ACUMEN

Skilled Nursing Facilities Payment Models Research Technical Report

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EXECUTIVE SUMMARY

This report introduces a comprehensive alternative to the current resident classification model (case-mix adjustment) within the skilled nursing facility (SNF) prospective payment system (PPS). The current payment model for residents of SNFs in Medicare Part A-covered stays classifies residents into clinically relevant groups for the purpose of determining how much Medicare will reimburse SNF facilities for the costs of providing care. Acumen developed an alternative classification for SNF residents in Medicare Part A-covered stays pursuant to a contract with the Centers for Medicare & Medicaid Services (CMS) (Contract No. HHSM-500-2011-00012I). CMS originally contracted with Acumen on 9/20/2012 to identify and evaluate possible alternatives to the existing SNF PPS therapy reimbursement model. In a subsequent contract modification (effective 9/9/2014), the scope of the project was expanded to develop alternatives to the SNF PPS case-mix adjustment methodology in its entirety. (Case-mix adjustment adjusts Medicare payments to facilities based on characteristics of the resident for whom care was provided.) This executive summary provides background on the current SNF PPS, introduces the Resident Classification System, Version I (RCS-I), and describes the advantages of the recommended reimbursement model.

Current SNF PPS

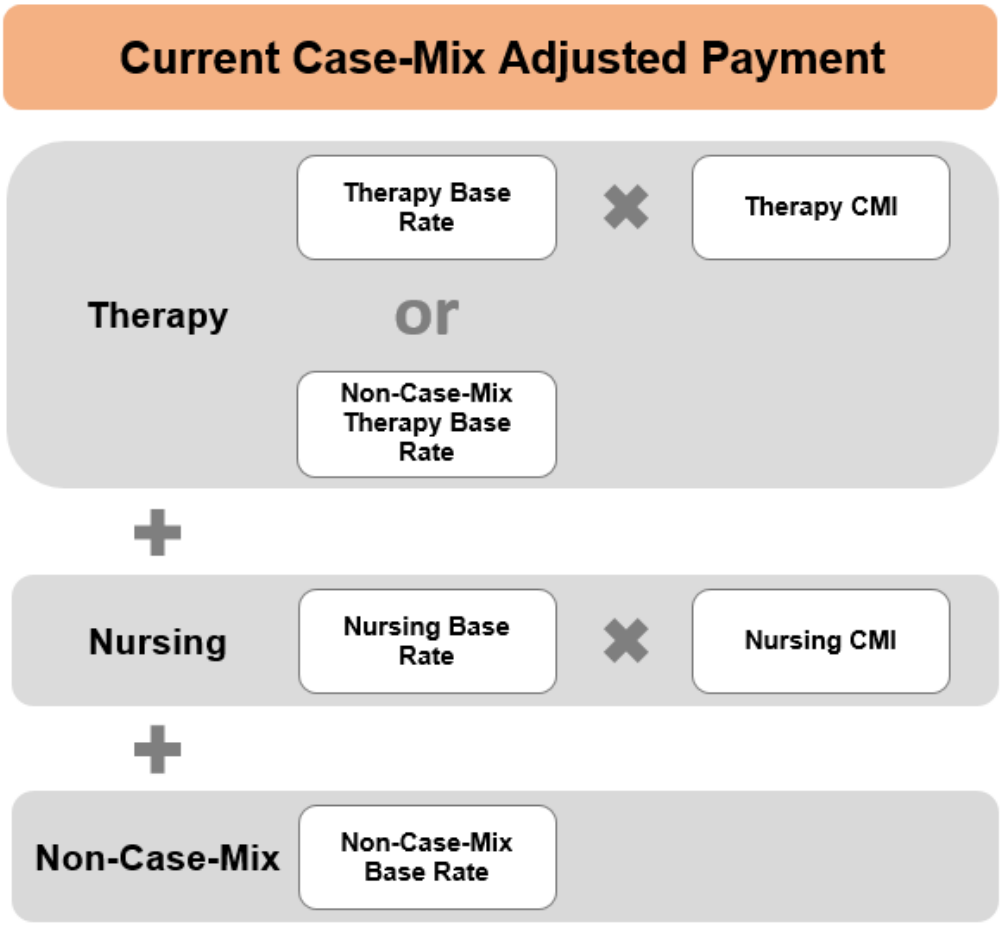
This section presents an overview of the current SNF PPS and describes refinements that could improve payment accuracy and incentives.

Overview

In the Balanced Budget Act of 1997, Congress amended the Social Security Act to require the Secretary of Health and Human Services to establish a SNF PPS by July 1, 1998. The PPS was designed to include all SNF services covered under Medicare Part A except for approved educational activities. A case-mix-adjusted PPS attempts to predict the cost to treat patients based on their diagnosis, services utilized, or other indications of resource use. Based on staff time studies conducted in 1995 and 1997, CMS identified three primary predictors of cost for SNF residents—clinical characteristics, activities of daily living (a measure of functional assistance required by a resident), and skilled services received (e.g., rehabilitation, extensive services, or IV medication)—and based the resident classification system on these characteristics. In the current RUG-IV model, SNF facilities are required to use the Minimum Data Set (MDS) 3.0 assessment tool to assign residents to one of 66 resource utilization groups (RUGs), also known as case-mix groups. While a variety of variables could factor into resident classification under RUG-IV, a large majority of SNF residents receive therapy, and their case-mix group is determined primarily by the number of therapy minutes they receive. CMS assigns a case-mix index (CMI) to each RUG based on the average cost of a SNF resident in that payment group. CMS calculates separate CMIs for nursing and therapy services. The CMI is

multiplied by a base rate to determine payment for each day of care. Figure 1 illustrates how payment is calculated under RUG-IV. Not shown is the adjustment for geographic differences in wages. In addition to case-mix adjustment, the Social Security Act also requires that payment under the SNF PPS be made on a per-diem basis[1].

Figure 1: Illustration of RUG-IV Payment



Since the SNF PPS was implemented, CMS has made several revisions to the payment system. In 2001, CMS contracted with the Urban Institute to study and develop refinements to the PPS that would better address medically complex beneficiaries. The Urban Institute's primary finding was that the RUG-III model in use at the time did not adequately account for the high utilization of non-therapy ancillary (NTA) services of residents who receive rehabilitation and extensive services. Based on this finding, CMS in 2006 implemented the RUG-53 classification, which incorporated nine additional case-mix groups in the new Rehabilitation Plus

[1] Health Care Financing Administration (HCFA), Department of Health and Human Services (HHS), "Medicare Program; Prospective Payment System and Consolidated Billing for Skilled Nursing Facilities," *Federal Register* 63 no. 91 (May 12, 1998): 26252-26316, https://www.gpo.gov/fdsys/pkg/FR-1998-05-12/pdf/98-12208.pdf.

Extensive Services category. In 2006-07, CMS conducted a new staff time study, the Staff Time and Resource Intensity Verification Project (STRIVE), to develop more comprehensive revisions to the payment system. Notable changes in the resident classification system, developed using the STRIVE data, included the addition of new RUGs, changes in the allocation of therapy minutes administered to multiple patients at once (concurrent therapy), and modifications to the scale used to measure activities of daily living (ADL)[2]. CMS published the final regulations establishing the revised payment model, RUG-IV, in August 2009. The new resident classification was effective as of fiscal year (FY) 2011.

Refinements to SNF PPS Can Improve Payment Accuracy

As noted above, for a large majority of SNF residents, payment is determined primarily by the number of therapy minutes they receive. This payment model does not fully consider the wide range of clinical characteristics that influence the relative resource use of SNF residents. Strengthening the relationship between payment and clinical characteristics promotes payment accuracy by providing the resources necessary to meet the care needs of a diverse range of patient types. Researchers have recommended two key reforms to improve payment accuracy and strengthen incentives to provide an appropriate level and quality of care:

(i) Remove therapy minutes as a determinant of payment and create a new therapy payment model in which payment is linked to differences in clinical characteristics[3] [4].

(ii) Create a separate payment component for NTA services, using resident characteristics to predict utilization of these services[5] [6].

[2] Eby, Jean, Dane Pelfrey, Kathy Langenberg, Brant Fries, Robert Godbout, David Maltiz, and David Oatway, "Staff Time and Resource Intensity Verification Project Phase II," *Iowa Foundation for Medical Care, University of Michigan, Stepwise Systems, CareTrack Systems, Baltimore, MD* (2011), https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/TimeStudy.html.

[3] Carter, Carol, Bowen Garrett, and Doug Wissoker, "Reforming Medicare Payments to Skilled Nursing Facilities to Cut Incentives for Unneeded Care and Avoiding High-Cost Patients," *Health Affairs*, 31 (2012), 1303-1313, content.healthaffairs.org/content/31/6/1303.long.

[4] Carter, Carol, Bowen Garrett, and Doug Wissoker, "The Need to Reform Medicare's Payments to Skilled Nursing Facilities is as Strong as Ever," Urban Institute, Medicare Payment Advisory Commission (2015), http://www.urban.org/sites/default/files/publication/39036/2000072-The-Need-to-Reform-Medicare-Payments-to-SNF.pdf.

[5] Carter, Carol, Bowen Garrett, and Doug Wissoker, "Reforming Medicare Payments to Skilled Nursing Facilities to Cut Incentives for Unneeded Care and Avoiding High-Cost Patients," 1303-1313.

[6] Carter, Carol, Bowen Garrett, and Doug Wissoker, "The Need to Reform Medicare's Payments to Skilled Nursing Facilities is as Strong as Ever."

Resident Classification System, Version I (RCS-I)

This section describes Acumen's recommendations, including an overview of the RCS-I reimbursement model, how payment would be calculated under RCS-I, and determinants of payment for each recommended payment component.

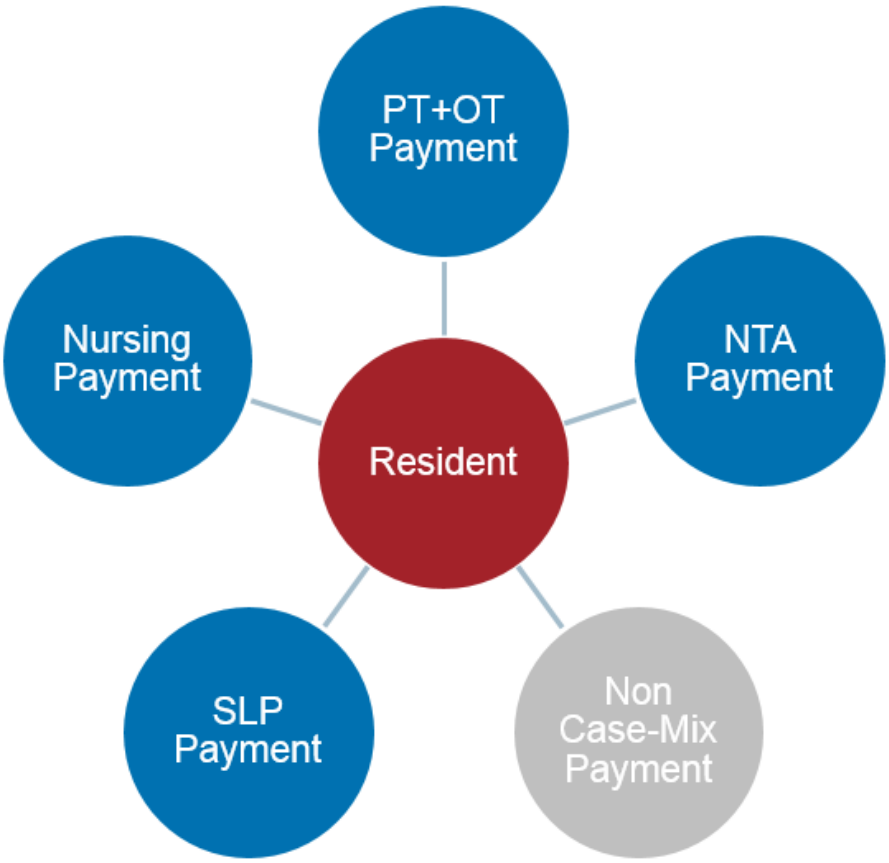
Overview

Based on extensive investigations of the relationship between resident characteristics and utilization of SNF resources, Acumen developed a new, comprehensive reimbursement model, the Resident Classification System, Version I (RCS-I). RCS-I consists of the following four case-mix-adjusted payment components:

- **PT/OT:** covers utilization of physical therapy (PT) and occupational therapy (OT)
- **SLP:** covers utilization of speech-language pathology (SLP) services
- **Nursing:** covers utilization of nursing services and social services
- **NTA:** covers utilization of non-therapy ancillary (NTA) services

Additionally, RCS-I would also maintain the existing non-case-mix component to cover utilization of SNF resources that do not vary according to resident characteristics. These five components are shown in Figure 2. For two of the case-mix-adjusted components, PT/OT and NTA, RCS-I includes variable per-diem payment adjustments that modify payment based on changes in utilization of these services over the course of a stay.

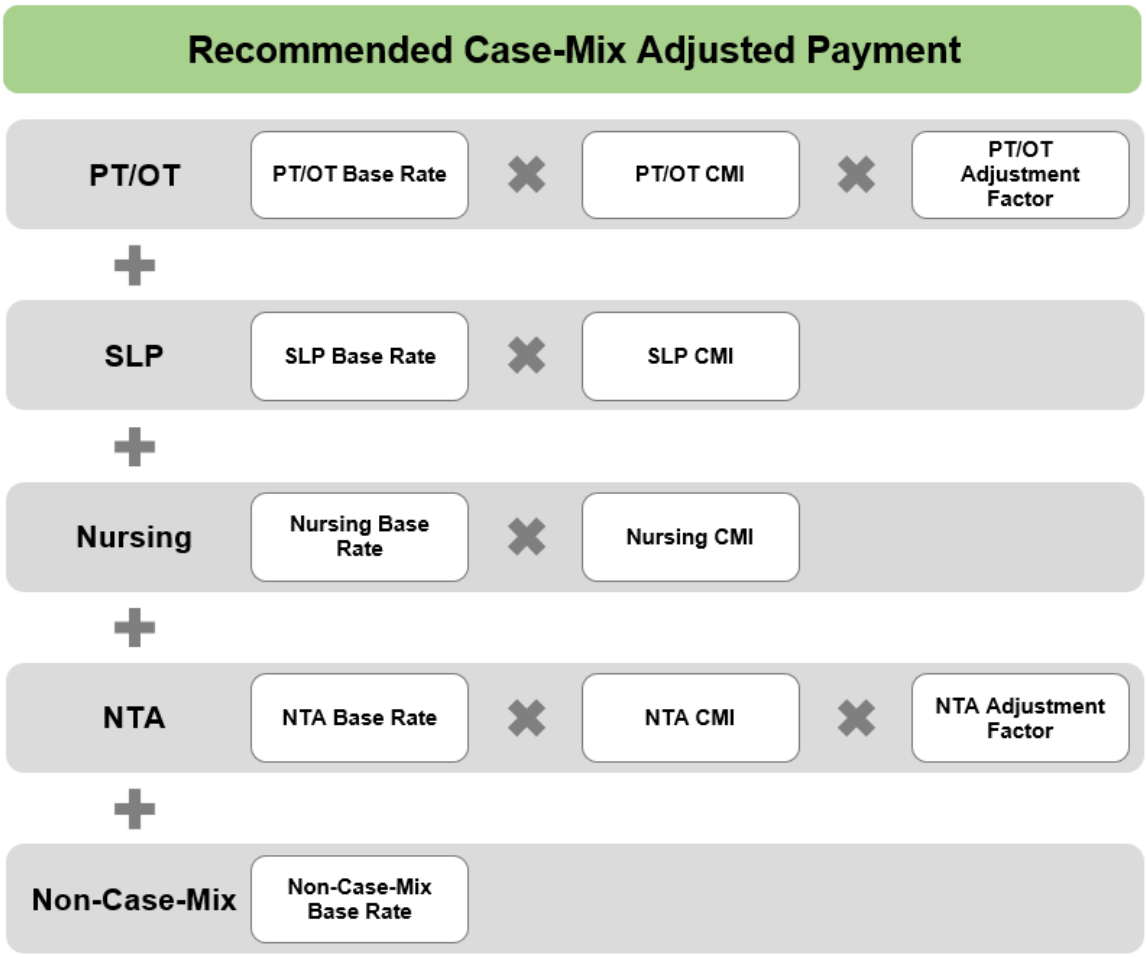
Figure 2: Resident-Centered Care Under RCS-I



Calculation of Payment Under RCS-I

Similar to the current RUG-IV model, per-diem payment under RCS-I would be determined by two primary factors: base rates that correspond to each component of payment discussed above and CMIs that correspond to each payment group. Each resident would be classified into a resident group for each of the four case-mix-adjusted components. The base rate for each case-mix-adjusted component would be multiplied by the CMI corresponding to the assigned resident group. Additionally, as noted above, separate adjustments would be applied to each resident's PT/OT and NTA payments depending on the day of the stay. Figure 3 illustrates how payment for a given day of SNF care would be calculated for a resident. Not shown is the adjustment for geographic differences in labor costs.

Figure 3: Illustration of Payment under RCS-I



Determinants of Payment Under RCS-I

Table 1 shows the determinants of payment for each case-mix-adjusted component in RCS-I. The non-case-mix component is not shown, as it is not dependent on resident characteristics. As shown, PT/OT payment would be based on diagnostic information from the prior inpatient stay, cognitive status, and functional status. SLP payment would be based on diagnostic information from the prior inpatient stay, cognitive status, SLP-related comorbidities, and the presence of a swallowing disorder or a mechanically altered diet. Nursing payment would be based on clinical information from the SNF stay, extensive services received, the presence of depression, and restorative nursing services received. NTA payment would be based on the presence of comorbidities and extensive services received. Both NTA and PT/OT payments would also vary based on the point in the stay.

Table 1: Determinants of Payment in RCS-I

PT/OT	SLP	Nursing	NTA
• Diagnostic information from prior inpatient stay • Cognitive status • Functional status	• Diagnostic information from prior inpatient stay • Cognitive status • SLP-related comorbidities • Presence of swallowing disorder or mechanically altered diet	• Clinical information from SNF stay • Extensive services received • Presence of depression • Restorative nursing services received	• Comorbidities present • Extensive services received
• Point in the stay (variable per diem adjustment)			• Point in the stay (variable per diem adjustment)

Advantages of RCS-I

RCS-I incorporates the two major recommendations from the research community and the Medicare Payment Advisory Commission (MedPAC): it removes therapy minutes as the basis for therapy payment and it establishes a separate case-mix-adjusted component for NTA services. Table 2 summarizes the key advantages of RCS-I.

Table 2: Summary of RCS-I

Advantages of RCS-I
• Removes therapy minutes as the basis for therapy payment • Establishes separate case-mix-adjusted component for NTA services, thereby improving targeting of resources to medically complex beneficiaries and increasing payment accuracy for these services • Enhances payment accuracy for nursing services by making nursing payment dependent on a wide range of clinical characteristics (as originally contemplated in RUG-IV) rather than being primarily a function of therapy minutes and ADL scores • Improves targeting of resources to beneficiaries with diverse therapy needs by dividing therapy component into two separate case-mix-adjusted components: PT/OT and SLP • Provides additional resources to facilities for treating potentially vulnerable populations, including beneficiaries with the following characteristics: high NTA utilization, extensive services (ventilator, respirator, or infection isolation), dual enrollment in Medicare and Medicaid, end-stage renal disease (ESRD), longer qualifying inpatient stays, diabetes, wound infections, and IV medication • Enhances payment accuracy for all SNF services by: (1) basing payment for each component on predicted resource utilization associated with clinically-relevant resident characteristics and (2) introducing variable per-diem payment adjustments to track changes in resource use over a stay • Promotes simplicity and transparency by: (1) using only the most important predictors of resource utilization to set payment for each component, (2) largely maintaining the current model of resident classification for nursing payment, and (3) implementing a simple variable per-diem schedule • Promotes consistency with other Medicare and post-acute payment settings by basing resident classification on objective clinical information while minimizing the role of service provision in determination of payment

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ADL	Activities of daily living
AIDS	Acquired Immune Deficiency Syndrome
ARD	Assessment reference date
ASHA	American Speech-Language-Hearing Association
BBA	Balanced Budget Act of 1997, Pub. L. 105-33
BBRA	Medicare, Medicaid, and SCHIP Balanced Budget Refinement Act of 1999, Pub. L. 106-113
BIMS	Brief interview for mental status
BIPA	Medicare, Medicaid, and SCHIP Benefits Improvement and Protection Act of 2000, Pub. L. 106-554
BLS	Bureau of Labor Statistics
CAH	Critical access hospital
CARE	Continuity Assessment Record and Evaluation
CART	Classification and regression trees
CASPER	Certification and Survey Provider Enhanced Reporting
CBSA	Core-based statistical area
CC	Condition category
CCN	CMS Certification Number
CCR	Cost-to-charge ratio
CFR	Code of Federal Regulations
CFS	Cognitive Function Scale
CMI	Case-mix index
CMS	Centers for Medicare & Medicaid Services
COT	Change of Therapy
CPS	Cognitive Performance Scale
CWF	Common Working File
ESRD	End-stage renal disease

FFS	Fee-for-service
FR	Federal Register
FY	Fiscal year
GAO	U.S. Government Accountability Office
HCFA	Health Care Financing Administration
HCPCS	Healthcare Common Procedure Coding System
HHS	U.S. Department of Health and Human Services
HIPPS	Health Insurance Prospective Payment System
HIV	Human Immunodeficiency Virus
ICD-9	International Classification of Diseases, 9th Revision
ICD-10	International Classification of Diseases, 10th Revision
ICU	Intensive care unit
IMPACT	Improving Medicare Post-Acute Care Transformation Act of 2014, Pub. L. 113-185
IPPS	Inpatient prospective payment system
IRF	Inpatient Rehabilitation Facility
IRF-PAI	Inpatient Rehabilitation Facility Patient Assessment Instrument
IV	Intravenous
LASSO	Least Absolute Shrinkage and Selection Operator
LPN	Licensed practical nurse
LTC	Long-term care
LTCH	Long-term care hospital
MACRA	Medicare Access and CHIP Reauthorization Act of 2015, Pub. L. 114-10
MAP	Measures Application Partnership
MBI	Market Based Index
MDS	Minimum data set
MedPAC	Medicare Payment Advisory Commission

MMA	Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Pub. L. 108-173
MSA	Metropolitan statistical area
MS-DRG	Medical Severity-Diagnosis Related Group
NAICS	North American Industry Classification System
NECMA	New England County Metropolitan Area
NF	Nursing facility
NQF	National Quality Forum
NRST	Non-Resident Specific Time
NST	Non-Study Time
NTA	Non-therapy ancillary
OASIS	Outcome and Assessment Information Set
OES	Occupation and Employment Survey
OIG	The Office of the Inspector General, U.S. Department of Health and Human Services
OLS	Ordinary least squares
OMB	Office of Management and Budget
OMRA	Other Medicare Required Assessment
OT	Occupational therapy
PAC	Post-acute care
PAMA	Protecting Access to Medicare Act of 2014, Pub. L. 113-93
PPS	Prospective Payment System
PT	Physical therapy
RAI	Resident assessment instrument
RCS-I	Resident Classification System, Version I
RIC	Rehabilitation Impairment Category
RN	Registered nurse
RST	Resident Specific Time

RUG	Resource utilization group
RUG-III	Resource Utilization Groups, Version 3
RUG-IV	Resource Utilization Groups, Version 4
RUG-53	Refined 53-Group RUG-III Case-Mix Classification System
RUGAI	Resource utilization group assessment indicator
SE	Standard error
SLP	Speech-language pathology
SNF	Skilled nursing facility
SNF PMR	Skilled Nursing Facility Payment Models Research
SSA	Social Security Act
STM	Staff time measurement
STRIVE	Staff time and resource intensity verification project
TEP	Technical expert panel
TOB	Type of Bill
WWST	Wage-weighted staff time

1 INTRODUCTION

This report introduces a comprehensive alternative to the current resident classification model (case-mix adjustment) within the skilled nursing facility (SNF) prospective payment system (PPS). The current payment model for residents of SNFs in Medicare Part A-covered stays classifies residents into clinically relevant groups for the purpose of determining how much Medicare will reimburse SNF facilities for the costs of providing care. Acumen developed an alternative classification for SNF residents in Medicare Part A-covered stays pursuant to a contract with the Centers for Medicare & Medicaid Services (CMS) (Contract No. HHSM-500-2011-00012I). CMS originally contracted with Acumen on 9/20/2012 to identify and evaluate possible alternatives to the existing SNF PPS therapy reimbursement model. In a subsequent contract modification (effective 9/9/2014), the scope of the project was expanded to develop alternatives to the SNF PPS case-mix adjustment methodology in its entirety. (Case-mix adjustment adjusts Medicare payments to facilities based on characteristics of the resident for whom care was provided.)

