchr
behavioral 1	295.92	schizophrenia nos-chr
behavioral 1	295.93	schizo nos-subchr/exacer
behavioral 1	295.94	schizo nos-chr/exacerb
behavioral 2	296.00	bipol i single manic nos
behavioral 2	296.01	bipol i single manc-mild
behavioral 2	296.02	bipol i single manic-mod
behavioral 2	296.03	bipol i sing-sev w/o psy
behavioral 2	296.04	bipo i sin man-sev w psy
behavioral 2	296.11	recur manic dis-mild
behavioral 2	296.12	recur manic dis-mod

Category Name	ICD-9	Description
behavioral 2	296.13	recur manic dis-severe
behavioral 2	296.14	recur manic-sev w psycho
behavioral 2	296.15	recur manic-part remiss
behavioral 2	296.16	recur manic-full remiss
behavioral 2	296.20	depress psychosis-unspec
behavioral 2	296.21	depress psychosis-mild
behavioral 2	296.22	depressive psychosis-mod
behavioral 2	296.23	depress psychosis-severe
behavioral 2	296.24	depr psychos-sev w psych
behavioral 2	296.25	depr psychos-part remiss
behavioral 2	296.30	recurr depr psychos-unsp
behavioral 2	296.31	recurr depr psychos-mild
behavioral 2	296.32	recurr depr psychos-mod
behavioral 2	296.33	recur depr psych-severe
behavioral 2	296.34	rec depr psych-psychotic
behavioral 2	296.35	recur depr psyc-part rem
behavioral 2	296.40	bipol i currnt manic nos
behavioral 2	296.41	bipol i curnt manic-mild
behavioral 2	296.42	bipol i currnt manic-mod
behavioral 2	296.43	bipol i manc-sev w/o psy
behavioral 2	296.44	bipol i manic-sev w psy
behavioral 2	296.45	bipol i cur man part rem
behavioral 2	296.50	bipol i cur depres nos
behavioral 2	296.51	bipol i cur depress-mild
behavioral 2	296.52	bipol i cur depress-mod
behavioral 2	296.53	bipol i curr dep w/o psy
behavioral 2	296.54	bipol i currnt dep w psy
behavioral 2	296.60	bipol i currnt mixed nos
behavioral 2	296.61	bipol i currnt mix-mild
behavioral 2	296.62	bipol i currnt mixed-mod
behavioral 2	296.63	bipol i cur mix w/o psy
behavioral 2	296.64	bipol i cur mixed w psy
behavioral 2	296.65	bipol i cur mix-part rem
behavioral 2	296.66	bipol i cur mixed remiss
behavioral 2	296.7	bipolor i current nos
behavioral 2	296.80	bipolar disorder nos
behavioral 2	296.81	atypical manic disorder

Category Name	ICD-9	Description
behavioral 2	296.82	atypical depressive dis
behavioral 2	296.89	bipolar disorder nec
behavioral 2	296.90	episodic mood disord nos
behavioral 2	296.99	episodic mood disord nec
behavioral 3	297.0	paranoid state, simple
behavioral 3	297.1	delusional disorder
behavioral 3	297.2	paraphrenia
behavioral 3	297.3	shared psychotic disord
behavioral 3	297.8	paranoid states nec
behavioral 3	297.9	paranoid state nos
behavioral 4	298.0	react depress psychosis
behavioral 4	298.0	react depress psychosis
behavioral 4	298.1	excitativ type psychosis
behavioral 4	298.2	reactive confusion
behavioral 4	298.3	acute paranoid reaction
behavioral 4	298.4	psychogen paranoid psych
behavioral 4	298.8	react psychosis nec/nos
behavioral 4	298.9	psychosis nos
behavioral 5	300.00	anxiety state, unspecified
behavioral 5	300.01	panic state w/o agoraphobia
behavioral 5	300.02	generalized anxiety disorder
behavioral 5	300.09	other anxiety state
behavioral 5	300.21	agoraphobia w panic dis
behavioral 5	300.22	agoraphobia w/o panic
behavioral 5	300.3	obsessive-compulsive dis
behavioral 6	301.0	paranoid personality
behavioral 6	301.10	affectiv personality nos
behavioral 6	301.11	chronic hypomanic person
behavioral 6	301.12	chr depressive person
behavioral 6	301.13	cyclothymic disorder
behavioral 6	301.20	schizoid personality nos
behavioral 6	301.21	introverted personality
behavioral 6	301.22	schizotypal person dis
behavioral 6	301.3	explosive personality
behavioral 6	301.4	obsessive-compulsive dis
behavioral 6	301.50	histrionic person nos
behavioral 6	301.51	chr factitious illness