Since 1998, Medicare has paid for services provided by SNFs under the Medicare Part A benefit on a per diem basis through the SNF PPS. Various experts and researchers have recommended fundamental changes to the reimbursement model. These organizations include the Medicare Payment Advisory Commission (MedPAC)[7], the Office of the Inspector General (OIG) within the U.S. Department of Health and Human Services[8], and the Urban Institute, which was commissioned by CMS to study the SNF reimbursement model and present options to improve the model[9]. These organizations recommend a new payment model that links payment to clinical characteristics. They attribute the increasing volume of therapy services billed to Medicare by SNFs to the current therapy reimbursement model, which strongly incentivizes therapy provision[10]. Additionally, their research indicates that the current nursing reimbursement model does not appropriately account for variation in the utilization of non-therapy ancillary (NTA) services. Building on these findings in the Medicare payment literature, Acumen conducted extensive quantitative and qualitative analyses to develop a comprehensive alternative payment model that addresses concerns with the current therapy reimbursement

[7] Medicare Payment Advisory Commission, "Report to the Congress: Reforming the Delivery System," Washington, DC: 2008, http://www.medpac.gov/documents/jun08_entirereport.pdf.
[8] Office of the Inspector General, U.S. Department of Health and Human Services, "Inappropriate Payments to Skilled Nursing Facilities Cost Medicare More Than a Billion Dollars in 2009," Washington, DC: 2012, https://oig.hhs.gov/oei/reports/oei-02-09-00200.pdf.
[9] Liu, Korbin, Bowen Garrett, Sharon Long, Stephanie Maxwell, Yu-Chu Shen, Douglas Wissoker, Brant Fries, et al, "Final Report to CMS: Options for Improving Medicare Payment for Skilled Nursing Facilities," *Urban Institute, University of Michigan, University of Colorado Health Sciences Center, and Harvard University, Baltimore, MD* (2007), http://www.urban.org/sites/default/files/alfresco/publication-pdfs/411526-Options-for-Improving-Medicare-Payment-for-Skilled-Nursing-Facilities.pdf.
[10] Medicare Payment Advisory Commission, "Report to the Congress: Reforming the Delivery System."

model, improves targeting of resources to medically complex beneficiaries (i.e., those with high NTA utilization), and enhances payment accuracy system-wide.

This report begins by summarizing Acumen's activities during the base year of the contract and during the subsequent option period. It then describes the steps Acumen followed to develop the comprehensive alternative payment model, including identifying a study population, creating dependent variables to measure resident resource utilization, selecting clinical characteristics predictive of resource use, and conducting regression analyses to build payment groups. Lastly, the report presents the recommended payment groups, estimated payment weights, additional recommendations to improve the payment system, and the results of related analyses.

1.1 Base Year Activities

As discussed above, CMS initially contracted with Acumen to identify and evaluate possible alternatives to the existing therapy reimbursement model for the SNF PPS. Although the scope of the project was later expanded to develop a comprehensive alternative reimbursement model, the first year of the contract focused exclusively on the therapy component.

In the base year, which ran from September 2012 to September 2013, Acumen followed a four step process to begin exploring changes to therapy reimbursement. First, Acumen conducted an environmental scan and stakeholder outreach to gather information about the existing therapy reimbursement model and possible alternative payment approaches. The environmental scan drew on evaluations of the SNF PPS therapy reimbursement model in the academic literature, unpublished government documents, and reports from government-affiliated and non-governmental organizations such as MedPAC and the Urban Institute. Stakeholder outreach consisted of a listening session and the solicitation of public comments through a CMS email inbox. Acumen used these outreach strategies to identify strengths and areas for improvement in the existing payment system. The environmental scan and stakeholder outreach informed future research into alternatives to the existing therapy reimbursement model.

Second, Acumen identified areas for future research to support the development of an alternative therapy payment model. Acumen identified gaps in the existing literature, as well as data limitations that could potentially hinder efforts to develop and implement an alternative therapy payment model. To address these gaps in the literature and data limitations, Acumen proposed two groups of potential analyses. The first group would support the development of a resident classification model for SNF therapy payment based on clinical characteristics. The second group would support changes to the payment unit for SNF therapy services.

Third, Acumen drew on information obtained through the prior steps to evaluate a broad range of considerations for the development of an alternative therapy payment model including:

- payment unit choices,
- therapy case-mix adjustment options,
- data sources, and
- pricing adjustments.

Within each of these broad categories, Acumen evaluated alternatives based on their impact within the SNF setting, impact across settings, and feasibility of implementation.

Finally, based on these analyses, Acumen determined that four broad candidate payment concepts could be constructed for therapy payment. Acumen selected concepts that represent fundamentally different approaches to paying for SNF therapy services. The four evaluated alternatives included: a resident characteristics model, a resident characteristics model blended with a resource-based pricing adjustment (the hybrid model), a fee schedule, and a competitive bidding model. Examples of a resource-based adjustment include an outlier payment for residents whose costs of care exceed the costs predicted by the resident characteristics model and a variable per diem pricing adjustment that may increase or decrease payments over a resident's stay based on evidence of how costs vary across a stay. Acumen evaluated each payment concept according to six criteria:

(i) Improves payment accuracy for SNF services
(ii) Improves incentives to provide the appropriate level of care for individuals
(iii) Feasible to implement in the short-to-medium term
(iv) Minimizes start-up and ongoing implementation costs for CMS
(v) Minimizes burden on stakeholders
(vi) Reduces impacts on or improves consistency with other settings and payers

After analyzing each of the concepts in relation to the criteria, Acumen decided to further investigate the resident characteristics model and the hybrid model in the next stage of the project. A report that summarizes Acumen's activities and recommendations during the base year of the contract may be found online here: Base Year Summary Report.

1.2 Option Period Activities

In Option Periods 1 and 2 of this project, which began September 2013 and runs until September 2017, the project scope was expanded to investigate improvements to all case-mix-adjusted components of the SNF PPS and develop a fully implementable alternative payment model based on the payment approaches selected for further exploration during the base year.

Additionally, Acumen facilitated multiple opportunities for experts and stakeholders to provide feedback on the alternative payment model and used this feedback to make further improvements to the alternative payment model.

First, Acumen converted the payment approaches selected for further investigation during the base year into a fully implementable payment model. This process included creating dependent variables, selecting independent variables, and testing the relationship between the independent and dependent variables via regression modeling. Acumen followed these steps for each component in the alternative resident classification (the process to develop the nursing component was somewhat different, as described in Section 3.6). Determinants of payment were selected based on clinical input, literature reviews, statistical evidence, and expert and stakeholder input. Acumen then created payment groups using selected resident characteristics that were good predictors of resource utilization, aligned with clinical logic and input, and maintained the simplicity necessary for an operational payment system.

Second, to take advantage of the expertise of researchers in Medicare payment policy as well as clinicians and health care providers in the SNF setting, Acumen facilitated a series of opportunities for these individuals to provide feedback on improvements to the SNF PPS. The first of these opportunities was a technical expert panel (TEP) held in February 2015 that focused on alternative therapy payment models. The second opportunity was a November 2015 TEP focused on alternative models for nursing payment. A third TEP focusing on overall improvements to the payment model was held in June 2016. A fourth TEP presenting a preliminary version of Acumen's alternative resident classification took place in October 2016. In addition to convening this series of TEPs, Acumen solicited feedback via a project inbox and obtained expert and stakeholder input on specific areas of research following the TEPs and during the analytical process. Acumen compiled the recommendations received in these forums and used the feedback to generate new analyses and make further refinements to the recommended payment model. Summaries of the content, discussion, and recommendations from the four TEPs can be found at the following links:

Alternative Therapy Payment Models TEP Summary Report

Alternative Nursing Payment Models TEP Summary Report

Overall SNF Payment TEP Summary Report

Alternative Payment Model TEP Summary Report

2 BACKGROUND ON SNF PPS

This section provides background on the SNF PPS, including a description of the cost-based payment system that preceded the SNF PPS, the development and key features of the PPS, the 2006-07 staff time study which developed refinements to the PPS, and areas for improvement within the payment system.

2.1 Cost-Based Payment System

Prior to implementation of the SNF PPS, Medicare payment for SNFs was based on retrospective cost reimbursement. Facilities received payment for three major categories of costs: routine, ancillary, and capital. Routine costs were associated with services included by the provider in a daily service charge. These included nursing, minor medical supplies, social services, and the use of certain facilities and equipment which did not entail separate charges. Ancillary costs covered specialized services, including therapy, drugs, and laboratory services, that were associated with individual patients. Capital costs encompassed land, facilities, equipment, and interest associated with financing these purchases[11]. Under the pre-PPS payment system, Medicare reimbursed SNF facilities for routine costs (including room and board and nursing) up to specified limits. Reimbursement for ancillary costs was not limited, resulting in weak incentives for facilities to mitigate these costs[12]. Despite limitations on routine costs, Medicare spending on SNFs rose faster than spending in many other areas of Medicare in the 1990s, leading to calls for adoption of a PPS[13].

2.2 SNF Prospective Payment System

This section describes the initial development and key elements of the SNF PPS.

2.2.1 Establishment of the SNF PPS

In the Balanced Budget Act of 1997, Congress amended the Social Security Act to require the Secretary of Health and Human Services to establish a SNF PPS by July 1, 1998. The PPS was designed to include all SNF services covered under Medicare Part A except for approved educational activities. The revisions to the Social Security Act set the formula for determining Medicare payment rates to SNFs and required the rates to be adjusted for geographic cost differences as well as case mix (i.e., differences in each facility's patient population). A case-mix-adjusted PPS attempts to predict the cost to treat patients based on their clinical

[11] Health Care Financing Administration (HCFA), Department of Health and Human Services (HHS), "Medicare Program; Prospective Payment System and Consolidated Billing for Skilled Nursing Facilities," 26252-26316.
[12] U.S. Government Accountability Office, 2002a, "Skilled Nursing Facilities: Medicare Payments Exceed Costs for Most but Not All Facilities," GAO-03-183, Washington, DC, 2002, http://www.gao.gov/assets/240/236797.pdf.
[13] Medicare Payment Advisory Commission (MedPAC), "Report to the Congress: Medicare Payment Policy," Washington, DC: 2002, http://www.medpac.gov/docs/default-source/reports/Mar02_Entire_report.pdf.

characteristics, services utilized, or other factors indicative of resource use. For example, a resident with more dependence to perform activities of daily living would be expected to require greater nursing resources than a more independent resident, resulting in a higher nursing payment to the facility treating this beneficiary. Prior to the adoption of the Medicare SNF PPS, states had developed more than 25 case-mix models for Medicaid patients treated in nursing facilities. The Health Care Financing Administration (renamed the Center for Medicare & Medicaid Services in 2001), also funded a multi-state demonstration beginning in 1989 to test a Medicare PPS and quality monitoring system for nursing homes across several states[14]. In addition to case-mix adjustment, the Social Security Act also requires that payment under the SNF PPS be made on a per-diem basis.

2.2.2 SNF Base Rates

For the two case-mix adjusted components of payment (therapy and nursing), payment is calculated by multiplying the base rate for each component by the case-mix index for a resident's case-mix group. SNF base payment rates are based on mean SNF costs for a base year, FY 1995, updated for inflation to the initial period of the SNF PPS (July 1, 1998 to September 30, 1999), and adjusted for facility-level differences in case mix and geographic variation in wages. The original base rates were based on cost report data from hospital-based and freestanding SNFs. Allowable costs used to calculate base rates included routine, ancillary, and capital-related costs for SNF services provided under Part A, as well as an estimate of amounts payable under Part B for covered SNF services provided in FY 1995 to SNF residents receiving Part A services.

CMS publishes updated per-diem federal rates in the Federal Register every year before August 1 preceding the fiscal year in which the rates will be implemented. Rates are updated for inflation each year after the initial period using the SNF Market Basket Index (MBI). Rates are published for four separate components of SNF payments, with both urban and rural rates issued for each component:

(i) nursing case-mix, which includes costs for nursing, social services, and non-therapy ancillary costs (e.g., drugs);

(ii) therapy case-mix, which includes physical, occupational, and speech-language pathology;

(iii) non-case-mix therapy, which includes therapy-related costs for patients not placed in a therapy classification group (e.g., evaluation for therapy);

[14] Health Care Financing Administration (HCFA), Department of Health and Human Services (HHS), "Medicare Program; Prospective Payment System and Consolidated Billing for Skilled Nursing Facilities," 26253-26254.

(iv) a separate non-case-mix component, which includes all other costs (e.g., room and board).

The nursing case-mix and therapy case-mix components are adjusted for resident characteristics, as described in the next section. The non-case-mix therapy and non-case-mix components do not vary with resident characteristics.

2.2.3 Case-Mix Adjustments

As noted above, the Social Security Act requires SNF payments to be case-mix adjusted for expected differences in resident resource use based on residents' clinical characteristics, services utilized, or other factors indicative of resource use. To achieve this, CMS constructed a classification model that grouped residents with similar expected resource utilization, and calculated case-mix indexes, or payment weights, for each group. CMS conducted studies in 1995 and 1997 to measure nursing and therapy minutes provided per resident. These studies included 12 states, 154 SNFs, and 2,900 SNF residents. Researchers identified three primary predictors of cost for SNF residents—clinical characteristics, the level of assistance required to perform activities of daily living, and skilled services received (e.g., rehabilitation, extensive services, or IV medication)—and based the resident classification model on these characteristics. At the time of the SNF PPS implementation, SNF facilities were required to use the Minimum Data Set (MDS) assessment tool to assign residents to one of 44 resource utilization groups (RUGs) in the RUG-III classification model. CMS assigned a case-mix index (CMI) to each RUG based on the average cost of a SNF resident in that payment group. For example, a resident with a CMI of 1.5 would be expected to be 1.5 times as costly as the average resident. The facility treating that resident would receive a per diem payment 1.5 times the base rate for that fiscal year. CMS calculates separate CMIs for nursing and therapy services[15].

2.3 Refinements to the SNF PPS

As discussed in the FY 2006 proposed rule[16], following implementation of the SNF PPS, concerns arose that the transition to a prospective payment system could limit access for medically complex beneficiaries. In the Medicare, Medicaid, and SCHIP Balanced Budget Refinement Act of 1999 (BBRA), Congress enacted various temporary payment adjustments in response to these concerns, including a 20% increase in per diem rates for 12 complex medical groups in the RUG-III classification. These payment adjustments were to be in place only until CMS refined the resident classification model to better account for medically complex

[15] Ibid., 26256-26268.
[16] Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services (HHS), 2005b, "Medicare Program; Prospective Payment System and Consolidated Billing for Skilled Nursing Facilities for FY 2006," *Federal Register* 70 no. 96 (May 19, 2005): 29070-29162, https://www.gpo.gov/fdsys/pkg/FR-2005-05-19/pdf/05-9934.pdf.

beneficiaries. In 2001, CMS contracted with the Urban Institute to study and develop such refinements. The Urban Institute's primary finding was that the RUG-III model in use at the time did not adequately account for the high NTA utilization of residents who receive both rehabilitation and extensive services. Based on this finding, CMS in 2006 implemented the RUG-53 classification, which incorporated nine additional case-mix groups in the new Rehabilitation Plus Extensive Services category.

2.4 The STRIVE Study

CMS stated in the FY 2006 proposed rule that the changes to the resident classification implemented that year were not intended to represent comprehensive changes to the case-mix model. This effort began with a new staff time measurement study conducted in 2006-07. A team of researchers measured staff time provided to residents at 205 SNFs in 15 participating states. Researchers documented clinical characteristics and the minutes of nursing and therapy staff time received by each resident in the study population. The staff time minutes were weighted to account for differences in wages for various SNF staff. The Staff Time and Resource Intensity Verification Project (STRIVE) determined that the RUG-III model then in place predicted resident costs reasonably well. Therefore, STRIVE researchers decided to refine the existing classification model, rather than developing an entirely new one.

Using the data derived from the time measurement study, researchers built on the RUG-III model to develop RUG-IV, which incorporated notable changes to resident classification in SNFs. Changes included the addition of new RUGs, modifications in the allocation of therapy minutes administered to multiple patients at once (concurrent therapy), and updates to the scale used to measure activities of daily living (ADL). See Figure 15 in the Appendix for a summary of the resident classification process under RUG-IV, which has been in place until now. These changes also required updates to the MDS assessment tool. Researchers compared RUG-IV to the original classification model and determined that RUG-IV better explained variation in costs across SNF residents, created more homogenous resident groups, and displayed wider variation in case-mix weights (suggesting better incentives to serve high-cost residents). However, the STRIVE study also suffered from notable shortcomings, including methodological flaws in the collection of therapy minutes, small sample sizes for certain resident groups used to generate CMIs, and the retention of various measures of service provision as determinants of payment. The STRIVE researchers adjusted for counterintuitive results produced by small sample sizes by smoothing staff time estimates to produce CMIs consistent with clinical expectations. CMS

published the final regulations establishing RUG-IV in August 2009[17]. The new resident classification was effective as of FY 2011.

2.5 Areas for Improvement in the SNF PPS

Under RUG-IV, a majority of residents receive therapy, and the number of therapy minutes received is the primary determinant of both therapy and nursing payment. (See Table 88 in the Appendix showing the frequency of stays for each RUG in RUG-IV.) This payment model overlooks the wide range of clinical characteristics that influence the relative resource use of SNF residents. Strengthening the relationship between payment and clinical characteristics promotes payment accuracy by providing the resources necessary to meet the care needs of a diverse range of resident types. Researchers have recommended two key reforms to improve payment accuracy and strengthen incentives to provide an appropriate level and quality of care:

(i) Remove therapy minutes as a determinant of payment and create a new therapy payment model in which payment is linked to differences in clinical characteristics[18] [19].

(ii) Create a separate payment component for NTA services, using resident characteristics to predict utilization of these services[20] [21].

[17] Eby, Jean, Dane Pelfrey, Kathy Langenberg, Brant Fries, Robert Godbout, David Maltiz, and David Oatway, "Staff Time and Resource Intensity Verification Project Phase II," *Iowa Foundation for Medical Care, University of Michigan, Stepwise Systems, CareTrack Systems, Baltimore, MD* (2011), https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/TimeStudy.html.

[18] Carter, Carol, Bowen Garrett, and Doug Wissoker, "Reforming Medicare Payments to Skilled Nursing Facilities to Cut Incentives for Unneeded Care and Avoiding High-Cost Patients," *Health Affairs*, 31 (2012), 1303-1313, content.healthaffairs.org/content/31/6/1303.long.

[19] Carter, Carol, Bowen Garrett, and Doug Wissoker, "The Need to Reform Medicare's Payments to Skilled Nursing Facilities is as Strong as Ever," Urban Institute, Medicare Payment Advisory Commission (2015), http://www.urban.org/sites/default/files/publication/39036/2000072-The-Need-to-Reform-Medicare-Payments-to-SNF.pdf.

[20] Carter, Carol, Bowen Garrett, and Doug Wissoker, "Reforming Medicare Payments to Skilled Nursing Facilities to Cut Incentives for Unneeded Care and Avoiding High-Cost Patients," 1306.

[21] Carter, Carol, Bowen Garrett, and Doug Wissoker, "The Need to Reform Medicare's Payments to Skilled Nursing Facilities is as Strong as Ever."

3 RESIDENT CLASSIFICATION SYSTEM I (RCS-I)

This section describes the methodology used to develop RCS-I and the results of Acumen's analysis.

3.1 Data and Methods

The analysis of SNF payment alternatives began with the identification of a study population. The first step in this process was to select a study window, described in Section 3.1.1. After defining the study window, Acumen constructed stays from SNF claims, described in Section 3.1.2. Acumen then applied a series of restrictions to ensure: 1) stays could be matched to other sources of resident and provider information (Section 3.1.3), and inaccurate, invalid, or irrelevant data (e.g., not pertaining to a SNF resident in a Medicare Part A stay) was excluded (Section 3.1.4).

3.1.1 Year of Data Used for Analyses

The study window uses stays with admissions in fiscal year (FY) 2014 for three reasons. First, this data reflects the most recent data available to Acumen at the time that research to develop a comprehensive alternative payment model began. Second, the assessment data in that period corresponds to version 3.0 of the Minimum Data Set (MDS), which is the same version that is currently in place. Finally, policy changes such as the introduction of the Change-of-Therapy (COT) assessment and the Other Medicare Required Assessment (OMRA), as well as changes to the allocation of group and concurrent therapy minutes, occurred prior to FY 2014. Therefore, FY 2014 data should reflect any changes in care practices related to these modifications in payment policy. Although the primary study population was created from FY 2014 data, data from prior years was used for specific investigations, including identifying certain chronic conditions and examining changes in resident characteristics over time.

3.1.2 Constructing SNF Stays

This section describes the data sources and methods Acumen used to construct SNF stays from claims. Acumen used Medicare Parts A and B claims from the CMS Common Working File (CWF). CWF data was downloaded weekly from CMS mainframes and then processed according to CMS final action rules. Acumen worked with this final-action data, which describes final payments to providers transacted up to the date of the download. The primary claims data used for the analyses are SNF claims. SNF claims are identified with Type of Bill (TOB) 21X, while hospital swing bed providers (also part of our population) use TOB 18X[22]. SNF claims were used to identify Medicare Part A stays paid under the SNF PPS. Acumen

[22] Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services (HHS), 2016a, "Chapter 6: SNF Inpatient Part A Billing and SNF Consolidated Billing," *Medicare Claims Processing Manual*, http://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/clm104c06.pdf.

constructed Part A stays by linking claims that share the same beneficiary identifier, facility CMS Certification Number (CCN), and admission date. Information from the claims, including resource utilization groups (RUGs), payment, charges, diagnoses, and assessment dates, were aggregated across a stay. Stays created from SNF claims were then linked to other Medicare claims data and assessment data using beneficiary identifiers.

Acumen applied a series of restrictions to the study population to ensure that all stays included in the study population are associated with Medicare beneficiaries receiving Part A benefits in a SNF. Table 3 lists the restrictions. The first three restrictions (1.1 to 1.3) ensure that all stays are enrolled exclusively in Medicare Part A throughout the stay. Restrictions 1.4 through 1.6 restrict the population to stays that occurred within a SNF and are associated with a Medicare payment.

Table 3: Medicare Part A Payment Restrictions

Medicare Part A Payment Restrictions	
1.1	Stay does not have any Part C encounter claims
1.2	Beneficiary is continuously enrolled in Part A throughout stay
1.3	Beneficiary did not transfer from Part C to Part A during stay
1.4	Stay only has PPS claims
1.5	Stay has positive utilization days
1.6	Stay has positive Medicare payment

3.1.3 Matching Stays to Other Sources of Information

The next step in building our study population was matching the SNF stays to various sources of resident and provider information. Matching stays to the prior inpatient claim and overlapping MDS assessments was necessary to be able to conduct analyses linking cost information to resident characteristics. Matching to provider information was necessary to access cost report and wage index data to accurately estimate beneficiary costs. In later stages of the analysis, provider information was used to assess the impact of RCS-I on various types of providers. To enable matching, Acumen applied a series of restrictions to the study population.

Table 4 lists the restrictions used for matching. Items 2.1 to 2.6 enable matching of stay-level cost data to sources of resident and provider information. Item 2.1 requires the SNF stays in the population to have a qualifying inpatient stay. Acumen used the first non-missing pair of QLFYFROM and QLFYTHRU dates on the beneficiary's claims to form the SNF stay's qualifying inpatient window. The beneficiary's inpatient stay can be matched to the SNF stay if the inpatient stay overlaps with the qualifying window, or if the inpatient stay through date falls

within 60 days prior to the SNF admission date. Item 2.2 restricts the population to stays with provider information by matching the stay to the Certification and Survey Provider Enhanced Reports (CASPER) data using the provider's CCN, or if a provider cannot be found in CASPER, by matching the stay to a provider in the POS database. If a swing bed facility cannot be found in CASPER or the POS database using the swing bed CCN, we use the corresponding hospital CCN to locate the facility in CASPER or the POS database and match the provider information associated with that hospital to the stay. Item 2.3 ensures that only stays with a matching MDS 5-day assessment are included. Acumen matched MDS assessments to their corresponding SNF claims using the specific Health Insurance Prospective Payment System (HIPPS) code that appears on both documents. Item 2.4 requires that every non-default assessment indicator in the HIPPS code on claims can be matched to an MDS assessment. Acumen then ordered the assessments by reference date and imposed restrictions 2.5 and 2.6 to ensure that each stay had a correctly ordered and complete series of matched assessments.

Items 2.7 and 2.8 enable estimation of resident costs. Calculating costs requires four elements: charges reported on SNF claims, cost-to-charge ratios (CCRs) from cost reports, each region's wage index, and the annual labor share (the last two elements are required to standardize costs). Charges for each stay and the annual labor share are always available in the claims and the SNF PPS final rule, respectively. However, if any of the other two elements is missing, stay costs cannot be calculated. Items 2.7 and 2.8 are two additional matching restrictions used to ensure that the stay's costs can be converted from charges on claims using the CCR on the cost report, and that the calculated costs can be standardized by removing geographic differences using the wage index and labor share.

Table 4: Matching Restrictions

Matching Restrictions	
2.1	Stay can be matched to qualifying inpatient stay
2.2	Provider of stay can be found in CASPER or POS
2.3	One 5-day MDS assessment is matched to the stay
2.4	All non-default RUGAIs can be matched to their MDS assessment
2.5	Stay does not begin with unscheduled PPS assessment
2.6	Stay does not have any expected scheduled PPS assessment missing
2.7	A cost report can be found for the provider
2.8	The county in which the facility is located has a wage index

3.1.4 Data Validity Restrictions

After constructing SNF Part A stays and ensuring stays could be matched to other sources of resident and provider information, Acumen created the final study population by applying data validity restrictions. Table 5 lists the restrictions in this category. Restrictions 3.1 to 3.7 exclude stays that contain invalid information (for example, both zero total therapy charges and positive therapy minutes). Because of the importance of estimating costs in our analysis of payment alternatives, Acumen imposed additional restrictions (3.8 to 3.13) to ensure the quality of estimated costs in our analyses. Items 3.8 and 3.9 are restrictions on CCRs from the cost report. Items 3.10 and 3.11 exclude a stay if any one of the six types of therapy and NTA charges are unrealistically high. Finally, items 3.12 and 3.13 require stays in the population to have costs of all three therapy disciplines present to ensure that the calculated total therapy costs are complete and do not have any component missing, as well as all three types of NTA costs. As shown in

Table 6 the final study population contains 73% of total stays. Acumen compared resident characteristics of the final study population to those of all stays in terms of gender, age, ethnicity, Medicaid enrollment, location, ownership, and institution type. The two populations are similar in most respects, although the study population contains a higher proportion of stays from for-profit facilities and a lower proportion of stays from swing bed facilities, as shown in Table 7.

Table 5: Data Validity Restrictions

	Validity Restrictions
3.1	Provider of stay is in the 50 states or DC
3.2	Stay has a valid first claim
3.3	Stay does not have a gap between claims
3.4	Stay does not have any overlap with the previous or the next stay of the same beneficiary
3.5	Stay's total utilization days equals the sum of revenue units for all RUGAIs in the claim
3.6	Total utilization days does not exceed 100
3.7	Stay does not have zero total therapy charges and positive therapy minutes at the same time
3.8	Each of the stay's three therapy CCRs (PT, OT, and SLP) falls within the P1-P99 range for the stay provider
3.9	Each of the stay's three NTA CCRs (Drug, Respiratory, and Other) falls within the P1-P99 range for the stay provider
3.10	Each of the stay's three therapy charges does not fall in top 0.01% of charges for all stays
3.11	Respiratory and Other NTA charges do not fall in top 0.05% and Drug charges do not fall in top 0.01% of charges for all stays
3.12	All three nominal therapy costs, calculated by charges*CCR, are not missing
3.13	All three nominal NTA costs, calculated by charges*CCR, are not missing

Table 6: All Study Population Restrictions

Restrictions		Frequency		Cumulative Frequency	
		# of Stays	% of Stays	# of Stays	% of Stays
-	**All SNF Stays in FY 2014**	2,728,961	**100.0%**	2,728,961	**100.0%**
1.1	Stay does not have any Part C encounter claims	2,526,960	92.6%	2,526,960	92.6%
1.2	Beneficiary is continuously enrolled in Part A throughout stay	2,480,592	90.9%	2,479,170	90.8%
1.3	Beneficiary did not transfer from Part C to Part A during stay	2,719,588	99.7%	2,477,487	90.8%
1.4	Stay only has PPS claim(s)	2,638,464	96.7%	2,393,697	87.7%
1.5	Stay has positive utilization days	2,559,829	93.8%	2,325,589	85.2%
1.6	Stay has positive Medicare payment	2,455,509	90.0%	2,323,145	85.1%
2.1	Stay can be matched to qualifying inpatient stay	2,630,366	96.4%	2,281,618	83.6%
2.2	Provider of stay can be found in CASPER or POS	2,728,663	100.0%	2,281,329	83.6%
2.3	One 5-day MDS assessment is matched to the stay	2,417,378	88.6%	2,238,405	82.0%
2.4	All non-default RUGAIs can be matched to their MDS assessment	2,263,590	82.9%	2,132,610	78.1%
2.5	Stay does not begin with unscheduled PPS assessment	2,598,463	95.2%	2,131,971	78.1%
2.6	Stay does not have any expected scheduled PPS assessment missing	2,576,397	94.4%	2,090,788	76.6%
2.7	A cost report can be found for the provider	2,720,790	99.7%	2,085,202	76.4%
2.8	The county in which the facility is located has a wage index	2,728,135	100.0%	2,084,411	76.4%
3.1	Provider of stay is in the 50 states or DC	2,728,474	100.0%	2,084,272	76.4%
3.2	Stay has a valid first claim	2,726,895	99.9%	2,083,697	76.4%
3.3	Stay does not have a gap between claims	2,727,025	99.9%	2,083,057	76.3%
3.4	Stay does not have any overlap with the previous or the next stay of the same beneficiary	2,728,470	100.0%	2,082,898	76.3%
3.5	Stay's total utilization days equals the sum of revenue units for all RUGAIs in the claim	2,626,917	96.3%	2,078,809	76.2%
3.6	Total utilization days does not exceed 100	2,728,800	100.0%	2,078,809	76.2%
3.7	Stay does not have zero total therapy charges and positive therapy minutes at the same time	2,722,831	99.8%	2,074,187	76.0%
3.8	Each of the stay's three therapy CCRs (PT, OT, and SLP) falls within the P1-P99 range for the stay provider	2,702,543	99.0%	2,053,986	75.3%
3.9	Each of the stay's three NTA CCRs (Drug, Respiratory, and Other) falls within the P1-P99 range for the stay provider	2,691,331	98.6%	2,035,288	74.6%
3.10	Each of the stay's three therapy charges does not fall in top 0.01% of charges for all stays	2,728,423	100.0%	2,034,976	74.6%
3.11	Respiratory and Other NTA charges do not fall in top 0.05% and Drug charges do not fall in top 0.01% of charges for all stays	2,707,309	99.2%	2,024,112	74.2%
3.12	All three nominal therapy costs, calculated by charges*CCR, are not missing	2,645,948	97.0%	2,013,369	73.8%
3.13	All three nominal NTA costs, calculated by charges*CCR, are not missing	2,617,584	95.9%	1,985,770	72.8%
-	**Study Population Stays**	-	-	**1,985,770**	**72.8%**

Table 7: Resident and Provider Characteristics in the Study Population

Resident and Provider Characteristics	Values	All Stays		Stays in Study Population	
		#	%	#	%
All Stays	-	**2,728,961**	**100.0%**	**1,985,770**	**72.8%**
Sex	Female	1,663,470	61.0%	1,218,984	61.4%
Sex	Male	1,065,473	39.0%	766,786	38.6%
Age	Under 65	285,418	10.5%	208,459	10.5%
Age	65-69	281,892	10.3%	201,229	10.1%
Age	70-74	345,941	12.7%	247,905	12.5%
Age	75-79	418,569	15.3%	302,767	15.3%
Age	80-84	494,087	18.1%	359,555	18.1%
Age	85 and older	903,036	33.1%	665,855	33.5%
Race / ethnicity	White	2,302,551	84.4%	1,674,510	84.3%
Race / ethnicity	Black	306,525	11.2%	222,239	11.2%
Race / ethnicity	Hispanic	44,825	1.6%	33,518	1.7%
Race / ethnicity	Asian	31,535	1.2%	24,181	1.2%
Race / ethnicity	North American Native	12,213	0.5%	8,543	0.4%
Race / ethnicity	Other	23,568	0.9%	17,159	0.9%
Race / ethnicity	Unknown	7,726	0.3%	5,620	0.3%
Medicaid enrollment	Not Dually Enrolled	1,745,603	64.0%	1,274,675	64.2%
Medicaid enrollment	Dually Enrolled	983,340	36.0%	711,095	35.8%
Location	Urban	2,151,721	78.8%	1,624,709	81.8%
Location	Rural	577,240	21.2%	361,061	18.2%
Census division	New England	183,586	6.7%	141,845	7.1%
Census division	Middle Atlantic	394,362	14.5%	283,923	14.3%
Census division	East North Central	502,050	18.4%	381,756	19.2%
Census division	West North Central	239,347	8.8%	137,896	6.9%
Census division	South Atlantic	556,009	20.4%	422,403	21.3%
Census division	East South Central	193,526	7.1%	138,768	7.0%
Census division	West South Central	258,987	9.5%	186,232	9.4%
Census division	Mountain	124,630	4.6%	84,455	4.3%
Census division	Pacific	275,977	10.1%	208,492	10.5%
Census division	Other	487	0.0%	0	-
Ownership type	For profit	1,915,377	70.2%	1,480,699	74.6%
Ownership type	Non-profit	678,159	24.9%	445,128	22.4%
Ownership type	Government	126,245	4.6%	59,008	3.0%
Ownership type	Unknown	8,882	0.3%	935	0.0%
Institution type	Freestanding	2,446,996	89.7%	1,903,073	95.8%

Resident and Provider Characteristics	Values	All Stays		Stays in Study Population	
		#	%	#	%
Institution type	Hospital-Based	167,753	6.2%	73,794	3.7%
Institution type	Swing Bed	114,212	4.2%	8,903	0.4%

3.2 Development of the Dependent Variable

This section describes the development of measures of resource use, quality checks of the data used to develop these measures, and the selection of an appropriate unit of time for the analysis.

3.2.1 Measures of Resource Use

There are three measures of resource use documented in the current SNF PPS: charges, costs, and minutes. Therapy minutes provided to each resident are recorded on the MDS assessments and used to determine classification under RUG-IV. However, minutes are only recorded for therapy services received, and not for other types of services. Therefore, it is not possible to use minutes to measure resource use across all types of SNF services. Moreover, therapy minutes are only recorded for days that fall during the 7-day look-back window preceding each MDS assessment, so the current data does not document the exact number of therapy minutes provided each day of a SNF stay, so using minutes as a measure of resource use presents methodological challenges. Therefore, Acumen focused on charges and costs.

Charges are reported on claims SNF providers submit to Medicare and indicate the amount facilities charge payers for a service. Charges are documented in the claim's revenue centers, so each charge is associated to a specific type of service. Costs are reported on annual cost reports, which facilities are required to submit to allow final settlement of payment between CMS and the provider. While charges are recorded on claims and therefore provide resident-level information, cost reports provide information at the facility level. Cost reports contain cost-to-charge ratios (CCRs) that allow conversion of charges billed on Medicare claims to costs. Similar to charges, different CCRs in the cost reports refer to different types of services. Acumen decided to derive costs from the charges on claims using CCRs on facility cost reports. This measure of resource use was utilized to develop an alternative reimbursement model. Costs from charges, as opposed to raw charges, were considered to better reflect differences in relative resource use across residents because costs are less reflective of differences in the coding of charges across providers.

Acumen calculated costs separately for the three therapy disciplines and NTA services. SNF claims report charges for each of three therapy disciplines: physical therapy (PT),

occupational therapy (OT), and speech-language pathology (SLP). Additionally, cost reports contain CCRs for each therapy discipline. To calculate therapy costs, Acumen multiplied the charges from the SNF claims by the CCR from the facility cost report. This procedure was followed for each discipline to calculate total, PT, OT, and SLP costs for each stay in the study population. NTA charges are recorded in 132 separate revenue centers on SNF claims. (Acumen determined which revenue centers are associated with NTA services using a mapping provided by CMS [see Table 89 in the Appendix].) Acumen multiplied charges recorded in each of these revenue centers by the corresponding CCRs from the facility-level costs reports to calculate costs for each NTA revenue center. Acumen then summed across all NTA-related revenue centers to calculate total NTA costs for a stay.

The final step of calculating costs per day is standardizing costs for geographic wage differences. To do this, Acumen used the inverse of the formula used in the SNF PPS to adjust payments to reflect geographic wage differences. Each facility was mapped to its corresponding core-based statistical area (CBSA), which in turn was mapped to the FY 2014 wage index for that CBSA. In FY 2014, CMS estimated that 69.545% of SNF costs corresponded to labor, and therefore adjusted that percentage of SNF PPS payments to reflect geographic differences in wages. Acumen removed the geographic adjustment applied to the labor portion of costs using the following formula:

$$Standardized\ Cost = Cost\ from\ Charges\ /[(Wage\ Index * Labor\ Share) + (1 - Labor\ Share)]$$

Estimating nursing costs presented unique challenges. Unlike therapy and NTA charges, nursing charges are reported on SNF claims as part of routine revenue centers, which does not permit researchers to isolate nursing charges from routine services. The inclusion of nursing charges in routine cost centers is confirmed by the literature and the data. The Provider Reimbursement Manual[23] states that routine cost centers include "all general nursing services, including administration of oxygen and related medications, handfeeding, incontinency care, tray service, enemas, etc." Claims data support this finding, as the bulk of non-therapy, non-NTA charges fall in the routine cost centers.

Additionally, Acumen discovered that there was very little variation in routine charges per day across residents in a given facility, indicating that facilities did not record resident-specific nursing charges. For example, for each provider, Acumen subtracted the 10th percentile of charges per day from the 90th percentile of charges per day for three types of charges: nursing+non-case-mix, therapy, and NTA. As shown in Table 8, for most providers, the difference across residents between the 90th percentile and 10th percentile of nursing+non-case-

[23] Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services (HHS), *The Provider Reimbursement Manual – Part 1*, https://www.cms.gov/regulations-and-guidance/guidance/manuals/paper-based-manuals-items/cms021929.html.

mix charges per day was small, particularly compared to the difference for therapy and NTA charges per day. We also divided the 90th percentile by the 10th percentile for each category of charges. These ratios, shown in Table 9, indicate that for most providers, there is very little difference between residents with the highest and lowest nursing+non-case-mix charges. These findings are consistent with prior research, for example, the Urban Institute's 2007 final report to CMS[24]. As described in more detail in Section 3.6, because it was not possible to create a dependent variable for nursing using current data, Acumen used the existing non-rehabilitation RUGs to classify residents for nursing payment, updating estimates of relative resource use (nursing case-mix indexes) to reflect the current distribution of residents across the 43 nursing groups.

Table 8: Provider Variation – Difference between P90 and P10

Within-Provider Difference of Charges per Day: 90th Percentile Minus 10th Percentile						
Per Day Charges	**Provider Count**	**P10**	**P25**	**P50**	**P75**	**P90**
Nursing+Non-case-mix	13,472	$0	$0	$15	$47	$151
Therapy	13,472	$110	$148	$202	$282	$393
NTA	13,472	$69	$105	$158	$238	$348

Table 9: Provider Variation – Ratio of P90 divided by P10*

Within-Provider Ratio of Charges per Day: 90th Percentile Divided by 10th Percentile						
Per Day Charges	**Provider Count**	**P10**	**P25**	**P50**	**P75**	**P90**
Nursing+Non-case-mix	13,472	1.0	1.0	1.1	1.2	1.6
Therapy	11,953	1.6	1.9	2.5	3.7	6.2
NTA	12,316	5.2	7.9	11.7	18.7	32.3

**This table excludes providers with 0 10th percentile costs because 0 cannot be a denominator.*

3.2.2 Data Quality Checks

For each of the dependent variables described above, Acumen conducted investigations to verify the quality of the data used to construct the dependent variable. To verify the quality of nursing data, Acumen replicated the methodology followed in the STRIVE study to generate estimates of nursing resource use for the STRIVE study population (see Section 3.6.2 for a full description of this methodology). These estimates were very close to those reported by STRIVE researchers, as shown in Table 93 of the Appendix.

[24] Liu, Korbin, Bowen Garrett, Sharon Long, Stephanie Maxwell, Yu-Chu Shen, Douglas Wissoker, Brant Fries, et al, "Final Report to CMS: Options for Improving Medicare Payment for Skilled Nursing Facilities."

For the dependent variables used to develop the three other recommended case-mix components described in Section 3.3, Acumen explored the validity of costs derived from charges using two approaches. First, Acumen checked the consistency of reported charges on the claims and reported charges on the cost report. Providers are required to report Part A SNF total charges for each cost center on the cost reports. Ideally, the total charges reported for each cost center on the cost report would match the total charges reported in the related revenue centers on the claims associated with the cost reporting period. Table 10 below shows that for PT/OT, SLP, and NTA charges, charges from cost reports and charges from claims are close in most cases. These results suggest that the data on charges Acumen used to derive costs is reliable, as cost reports and claims data are generally consistent.

Second, Acumen calculated the correlation between therapy costs per stay derived from charges and estimated therapy minutes per stay for the three therapy disciplines derived from MDS assessments. To estimate therapy minutes during the stay, Acumen used two methods: For utilization days that fell within an MDS assessment look-back window, the actual number of minutes provided was used. For utilization days that did not fall within as assessment look-back window, Acumen assumed that the amount of therapy minutes per day was the same as in the most-recent prior assessment. The basis for this assumption is that a change of therapy (COT) assessment would be required if there was a substantive change in the amount of therapy provided to the resident. Table 11 shows therapy costs were highly correlated with therapy minutes, indicating that therapy costs from charges are reflective of actual therapy utilization during a stay.

Table 10: Consistency in Charges from Cost Reports and Claims

Payment Component	% of Cost Reports for which Charges on Claims are within +/-10% of Charges on Cost Report	% of Cost Reports for which Charges on Claims are within +/-20% of Charges on Cost Report
PT/OT	82.0%	89.2%
SLP	77.3%	83.4%
NTA	73.9%	85.6%

Table 11: Correlation between Therapy Minutes per Stay and Therapy Costs per Stay

Therapy Discipline	Correlation
PT	0.87
OT	0.88
SLP	0.86

3.2.3 Units of Time

Acumen considered three units of time for the analysis: per day, per stay, and per benefit period/episode. It is important that the unit of time used for the analysis matches the unit of time used for payment. This is because resident characteristics found to be highly predictive of costs per unit of time may vary depending on the unit of time used for the analysis. For example, residents entering a SNF after an inpatient stay of one type may tend to have short stays with very high costs per day, while residents entering a SNF after an inpatient stay of another type may tend to have longer stays with low costs per day. In this case, the two types of residents may exhibit similar average costs per stay, but different average costs per day. The type of inpatient stay would therefore predict costs more effectively – and hence be incorporated into the recommended resident classification – if a per day unit of analysis were used. For this reason, if CMS uses a per day unit for payment, then using a per day unit for analysis can better ensure that payments in the recommended resident classification closely track costs.

As current statute requires per day payment, Acumen decided to also use a per day unit for research purposes. Additionally, using a per day unit for analysis was consistent with feedback received from technical expert panels. To derive costs per day, Acumen summed total costs across the stay and divided by total utilization days for the stay.

3.3 Definition of Payment Components

RUG-IV includes two case-mix-adjusted components: nursing (includes nursing, NTA, and social services) and therapy. There is also a therapy non-case-mix component, which only applies to residents who do not receive therapy and is intended to cover the costs of therapy evaluation(s). Finally, there is a non-case-mix component that does not vary with resident characteristics. RCS-I includes five components: four case-mix adjusted components (PT/OT, SLP, nursing, and NTA) and one non-case-mix component. This section describes how Acumen selected the components in RCS-I.

3.3.1 Splitting Current Therapy Component

The current therapy component covers the costs of three therapy disciplines: PT, OT, and SLP. However, Acumen found almost no relationship between a resident's PT/OT costs per day and SLP costs per day (correlation of 0.04, as shown in Table 12). Additionally, investigation of independent variables revealed that certain key resident characteristics have opposite effects on PT/OT and SLP costs per day. For example, residents with cognitive impairments receive less physical and occupational therapy but receive more speech-language pathology (see Table 13). Based on these investigations, clinical input, and feedback from technical expert panels, Acumen concluded that SLP costs per day are predicted by a different set of independent variables than

those that predict PT and OT costs per day, therefore SLP services should be case-mix adjusted with a separate payment component.

Acumen then conducted a series of investigations to determine whether PT and OT should form a single payment component. These investigations were prompted by discussion at the Third TEP in June 2016. TEP members were generally supportive of the creation of a separate SLP component, and some members recommended exploring whether there should also be two separate components for PT and OT. As shown in Table 12, Acumen found a strong correlation between PT and OT costs per day of 0.62. Acumen looked at trends in PT and OT costs per day across a wide range of resident characteristics and found that they follow similar trends. For example, both PT and OT costs per day decline as a resident's cognitive and communicative function declines. Acumen then regressed a range of resident characteristics on PT and OT costs per day separately and found that the coefficients in both models followed similar patterns (90% of coefficients had the same sign across the two models, as shown in Table 94 in the Appendix). Acumen also used a broader model containing 1,016 recorded values from the MDS assessment, prior inpatient stay claim, and SNF claim to predict PT and OT costs per day separately. Out of the 271 values that were significant in both models, 98% of them had the same sign, indicating that they have a similar effect on PT and OT costs.

Next, Acumen tested the ability of coefficients from an OLS model predicting PT/OT costs per day (shown in Table 94) to predict PT and OT costs per day separately. To do this, Acumen multiplied the coefficient on each resident characteristic in the combined PT/OT model by the proportion of therapy costs contributed by PT (54.4%) and OT (45.6%), then measured the ability of these estimates to separately predict PT and OT costs per day. As shown in Table 14, the R-squared values of these estimates were only slightly lower than those of regression models predicting PT and OT costs per day separately, suggesting there is little gain in explanatory ability by predicting the two disciplines independently.

Table 12: Correlation between Costs per Day across Therapy Discipline

Therapy Discipline	Correlation		
	PT	OT	SLP
PT	1.00	0.62	0.00
OT	-	1.00	0.08
SLP	-	-	1.00
PT/OT	-	-	0.04

Table 13: Selected MDS Items and Associated Average Costs per Day by Therapy Discipline

MDS Item	Description	Value	# of Stays	% of Stays	Avg. Costs per Day			
					Total	PT	OT	SLP
G0110A1	Bed mobility - self-performance	Unable to determine	1,059	0.1%	$76	$34	$30	$12
G0110A1	Bed mobility - self-performance	Independent	67,983	3.4%	$126	$63	$51	$12
G0110A1	Bed mobility - self-performance	Supervision	99,313	5.0%	$133	$67	$54	$12
G0110A1	Bed mobility - self-performance	Limited Assistance	312,367	15.7%	$142	$71	$58	$13
G0110A1	Bed mobility - self-performance	Extensive Assistance	1,386,250	69.8%	$137	$65	$54	$17
G0110A1	Bed mobility - self-performance	Total Dependence	109,253	5.5%	$106	$44	$38	$24
G0110A1	Bed mobility - self-performance	Activity Occurred Only Once or Twice	8,984	0.5%	$94	$44	$36	$14
G0110A1	Bed mobility - self-performance	Activity Did Not Occur	561	0.0%	$86	$40	$34	$11
G0110A2	Bed mobility - support	Unable to determine	1,061	0.1%	$76	$34	$30	$12
G0110A2	Bed mobility - support	No Setup	59,974	3.0%	$125	$62	$50	$12
G0110A2	Bed mobility - support	Setup Help Only	59,207	3.0%	$132	$67	$53	$12
G0110A2	Bed mobility - support	One Person Physical Assist	986,469	49.7%	$139	$68	$56	$14
G0110A2	Bed mobility - support	Two+ Persons Physical Assist	878,498	44.2%	$132	$61	$52	$20
G0110A2	Bed mobility - support	Activity Did Not Occur	561	0.0%	$86	$40	$34	$11
G0110B1	Transfer - self-performance	Unable to determine	971	0.0%	$75	$33	$29	$13
G0110B1	Transfer - self-performance	Independent	37,950	1.9%	$114	$56	$46	$11
G0110B1	Transfer - self-performance	Supervision	96,709	4.9%	$130	$66	$53	$11
G0110B1	Transfer - self-performance	Limited Assistance	335,987	16.9%	$142	$72	$58	$13
G0110B1	Transfer - self-performance	Extensive Assistance	1,293,770	65.2%	$139	$67	$56	$17
G0110B1	Transfer - self-performance	Total Dependence	168,835	8.5%	$113	$48	$42	$24
G0110B1	Transfer - self-performance	Activity Occurred Only Once or Twice	30,415	1.5%	$100	$43	$37	$20
G0110B1	Transfer - self-performance	Activity Did Not Occur	21,133	1.1%	$75	$30	$27	$18
G0110B2	Transfer - support	Unable to determine	1,019	0.1%	$75	$33	$30	$12
G0110B2	Transfer - support	No Setup	36,327	1.8%	$113	$55	$45	$12
G0110B2	Transfer - support	Setup Help Only	52,485	2.6%	$129	$65	$52	$11
G0110B2	Transfer - support	One Person Physical Assist	986,698	49.7%	$140	$70	$57	$13
G0110B2	Transfer - support	Two+ Persons Physical Assist	888,108	44.7%	$133	$61	$51	$20
G0110B2	Transfer - support	Activity Did Not Occur	21,133	1.1%	$75	$30	$27	$18
G0110H1	Eating - self-performance	Unable to determine	1,231	0.1%	$80	$36	$30	$13
G0110H1	Eating - self-performance	Independent	583,089	29.4%	$141	$72	$58	$11
G0110H1	Eating - self-performance	Supervision	798,593	40.2%	$138	$67	$56	$15
G0110H1	Eating - self-performance	Limited Assistance	240,187	12.1%	$136	$64	$54	$19
G0110H1	Eating - self-performance	Extensive Assistance	240,218	12.1%	$128	$54	$47	$27
G0110H1	Eating - self-performance	Total Dependence	105,015	5.3%	$109	$42	$37	$30
G0110H1	Eating - self-performance	Activity Occurred Only Once or Twice	12,352	0.6%	$106	$48	$40	$18

MDS Item	Description	Value	# of Stays	% of Stays	Avg. Costs per Day			
					Total	PT	OT	SLP
G0110H1	Eating - self-performance	Activity Did Not Occur	5,085	0.3%	$47	$19	$17	$12
G0110H2	Eating - support	Unable to determine	1,281	0.1%	$81	$37	$31	$14
G0110H2	Eating - support	No Setup	80,591	4.1%	$140	$74	$57	$9
G0110H2	Eating - support	Setup Help Only	1,108,212	55.8%	$139	$69	$57	$13
G0110H2	Eating - support	One Person Physical Assist	781,834	39.4%	$130	$58	$50	$22
G0110H2	Eating - support	Two+ Persons Physical Assist	8,767	0.4%	$128	$54	$47	$26
G0110H2	Eating - support	Activity Did Not Occur	5,085	0.3%	$47	$19	$17	$12
B0700	Makes Self Understood	Skipped	14,850	0.7%	$107	$46	$40	$21
B0700	Makes Self Understood	Understood	1,580,846	79.6%	$138	$68	$56	$14
B0700	Makes Self Understood	Usually understood	225,156	11.3%	$135	$58	$50	$27
B0700	Makes Self Understood	Sometimes understood	110,498	5.6%	$124	$51	$43	$30
B0700	Makes Self Understood	Rarely/never understood	54,420	2.7%	$95	$37	$32	$26
B0800	Ability to Understand Others	Skipped	15,631	0.8%	$107	$46	$40	$21
B0800	Ability to Understand Others	Understands	1,513,330	76.2%	$138	$68	$56	$14
B0800	Ability to Understand Others	Usually understands	284,868	14.3%	$135	$60	$51	$25
B0800	Ability to Understand Others	Sometimes understands	128,936	6.5%	$123	$51	$44	$29
B0800	Ability to Understand Others	Rarely/never understands	43,005	2.2%	$90	$35	$31	$24
C0500	BIMS Score*	Missing	242,801	12.2%	$122	$53	$45	$23
C0500	BIMS Score	0	21,905	1.1%	$122	$51	$43	$29
C0500	BIMS Score	1	10,524	0.5%	$126	$53	$45	$28
C0500	BIMS Score	2	16,220	0.8%	$128	$54	$46	$27
C0500	BIMS Score	3	61,498	3.1%	$129	$55	$47	$26
C0500	BIMS Score	4	33,430	1.7%	$133	$58	$49	$26
C0500	BIMS Score	5	39,243	2.0%	$134	$58	$50	$26
C0500	BIMS Score	6	44,801	2.3%	$135	$60	$51	$25
C0500	BIMS Score	7	41,520	2.1%	$136	$60	$51	$25
C0500	BIMS Score	8	49,987	2.5%	$137	$61	$52	$24
C0500	BIMS Score	9	64,770	3.3%	$137	$62	$53	$23
C0500	BIMS Score	10	65,513	3.3%	$139	$64	$54	$22
C0500	BIMS Score	11	79,876	4.0%	$140	$65	$55	$20
C0500	BIMS Score	12	103,715	5.2%	$140	$66	$55	$19
C0500	BIMS Score	13	179,930	9.1%	$140	$68	$57	$15
C0500	BIMS Score	14	206,888	10.4%	$140	$69	$57	$13
C0500	BIMS Score	15	670,064	33.7%	$138	$72	$58	$8
C0500	BIMS Score	Started but unable to complete	53,085	2.7%	$122	$51	$44	$27

Table 14: Comparison of R-squared Values using Single-Therapy Models and the PT/OT Model Estimates*Percentage of Costs by Therapy Type to Predict PT and OT Costs per Day

Therapy Costs per Day	R-squared	
	Single-Therapy Model Estimate	PT/OT Model Estimates * % Costs
PT	0.122	0.118
OT	0.079	0.074

To further test the similarity between predictors of PT and OT costs per day, Acumen used a variable selection technique called Least Absolute Shrinkage and Selection Operator (LASSO)[25] to identify strong predictors of PT and OT costs per day separately, and then tested the ability of the predictors identified for PT to predict OT utilization, and vice versa. Table 15 shows the R-squared values for the OLS regressions predicting PT and OT costs per day using the resident characteristics chosen for that therapy type, and R-squared values for the regressions that switch regressors. The difference in predictive power is minute, suggesting that the predictors of PT and OT costs per day are very similar.