Category Name	ICD-9	Description
behavioral 6	301.59	histrionic person nec
behavioral 6	301.6	dependent personality
behavioral 6	301.7	antisocial personality
behavioral 6	301.81	narcissistic personality
behavioral 6	301.82	avoidant personality dis
behavioral 6	301.83	borderline personality
behavioral 6	301.84	passive-aggressiv person
behavioral 6	301.89	personality disorder nec
behavioral 7	304.01	opioid dependence-contin
behavioral 7	304.11	sed,hyp,anxiolyt dep-con
behavioral 7	304.21	cocaine depend-contin
behavioral 7	304.41	amphetamin depend-contin
behavioral 7	304.51	hallucinogen dep-contin
behavioral 7	304.61	drug depend nec-contin
behavioral 7	304.71	opioid/other dep-contin
behavioral 7	304.81	comb drug dep nec-contin
behavioral 8	307.1	anorexia nervosa
behavioral 8	307.51	bulimia nervosa
behavioral 9	310.0	frontal lobe syndrome
behavioral 9	310.1	personality chg oth dis
behavioral 9	310.2	postconcussion syndrome
behavioral 9	310.8	nonpsychot brain syn nec#
behavioral 9	310.81	pseudobulbar affect
behavioral 9	310.89	nonpsych mntl disord nec
behavioral 9	310.0	frontal lobe syndrome
behavioral 9	310.1	personality chg oth dis
behavioral 9	310.2	postconcussion syndrome
behavioral 9	310.8	nonpsychot brain syn nec#
behavioral 9	310.81	pseudobulbar affect
behavioral 9	310.89	nonpsych mntl disord nec
behavioral 10	311	depressive disorder, nec
behavioral 11	317	mild intellect disabilty
behavioral 11	318.0	mod intellect disability
behavioral 11	318.1	sev intellect disability
behavioral 11	318.2	profnd intellct disablty

Category Name	ICD-9	Description
INFECTIOUS DISEASES		
infectious1	008.45	c-diff
infectious1	038.9	Unspecified septicema
infectious1	041.12	mrsa elsewhere/nos
infectious1	041.49	e-coli, other and unspecified
infectious2	042	human immuno virus dis
infectious3	053.11	herpes zoster geniculate
infectious3	053.12	herpes zoster trigeminal neuralgia
infectious3	053.13	herpes zoster polyneuropathy
infectious3	053.19	herpes zoster w/other neuro complic
infectious4	070.1	hepatitis a w/o coma
infectious4	070.30	hpt b acte wo cm wo dlta
infectious4	070.31	hpt b acte wo cm w dlta
infectious4	070.32	hpt b chrn wo cm wo dlta
infectious4	070.33	hpt b chrn wo cm w dlta
infectious4	070.51	hpt c acte wo coma
infectious4	070.52	hptb wo dlta or coma
infectious4	070.54	hpt c chronic wo coma
infectious4	070.59	other hpt wo coma
infectious4	070.70	hpt C unspecified wo coma
infectious4	070.9	unspecified hpt wo coma

Appendix Exhibit A9-3: Regression Used to Determine Comorbidity Adjustment

Variable	Coefficient	P-Value	Presence of Comorbidity Group Produces a Comorbidity Adjustment?
Functional/Cognitive Level and Clinical Group (MMTA - Low is excluded)			
MMTA – Medium	$247.52	0.0000	N/A
MMTA – High	$475.08	0.0000	N/A
Behavioral Health – Low	-$63.46	0.0000	N/A
Behavioral Health – High	$290.82	0.0000	N/A
Complex – Low	$161.60	0.0000	N/A
Complex – Medium	$510.61	0.0000	N/A
Complex – High	$699.01	0.0000	N/A
MS Rehab – Low	$165.77	0.0000	N/A
MS Rehab – High	$450.24	0.0000	N/A
Neuro Rehab – Low	$327.34	0.0000	N/A
Neuro Rehab – Medium	$628.51	0.0000	N/A
Neuro Rehab – High	$822.71	0.0000	N/A
Wound Level – Low	$528.45	0.0000	N/A
Wound Level – Medium	$775.55	0.0000	N/A
Wound Level - High	$1,044.92	0.0000	N/A
Admission Source With Timing (Community Early excluded)			
Community Late	-$688.38	0.0000	N/A
Institutional Early	$299.27	0.0000	N/A
Institutional Late	$26.32	0.0000	N/A
Comorbidity Groups			
circulatory_1	-$29.10	0.0000	No
circulatory_10	$290.73	0.0000	Yes
circulatory_11	$281.70	0.0000	Yes
circulatory_12	$108.59	0.0000	Yes
circulatory_2	-$10.95	0.0000	No
circulatory_3	$3.67	0.7520	No
circulatory_4	-$51.17	0.0000	No
circulatory_5	$50.11	0.0000	Yes
circulatory_6	$42.32	0.0000	Yes
circulatory_7	$34.84	0.0000	No
circulatory_8	$15.37	0.0000	No
circulatory_9	$83.35	0.0000	Yes
Cerebral_1	$67.95	0.0180	Yes
Cerebral_2	-$14.19	0.0640	No
Cerebral_3	$19.48	0.5130	No