Table 15: Comparison of R-squared Values using Switched Regressors to Predict PT and OT Costs per Day

Therapy Discipline	Regressors Selected for Therapy Discipline		Switched Regressors	
	R-squared	# of Values	R-squared	# of Values
PT	0.151	350	0.150	385
OT	0.103	385	0.102	350

Acumen continued to compare the similarities between PT and OT predictors of costs by running the Classification and Regression Trees (CART) algorithm[26] for PT and OT costs per day separately. CART is a non-parametric decision tree learning technique that produces either classification or regression trees, depending on whether the dependent variable is categorical or numeric, respectively. The functional score, Cognitive Function Scale (CFS) score, 10 clinical categories, and age were included as predictors (these predictors are described in more detail in Section 3.4 of this report). The CART algorithm identified very similar groups for PT and OT. The main function groups were 0-7, 8-13, and 14-18 for PT and 0-6, 7-13, 14-18 for OT. Both

[25] Tibshirani, Robert, "Regression Shrinkage and Selection via the Lasso," *Journal of the Royal Statistical Society: Series B (Statistical Methodology)* 58 (1996): 267-288, https://statweb.stanford.edu/~tibs/lasso/lasso.pdf.
[26] Breiman, Leo, Jerome Friedman, Charles J. Stone, and R.A. Olshen, *Classification and Regression Trees* (Monterey, CA: Wadsworth & Brooks/Cole Advanced Books & Software, 1984).

trees often grouped together the following clinical categories: Medical Management, Acute Infection, Pulmonary, Cancer, Cardiovascular and Coagulations, and Surgical Non-Orthopedic. In both trees, CFS score was split in similar ways across functional score bins.

Finally, Acumen consulted with clinicians, who advised Acumen that variables such as personal hygiene, dressing, and upper extremity motion may be good predictors of OT but not PT, and that lower extremity motion could be a better predictor of PT. Since those resident characteristics were not included in the CART model used to create PT/OT payment groups (described in Section 3.4.2), Acumen ran a CART model using these four resident characteristics in addition to functional score, CFS score, 10 clinical categories, and age to create groups for PT and OT costs per day separately. Table 16 shows the R-squared values for the payment groups generated by CART after adding an expanded set of variables, as well as the payment groups generated by CART with the original set of variables. The R-squared values do not change notably when the additional characteristics are added, and contrary to expectations none of the four variables was selected by the CART algorithm to classify residents in the OT model. Based on the results of the investigations described above, Acumen decided that existing therapy utilization patterns did not provide evidence to support the creation of separate payment components for PT and OT.

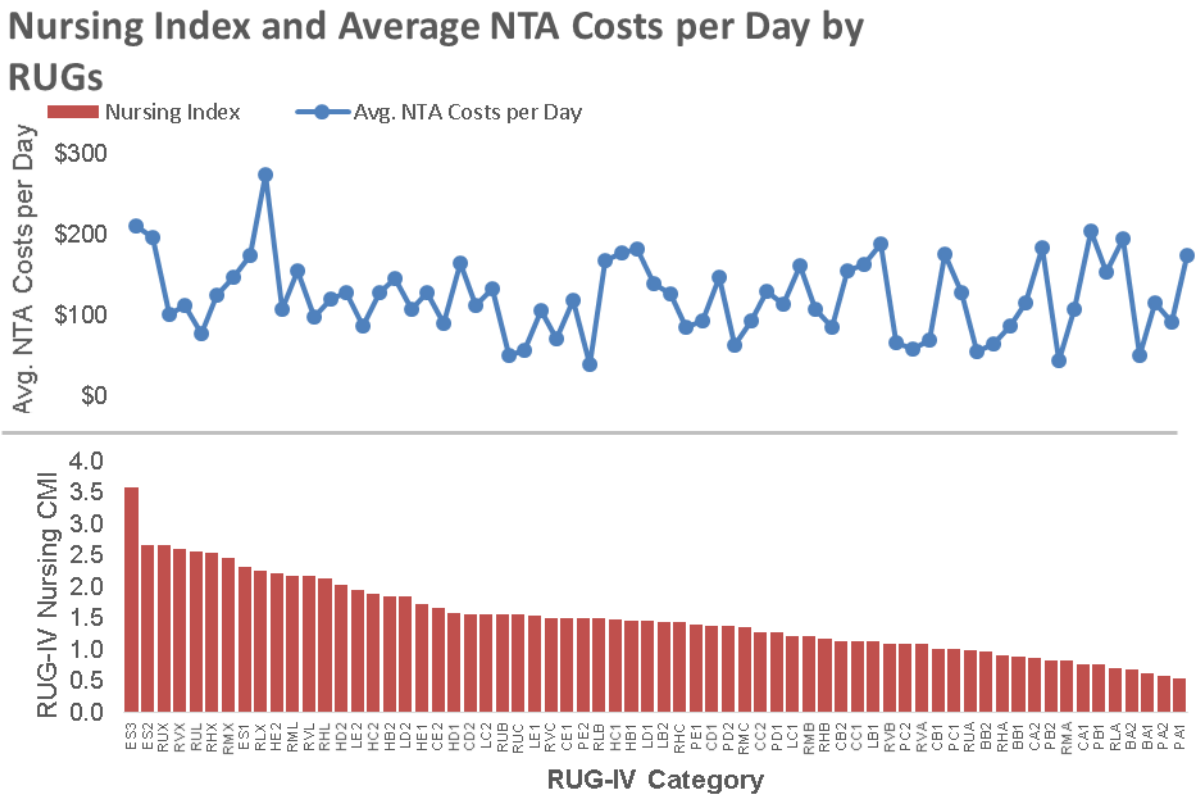
Table 16: Comparison of R-squared Values for Broad and Regular CART Models

Therapy Discipline	CART Model R-squared	
	Broad	Regular
PT	0.105	0.102
OT	0.066	0.066

3.3.2 Splitting Current Nursing Component

As noted above, NTA services are currently reimbursed by the nursing component of the SNF PPS. However, nursing case-mix indexes are solely based on variation in nursing staff time and therefore do not reflect variation in NTA resource use and costs. Figure 4 shows that average NTA costs per day do not track closely with nursing indexes. For example, stays in the CA1 RUG have the third-highest NTA costs per day ($206), but one of the lowest nursing component CMIs (0.78). Conversely, RUX receives very high nursing component payments (CMI of 2.67) despite having lower NTA costs ($101 per day). Table 95 in the Appendix provides more detail on each individual RUG.

Figure 4: Nursing Index and Average NTA Costs per Day by RUG



These findings are consistent with other studies. MedPAC stated in a 2015 report[27] that "under current (2014) policies, there is essentially no correlation between nursing payments and NTA costs, with (nursing) payments explaining 0.1% of variability in (NTA) costs." This means that facilities may be underpaid for residents with high NTA costs, and facilities may be overpaid for residents with low NTA costs, which could create an incentive for facilities to avoid residents with substantial NTA service needs. To address this, MedPAC recommended removing NTA services from the nursing component and creating a separate NTA component. In separate research, the Urban Institute concluded that alignment of SNF payments with NTA costs could be improved while imposing a minimal administrative burden on SNFs by creating a separate NTA component[28]. Additionally, members of the Nursing TEP in November 2015, the Third TEP in June 2016, and the Fourth TEP in October 2016 agreed with the recommendation to create a new NTA component separate from nursing. Based on the findings described above and the consensus on the issue, Acumen modeled NTA costs as a separate component.

[27] Carter, Carol, Bowen Garrett, and Doug Wissoker, "The Need to Reform Medicare's Payments to Skilled Nursing Facilities is as Strong as Ever."
[28] Liu, Korbin, Bowen Garrett, Sharon Long, Stephanie Maxwell, Yu-Chu Shen, Douglas Wissoker, Brant Fries, et al, "Final Report to CMS: Options for Improving Medicare Payment for Skilled Nursing Facilities."

3.4 Resident Classification for Physical and Occupational Therapy Component

This section describes the selection of independent variables for the PT/OT component, variable grouping methods, and results.

3.4.1 Selection of Independent Variables

Selection of independent variables consisted of two primary phases: (1) initial selection of resident characteristics likely to be good predictors of PT/OT utilization, and (2) final selection of the variables that were most predictive of resource use. Acumen used relevant literature, clinical input, regression evidence, and feedback from technical expert panels to identify resident characteristics that were potentially predictive of PT/OT utilization. In the initial selection phase, Acumen first narrowed the full list of MDS variables to likely predictors of each of the three therapy disciplines based on evidence from the literature and input from clinicians. Next, Acumen used the LASSO regression technique to determine which of the initial set of variables were most predictive of costs. Input from technical expert panels was also incorporated into the exploratory phase of independent variable selection. Acumen then developed a final list of potential predictors by removing items with a minimal impact on costs.

The final list of potential predictors selected for further exploration included: clinical reasons for the prior inpatient stay and SNF stay, functional status, cognitive impairment, age, prior utilization of services (emergency, acute inpatient, and post-acute), comorbidities recorded during the SNF stay and during the year prior to the stay, and services received during the SNF stay. Acumen then used regression analysis to examine the relationship between these characteristics and PT/OT costs per day. Three types of resident information were found to be strong predictors of PT/OT costs per day: clinical reasons for the prior inpatient stay, functional status, and cognitive impairment. Clinical reasons for the prior inpatient stay were defined using the clinical categories described in the first sub-section below. Cognitive impairment was identified using the cognitive indicator described in the second sub-section. Functional status was incorporated using a functional score described in the third sub-section.

Clinical Categories

In building the payment components used in RCS-I, Acumen explored clinically relevant classifications to group residents for payment purposes. Acumen sought to create broad groupings that would allow the incorporation of additional criteria relevant to SNF resource use. To achieve this, Acumen worked with clinicians to create broad clinical categories that group residents based on diagnosis information from the prior inpatient stay.

The initial attempts to classify residents into clinical categories focused on classifying residents based on the main reason or reasons for their SNF stay. The two main sources of

clinical information about the SNF stay are the MDS assessments and the claims. The MDS assessments contain a vast amount of information about a resident, but they do not indicate the main reason or reasons for the stay. The claims contain a field for principal diagnosis. However, 47% of SNF claims assign generic V codes as the principal diagnosis, with roughly a third assigned V57 ("Care involving use of rehabilitation procedures"), limiting the usefulness of diagnoses from SNF claims in classifying residents. As a result, Acumen used information from the prior inpatient stay to create clinical categories. Although most prior inpatient stays were in acute hospitals, some were in other settings, such as IRFs or LTCHs. For purposes of resident classification, all prior inpatient stays were treated the same; that is, only diagnosis and not inpatient setting was considered in classifying residents.

It must be noted that the clinical information from the inpatient stay does not always correspond to the principal condition of the SNF stay. To qualify for the SNF benefit, residents must be treated for a condition for which the resident was receiving inpatient hospital services, or a condition which arose while in the SNF. The Medicare Benefit Policy Manual explicitly states that "the applicable hospital condition need not have been the principal diagnosis that actually precipitated the beneficiary's admission to the hospital, but could be any one of the conditions present during the qualifying hospital stay"[29]. However, inpatient claims provide a uniform source of clinical information for all SNF residents, and the broad clinical categories based on inpatient claims explained resource use at the SNF, as described later in the report. The remainder of this section documents the process of building the clinical categories using information from the most-recent inpatient claim at the time of SNF admission.

First, due to differences in clinical characteristics and resource use, residents were divided based on whether the Medical Severity – Diagnostic Related Group (MS-DRG) from the prior inpatient stay was surgical or medical[30]. Next, surgical residents were divided into orthopedic and non-orthopedic groups based on the procedure performed during the prior inpatient stay. This division was made because of clinical differences between orthopedic and non-orthopedic surgical residents, as well as observed differences in resource use (see Table 17). "Surgical – Orthopedic" residents had higher therapy costs than "Surgical – Non-Orthopedic" residents, while non-orthopedic residents had higher NTA costs.

[29] Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services (HHS), 2016b, "Chapter 8: Coverage of Extended Care (SNF) Services Under Hospital Insurance," *Medicare Benefit Policy Manual*, http://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/bp102c08.pdf.
[30] For the purposes of creating clinical categories, MS-DRGs were first collapsed into MS-DRG groups. These groups were then mapped to clinical categories as described in this section.

Table 17: Comparison of Orthopedic and Non-Orthopedic Surgery Average SNF Costs

Clinical Category	# of Stays	% of Stays	Avg. Costs per Day		
			PT/OT	SLP	NTA
Orthopedic Surgery	370,709	18.7%	$139	$9	$67
Non-Orthopedic Surgery	223,973	11.3%	$120	$14	$89

The next step was exploring how to divide "Surgical – Orthopedic" residents. Acumen explored whether emergent v. elective surgery was an appropriate distinction. Acumen defined elective admissions as those coded as having "elective" admission types on the inpatient claim, while all other admission types were defined as emergent. Acumen discovered that while residents who received elective surgery had higher therapy costs, most of this difference was explained by differences in the type of surgical procedure performed. Figure 5 shows that average therapy costs per day were similar for residents in a given MS-DRG group regardless of whether they received elective or emergent surgery. Figure 6 shows that emergent and elective surgeries are unevenly distributed across MS-DRG groups. The MS-DRG groups with a high percentage of elective surgeries correspond to two types of procedures: major joint replacements and spinal surgeries. The MS-DRG groups with a high percentage of emergent surgeries include other types of orthopedic surgeries involving extremities, often related to falls. Because of the observed differences in therapy use between these two groups, residents who received major joint replacements or spinal surgeries were grouped together and placed in "Major Joint Replacement and Spinal Surgery," while residents who received other orthopedic procedures were placed in "Surgical Procedures on Extremities."

Next, Acumen selected criteria to further classify medical residents. Earlier versions of the clinical categories developed by Acumen divided medical residents based on whether they were treated in the intensive care unit (ICU) during their prior inpatient stay. Acumen developed later versions of the classification that do not use ICU use to distinguish residents, reflecting feedback received at the November 2015 TEP, potential challenges to implementing this criterion in a payment system, and the finding that there was not a notable difference in resource use between ICU and non-ICU residents. Table 18 shows that average PT/OT and SLP costs per day are similar for ICU and non-ICU residents. NTA costs, however, are higher for ICU residents. The percentage of ICU and non-ICU residents varies notably by MS-DRG group. In therapy and NTA costs regressions, many MS-DRG groups were statistically significant, while few interactions between ICU use and MS-DRG groups were significant. Similar to the analysis performed for elective v. emergent surgery, these results suggest underlying condition, rather than whether a resident received ICU treatment, relate to observable differences in patterns of SNF resource use.

Table 18: Average NTA and Therapy Costs per Day by ICU Use in Prior Inpatient Stay

ICU Use	# of Stays	% of Stays	Avg. Costs per Day		
			NTA	PT/OT	SLP
Yes	574,433	28.9%	$85	$116	$19
No	1,411,337	71.1%	$72	$120	$16

Given the investigations described above suggesting that ICU use is not a key determinant of resource use, Acumen pursued other clinical groupings for medical residents. Acumen initially observed that residents with acute infections have higher NTA costs, and decided to group them together. However, Acumen's research also revealed that residents in MS-DRGs 871 (Septicemia or severe sepsis w/o MV 96+ hours w/MCC) and 872 (Septicemia or severe sepsis w/o MV 96+ hours w/o MCC) had lower NTA costs than residents with other acute infections. To investigate whether to place this group in the Acute Infections category, the primary diagnoses within the septicemia MS-DRGs (871 and 872) were explored. Figure 7 shows a density plot of NTA costs per day by principal inpatient diagnosis for residents who fell into MS-DRGs 871 or 872. Several diagnoses cluster at the bottom right of the graph, indicating that residents with these inpatient diagnoses tend to have higher NTA costs. These residents were placed in the "Acute Infections" category. Residents in MS-DRGs 871 or 872 who had principal diagnoses associated with lower NTA costs (clustered in the upper left part of the graph) were placed in "Medical Management."

The remaining medical residents were placed into several groups based on clinical logic and statistical evidence. For example, Acumen created the "Acute Neurologic" group because of the unique clinical characteristics of this group as well as a pattern of resource use distinct from some other medical residents (high therapy minutes and low NTA costs). The remainder of the medical categories were created in a similar fashion. Based on the analyses and criteria described above, ten clinical categories were created: Acute Infections, Acute Neurologic, Cancer, Cardiovascular and Coagulation, Major Joint Replacement and Spinal Surgery, Medical Management, Non-Surgical Orthopedic/Musculoskeletal, Pulmonary, Surgical Non-Orthopedic, and Surgical Procedures on Extremities. The 10 groups are shown in Table 19. A full mapping between MS-DRGs and the 10 categories is shown in

Table 97 in the Appendix. These 10 categories were included as independent variables in the analyses described below, which were used to develop payment groups for each case-mix component. The clinical categories were ultimately selected one of the determinants of payment for two payment components: PT/OT and SLP. In both cases, empirical results and clinical input led Acumen to collapse the 10 initial categories into fewer clinical groups for resident classification/payment purposes. The two remaining case-mix payment components, nursing and

NTA, do not use the Acumen-developed clinical categories to classify residents. The rationale for these decisions is described in greater detail below.

Table 19: 10 Clinical Categories and PT/OT, SLP, and NTA Average Costs per Day

Clinical Category	# of Stays	% of Stays	Avg. Costs per Day		
			PT/OT	SLP	NTA
Major Joint Replacement or Spinal Surgery	201,181	10.1%	$147	$6	$64
Surgical Procedures on Extremities not Major Joint	169,528	8.5%	$130	$12	$70
Non-Surgical Orthopedic/Musculoskeletal	107,969	5.4%	$127	$13	$60
Non-Orthopedic Surgery	223,973	11.3%	$120	$14	$89
Acute Neurologic	124,882	6.3%	$118	$34	$59
Cardiovascular and Coagulations	175,730	8.8%	$117	$15	$77
Acute Infections	154,743	7.8%	$112	$16	$94
Pulmonary	148,832	7.5%	$111	$20	$97
Medical Management	584,652	29.4%	$110	$18	$73
Cancer	94,280	4.7%	$108	$19	$66

Figure 5: Average Therapy Costs per Day by "Surgical – Orthopedic" MS-DRG Group

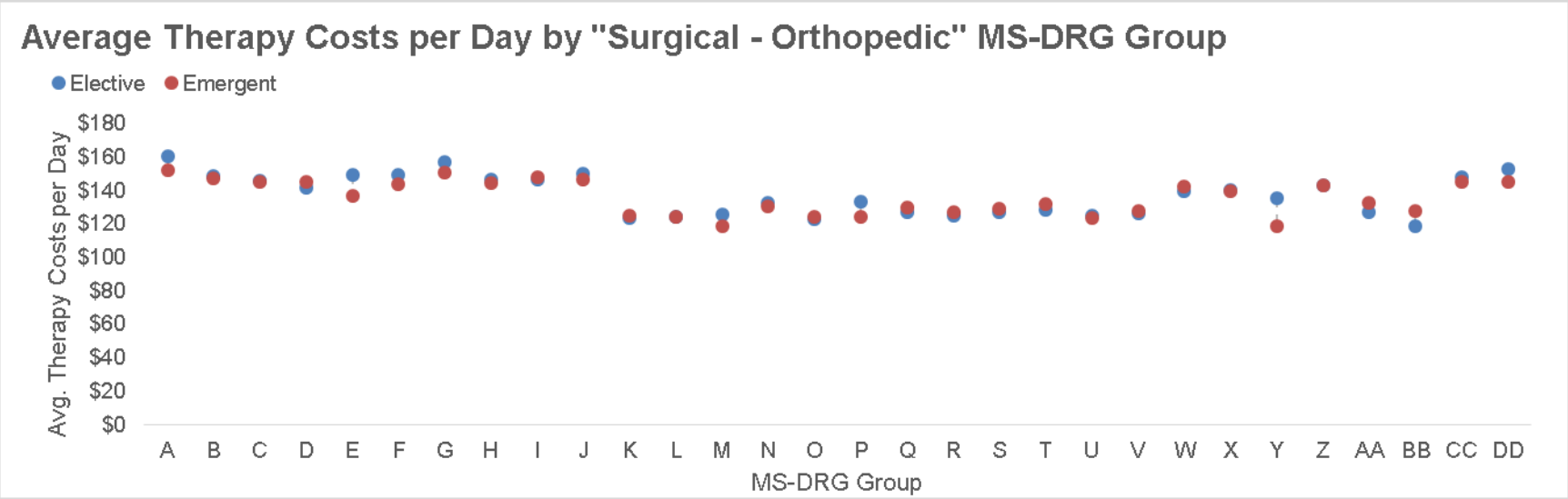


Figure 6: Distribution of Emergent/Elective Surgery, by "Surgical – Orthopedic" MS-DRG Group

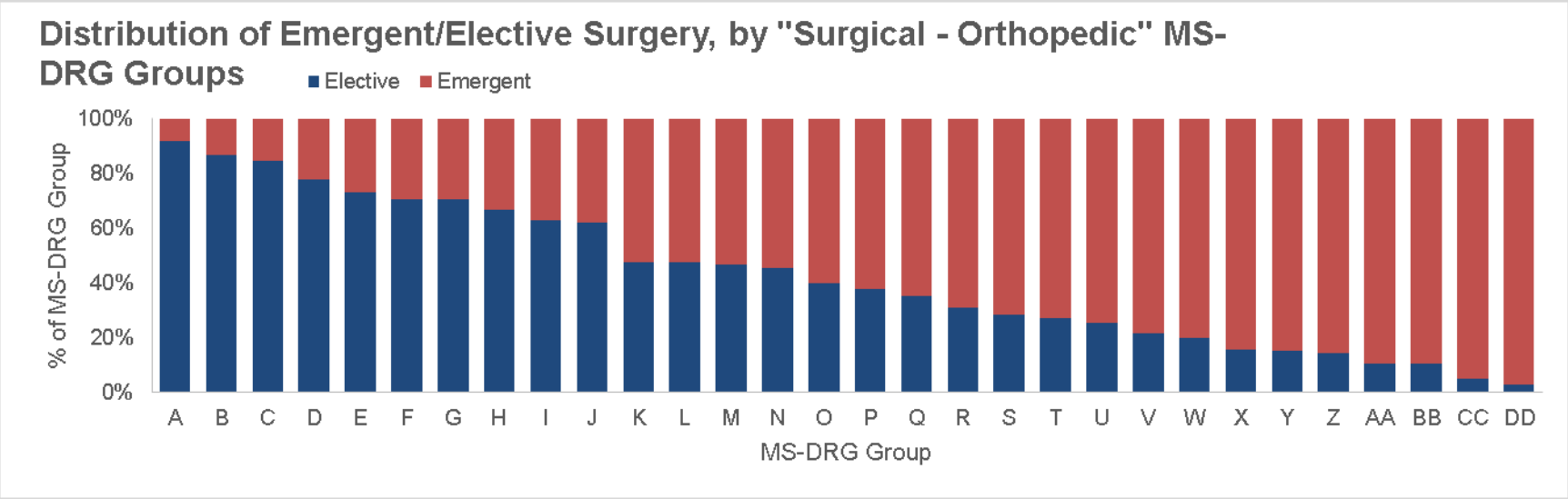
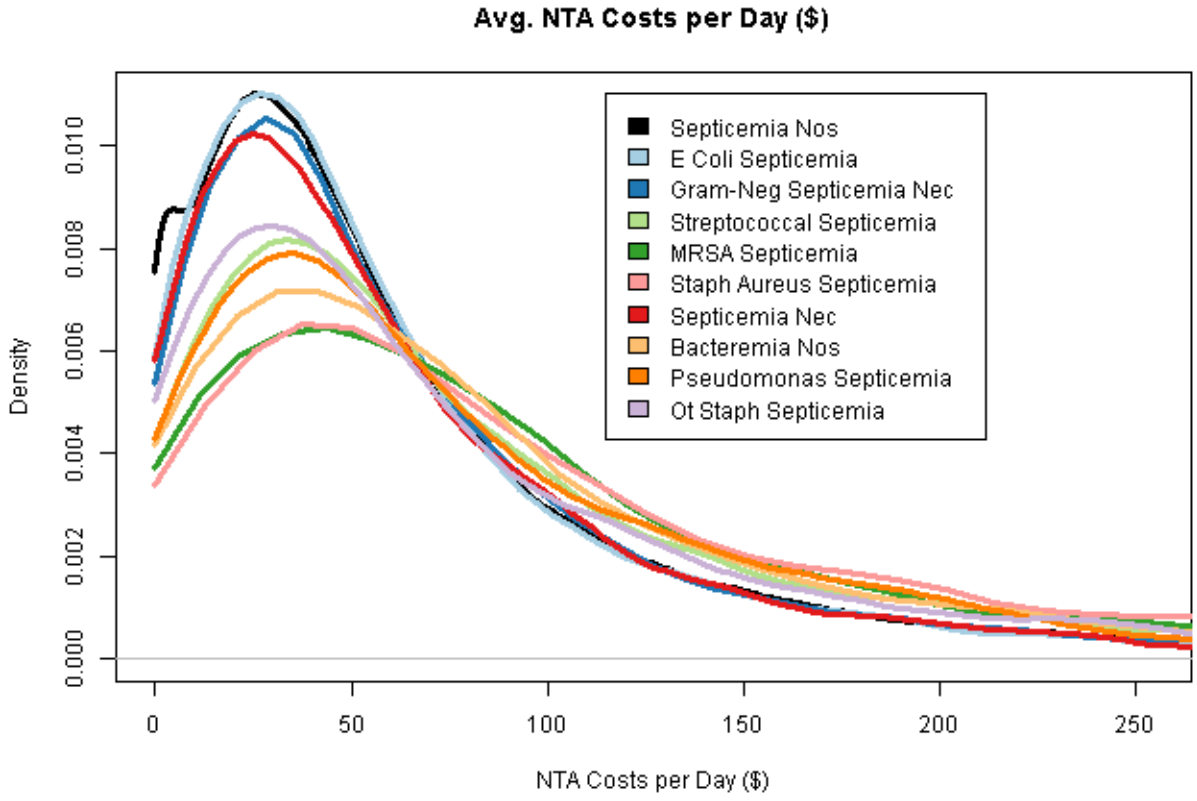


Figure 7: Density Plot of Average NTA Costs per Day by Principal Inpatient Diagnosis for Residents in MS-DRGs 871 or 872



While for most SNF residents the prior inpatient stay takes place at an acute hospital, some residents' prior inpatient stay is at another setting, such as an LTCH or an IRF. The IRF PPS does not use MS-DRGs to determine payment, and therefore it would be problematic to assign residents to clinical categories based on the MS-DRG of an IRF stay. In these cases, residents were assigned to a clinical category based on their Rehabilitation Impairment Category (RIC) rather than their MS-DRG. Acumen clinicians created a mapping of the RIC to the clinical categories, shown in Table 20.

Table 20: Mapping of RIC during IRF Stay to Clinical Categories

RIC	RIC Description	Assigned Clinical Category	# of IRF Transfer Stays	% of IRF Transfer Stays	% of All Stays	PT/OT Avg. Costs per Day	SLP Avg. Costs per Day
01	Stroke	Acute Neurologic	17,526	27.1%	0.9%	$122	$41
02	Traumatic brain Injury	Acute Neurologic	2,515	3.9%	0.1%	$122	$35
03	Non-traumatic brain injury	Acute Neurologic	3,273	5.1%	0.2%	$122	$33
04	Traumatic spinal cord injury	Major Joint Replacement or Spinal Surgery	631	1.0%	0.0%	$136	$16
05	Non-traumatic spinal cord injury	Major Joint Replacement or Spinal Surgery	2,304	3.6%	0.1%	$136	$12
06	Neurological	Medical Management	6,937	10.7%	0.3%	$128	$22
07	Fracture of lower extremity	Surgical Procedures on Extremities not Major Joint	10,590	16.4%	0.5%	$135	$16

RIC	RIC Description	Assigned Clinical Category	# of IRF Transfer Stays	% of IRF Transfer Stays	% of All Stays	PT/OT Avg. Costs per Day	SLP Avg. Costs per Day
08	Replacement of lower extremity	Major Joint Replacement or Spinal Surgery	2,013	3.1%	0.1%	$144	$7
09	Other orthopedic	Non-Surgical Orthopedic/Musculoskeletal	5,444	8.4%	0.3%	$134	$14
10	Amputation, lower extremity	Surgical Procedures on Extremities not Major Joint	1,548	2.4%	0.1%	$134	$9
11	Amputation, other	Surgical Procedures on Extremities not Major Joint	91	0.1%	0.0%	$132	$11
12	Osteoarthritis	Non-Surgical Orthopedic/Musculoskeletal	294	0.5%	0.0%	$125	$20
13	Rheumatoid, other arthritis	Non-Surgical Orthopedic/Musculoskeletal	283	0.4%	0.0%	$130	$16
14	Cardiac	Cardiovascular and Coagulations	1,916	3.0%	0.1%	$131	$18
15	Pulmonary	Pulmonary	636	1.0%	0.0%	$124	$20
16	Pain syndrome	Medical Management	403	0.6%	0.0%	$136	$12
17	Major multiple trauma, no brain injury or spinal cord injury	Surgical Procedures on Extremities not Major Joint	1,523	2.4%	0.1%	$138	$13
18	Major multiple trauma, with brain injury or spinal cord injury	Acute Neurologic	358	0.6%	0.0%	$131	$30
19	Guillian Barre	Medical Management	114	0.2%	0.0%	$137	$13
20	Miscellaneous	Medical Management	6,291	9.7%	0.3%	$129	$20
21	Burns	Medical Management	39	0.1%	0.0%	$140	$20

Finally, Acumen ran OLS regressions to test how well the clinical categories predict PT/OT, SLP, and NTA resource utilization. Table 21 shows the R-squared values for OLS regressions using clinical categories to predict PT/OT, SLP, and NTA costs per day, and Table 22 shows the coefficients for each model. All of the coefficients on the clinical categories (except for the reference group) were statistically significant, indicating that the clinical categories capture differences in the expected resource use of residents. The R-squared is much lower for the model predicting NTA costs per day, indicating that the clinical categories capture a larger share of the variation in PT/OT costs per day and SLP costs per day.

Table 21: R-squared Values for OLS Regressions using Clinical Categories to Predict PT/OT, SLP, and NTA Average Costs per Day

Discipline	R-squared
PT/OT	0.038
SLP	0.045
NTA	0.008

Table 22: OLS Regression Coefficients for OLS Regressions using Clinical Categories to Predict PT/OT, SLP, and NTA Costs per Day

Clinical Category	Estimate		
	PT/OT	SLP	NTA
Intercept	110.26**	18.38**	72.75**
Medical Management	Reference	Reference	Reference
Acute Infections	1.61**	-2.06**	20.78**
Acute Neurologic	7.96**	15.51**	-13.75**
Cancer	-1.91**	0.61**	-6.81**
Cardiovascular and Coagulations	7.03**	-3.18**	3.92**
Non-Surgical Orthopedic/Musculoskeletal	16.66**	-5.35**	-12.72**
Pulmonary	0.70**	1.36**	24.23**
Non-Orthopedic Surgery	9.28**	-4.55**	15.78**
Major Joint Replacement/Spinal Surgery	37.21**	-12.02**	-8.77**
Orthopedic Surgery not Major Joint	19.34**	-6.55**	-2.38**

*** Significant at the 1% level.*

Cognitive Measure

Cognitive status is used for payment and resident classification in RUG-IV. The Brief Interview for Mental Status (BIMS), developed for the MDS 3.0, is the primary instrument used to measure residents' cognitive function. However, about 15% of residents do not complete the BIMS: in 12% of cases, the interview is not attempted, and for 3% of stays, the interview is attempted but cannot be completed. In these cases, the MDS requires assessors to complete the Staff Assessment for Mental Status (items C0700-C1000), and the Cognitive Performance Scale (CPS), originally developed for the MDS 2.0, can be used to assess cognitive function.

Because about 15% of residents are unable to complete the BIMS and therefore must be assessed using a different scale that relies on a different set of MDS items, there is currently no single measure of cognitive status that allows comparability across residents. To address this issue, Thomas et al. proposed in a 2015 paper using a new cognitive measure, the Cognitive Function Scale (CFS), which combines scores from the BIMS and CPS into one scale that can be used to compare cognitive function across all residents. The CFS places residents into one of four cognitive performance categories based on their score on either the BIMS or CPS, as shown in Table 23. As discussed above, the CPS is only used to assess cognitive function if the assessor is unable to complete the BIMS for a resident.

Table 23: Mapping between BIMS/CPS Scores and Cognitive Function Scale

CFS Cognitive Level	BIMS Score	CPS Score
1 - Cognitively Intact	13-15	-
2 - Mildly Impaired	8-12	0-2
3 - Moderately Impaired	0-7	3-4
4 - Severely Impaired	-	5-6

Based on feedback from the Third TEP in June 2016, Acumen investigated the CFS as an indicator of cognitive impairment. The CFS performed similarly to the BIMS score and a combined scale using both the BIMS score and CPS score (when the BIMS score was not available) in predicting PT/OT and SLP costs per day. Table 24 shows the relationship between the CFS and PT/OT and SLP costs per day. Acumen also used the CART algorithm (described in Section 3.4.2) to investigate the impact of using CFS as a cognitive indicator. Using CFS as a cognitive indicator explained as much or more variation in PT/OT costs per day for each clinical category and explained more variation for the full population compared to other indicators (B0700: Makes Self Understood and the combined BIMS+CPS scale).

Table 24: Relationship between CFS Cognitive Level and Average PT/OT and SLP Costs per Day

CFS Cognitive Level	BIMS Score	CPS Score	# of Stays	% of Stays	Avg. PT/OT Costs per Day	Avg. SLP Costs per Day
1 - Cognitively Intact	13-15	-	1,056,882	53.2%	$128	$10
2 - Mildly Impaired	8-12	0-2	438,667	22.1%	$118	$20
3 - Moderately Impaired	0-7	3-4	348,543	17.6%	$104	$27
4 - Severely Impaired	-	5-6	91,125	4.6%	$74	$26
Missing	-	-	50,553	2.5%	$107	$21

Based on these results and feedback from the Third TEP, Acumen decided to use the CFS as an indicator of cognitive status for PT/OT and SLP payment. The CFS is not used to determine payment in the recommended nursing and NTA components. As described in more detail in Section 3.6, the nursing component largely maintains the current RUG-IV criteria to classify residents for nursing payment. Consistent with the RUG-IV nursing classification criteria, the recommended nursing component uses the BIMS and CPS to measure cognitive status in order to classify some residents for payment. The recommended NTA component does not use cognitive status to classify residents for payment because cognitive status was not determined to be a key indicator of NTA service utilization, based on clinical input and Acumen's empirical findings (discussed in more detail in Section 3.7).

Construction of Functional Score

Under RUG-IV, the MDS measures function using a variety of activities of daily living (ADLs). These measures are divided into "early loss" and "late loss" measures. "Early loss" measures represent the activities of daily living that are impacted first as a person's function declines, whereas "late loss" measures include activities that are impacted later. Additionally, the MDS contains both "self-performance" and "support provided" items. The former items measure how well a resident can perform an activity without assistance, while the latter measure how much assistance was required in completing each activity.

To develop the functional measure used in the PT/OT component, Acumen initially investigated a wide range of ADL items as predictors of PT/OT utilization. Three late-loss self-performance items were selected as the best predictors of PT/OT utilization (see Table 25) and the most clinically appropriate indicators of resident function: transfer self-performance, eating self-performance, and toileting self-performance. Early-loss ADLs were excluded because they are less clinically relevant (RUG-IV uses late-loss ADLs exclusively to set payment). Table 26 shows the regression results for each individual ADL item predicting PT/OT costs per day (for each MDS item, Acumen ran a separate regression using the responses to the item as independent variables). Additionally, Acumen excluded several items from consideration because their inclusion would not be consistent with a payment model based on clinical characteristics of residents rather than the level of care provided by facilities. These service-based items included "support provided" items and the bed mobility ADL (both the self-performance and support provided items). While bed mobility is a component of the current ADL score, clinicians working with Acumen advised that this measure is partly dependent on environmental factors such as characteristics of the bed used and therefore does not always reflect underlying resident condition. All three items selected for the functional score used for PT/OT classification in RCS-I are components of the ADL score used to measure function in RUG-IV.

Table 25: R-squared Values for OLS Regressions using Individual ADL Items on the MDS 5-Day Assessment Predicting PT/OT Average Costs per Day

MDS Item	ADL Item Description	R-squared
G0110A1	Bed Mobility - Self Performance	0.029
G0110A2	Bed Mobility - Support Provided	0.011
G0110B1	Transfer - Self-Performance	0.049
G0100B2	Transfer - Support Provided	0.028
G0110H1	Eating - Self-Performance	0.055
G0110H2	Eating - Support Provided	0.031
G0110I1	Toileting - Self-Performance	0.035
G0110I2	Toileting - Support Provided	0.010

MDS Item	ADL Item Description	R-squared
G0110C1	Walk in Room - Self-Performance	0.033
G0110C2	Walk in Room - Support Provided	0.032
G0110D1	Walk in Corridor - Self-Performance	0.029
G0110D2	Walk in Corridor - Support Provided	0.029
G0110E1	Locomotion on Unit - Self-Performance	0.033
G0110E2	Locomotion on Unit - Support Provided	0.017
G0110F1	Locomotion off Unit - Self-Performance	0.019
G0110F2	Locomotion off Unit - Support Provided	0.011
G0110G1	Dressing - Self-Performance	0.033
G0110G2	Dressing - Support Provided	0.008
G0110J1	Personal Hygiene - Self-Performance	0.039
G0110J2	Personal Hygiene - Support Provided	0.009

Table 26: OLS Estimates from Regressions of PT/OT Average Costs per Day on All ADL Items from the MDS 5-Day Assessment

MDS Function Variable	Description	# of Stays	% of Stays	Avg. PT/OT Costs per Day	OLS Estimate
G0110A1: Bed Mobility - Self Performance	Intercept	-	-	-	114.06**
G0110A1: Bed Mobility - Self Performance	Unable to Determine	1,059	0.1%	$64	-49.62**
G0110A1: Bed Mobility - Self Performance	Independent	67,983	3.4%	$114	Ref.
G0110A1: Bed Mobility - Self Performance	Supervision	99,313	5.0%	$121	7.02**
G0110A1: Bed Mobility - Self Performance	Limited Assistance	312,367	15.7%	$129	15.42**
G0110A1: Bed Mobility - Self Performance	Extensive Assistance	1,386,250	69.8%	$120	5.65**
G0110A1: Bed Mobility - Self Performance	Total Dependence	109,253	5.5%	$82	-31.68**
G0110A1: Bed Mobility - Self Performance	Activity Occurred Only Once or Twice	8,984	0.5%	$80	-34.34**
G0110A1: Bed Mobility - Self Performance	Activity Did Not Occur	561	0.0%	$75	-39.44**
G0110A2: Bed Mobility - Support Provided	Intercept	-	-	-	112.6**
G0110A2: Bed Mobility - Support Provided	Unable to Determine	1,061	0.1%	$65	-47.88**
G0110A2: Bed Mobility - Support Provided	No Setup	59,974	3.0%	$113	Ref.
G0110A2: Bed Mobility - Support Provided	Setup Help Only	59,207	3.0%	$120	7.53**
G0110A2: Bed Mobility - Support Provided	One Person Physical Assist	986,469	49.7%	$125	12.11**
G0110A2: Bed Mobility - Support Provided	Two+ Persons Physical Assist	878,498	44.2%	$113	0.1
G0110A2: Bed Mobility - Support Provided	Activity Did Not Occur	561	0.0%	$75	-37.98**
G0110B1: Transfer - Self-Performance	Intercept	-	-	-	102.24**
G0110B1: Transfer - Self-Performance	Unable to Determine	971	0.0%	$62	-40.09**
G0110B1: Transfer - Self-Performance	Independent	37,950	1.9%	$102	Ref.
G0110B1: Transfer - Self-Performance	Supervision	96,709	4.9%	$119	16.95**
G0110B1: Transfer - Self-Performance	Limited Assistance	335,987	16.9%	$130	27.48**
G0110B1: Transfer - Self-Performance	Extensive Assistance	1,293,770	65.2%	$122	20.02**
G0110B1: Transfer - Self-Performance	Total Dependence	168,835	8.5%	$90	-12.65**
G0110B1: Transfer - Self-Performance	Activity Occurred Only Once or Twice	30,415	1.5%	$80	-22.5**

MDS Function Variable	Description	# of Stays	% of Stays	Avg. PT/OT Costs per Day	OLS Estimate
G0110B1: Transfer - Self-Performance	Activity Did Not Occur	21,133	1.1%	$57	-44.86**
G0100B2: Transfer - Support Provided	Intercept	-	-	-	100.72**
G0100B2: Transfer - Support Provided	Unable to Determine	1,019	0.1%	$63	-37.72**
G0100B2: Transfer - Support Provided	No Setup	36,327	1.8%	$101	Ref.
G0100B2: Transfer - Support Provided	Setup Help Only	52,485	2.6%	$117	16.58**
G0100B2: Transfer - Support Provided	One Person Physical Assist	986,698	49.7%	$127	26.03**
G0100B2: Transfer - Support Provided	Two+ Persons Physical Assist	888,108	44.7%	$112	11.71**
G0100B2: Transfer - Support Provided	Activity Did Not Occur	21,133	1.1%	$57	-43.33**
G0110H1: Eating - Self-Performance	Intercept	-	-	-	129.77**
G0110H1: Eating - Self-Performance	Unable to Determine	1,231	0.1%	$66	-63.5**
G0110H1: Eating - Self-Performance	Independent	583,089	29.4%	$130	Ref.
G0110H1: Eating - Self-Performance	Supervision	798,593	40.2%	$123	-6.68**
G0110H1: Eating - Self-Performance	Limited Assistance	240,187	12.1%	$118	-12.22**
G0110H1: Eating - Self-Performance	Extensive Assistance	240,218	12.1%	$101	-29.18**
G0110H1: Eating - Self-Performance	Total Dependence	105,015	5.3%	$79	-50.87**
G0110H1: Eating - Self-Performance	Activity Occurred Only Once or Twice	12,352	0.6%	$88	-42**
G0110H1: Eating - Self-Performance	Activity Did Not Occur	5,085	0.3%	$35	-94.34**
G0110H2: Eating - Support Provided	Intercept	-	-	-	131.12**
G0110H2: Eating - Support Provided	Unable to Determine	1,281	0.1%	$68	-63.43**
G0110H2: Eating - Support Provided	No Setup	80,591	4.1%	$131	Ref.
G0110H2: Eating - Support Provided	Setup Help Only	1,108,212	55.8%	$126	-4.74**
G0110H2: Eating - Support Provided	One Person Physical Assist	781,834	39.4%	$108	-23.4**
G0110H2: Eating - Support Provided	Two+ Persons Physical Assist	8,767	0.4%	$102	-29.53**
G0110H2: Eating - Support Provided	Activity Did Not Occur	5,085	0.3%	$35	-95.69**
G0110I1: Toileting - Self-Performance	Intercept	-	-	-	108.18**
G0110I1: Toileting - Self-Performance	Unable to Determine	1,132	0.1%	$66	-42.66**
G0110I1: Toileting - Self-Performance	Independent	36,846	1.9%	$108	Ref.
G0110I1: Toileting - Self-Performance	Supervision	86,071	4.3%	$122	13.7**
G0110I1: Toileting - Self-Performance	Limited Assistance	296,180	14.9%	$131	22.58**
G0110I1: Toileting - Self-Performance	Extensive Assistance	1,362,622	68.6%	$121	12.73**
G0110I1: Toileting - Self-Performance	Total Dependence	189,665	9.6%	$89	-19.16**
G0110I1: Toileting - Self-Performance	Activity Occurred Only Once or Twice	10,576	0.5%	$83	-25.29**
G0110I1: Toileting - Self-Performance	Activity Did Not Occur	2,678	0.1%	$73	-35.32**
G0110I2: Toileting - Support Provided	Intercept	-	-	-	105.86**
G0110I2: Toileting - Support Provided	Unable to Determine	1,140	0.1%	$65	-40.65**
G0110I2: Toileting - Support Provided	No Setup	32,186	1.6%	$106	Ref.
G0110I2: Toileting - Support Provided	Setup Help Only	48,766	2.5%	$120	14.42**
G0110I2: Toileting - Support Provided	One Person Physical Assist	1,213,848	61.1%	$123	17.29**
G0110I2: Toileting - Support Provided	Two+ Persons Physical Assist	687,152	34.6%	$112	6.16**
G0110I2: Toileting - Support Provided	Activity Did Not Occur	2,678	0.1%	$73	-32.99**
G0110C1: Walk in Room - Self-Performance	Intercept	-	-	-	104.79**
G0110C1: Walk in Room - Self-Performance	Unable to Determine	4,417	0.2%	$98	-7.03**
G0110C1: Walk in Room - Self-Performance	Independent	45,802	2.3%	$105	Ref.
G0110C1: Walk in Room - Self-Performance	Supervision	155,293	7.8%	$123	17.93**
G0110C1: Walk in Room - Self-Performance	Limited Assistance	422,348	21.3%	$131	26.2**

MDS Function Variable	Description	# of Stays	% of Stays	Avg. PT/OT Costs per Day	OLS Estimate
G0110C1: Walk in Room - Self-Performance	Extensive Assistance	449,350	22.6%	$128	23.65**
G0110C1: Walk in Room - Self-Performance	Total Dependence	5,110	0.3%	$114	9.38**
G0110C1: Walk in Room - Self-Performance	Activity Occurred Only Once or Twice	94,978	4.8%	$120	15.3**
G0110C1: Walk in Room - Self-Performance	Activity Did Not Occur	808,472	40.7%	$107	2.41**
G0110C2: Walk in Room - Support Provided	Intercept	-	-	-	104.91**
G0110C2: Walk in Room - Support Provided	Unable to Determine	4,611	0.2%	$99	-6.34**
G0110C2: Walk in Room - Support Provided	No Setup	53,126	2.7%	$105	Ref.
G0110C2: Walk in Room - Support Provided	Setup Help Only	89,547	4.5%	$122	16.91**
G0110C2: Walk in Room - Support Provided	One Person Physical Assist	915,033	46.1%	$129	23.9**
G0110C2: Walk in Room - Support Provided	Two+ Persons Physical Assist	114,981	5.8%	$126	21.4**
G0110C2: Walk in Room - Support Provided	Activity Did Not Occur	808,472	40.7%	$107	2.3**
G0110D1: Walk in Corridor - Self-Performance	Intercept	-	-	-	103.6**
G0110D1: Walk in Corridor - Self-Performance	Unable to Determine	4,092	0.2%	$97	-6.98**
G0110D1: Walk in Corridor - Self-Performance	Independent	37,372	1.9%	$104	Ref.
G0110D1: Walk in Corridor - Self-Performance	Supervision	159,640	8.0%	$124	20.13**
G0110D1: Walk in Corridor - Self-Performance	Limited Assistance	379,568	19.1%	$132	27.99**
G0110D1: Walk in Corridor - Self-Performance	Extensive Assistance	396,111	19.9%	$128	24.19**
G0110D1: Walk in Corridor - Self-Performance	Total Dependence	5,803	0.3%	$118	13.95**
G0110D1: Walk in Corridor - Self-Performance	Activity Occurred Only Once or Twice	123,435	6.2%	$124	19.91**
G0110D1: Walk in Corridor - Self-Performance	Activity Did Not Occur	879,749	44.3%	$109	4.93**
G0110D2: Walk in Corridor - Support Provided	Intercept	-	-	-	106.29**
G0110D2: Walk in Corridor - Support Provided	Unable to Determine	4,167	0.2%	$96	-9.8**
G0110D2: Walk in Corridor - Support Provided	No Setup	52,915	2.7%	$106	Ref.
G0110D2: Walk in Corridor - Support Provided	Setup Help Only	93,861	4.7%	$123	16.65**
G0110D2: Walk in Corridor - Support Provided	One Person Physical Assist	874,314	44.0%	$129	22.81**
G0110D2: Walk in Corridor - Support Provided	Two+ Persons Physical Assist	80,764	4.1%	$125	18.52**
G0110D2: Walk in Corridor - Support Provided	Activity Did Not Occur	879,749	44.3%	$109	2.25**
G0110E1: Locomotion on Unit - Self-Performance	Intercept	-	-	-	110.62**
G0110E1: Locomotion on Unit - Self-Performance	Unable to Determine	2,908	0.1%	$88	-22.85**
G0110E1: Locomotion on Unit - Self-Performance	Independent	81,288	4.1%	$111	Ref.
G0110E1: Locomotion on Unit - Self-Performance	Supervision	181,755	9.2%	$121	10.06**
G0110E1: Locomotion on Unit - Self-Performance	Limited Assistance	376,318	19.0%	$130	19**
G0110E1: Locomotion on Unit - Self-Performance	Extensive Assistance	896,771	45.2%	$123	12.6**
G0110E1: Locomotion on Unit - Self-Performance	Total Dependence	308,715	15.5%	$107	-3.96**
G0110E1: Locomotion on Unit - Self-Performance	Activity Occurred Only Once or Twice	57,425	2.9%	$102	-8.69**
G0110E1: Locomotion on Unit - Self-Performance	Activity Did Not Occur	80,590	4.1%	$84	-26.74**
G0110E2: Locomotion on Unit - Support Provided	Intercept	-	-	-	108.2**
G0110E2: Locomotion on Unit - Support Provided	Unable to Determine	2,973	0.1%	$88	-19.76**
G0110E2: Locomotion on Unit - Support Provided	No Setup	73,113	3.7%	$108	Ref.
G0110E2: Locomotion on Unit - Support Provided	Setup Help Only	116,828	5.9%	$119	11.05**
G0110E2: Locomotion on Unit - Support Provided	One Person Physical Assist	1,639,211	82.5%	$121	13.07**
G0110E2: Locomotion on Unit - Support Provided	Two+ Persons Physical Assist	73,055	3.7%	$114	6.02**
G0110E2: Locomotion on Unit - Support Provided	Activity Did Not Occur	80,590	4.1%	$84	-24.32**
G0110F1: Locomotion off Unit - Self-Performance	Intercept	-	-	-	110.12**