Variable	Coefficient	P-Value	Presence of Comorbidity Group Produces a Comorbidity Adjustment?
Cerebral_4	$67.88	0.0000	Yes
Endrocrine_1	-$62.73	0.0000	No
Endrocrine_2	-$1.44	0.8910	No
Endrocrine_3	-$5.60	0.0000	No
Endrocrine_4	-$0.01	0.9980	No
Endrocrine_5	-$3.13	0.1670	No
Endrocrine_6	$0.00	-	No
GI_1	$40.78	0.0000	Yes
GI_2	$30.75	0.0040	No
GI_3	$0.00	-	No
GI_4	-$44.45	0.0000	No
GI_5	-$38.55	0.0040	No
GI_6	-$106.34	0.0010	No
GI_7	$0.00	-	No
GI_8	-$63.12	0.0000	No
GI_9	-$56.88	0.0010	No
Heart_1	$75.59	0.0000	Yes
Heart_10	$30.47	0.0000	No
Heart_11	$25.88	0.0000	No
Heart_12	-$23.97	0.0020	No
Heart_3	-$75.67	0.0000	No
Heart_4	-$54.56	0.0000	No
Heart_5	-$20.09	0.0000	No
Heart_6	$0.00	-	No
Heart_7	-$13.45	0.0010	No
Heart_8	-$32.15	0.0000	No
Heart_9	-$58.83	0.0000	No
Neuro_1	-$33.13	0.0000	No
Neuro_10	$94.32	0.0000	Yes
Neuro_11	-$4.71	0.7810	No
Neuro_2	$0.00	-	No
Neuro_3	-$91.53	0.0000	No
Neuro_4	$12.23	0.1700	No
Neuro_5	$75.19	0.0000	Yes
Neuro_6	$203.64	0.0000	Yes
Neuro_7	$327.22	0.0000	Yes
Neuro_8	-$47.06	0.0000	No

Variable	Coefficient	P-Value	Presence of Comorbidity Group Produces a Comorbidity Adjustment?
Neuro_9	$33.52	0.2450	No
Resp_1	-$34.65	0.0000	No
Resp_2	-$82.92	0.0000	No
Resp_3	-$101.24	0.0000	No
Resp_4	-$31.91	0.0000	No
Resp_5	-$18.48	0.0000	No
Resp_6	-$8.72	0.0000	No
Resp_7	-$104.24	0.0000	No
Resp_8	-$11.83	0.0530	No
Resp_9	-$22.17	0.0000	No
behavioral_1	-$37.03	0.0000	No
behavioral_10	$8.60	0.0000	No
behavioral_11	-$242.73	0.0000	No
behavioral_2	-$16.12	0.0000	No
behavioral_3	-$80.00	0.0000	No
behavioral_4	-$33.22	0.0000	No
behavioral_5	-$59.79	0.0000	No
behavioral_6	-$105.24	0.0000	No
behavioral_7	-$89.99	0.0360	No
behavioral_8	$0.00	-	No
behavioral_9	$46.02	0.0200	Yes
infectious_1	$100.90	0.0000	Yes
infectious_2	-$74.53	0.0000	No
infectious_3	-$23.84	0.0690	No
infectious_4	-$104.39	0.0000	No
ms_1	-$33.76	0.0000	No
ms_2	$0.00	-	No
ms_3	$14.17	0.0000	No
ms_4	$5.32	0.3820	No
ms_5	-$21.33	0.0000	No
neoplasms_1	-$87.43	0.0000	No
neoplasms_10	$0.00	-	No
neoplasms_11	$25.73	0.0000	No
neoplasms_12	-$6.10	0.6130	No
neoplasms_13	$132.90	0.0000	Yes
neoplasms_14	$0.00	-	No
neoplasms_15	$0.00	-	No

Variable	Coefficient	P-Value	Presence of Comorbidity Group Produces a Comorbidity Adjustment?
neoplasms_16	-$9.80	0.5720	No
neoplasms_17	-$26.13	0.0000	No
neoplasms_18	$40.07	0.0000	Yes
neoplasms_19	$0.00	-	No
neoplasms_2	$67.45	0.0000	Yes
neoplasms_20	$36.46	0.1550	Yes
neoplasms_21	$17.37	0.5370	No
neoplasms_22	-$26.39	0.0000	No
neoplasms_23	$42.95	0.1570	Yes
neoplasms_24	$0.00	-	No
neoplasms_3	-$63.46	0.0000	No
neoplasms_4	-$51.44	0.0010	No
neoplasms_5	$0.00	-	No
neoplasms_6	-$4.41	0.4460	No
neoplasms_7	$25.31	0.2310	No
neoplasms_8	$85.74	0.0010	Yes
neoplasms_9	$58.14	0.0000	Yes
renal_1	-$20.80	0.0000	No
renal_2	-$34.28	0.0000	No
renal_3	$0.00	-	No
renal_4	-$40.41	0.0000	No
renal_5	$65.19	0.0000	Yes
skin_1	$170.39	0.0000	Yes
skin_2	$270.04	0.0000	Yes
skin_3	$382.68	0.0000	Yes
skin_4	$221.73	0.0000	Yes
skin_5	$381.63	0.0000	Yes
Constant	$1,547.22	0.0000	N/A
N	9,393,024	-	-
Adj R-Squared	0.2780	-	-