MDS Function Variable	Description	# of Stays	% of Stays	Avg. PT/OT Costs per Day	OLS Estimate
G0110F1: Locomotion off Unit - Self-Performance	Unable to Determine	3,339	0.2%	$94	-16.22**
G0110F1: Locomotion off Unit - Self-Performance	Independent	67,154	3.4%	$110	Ref.
G0110F1: Locomotion off Unit - Self-Performance	Supervision	160,060	8.1%	$120	9.84**
G0110F1: Locomotion off Unit - Self-Performance	Limited Assistance	298,730	15.0%	$128	18.25**
G0110F1: Locomotion off Unit - Self-Performance	Extensive Assistance	793,988	40.0%	$124	13.88**
G0110F1: Locomotion off Unit - Self-Performance	Total Dependence	389,924	19.6%	$112	1.82**
G0110F1: Locomotion off Unit - Self-Performance	Activity Occurred Only Once or Twice	113,866	5.7%	$112	2.07**
G0110F1: Locomotion off Unit - Self-Performance	Activity Did Not Occur	158,709	8.0%	$100	-10.13**
G0110F2: Locomotion off Unit - Support Provided	Intercept	-	-	-	108.92**
G0110F2: Locomotion off Unit - Support Provided	Unable to Determine	3,473	0.2%	$95	-14.09**
G0110F2: Locomotion off Unit - Support Provided	No Setup	67,510	3.4%	$109	Ref.
G0110F2: Locomotion off Unit - Support Provided	Setup Help Only	98,964	5.0%	$118	8.99**
G0110F2: Locomotion off Unit - Support Provided	One Person Physical Assist	1,603,070	80.7%	$121	12.57**
G0110F2: Locomotion off Unit - Support Provided	Two+ Persons Physical Assist	54,044	2.7%	$112	2.59**
G0110F2: Locomotion off Unit - Support Provided	Activity Did Not Occur	158,709	8.0%	$100	-8.93**
G0110G1: Dressing - Self-Performance	Intercept	-	-	-	110.62**
G0110G1: Dressing - Self-Performance	Unable to Determine	2,192	0.1%	$76	-34.22**
G0110G1: Dressing - Self-Performance	Independent	34,543	1.7%	$111	Ref.
G0110G1: Dressing - Self-Performance	Supervision	87,014	4.4%	$122	11.26**
G0110G1: Dressing - Self-Performance	Limited Assistance	343,065	17.3%	$130	19.36**
G0110G1: Dressing - Self-Performance	Extensive Assistance	1,358,737	68.4%	$120	9.42**
G0110G1: Dressing - Self-Performance	Total Dependence	138,861	7.0%	$84	-26.2**
G0110G1: Dressing - Self-Performance	Activity Occurred Only Once or Twice	17,108	0.9%	$98	-12.53**
G0110G1: Dressing - Self-Performance	Activity Did Not Occur	4,250	0.2%	$74	-36.96**
G0110G2: Dressing - Support Provided	Intercept	-	-	-	104.37**
G0110G2: Dressing - Support Provided	Unable to Determine	2,214	0.1%	$76	-27.89**
G0110G2: Dressing - Support Provided	No Setup	24,269	1.2%	$104	Ref.
G0110G2: Dressing - Support Provided	Setup Help Only	55,843	2.8%	$120	15.84**
G0110G2: Dressing - Support Provided	One Person Physical Assist	1,645,659	82.9%	$121	16.57**
G0110G2: Dressing - Support Provided	Two+ Persons Physical Assist	253,535	12.8%	$107	3.08**
G0110G2: Dressing - Support Provided	Activity Did Not Occur	4,250	0.2%	$74	-30.71**
G0110J1: Personal Hygiene - Self-Performance	Intercept	-	-	-	126.58**
G0110J1: Personal Hygiene - Self-Performance	Unable to Determine	2,194	0.1%	$76	-50.94**
G0110J1: Personal Hygiene - Self-Performance	Independent	71,892	3.6%	$127	Ref.
G0110J1: Personal Hygiene - Self-Performance	Supervision	186,576	9.4%	$129	2**
G0110J1: Personal Hygiene - Self-Performance	Limited Assistance	433,672	21.8%	$129	2.34**
G0110J1: Personal Hygiene - Self-Performance	Extensive Assistance	1,122,397	56.5%	$118	-8.48**
G0110J1: Personal Hygiene - Self-Performance	Total Dependence	152,568	7.7%	$84	-42.93**
G0110J1: Personal Hygiene - Self-Performance	Activity Occurred Only Once or Twice	14,340	0.7%	$95	-31.12**
G0110J1: Personal Hygiene - Self-Performance	Activity Did Not Occur	2,131	0.1%	$70	-56.09**
G0110J2: Personal Hygiene - Support Provided	Intercept	-	-	-	114.48**
G0110J2: Personal Hygiene - Support Provided	Unable to Determine	2,232	0.1%	$75	-38.99**
G0110J2: Personal Hygiene - Support Provided	No Setup	30,881	1.6%	$114	Ref.
G0110J2: Personal Hygiene - Support Provided	Setup Help Only	152,491	7.7%	$131	16.23**

MDS Function Variable	Description	# of Stays	% of Stays	Avg. PT/OT Costs per Day	OLS Estimate
G0110J2: Personal Hygiene - Support Provided	One Person Physical Assist	1,628,767	82.0%	$119	4.83**
G0110J2: Personal Hygiene - Support Provided	Two+ Persons Physical Assist	169,268	8.5%	$106	-8.83**
G0110J2: Personal Hygiene - Support Provided	Activity Did Not Occur	2,131	0.1%	$70	-44**

*** Significant at the 1% level. * Significant at the 5% level.*

Acumen next used statistical evidence to build the functional score. Acumen first tested the relationship between each possible response to the three selected ADL items and PT/OT costs per day. As shown in Table 27, this investigation revealed that therapy costs first increase, then decrease with residents' greater dependence on the transfer and toileting items. However, costs consistently decrease with greater dependence on the eating item. Acumen assigned points to each possible response to the three selected items based on the observed cost patterns. For example, Table 27 shows that for the transfer item, residents who received limited assistance had the highest PT/OT costs per day. Therefore, residents who received limited assistance were assigned the highest number of points (6) for the transfer item. The second-costliest group of residents (also for the transfer item) were those who received extensive assistance. These residents were assigned the second-highest number of points (5). This process continued until points were assigned for each possible response for each of the three ADL items. For each item, the points assigned to each response (ranging from 6 to 0) follows the ranking of the responses from highest PT/OT costs per day to lowest PT/OT costs per day.

Table 28 shows the points assigned to each value. As the table shows, the points assigned to each response mirror the inverse U-shape of the dependence-cost curve for the transfer and toileting items and the monotonic decrease in costs associated with increasing dependence on the eating item. This produces a functional score that ranges from 0 to 18, where 0 indicates that none of the three activities occurred and 18 is assigned to residents who received the highest possible number of points (6) for all three items.

Table 27: PT/OT Average Costs per Day for ADL Items on the MDS 5-Day Assessment Used in the Recommended Functional Score

MDS Item	Item Description	Value	# of Stays	% of Stays	Avg. PT/OT Costs per Day
G0110B1	Transfer - Self-Performance	Independent	37,950	1.9%	$102
G0110B1	Transfer - Self-Performance	Supervision	96,709	4.9%	$119
G0110B1	Transfer - Self-Performance	Limited Assistance	335,987	16.9%	$130
G0110B1	Transfer - Self-Performance	Extensive Assistance	1,293,770	65.2%	$122
G0110B1	Transfer - Self-Performance	Total Dependence	168,835	8.5%	$90
G0110B1	Transfer - Self-Performance	Activity Occurred Only Once or Twice	30,415	1.5%	$80
G0110B1	Transfer - Self-Performance	Activity Did Not Occur	21,133	1.1%	$57
G0110B1	Transfer - Self-Performance	Unable to Determine	971	0.0%	$62
G0110H1	Eating - Self-Performance	Independent	583,089	29.4%	$130
G0110H1	Eating - Self-Performance	Supervision	798,593	40.2%	$123

MDS Item	Item Description	Value	# of Stays	% of Stays	Avg. PT/OT Costs per Day
G0110H1	Eating - Self-Performance	Limited Assistance	240,187	12.1%	$118
G0110H1	Eating - Self-Performance	Extensive Assistance	240,218	12.1%	$101
G0110H1	Eating - Self-Performance	Total Dependence	105,015	5.3%	$79
G0110H1	Eating - Self-Performance	Activity Occurred Only Once or Twice	12,352	0.6%	$88
G0110H1	Eating - Self-Performance	Activity Did Not Occur	5,085	0.3%	$35
G0110H1	Eating - Self-Performance	Unable to Determine	1,231	0.1%	$66
G0110I1	Toileting - Self-Performance	Independent	36,846	1.9%	$108
G0110I1	Toileting - Self-Performance	Supervision	86,071	4.3%	$122
G0110I1	Toileting - Self-Performance	Limited Assistance	296,180	14.9%	$131
G0110I1	Toileting - Self-Performance	Extensive Assistance	1,362,622	68.6%	$121
G0110I1	Toileting - Self-Performance	Total Dependence	189,665	9.6%	$89
G0110I1	Toileting - Self-Performance	Activity Occurred Only Once or Twice	10,576	0.5%	$83
G0110I1	Toileting - Self-Performance	Activity Did Not Occur	2,678	0.1%	$73
G0110I1	Toileting - Self-Performance	Unable to Determine	1,132	0.1%	$66

Table 28: Points Assigned to Each Response to Three ADL Self-Performance Items Used in Construction of Recommended Functional Score

ADL Level	Transfer	Toileting	Eating
Independent	3	3	6
Supervision	4	4	5
Limited Assistance	6	6	4
Extensive Assistance	5	5	3
Total Dependence	2	2	2
Activity Occurred only Once or Twice	1	1	1
Activity did not Occur	0	0	0

Acumen then compared the recommended functional score with the current ADL score. As illustrated in Figure 8, there is not a clear relationship between the current ADL score and PT/OT costs, and there is clustering of stays around payment thresholds, such as 6 (more information on RUG-IV ADL payment thresholds can be found in Figure 15 in the Appendix). As shown in Figure 9, the recommended functional score has a more linear relationship with PT/OT costs: as the score increases, PT/OT costs per day also generally increase, especially for scores with more residents. The recommended score also exhibits a more normal distribution compared to the current ADL score, though there is a long left tail representing a relatively small number of stays. For the foregoing clinical and empirical reasons, the new functional score was selected as the functional indicator for PT/OT payment.

Figure 8: Distribution of Total ADL Score in RUG-IV and Average PT/OT Costs per Day

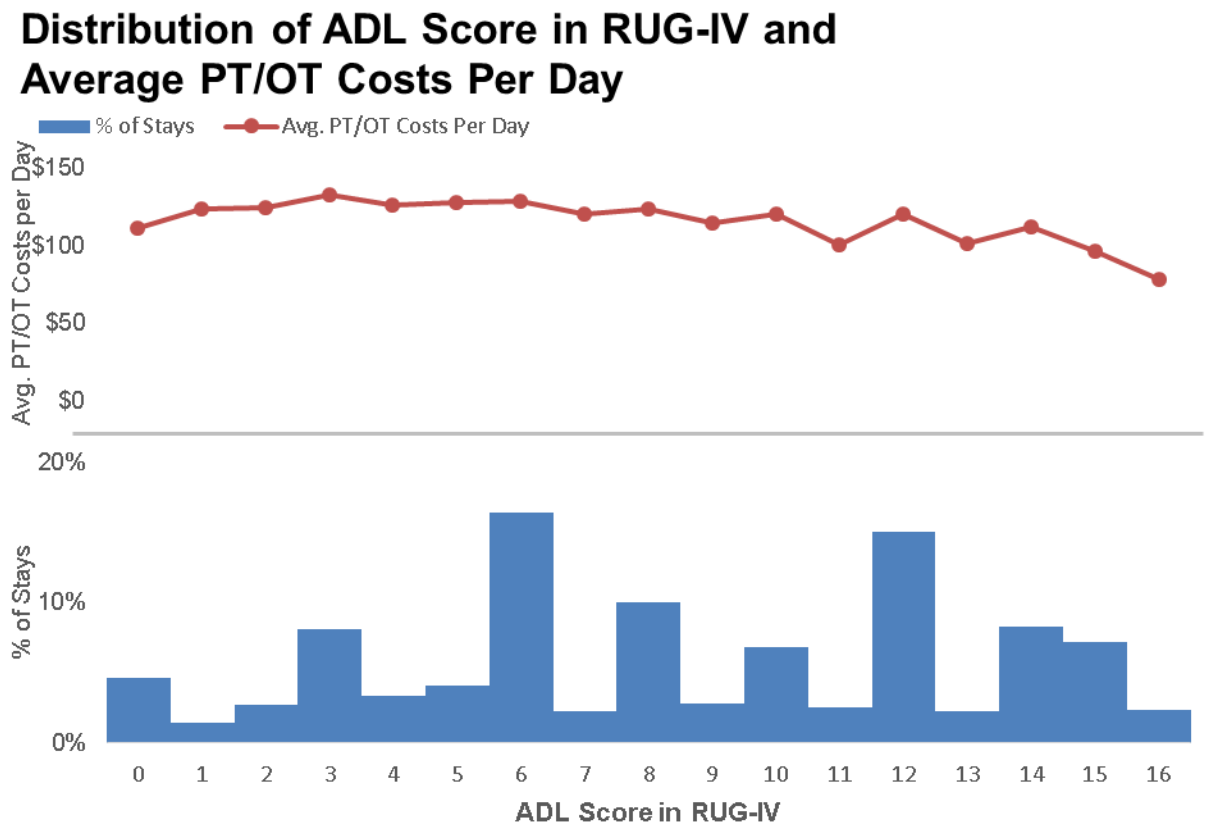
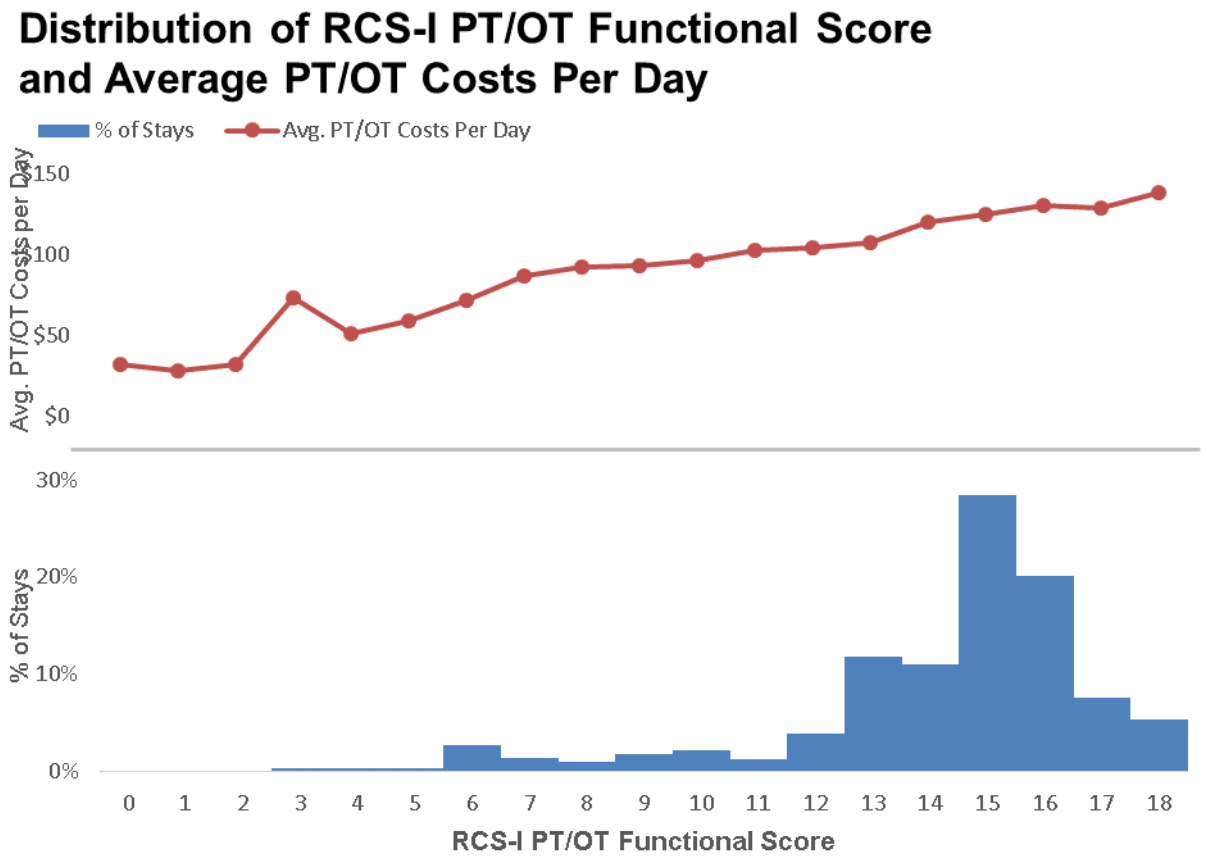


Figure 9: Distribution of Recommended Functional Score and PT/OT Costs per Day



3.4.2 Variable Grouping Methods

After selecting independent variables related to PT/OT utilization, Acumen used the CART algorithm to explore possible payment groups. The following sections describe the algorithm and how Acumen used CART results to build case-mix groups.

CART Algorithm

CART is a non-parametric decision tree learning technique that produces either classification or regression trees, depending on whether the dependent variable is categorical or numeric, respectively. Rules based on variables' values are selected to get the best split to differentiate observations based on the dependent variable. CART is a recursive procedure. Once a rule is selected and splits a node into two, the same process is applied to each "child" node until CART detects no further gain can be made, or some pre-set stopping rules are met. Each branch of the tree ends in a terminal node, each observation falls into one and exactly one terminal node, and each terminal node is uniquely defined by a set of rules.

Acumen required that each split in the tree must increase the overall R-squared by at least 0.0001. Acumen then pruned the tree generated by CART to find the smallest number of splits with an associated cross-validated error less than the minimum cross-validated error plus one

standard error of that minimum error (a "1-Standard Error (SE)" rule). In other words, we take the simplest tree whose error is within one standard error of the minimum error[31].

Using the CART technique to identify potential payment groups is advantageous because the model is easy to interpret and resistant to outliers. Additionally, CART employs variable selection, which enhances generalization by reducing the chances of overfitting, which is likely in a complex index model. CART was used to create payment groups in other Medicare settings. For example, it determined the age, function, and cognitive splits within rehabilitation impairment groups (RICs) when the IRF PPS was developed. The Urban Institute has also used CART in its research on SNF payment alternatives. Researchers from the Urban Institute used CART to explore alternatives to traditional regression models[32] and create classification groups for NTA payment[33]. However, a limitation of CART is that each subsequent split depends on the previous one, so that an error in the higher split is propagated down. Additionally, a small change in the dataset can cause a large change in the tree. For these reasons, Acumen examined the robustness of conclusions by running CART on multiple populations, and used clinical review of the final results to ensure clinical validity.

Variables Included in the CART Models

The CART algorithm requires a dependent variable and at least one independent variable. The dependent variable was PT/OT costs per day. Sections 3.3.1 and 3.2.3 describe the rationale for combining PT and OT into a single utilization measure and the choice of a per day unit. The initial CART models used functional score, cognitive status, and age as independent variables. Comorbidities were not used to create PT/OT payment groups because they were not determined to be strong predictors of PT/OT utilization, as discussed in Section 3.4.1. Table 29 shows the functional score included in CART, which was calculated using the transfer, eating, and toileting self-performance items on the MDS assessment. The functional variable is numeric, meaning the score is included as one continuous variable and can contain any value between 0 and 18. Table 30 shows the cognitive status variable used in the CART analysis. The cognitive status variable is categorical, meaning that each value is treated independently as its own category, and not considered part of an ordered scale. Finally, Table 31 shows the age bins included in CART,

[31] For more detail on why these parameters were chosen, see: Therneau, Terry M., and Elizabeth J. Atkinson, "An Introduction to Recursive Partitioning Using the RPART Routines," *Mayo Foundation, Rochester, MN* (2015), https://cran.r-project.org/web/packages/rpart/vignettes/longintro.pdf.
[32] Liu, Korbin, Bowen Garrett, Sharon Long, Stephanie Maxwell, Yu-Chu Shen, Douglas Wissoker, Brant Fries, et al., "Final Report to CMS: Options for Improving Medicare Payment for Skilled Nursing Facilities."
[33] Wissoker, Doug, and A. Bowen Garrett, "Development of Updated Models of Non-Therapy Ancillary Costs," *Urban Institute, Medicare Payment Advisory Commission. Washington, DC* (2010), http://www.urban.org/sites/default/files/alfresco/publication-pdfs/412249-Development-of-Updated-Models-of-Non-Therapy-Ancillary-Costs.PDF.

which are also categorical. Age was included in the CART analysis because it was identified by clinicians as a possible predictor of PT/OT utilization.

Table 29: Functional Score Included in CART

Functional Score	# of Stays	% of Stays	Avg. PT/OT Costs per Day
0 –High function	343	0.0%	$32
1	511	0.0%	$28
2	2,639	0.1%	$33
3	5,840	0.3%	$73
4	8,180	0.4%	$51
5	5,992	0.3%	$59
6	55,076	2.8%	$72
7	28,430	1.4%	$87
8	19,908	1.0%	$93
9	37,149	1.9%	$93
10	44,874	2.3%	$97
11	26,044	1.3%	$103
12	78,065	3.9%	$104
13	233,520	11.8%	$108
14	219,019	11.0%	$120
15	563,095	28.4%	$125
16	400,034	20.1%	$130
17	150,037	7.6%	$129
18 – Low function	105,513	5.3%	$138
Missing*	1,501	0.1%	$69

**Stays with missing values were not included in the CART analysis*

Table 30: Cognitive Status Variable Included in CART

CFS Cognitive Level	# of Stays	% of Stays	Avg. PT/OT Costs per Day
1 - Cognitively Intact	1,056,882	53.2%	$128
2 - Mildly Impaired	438,667	22.1%	$118
3 - Moderately Impaired	348,543	17.6%	$104
4 - Severely Impaired	91,125	4.6%	$74
Missing*	50,553	2.5%	$107

**Stays with missing values were not included in the CART analysis*

Table 31: Age Variable Included in CART

Age Group	# of Stays	% of Stays	Avg. PT/OT Costs per Day
0-64	208,459	10.5%	$112
65-89	1,479,826	74.5%	$121
90+	297,485	15.0%	$114

CART Results

The CART algorithm was run within each of the 10 clinical categories, generating 10 sets of groups. However, a simpler model run on the full population (including the clinical categories, functional score, CFS level, and age as independent variables) generated fewer resident groups but resulted in a high R-squared value, suggesting the clinical categories could be collapsed while retaining predictive ability. The CART model run on the full population, which allowed CART to collapse clinical categories, created 22 groups. The CART grouping of clinical categories in this model are shown in Table 32. Acumen used the results of this simpler model to collapse categories that were often grouped together by CART.

Table 32: Results of CART Model Grouping Clinical Categories for PT/OT

Group	Clinical Category Groups
1	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery, Acute Neurologic, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint, Major Joint Replacement/Spinal Surgery
2	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
3	Acute Neurologic, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint, Major Joint Replacement/Spinal Surgery
4	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
5	Acute Neurologic, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint, Major Joint Replacement/Spinal Surgery
6	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
7	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
8	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
9	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
10	Acute Neurologic, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint, Major Joint Replacement/Spinal Surgery
11	Acute Neurologic, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint
12	Major Joint Replacement/Spinal Surgery
13	Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary
14	Acute Neurologic, Non-Orthopedic Surgery, Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint
15	Acute Neurologic, Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery

Group	Clinical Category Groups
16	Acute Neurologic, Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
17	Acute Neurologic, Acute Infection ,Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
18	Acute Neurologic, Acute Infection, Cancer, Cardiovascular and Coagulations, Medical Management, Pulmonary, Non-Orthopedic Surgery
19	Non-Surgical Orthopedic/Musculoskeletal, Orthopedic - Surgical Extremities not Major Joint
20	Major Joint Replacement/Spinal Surgery
21	Major Joint Replacement/Spinal Surgery
22	Major Joint Replacement/Spinal Surgery

Table 33 shows the five collapsed categories. Five medical categories were collapsed because they were often grouped together. The resulting group was named "Medical Management", and it includes residents who receive the lowest levels of therapy on average. Two categories were also collapsed into the "Other Orthopedic" group (orthopedic surgeries on extremities without major joint replacement and Non-Surgical Orthopedic/Musculoskeletal). Residents in these groups had PT/OT costs much higher than those in the Medical Management category. The Acute Neurologic group was retained as an independent category because residents in this category had higher costs than the residents in the Medical Management category, but lower costs than residents in the Other Orthopedic category. The Major Joint Replacement or Spinal Surgery group was also retained because CART generated a unique pattern of splits for this group and residents in this group had by far the highest PT/OT costs. Although CART generated splits in the Non-Orthopedic Surgery group similar to those in the Medical Management category, Non-Orthopedic Surgery was also retained because of clinical differences between these two groups. Table 34 shows the collapsed clinical categories, the number of stays, and the PT/OT costs per day.

Table 33: Collapsed Clinical Categories for PT/OT Component

Original Categories	Collapsed Categories
Major Joint Replacement or Spinal Surgery	Major Joint Replacement or Spinal Surgery
Non-Surgical Orthopedic/Musculoskeletal	Other Orthopedic
Orthopedic - Surgical Extremities not Major Joint	Other Orthopedic
Acute Infections	Medical Management
Medical - Management	Medical Management
Cancer	Medical Management
Pulmonary	Medical Management
Cardiovascular and Coagulations	Medical Management
Acute Neurologic	Acute Neurologic
Non-Orthopedic Surgery	Non-Orthopedic Surgery

Table 34: Collapsed Clinical Categories and Average PT/OT Costs per Day

Clinical Category	# of Stays	% of Stays	Avg. PT/OT Costs per Day
Overall	**1,985,770**	**100%**	**$119**
Major Joint Replacement or Spinal Surgery	201,181	10.1%	$147
Other Orthopedic	277,497	14.0%	$129
Non-Orthopedic Surgery	223,973	11.3%	$120
Acute Neurologic	124,882	6.3%	$118
Medical Management	1,158,237	58.3%	$111

After collapsing the clinical categories, Acumen ran a CART analysis within each of the 5 collapsed categories, resulting in 24 groups. All observations with missing values were dropped before running the CART analysis. Table 35 shows the payment groups generated by CART and their associated costs.

Table 35: PT/OT Groups Created by CART within Collapsed Clinical Categories

Clinical Category	Functional Score	CFS	Age	# of Stays	% of Stays	Avg. PT/OT Costs per Day
Medical Management	0-7	4	-	26,147	1.4%	$51
Medical Management	0-7	1,2,3	-	42,234	2.2%	$77
Medical Management	8-13	4	-	27,423	1.4%	$76
Medical Management	8-13	3	-	84,973	4.4%	$93
Medical Management	8-12	1,2	-	80,089	4.1%	$98
Medical Management	13	1,2	-	81,873	4.2%	$109
Medical Management	14-18	3,4	-	138,139	7.1%	$108
Medical Management	14-18	2	-	202,035	10.4%	$119
Medical Management	14-18	1	0-64	54,531	2.8%	$118
Medical Management	14-18	1	65+	389,299	20.1%	$126
Acute Neurologic	0-5	4	-	1,088	0.1%	$42
Acute Neurologic	6-18	4	-	8,769	0.5%	$94
Acute Neurologic	0-13	1,2,3	-	33,433	1.7%	$112
Acute Neurologic	14-18	2,3		38,038	2.0%	$121
Acute Neurologic	14-18	1	-	39,654	2.0%	$129
Other Orthopedic	0-13	3,4	-	23,649	1.2%	$102
Other Orthopedic	0-13	1,2	-	34,425	1.8%	$120
Other Orthopedic	14-18	3,4	-	26,204	1.4%	$121
Other Orthopedic	14-18	1,2	-	187,879	9.7%	$135
Non-Orthopedic Surgery	0-11	4	-	4,968	0.3%	$60
Non-Orthopedic Surgery	0-11	1,2,3	-	19,750	1.0%	$94
Non-Orthopedic Surgery	12-13	3,4		7,330	0.4%	$98
Non-Orthopedic Surgery	12-13	1,2	-	24,296	1.3%	$114
Non-Orthopedic Surgery	14-18	3,4	-	13,598	0.7%	$115

Clinical Category	Functional Score	CFS	Age	# of Stays	% of Stays	Avg. PT/OT Costs per Day
Non-Orthopedic Surgery	14-18	1,2	0-64	17,285	0.9%	$118
Non-Orthopedic Surgery	14-18	1,2	65+	129,699	6.7%	$129
Major Joint Replacement or Spinal Surgery	0-18	3,4	-	15,373	0.8%	$121
Major Joint Replacement or Spinal Surgery	0-15	1,2	-	89,718	4.6%	$144
Major Joint Replacement or Spinal Surgery	16-18	1,2	-	92,592	4.8%	$156

** A dash indicates that any value is included.*

Consistent Splits Approach

In addition to the groups created by CART, Acumen also tested a classification option using consistent splits across multiple clinical categories. The splits were determined using information from the preliminary CART results shown in Table 35. The advantage of this method is that it is informed by CART output but it is uniform across multiple clinical categories, which may make it easier to understand. Table 36 compares the R-squared values for the CART results and the consistent splits. The consistent splits model has only a slightly lower R-squared and is much simpler. The consistent splits payment groups and associated costs are shown in Section 3.4.3.

Table 36: PT/OT Group Options R-squared Comparison

Model	# of Groups	R-squared Value
Consistent Splits	30	0.099
CART	29	0.103

3.4.3 Results

Table 37 shows the recommended resident groups for PT/OT payment, frequency of stays, and average PT/OT costs per day. Average PT/OT costs per day increase monotonically across Functional Scores when keeping Clinical Category and CFS constant: For any combination of Clinical Category and CFS bin, average PT/OT costs per day are highest for residents with Functional Scores 14-18 and lowest for residents with Functional Scores 0-7. Similarly, average PT/OT costs per day decrease monotonically across CFS bins when keeping Clinical Category and Functional Score constant: For any combination of Clinical Category and Functional Score bin, average PT/OT costs per day are highest for residents with CFS 1-2 and lowest for residents with CFS 3-4. The coefficients of variation of PT/OT costs per day for all resident groups are greater than 1.

Table 37: Recommended Resident Groups for PT/OT Payment

Clinical Category	Functional Score	CFS	# of Stays	% of Stays	Avg. PT/OT Costs per Day	Std. Deviation PT/OT Costs per Day
Major Joint Replacement or Spinal Surgery	14-18	1-2	166,082	8.6%	$151	$56
Major Joint Replacement or Spinal Surgery	14-18	3-4	8,127	0.4%	$128	$57
Major Joint Replacement or Spinal Surgery	8-13	1-2	15,265	0.8%	$142	$60
Major Joint Replacement or Spinal Surgery	8-13	3-4	6,022	0.3%	$114	$53
Major Joint Replacement or Spinal Surgery	0-7	1-2	963	0.0%	$118	$93
Major Joint Replacement or Spinal Surgery	0-7	3-4	1,224	0.1%	$103	$62
Other Orthopedic	14-18	1-2	187,879	9.7%	$135	$52
Other Orthopedic	14-18	3-4	26,204	1.4%	$121	$52
Other Orthopedic	8-13	1-2	31,899	1.6%	$122	$58
Other Orthopedic	8-13	3-4	18,940	1.0%	$106	$53
Other Orthopedic	0-7	1-2	2,526	0.1%	$104	$78
Other Orthopedic	0-7	3-4	4,709	0.2%	$85	$65
Non-Orthopedic Surgery	14-18	1-2	146,984	7.6%	$128	$53
Non-Orthopedic Surgery	14-18	3-4	13,598	0.7%	$115	$54
Non-Orthopedic Surgery	8-13	1-2	33,630	1.7%	$111	$61
Non-Orthopedic Surgery	8-13	3-4	11,512	0.6%	$94	$59
Non-Orthopedic Surgery	0-7	1-2	3,843	0.2%	$86	$71
Non-Orthopedic Surgery	0-7	3-4	7,359	0.4%	$68	$64
Acute Neurologic	14-18	1-2	61,820	3.2%	$127	$49
Acute Neurologic	14-18	3-4	17,321	0.9%	$116	$50
Acute Neurologic	8-13	1-2	16,063	0.8%	$118	$54
Acute Neurologic	8-13	3-4	16,698	0.9%	$105	$51
Acute Neurologic	0-7	1-2	2,008	0.1%	$108	$66
Acute Neurologic	0-7	3-4	7,072	0.4%	$84	$65
Medical Management	14-18	1-2	645,865	33.4%	$123	$53
Medical Management	14-18	3-4	138,139	7.1%	$108	$56
Medical Management	8-13	1-2	161,962	8.4%	$104	$61
Medical Management	8-13	3-4	112,396	5.8%	$89	$58
Medical Management	0-7	1-2	18,259	0.9%	$82	$72
Medical Management	0-7	3-4	50,122	2.6%	$62	$63

3.5 Resident Classification for Speech Language Pathology Component

This section describes the selection of independent variables for the SLP component, variable grouping methods, and results.

3.5.1 Selection of Independent Variables

Selection of independent variables consisted of two primary phases: (1) initial selection of resident characteristics likely to be good predictors of SLP utilization, and (2) final selection of the variables that were most predictive of resource use. Acumen used relevant literature, clinical input, regression evidence, and feedback from technical expert panels to identify resident characteristics that were potentially predictive of SLP utilization. In the initial selection phase, Acumen first narrowed the full list of MDS variables to likely predictors of SLP utilization based on evidence from the literature and input from clinicians. Input from technical expert panels was also incorporated into the exploratory phase of independent variable selection. The final list of potential predictors selected for further exploration included: clinical reasons for the prior inpatient stay and SNF stay, functional status, cognitive impairment, age, prior utilization of services (emergency, acute inpatient, and post-acute), comorbidities recorded during the SNF stay and during the year prior to the stay, and services received during the SNF stay.

Acumen then used regression analysis to examine the relationship between these characteristics and SLP costs per day. Table 38 shows R-squared values for the single regressions used to evaluate the ability of each selected resident characteristic to predict SLP costs per day. Table 39 shows the coefficients for each item. Based on this analysis and additional clinical input, five types of resident information were found to be strong predictors of SLP costs per day: clinical reasons for the prior inpatient stay, cognitive impairment, SLP-related conditions and services, the presence of a swallowing disorder, and nutritional approach. Clinical reasons for the prior inpatient stay were defined using the clinical categories described in Section 3.4.1. Cognitive impairment was identified using the cognitive indicator described in Section 3.4.1. The incorporation of SLP-related conditions and services, swallowing disorder, and nutritional approach are described in the following sub-sections.

Table 38: R-squared Values for OLS Regressions using Speech-Related Items on the MDS 5-Day Assessment to Predict SLP Costs per Day

Speech-Related Item	R-squared
G0110H1: Eating - Self-Performance	0.043
B0700 Makes Self Understood	0.041
B0600 Speech Clarity	0.026
K0100A Loss of liquids/solids from mouth when eating or drinking	0.004
K0100B Holding food in mouth/cheeks or residual food in mouth after meal	0.010
K0100C Coughing or Choking during meals or when swallowing medications	0.017
K0100D Complaints of difficulty or pain with swallowing	0.011

Speech-Related Item	R-squared
K0100Z No sign of swallowing disorder	0.031
Clinical Category	0.045
BIMS	0.063
CFS	0.060

Table 39: OLS Estimates from Regressions of SLP Costs per Day on Selected Speech-Related Measures from the MDS 5-Day Assessment

Function Variable	Description	# of Stays	% of Stays	Avg. SLP Costs per Day	Estimate
G0110H1: Eating - Self-Performance	Intercept	-	-	-	11.23**
G0110H1: Eating - Self-Performance	Unable to Determine	1,231	0.1%	$13	2.15**
G0110H1: Eating - Self-Performance	Independent	583,089	29.4%	$11	Reference
G0110H1: Eating - Self-Performance	Supervision	798,593	40.2%	$15	3.39**
G0110H1: Eating - Self-Performance	Limited Assistance	240,187	12.1%	$19	7.71**
G0110H1: Eating - Self-Performance	Extensive Assistance	240,218	12.1%	$27	15.87**
G0110H1: Eating - Self-Performance	Total Dependence	105,015	5.3%	$30	18.51**
G0110H1: Eating - Self-Performance	Activity Occurred Only Once or Twice	12,352	0.6%	$18	6.5**
G0110H1: Eating - Self-Performance	Activity Did Not Occur	5,085	0.3%	$12	0.74
B0700 Makes Self Understood	Intercept	-	-	-	13.65**
B0700 Makes Self Understood	Understood	1,580,846	79.6%	$14	Reference
B0700 Makes Self Understood	Usually understood	225,156	11.3%	$27	13.37**
B0700 Makes Self Understood	Sometimes understood	110,498	5.6%	$30	16.17**
B0700 Makes Self Understood	Rarely/never understood	54,420	2.7%	$26	12.61**
B0700 Makes Self Understood	Skipped	14,850	0.7%	$21	7.29**
B0600 Speech Clarity	Intercept	-	-	-	15.08**
B0600 Speech Clarity	Clear Speech	1,802,144	90.8%	$15	Reference
B0600 Speech Clarity	Unclear Speech	134,305	6.8%	$32	16.84**
B0600 Speech Clarity	No Speech	36,335	1.8%	$27	11.47**
B0600 Speech Clarity	Skipped	12,986	0.7%	$20	5.12**
K0100A Loss of liquids/solids from mouth when eating or drinking	Intercept	-	-	-	16.36**
K0100A Loss of liquids/solids from mouth when eating or drinking	No	1,958,926	98.6%	$16	Reference
K0100A Loss of liquids/solids from mouth when eating or drinking	Yes	11,729	0.6%	$39	22.77**
K0100A Loss of liquids/solids from mouth when eating or drinking	Skipped	15,115	0.8%	$13	-3.75**
K0100B Holding food in mouth/cheeks or residual food in mouth after meal	Intercept	-	-	-	16.18**
K0100B Holding food in mouth/cheeks or residual food in mouth after meal	No	1,946,773	98.0%	$16	Reference
K0100B Holding food in mouth/cheeks or residual food in mouth after meal	Yes	23,902	1.2%	$42	25.69**
K0100B Holding food in mouth/cheeks or residual food in mouth after meal	Skipped	15,095	0.8%	$13	-3.62**
K0100C Coughing or Choking during meals or when swallowing medications	Intercept	-	-	-	15.91**
K0100C Coughing or Choking during meals or when swallowing medications	No	1,922,117	96.8%	$16	Reference

Function Variable	Description	# of Stays	% of Stays	Avg. SLP Costs per Day	Estimate
K0100C Coughing or Choking during meals or when swallowing medications	Yes	48,542	2.4%	$40	23.74**
K0100C Coughing or Choking during meals or when swallowing medications	Skipped	15,111	0.8%	$13	-3.29**
K0100D Complaints of difficulty or pain with swallowing	Intercept	-	-	-	16.02**
K0100D Complaints of difficulty or pain with swallowing	No	1,919,372	96.7%	$16	Reference
K0100D Complaints of difficulty or pain with swallowing	Yes	51,354	2.6%	$34	18.3**
K0100D Complaints of difficulty or pain with swallowing	Skipped	15,044	0.8%	$13	-3.49**
K0100Z No sign of swallowing disorder	Intercept	-	-	-	15.33**
K0100Z No sign of swallowing disorder	Has sign of swallowing disorder	1,864,039	93.9%	$15	Reference
K0100Z No sign of swallowing disorder	no sign of swallowing disorder	106,616	5.4%	$37	21.58**
K0100Z No sign of swallowing disorder	Skipped	15,115	0.8%	$12	-2.84**
Clinical Category	Intercept	-	-	-	18.38**
Clinical Category	Medical Management	584,652	29.4%	$18	Reference
Clinical Category	Acute Infections	154,743	7.8%	$16	-2.06**
Clinical Category	Acute Neurologic	124,882	6.3%	$34	15.51**
Clinical Category	Cancer	94,280	4.7%	$19	0.61**
Clinical Category	Cardiovascular and Coagulations	175,730	8.8%	$15	-3.18**
Clinical Category	Non-Surgical Orthopedic/Musculoskeletal	107,969	5.4%	$13	-5.35**
Clinical Category	Pulmonary	148,832	7.5%	$20	1.36**
Clinical Category	Non-Orthopedic Surgery	223,973	11.3%	$14	-4.55**
Clinical Category	Major Joint Replacement/Spinal Surgery	201,181	10.1%	$6	-12.02**
Clinical Category	Orthopedic - Surg Extremities not Major Joint	169,528	8.5%	$12	-6.55**
BIMS	Intercept	-	-	-	8.44**
BIMS	0	21,905	1.1%	$29	20.24**
BIMS	1	10,524	0.5%	$28	19.54**
BIMS	2	16,220	0.8%	$27	18.77**
BIMS	3	61,498	3.1%	$26	18.03**
BIMS	4	33,430	1.7%	$26	17.4**
BIMS	5	39,243	2.0%	$26	17.41**
BIMS	6	44,801	2.3%	$25	16.55**
BIMS	7	41,520	2.1%	$25	16.39**
BIMS	8	49,987	2.5%	$24	15.4**
BIMS	9	64,770	3.3%	$23	14.29**
BIMS	10	65,513	3.3%	$22	13.34**
BIMS	11	79,876	4.0%	$20	11.73**
BIMS	12	103,715	5.2%	$19	10.13**
BIMS	13	179,930	9.1%	$15	6.55**
BIMS	14	206,888	10.4%	$13	4.42**
BIMS	15	670,064	33.7%	$8	Reference
BIMS	Started but Failed to Complete	53,085	2.7%	$27	18.09**
BIMS	Skipped	242,801	12.2%	$23	14.72**
CFS	Intercept	-	-	-	10.42**
CFS	Missing	50,553	2.5%	$21	10.93**

Function Variable	Description	# of Stays	% of Stays	Avg. SLP Costs per Day	Estimate
CFS	Cognitively Intact	1,056,882	53.2%	$10	Reference
CFS	Mildly Impaired	438,667	22.1%	$20	9.76**
CFS	Moderately Impaired	348,543	17.6%	$27	16.36**
CFS	Severely Impaired	91,125	4.6%	$26	16.06**

*** Significant at the 1% level. *Significant at the 5% level.*

SLP-Related Conditions and Services

Following the Third TEP in June 2016, Acumen sought to incorporate a wider range of predictors of SLP utilization to improve payment accuracy for residents who receive SLP services. Acumen tested a more exhaustive model using variables from the MDS assessment to predict SLP costs per day. This investigation found that four Section I diagnoses indicating neurological conditions (I4300, I4500, I4900, and I5500) were associated with notably higher SLP costs. Additionally, panelists at the Third TEP stated that laryngeal cancer was likely a good predictor of speech therapy. Acumen also incorporated predictors based on recommendations from Acumen clinicians and the American Speech-Language-Hearing Association (ASHA). Acumen used diagnosis codes on the most recent inpatient claim for each SNF stay and the SNF claim to identify these diagnoses and found that residents with these conditions had much higher SLP costs per day. Table 40 shows the services and conditions included as SLP comorbidities.

Table 40: Services and Conditions Included as SLP Comorbidities

Condition/Service	Value	# of Stays	% of Stays	Avg. SLP Costs per Day
I4300: Aphasia	No	1,934,747	97.4%	$16
I4300: Aphasia	Yes	41,719	2.1%	$38
I4300: Aphasia	Missing	9,304	0.5%	$7
I4500: CVA,TIA, or Stroke	No	1,734,004	87.3%	$15
I4500: CVA,TIA, or Stroke	Yes	251,445	12.7%	$27
I4500: CVA,TIA, or Stroke	Missing	321	0.0%	$21
I4900: Hemiplegia or Hemiparesis	No	1,891,945	95.3%	$16
I4900: Hemiplegia or Hemiparesis	Yes	93,549	4.7%	$30
I4900: Hemiplegia or Hemiparesis	Missing	276	0.0%	$18
I5500: Traumatic Brain Injury	No	1,974,411	99.4%	$16
I5500: Traumatic Brain Injury	Yes	11,143	0.6%	$28
I5500: Traumatic Brain Injury	Missing	216	0.0%	$18
O0100E2: Tracheostomy as Resident	No	1,961,349	98.8%	$16
O0100E2: Tracheostomy as Resident	Yes	20,267	1.0%	$29
O0100E2: Tracheostomy as Resident	Missing	4,154	0.2%	$14
O0100F2: Ventilator as Resident	No	1,974,352	99.4%	$16

Condition/Service	Value	# of Stays	% of Stays	Avg. SLP Costs per Day
O0100F2: Ventilator as Resident	Yes	7,245	0.4%	$23
O0100F2: Ventilator as Resident	Missing	4,173	0.2%	$14
Laryngeal Cancer	No	1,983,756	99.9%	$16
Laryngeal Cancer	Yes	2,014	0.1%	$29
Apraxia	No	1,983,478	99.9%	$16
Apraxia	Yes	2,292	0.1%	$44
Dysphagia	No	1,948,730	98.1%	$16
Dysphagia	Yes	37,040	1.9%	$43
ALS	No	1,984,704	99.9%	$16
ALS	Yes	1,066	0.1%	$24
Oral Cancers	No	1,982,562	99.8%	$16
Oral Cancers	Yes	3,208	0.2%	$29
Speech and Language Deficits	No	1,920,144	96.7%	$16
Speech and Language Deficits	Yes	65,626	3.3%	$40

Acumen tested various ways to incorporate the SLP comorbidities into the SLP model. Table 41 compares the R-squared values when the SLP comorbidities are included in models separately and as a single flag. All six models contain K0510C2: Mechanically Altered Diet, G0110H1: Eating, K0100Z: No Sign of Swallowing Disorder, CFS, and age. Given the greater simplicity of including the SLP comorbidities as a combined flag and only a small drop in the R-squared value, Acumen incorporated SLP comorbidities as a combined flag.

Table 41: R-squared Values for SLP Comorbidity Options

Clinical Category	No SLP Comorbidities	SLP Comorbidities as One Flag	Each SLP Comorbidity Separately
All	0.143	0.148	0.152
Non-Neurologic	0.122	0.127	0.129
Acute Neurologic	0.091	0.105	0.121

Swallowing Disorder and Nutritional Approach

As described above, the presence of a swallowing disorder was initially selected as a likely predictor of SLP utilization by clinicians. Acumen used a regression to verify that this was indeed a strong predictor of SLP costs. Subsequently, several panelists at the Fourth TEP in October 2016 said residents who have problems swallowing are likely to receive special nutritional approaches (e.g., mechanically altered food), and thus may not exhibit any swallowing disorder symptoms that would be recorded in MDS assessments. Additionally, TEP members expressed concerns that using swallowing disorder as a payment item may incentivize

some providers to change treatment plans to reveal swallowing disorder symptoms, which may have adverse effects on residents' health.

Based on the feedback from the Fourth TEP, Acumen investigated the effect of various nutritional approaches recorded on the MDS on SLP costs per day. Two items, K0510B2 (feeding tube) and K0510C2 (mechanically altered diet), were associated with high SLP costs. Table 42 shows that stays for residents who received a feeding tube or mechanically altered diet were on average $17 and $18 costlier per day respectively in terms of SLP costs than stays for residents who did not receive these services. Based on these results and subsequent investigations, which showed that even when including all independent variables, mechanically altered diet and feeding tube were still associated with higher SLP costs, Acumen retained these variables to create SLP payment groups, as discussed in Section 3.5.2.

Table 42: Average SLP Costs per Day by Nutritional Approach

Nutritional Approach	Value	# of Stays	% of Stays	Avg. SLP Costs per Day
K0510B2 Feeding Tube	No	1,887,401	95.0%	$16
K0510B2 Feeding Tube	Yes	93,136	4.7%	$33
K0510B2 Feeding Tube	Missing	5,233	0.3%	$15
K0510C2 Mechanically Altered Diet	No	1,507,318	75.9%	$12
K0510C2 Mechanically Altered Diet	Yes	472,493	23.8%	$30
K0510C2 Mechanically Altered Diet	Missing	5,959	0.3%	$15

3.5.2 Variable Grouping Methods

After selecting independent variables related to SLP utilization, Acumen used the CART algorithm, described in Section 3.4.2, to explore possible payment groups. The dependent variable used in this analysis was SLP costs per day. The independent variables used were cognitive impairment, SLP-related conditions and services, the presence of a swallowing disorder, and nutritional approach (the presence of a mechanically altered diet or feeding tube). The following sections describe the steps used to create the final SLP payment groups.

Collapsing Clinical Categories

As in the PT/OT CART analysis, the CART algorithm was initially run within each of the 10 clinical categories (see Table 19). To simplify the groups, some clinical categories were collapsed. First, Acumen looked at SLP costs per day for each of the clinical categories, shown in Table 43. Next, Acumen ran a separate CART model using only clinical categories as independent variables, attempting to keep together the resulting groups. The CART results placed Acute Neurologic into one group, and the other nine categories into another. Based on these analyses, the Acute Neurologic group was found to have notably higher SLP utilization,

while residents in other groups had on average low utilization of SLP services. As a result, all of the clinical categories except for Acute Neurologic were collapsed into a single category, as shown in Table 44.

Table 43: Clinical Categories and Average SLP Costs per Day

Clinical Category	# of Stays	% of Stays	Avg. SLP Costs per Day
Overall	**1,985,770**	**100%**	**$16**
Acute Neurologic	124,882	6.3%	$34
Pulmonary	148,832	7.5%	$20
Cancer	94,280	4.7%	$19
Medical Management	584,652	29.4%	$18
Acute Infections	154,743	7.8%	$16
Cardiovascular and Coagulations	175,730	8.8%	$15
Non-Orthopedic	23,973	11.3%	$14
Non-Surgical Orthopedic/Musculoskeletal	107,969	5.4%	$13
Orthopedic - Surg Extremities not Major Joint	169,528	8.5%	$12
Major Joint Replacement/Spinal Surgery	201,181	10.1%	$6

Table 44: SLP Collapsed Clinical Categories

Clinical Category	Collapsed Categories used in CART
Acute Neurologic	Acute Neurologic
Major Joint Replacement/Spinal Surgery	Non-Neurologic
Non-Surgical Orthopedic/Musculoskeletal	Non-Neurologic
Surg Extremities not Major Joint	Non-Neurologic
Acute Infections	Non-Neurologic
Medical Management	Non-Neurologic
Cancer	Non-Neurologic
Pulmonary	Non-Neurologic
Cardiovascular and Coagulations	Non-Neurologic
Surgical Non-Orthopedic	Non-Neurologic

Final Selection of Independent Variables

After collapsing the clinical categories, Acumen tested various SLP CART models using the methodology described in Section 3.4.2. Each model included the three following independent variables: G0110H1: Eating, Cognitive Function Scale (CFS), and the presence of SLP-related conditions or services. Additional variables related to swallowing/nutritional approach varied across each of the five models, as follows:

- Model 1: Swallowing Disorder only

- Model 2: Mechanically Altered Diet only
- Model 3: Mechanically Altered Diet and Feeding Tube
- Model 4: Swallowing Disorder and Mechanically Altered Diet
- Model 5: Swallowing Disorder and Mechanically Altered Diet and Feeding Tube

Table 45 compares the R-squared values of the five models tested. As the table shows, including mechanically altered diet notably increased the predictive power of the models, while feeding tube only had a small impact on predictive ability. Based on the results of this analysis, Acumen decided to include swallowing disorder and mechanically altered diet as independent variables (Model 4 in Table 45).

Table 45: R-squared Comparison for Various SLP CART Models

Model	R-squared
Model 1: Swallowing Disorder	0.126
Model 2: Mechanically Altered Diet	0.144
Model 3: Mechanically Altered Diet + Feeding Tube	0.148
Model 4: Swallowing Disorder + Mechanically Altered Diet	0.151
Model 5: Swallowing Disorder + Mechanically Altered Diet + Feeding Tube	0.154

Groups Created by CART Algorithm

The CART analysis within the clinical categories Acute Neurologic and Non-Neurologic resulted in 20 groups. Table 46 lists the SLP resident groups produced by CART and average SLP costs per day for each group.

Table 46: Speech Therapy Groups Created by CART within Collapsed Clinical Categories

Clinical Category	Mechanically Altered Diet	CFS	Eating ADL	Swallowing Disorder	SLP-Related Comorbidity	# of Stays	% of Stays	Avg. SLP Costs per Day
Acute Neurologic	No	1	0,1,2,3,7,8	-*	No	15,292	0.8%	$15
Acute Neurologic	No	1	0,1,2,3,7,8	-	Yes	19,305	1.0%	$24
Acute Neurologic	No	2,3,4	0,1,2,3,7,8	-	No	13,041	0.7%	$24
Acute Neurologic	No	2,3,4	0,1,2,3,7,8	-	Yes	18,771	1.0%	$34
Acute Neurologic	No	-	4	-	-	6,803	0.4%	$48
Acute Neurologic	Yes	-	-	-	No	12,392	0.6%	$38
Acute Neurologic	Yes	-	-	-	Yes	34,183	1.8%	$47
Non-Neurologic	No	1	0,1,2,3,7,8	No	No	779,934	40.7%	$7
Non-Neurologic	No	1	0,1,2,3,7,8	Yes	No	9,631	0.5%	$21
Non-Neurologic	No	1	0,1,2,3,7,8	-	Yes	67,203	3.5%	$14

Clinical Category	Mechanically Altered Diet	CFS	Eating ADL	Swallowing Disorder	SLP-Related Comorbidity	# of Stays	% of Stays	Avg. SLP Costs per Day
Non-Neurologic	No	1	4	-	-	9,992	0.5%	$28
Non-Neurologic	No	2	0,1,2,7,8	No	No	235,834	12.3%	$14
Non-Neurologic	No	2	0,1,2,7,8	No	Yes	28,938	1.5%	$19
Non-Neurologic	No	2	0,1,2,7,8	Yes	-	4,343	0.2%	$30
Non-Neurologic	No	3,4	0,1,2,7,8	-	-	142,523	7.4%	$19
Non-Neurologic	No	2,3,4	3,4	-	No	71,891	3.8%	$21
Non-Neurologic	No	2,3,4	3,4	-	Yes	34,632	1.8%	$28
Non-Neurologic	Yes	1	-	No	No	95,107	5.0%	$21
Non-Neurologic	Yes	1	-	No	Yes	18,120	0.9%	$29
Non-Neurologic	Yes	2,3,4	-	No	No	182,511	9.5%	$28
Non-Neurologic	Yes	2,3,4	-	No	Yes	49,345	2.6%	$33
Non-Neurologic	Yes	-	-	Yes	-	65,270	3.4%	$38

** A dash (-) indicates that any value for that variable is included.*

Consistent Splits Approach

In addition to the CART method, Acumen also tested several classification options using consistent splits within the two clinical categories. The splits were determined using information from the preliminary CART results. Table 47 lists six consistent split candidate models ranging from complex to simple, and compares their predictive power with that of the CART model described in the previous section. In deciding which consistent splits option to pursue, we sought a solution that would balance simplicity and goodness of fit while minimizing adverse incentives. Model 3, shown in Table 47, was selected as the option that best satisfied these goals. This option has fewer groups (18) than the more complex options considered with minimal loss in predictive ability. This model also preserves the distinction between having either swallowing disorder or mechanically altered diet and having both, a distinction not present in the simpler models. This was identified as an important distinction to maintain because of the observed difference in resource use between the "either" and "both" populations (this can be observed in Table 48 below).

Table 47: SLP Consistent Split Models

Model	Clinical Category: Acute Neurologic	Mechanically Altered Diet	Swallowing Disorder	Cognitive Impairment*	SLP Related Comorbidity	# of Groups	R-squared
0	CART Model					21	0.149
1	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	32	0.143

Model	Clinical Category: Acute Neurologic	Mechanically Altered Diet	Swallowing Disorder	Cognitive Impairment*	SLP Related Comorbidity	# of Groups	R-squared
2	Yes/No	Yes/No	Yes/No	Neither/Either/Both		24	0.144
3	Yes/No	Neither/Either/Both		Neither/Either/Both		18	0.144
4	Yes/No	Yes/No		Neither/Either/Both		12	0.139
5	Yes/No	Yes/No		Yes/No		8	0.135
6	Yes/No	Yes/No				4	0.103

** Cognitive impairment is defined as CFS 2-4.*

3.5.3 Results

Table 48 shows the recommended resident groups for SLP payment, frequency of stays, and distribution of SLP costs per day. Average SLP costs per day increase monotonically across the swallowing variables: For both clinical categories and within each "SLP Comorbidity or Cognitive Impairment" category (neither, either, both), average SLP costs per day are the lowest for groups with neither a swallowing disorder nor a mechanically altered diet and highest for groups with both. SLP costs per day also increase monotonically across "SLP Comorbidity or Cognitive Impairment" categories: For a given clinical category and "Swallowing Disorder or Mechanically Altered Diet" category (neither, either, both), average SLP costs per day are lowest for groups with neither an SLP comorbidity nor a cognitive impairment and highest for those with both.

Table 48: Recommended Resident Groups for SLP Payment

Clinical Category	SLP Comorbidity or Cognitive Impairment	Swallowing Disorder or Mechanically Altered Diet	# of Stays	% of Stays	Avg. SLP Costs per Day	Std. Deviation SLP Costs per Day
Acute Neurologic	Neither	Neither	15,230	59.7%	$15	$23
Acute Neurologic	Neither	Either	3,086	26.7%	$31	$30
Acute Neurologic	Neither	Both	492	9.8%	$42	$28
Acute Neurologic	Either	Neither	32,951	40.7%	$25	$30
Acute Neurologic	Either	Either	16,006	16.6%	$40	$35
Acute Neurologic	Either	Both	3,701	6.2%	$48	$37
Acute Neurologic	Both	Neither	22,496	24.2%	$36	$36
Acute Neurologic	Both	Either	20,056	10.7%	$47	$38
Acute Neurologic	Both	Both	5,790	4.9%	$54	$38

Clinical Category	SLP Comorbidity or Cognitive Impairment	Swallowing Disorder or Mechanically Altered Diet	# of Stays	% of Stays	Avg. SLP Costs per Day	Std. Deviation SLP Costs per Day
Non-Neurologic	Neither	Neither	785,351	81.0%	$7	$17
Non-Neurologic	Neither	Either	105,369	43.7%	$21	$27
Non-Neurologic	Neither	Both	15,351	16.0%	$33	$27
Non-Neurologic	Either	Neither	493,843	60.7%	$16	$26
Non-Neurologic	Either	Either	212,385	34.1%	$28	$32
Non-Neurologic	Either	Both	38,585	15.4%	$38	$32
Non-Neurologic	Both	Neither	80,504	47.5%	$23	$32
Non-Neurologic	Both	Either	53,002	28.7%	$33	$36
Non-Neurologic	Both	Both	11,341	15.3%	$41	$36

3.6 Resident Classification for Nursing Component

As described in Section 3.2.1, because of the lack of resident-specific data on nursing utilization, Acumen was unable to create new nursing payment groups based on the relative resource use associated with various clinical characteristics. Instead, Acumen assigned all residents to a non-rehabilitation RUG based the RUG-IV criteria, which classify residents into one of 43 nursing groups based on clinical traits reported on the MDS assessment. Figure 15 in the Appendix shows the services and clinical conditions necessary to classify a SNF resident into a non-rehabilitation RUG. This classification is retained in RCS-I. However, because nursing indexes for non-rehabilitation RUGs were derived based only on nursing utilization for the non-rehabilitation population, it was necessary to re-estimate nursing indexes based on the full SNF population. The following sections provide further detail on this methodology.

3.6.1 STRIVE Data Collection

As discussed in Section 2.4, the STRIVE study collected resident-specific staff time measurements in nursing homes from 2006-2007. Staff time was collected by all nursing, therapy, and other ancillary staff providing care in participating facilities. Non-therapy time was collected over 48 hours, while therapy time was collected over seven days. Three types of staff time were collected: Resident Specific Time (RST), Non-Resident Specific Time (NRST), and Non-Study Time (NST). RST was time a staff member spent providing direct care to a resident. NRST included time spent supporting care for all residents in a study unit but also included tasks unrelated to the study, such as meals and breaks. NST included time spent completing tasks supporting the facility but unrelated to the study. Only RST was used to calculate case-mix indexes. Additionally, researchers collected the job titles associated with minutes of care provided.

3.6.2 STRIVE Construction of Resource Use Measure

This section describes how STRIVE researchers constructed the resource use measure used to set nursing weights. First, residents with zero nursing time (N=95) or observation windows shorter than 48 hours (N=415) were dropped from the study population. For the remaining residents, researchers divided the nursing minutes collected over the 48-hour period in two to arrive at per-diem amounts for each resident. Next, the researchers constructed wage weights based on the median hourly wage for a given job title relative to the median hourly wage for "nursing aides, orderlies and attendants" (Bureau of Labor Statistics [BLS] occupation code 31-1012). Researchers used national wage data from the 2006 BLS Occupation and Employment Survey (OES). For job titles that were not available in this dataset, researchers estimated median wages based on the wage distribution for "nursing aides, orderlies and attendants." For example, they assigned the wage corresponding to the 75th percentile for "nursing aides, orderlies and attendants" ($12.80) to restorative aides, which are not recorded as a separate job title in the 2006 BLS data. (See Table 49 for the median wages and wage weights for nursing job titles used in the STRIVE study.) The researchers multiplied the minutes associated with each job title by the wage weight for that job title. They then summed the weighted minutes across job titles to arrive at a per-diem wage-weighted staff time (WWST) estimate for a given resident.

To remove high outliers, the STRIVE team truncated the WWST estimates by assigning the 99th percentile of WWST for a given job category to any value above the 99th percentile within that job category. To remove low outliers, the STRIVE team assigned the wage-weighted equivalent of 10 raw minutes of total nursing staff time (14 WWST) to any resident with fewer than 14 total nursing WWST. Staff time estimates were first upper truncated within each job category (RN, LPN, and aides), then lower truncated after summing across all job categories.

3.6.3 Methodology to Update Resource Use Estimates

This section describes how Acumen updated the STRIVE resource use estimates. First, Acumen re-estimated the population WWST using 2006 BLS OES wages (national). This was done to verify the STRIVE methodology and data quality. Acumen's estimates of WWST by job title and for all nursing personnel were close, although not identical, to the estimates published in the STRIVE report. Next, Acumen re-estimated WWST for each resident in the population using 2015 wage data, with the following specifications:

• As in the STRIVE study, all residents with zero nursing time (N=95) or observation windows shorter than 48 hours (N=415) were dropped from the study population.

• 2015 BLS OES wage data from facilities with NAICS code 623100: "Nursing Care Facilities (Skilled Nursing Facilities)" was used to update median wages for all titles[34].

• Occupation code 31-1012 ("nursing aides, orderlies, and attendants") does not exist in 2015 data. Instead, Acumen used the closest substitute, occupation code 31-1014 ("nursing assistants").

• For other job titles unavailable in the 2015 BLS data, Acumen mirrored the STRIVE methodology and estimated median wages using the wage distribution for nursing assistants in nursing care facilities. For example, if STRIVE assigned the wage corresponding to the 75th percentile for "nursing aides, orderlies, and attendants" to a job title, Acumen assigned the 75th percentile of wages for nursing assistants to the job title.

• For each staff type (RN, LPN, and aides) Acumen upper-truncated WWST (adjusting for outliers above the 99th percentile as in the STRIVE study). When calculating total nursing WWST, Acumen lower-truncated WWST by assigning the wage-weighted equivalent of 10 raw nursing minutes (14 WWST) to residents with fewer than 14 total nursing WWST, as in the STRIVE study.

See Table 49 for the updated median wages and wage weights used to re-estimate WWST.

Table 49: Original and Updated Median Wages and Wage Weights for Nursing Job Titles in the STRIVE Study

Job Title (From STRIVE Table 4-11)	BLS Title	BLS Occupation Code	STRIVE (National)		2015 (Industry 623100)	
			Median Hourly Wage 2006	Wage Weight	Median Hourly Wage	Wage Weight
Registered Nurse (RN)	Registered Nurses	29-1111 (2006), 29-1141 (2015)	$27.54	2.58	$29.17	2.46
Respiratory Therapist	Respiratory Therapists	29-1126	$22.80	2.14	$28.13	2.37
Licensed Practical Nurse (LPN)	Licensed Practical and Licensed Vocational Nurses	29-2061	$17.57	1.65	$21.34	1.80
Certified Nurse Assistant (CNA) Geriatric Nurse Assistant (GNA) Resident Care Technician (RCT)	Nursing aides, orderlies, and attendants (2006) or nursing assistants (2015)	31-1012 (2006), 31-1014 (2015)	$10.67	1.00	$11.87	1.00
Certified Medication Aide (CMA)	Nursing aides, orderlies, and attendants (2006) or nursing assistants (2015)	31-1012 (2006), 31-1014 (2015)	$10.67	1.00	$11.87	1.00

[34] Bureau of Labor Statistics, U.S. Department of Labor, "May 2015 National Industry-Specific Occupational Employment and Wage Estimates: NAICS 623100 – Nursing Care Facilities (Skilled Nursing Facilities)," *Occupational Employment Statistics*, Last modified March 30, 2016, https://www.bls.gov/oes/2015/may/naics4_623100.htm.

Job Title (From STRIVE Table 4-11)	BLS Title	BLS Occupation Code	STRIVE (National)		2015 (Industry 623100)	
			Median Hourly Wage 2006	Wage Weight	Median Hourly Wage	Wage Weight
Restorative Aide	75th percentile of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$12.80	1.20	$14.14	1.19
Bath Aide	25th percentile of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$9.09	0.85	$10.28	0.87
Feeding Aide	25th percentile of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$9.09	0.85	$10.28	0.87
Psych Aide	Psychiatric Aides	31-1013	$11.49	1.08	$13.31	1.12
Non Certified Care Technician	25th percentile of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$9.09	0.85	$10.28	0.87
Clinical Associate	Median of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$10.67	1.00	$11.87	1.00
Transportation	25th percentile of national hourly 31-1012 wage (2006) or hourly 31-1014 wage (2015)	Does not exist	$9.09	0.85	$10.28	0.87
Respiratory Therapy Assistant	Respiratory Therapy Technicians	29-2054	$18.81	1.76	$22.48	1.89

3.6.4 Population Used to Update Resource Use Estimates

The STRIVE study used only non-rehabilitation residents to calculate nursing weights for non-rehabilitation RUGs. Because RCS-I assigns nursing payment for all residents based on their non-rehabilitation RUG classification, Acumen had to re-estimate average WWST for each RUG after reclassifying residents into one of the 43 non-rehabilitation RUGs.

Before updating nursing weights, it was necessary to determine which population of residents to use to estimate the average WWST for each non-rehabilitation RUG. Acumen considered two possibilities: the full STRIVE population and the STRIVE Part A population, which only included residents matched to a SNF Part A stay.

The STRIVE Part A population more closely resembles the current SNF population, has substantially higher nursing costs, and reveals less variation in nursing costs across resident characteristics, including those characteristics used for RUG classification. However, it only

contains 2,310 stays, resulting in very small sample sizes for some of the non-rehabilitation RUGs. The STRIVE study has been previously criticized both for its use of small sample sizes to develop weights, and for the lack of representativeness of the study population.

To compare the full STRIVE and STRIVE Part A populations, Acumen investigated whether trends in WWST matched clinical expectations across non-rehabilitation RUGs. The goal of this investigation was to determine whether the small sample sizes of the STRIVE Part A population produce non-intuitive results, which would raise concerns about using this population to update resource use estimates for each of the non-rehabilitation RUGs. Figure 15 in the Appendix shows the services and clinical conditions necessary to classify a SNF resident into a non-rehabilitation RUG. The RUG model relies on the assumption that an increase in ADL score or the presence of extensive services, depression, restorative nursing services, or another clinical condition is associated with increases in average nursing costs, as reflected in the current nursing component weights. Table 50 shows the number of stays, frequency of stays, and average WWST for each non-rehabilitation RUG based on the full STRIVE and STRIVE Part A populations, sorted by frequency in the full STRIVE population.

Table 50: Comparison of Full STRIVE and STRIVE Part A Populations

Non-rehab RUG	STRIVE Nursing Index	Full STRIVE			STRIVE Part A		
		STRIVE Frequency		Avg. WWST	STRIVE Frequency		Avg. WWST
		N	%		N	%	
Overall	-	9,706	100.0%	152.6	2,310	100.0%	189.8
ES3	2.98	208	2.1%	412.0	34	1.5%	435.5
ES2	2.22	150	1.5%	327.7	32	1.4%	284.6
ES1	1.93	79	0.8%	292.1	51	2.2%	312.1
HE2	1.88	26	0.3%	301.0	8	0.3%	384.2
HE1	1.47	123	1.3%	241.8	38	1.6%	249.3
HD2	1.69	61	0.6%	260.9	26	1.1%	280.8
HD1	1.33	215	2.2%	226.5	82	3.5%	252.5
HC2	1.57	51	0.5%	209.9	16	0.7%	262.5
HC1	1.23	271	2.8%	207.8	127	5.5%	229.6
HB2	1.55	49	0.5%	225.4	20	0.9%	265.9
HB1	1.22	211	2.2%	175.0	91	3.9%	187.0
LE2	1.61	58	0.6%	230.5	13	0.6%	224.0
LE1	1.26	244	2.5%	213.4	45	1.9%	269.6
LD2	1.54	89	0.9%	202.6	25	1.1%	224.1
LD1	1.21	333	3.4%	187.1	96	4.2%	228.8
LC2	1.3	84	0.9%	182.4	15	0.6%	182.9
LC1	1.02	287	3.0%	167.8	87	3.8%	190.3
LB2	1.21	24	0.2%	181.6	6	0.3%	186.0
LB1	0.95	116	1.2%	155.9	43	1.9%	187.7
CE2	1.39	34	0.4%	202.2	9	0.4%	255.8
CE1	1.25	85	0.9%	201.4	29	1.3%	225.2

Non-rehab RUG	STRIVE Nursing Index	Full STRIVE			STRIVE Part A		
		STRIVE Frequency		Avg. WWST	STRIVE Frequency		Avg. WWST
		N	%		N	%	
CD2	1.29	97	1.0%	207.8	34	1.5%	239.7
CD1	1.15	269	2.8%	175.0	94	4.1%	197.1
CC2	1.08	134	1.4%	179.0	45	1.9%	231.5
CC1	0.96	452	4.7%	149.2	167	7.2%	176.1
CB2	0.95	83	0.9%	159.6	28	1.2%	184.9
CB1	0.85	338	3.5%	137.0	179	7.7%	139.4
CA2	0.73	98	1.0%	122.6	26	1.1%	122.0
CA1	0.65	449	4.6%	117.6	123	5.3%	159.5
BB2	0.81	112	1.2%	110.5	14	0.6%	132.1
BB1	0.75	600	6.2%	114.7	85	3.7%	137.3
BA2	0.58	39	0.4%	89.3	5	0.2%	78.2
BA1	0.53	626	6.4%	75.5	63	2.7%	102.6
PE2	1.25	43	0.4%	180.4	1	0.0%	269.9
PE1	1.17	236	2.4%	173.8	16	0.7%	173.1
PD2	1.15	104	1.1%	159.9	6	0.3%	203.3
PD1	1.06	535	5.5%	154.3	63	2.7%	174.9
PC2	0.91	181	1.9%	127.5	16	0.7%	134.2
PC1	0.85	920	9.5%	140.2	177	7.7%	173.5
PB2	0.7	79	0.8%	111.7	7	0.3%	149.4
PB1	0.65	544	5.6%	109.7	159	6.9%	137.2
PA2	0.49	53	0.5%	63.3	5	0.2%	61.9
PA1	0.45	916	9.4%	69.4	104	4.5%	109.4

Table 51 shows the changes in WWST across changes in the ADL score, comparing RUG groups for which all other classification criteria are the same. For example, RUGs HB2, HC2, HD2, and HE2 all fall under "clinically complex – high, with depression", and they differ only by their ADL score. The column "Follows Expect. Trend" indicates whether the WWST associated with each of the compared RUGs increases monotonically as ADL score increases. If it does not increase monotonically, the orange highlighting indicates which RUG groups interrupt the trend. Dark orange indicates differences in WWST of more than 5, and light orange indicates differences of less than 5. This same process is used in Table 52 for extensive services, Table 53 for depression, and Table 54 for restorative nursing services. Table 55 and Table 56 explore the trend in WWST across comparable RUG groups.

Generally, as the tables below indicate, the STRIVE Part A population is more likely to break the expected monotonic trends. In the 73 comparisons performed, the full STRIVE population shows 8 unexpected results, whereas the STRIVE Part A population shows 24 unexpected results. This is likely because of the very small sample sizes in some of the RUGs (stay frequency can be seen in Table 50).

Table 51: Changes in ADL Score and WWST for Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups					STRIVE Pop.	Follows Expect. Trend	Avg. WWST by ADL Score				
							0-1	2-5	6-10	11-14	15-16
-	HB2	HC2	HD2	HE2	Full	N	-	225	210	261	301
					Part A	N	-	266	263	281	384
-	HB1	HC1	HD1	HE1	Full	Y	-	175	208	227	242
					Part A	N	-	187	230	253	249
-	LB2	LC2	LD2	LE2	Full	Y	-	182	182	203	230
					Part A	N	-	186	183	224	224
-	LB1	LC1	LD1	LE1	Full	Y	-	156	168	187	213
					Part A	Y	-	188	190	229	270
CA2	CB2	CC2	CD2	CE2	Full	N	123	160	179	208	202
					Part A	Y	122	185	232	240	256
CA1	CB1	CC1	CD1	CE1	Full	Y	118	137	149	175	201
					Part A	N	160	139	176	197	225
BA2	BB2	-	-	-	Full	Y	89	110	-	-	-
					Part A	Y	78	132	-	-	-
BA1	BB1	-	-	-	Full	Y	76	115	-	-	-
					Part A	Y	103	137	-	-	-
PA2	PB2	PC2	PD2	PE2	Full	Y	63	112	127	160	180
					Part A	N	62	149	134	203	270
PA1	PB1	PC1	PD1	PE1	Full	Y	69	110	140	154	174
					Part A	N	109	137	174	175	173

Table 52: Changes in Extensive Services and WWST for Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups			STRIVE Pop.	Follows Exp. Trend	Avg. WWST by Extensive Services		
					Low	Medium	High
ES1	ES2	ES3	Full	Y	292	328	412
			Part A	N	312	285	435

Table 53: Changes in Depression and WWST for Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups		STRIVE Pop.	Follows Exp. Trend	Avg. WWST by Presence of Depression	
				No	Yes
HB1	HB2	Full	Y	175	225
		Part A	Y	187	266
HC1	HC2	Full	Y	208	210
		Part A	Y	230	263
HD1	HD2	Full	Y	227	261
		Part A	Y	253	281
HE1	HE2	Full	Y	242	301
		Part A	Y	249	384
LB1	LB2	Full	Y	156	182
		Part A	N	188	186
LC1	LC2	Full	Y	168	182
		Part A	N	190	183
LD1	LD2	Full	Y	187	203
		Part A	N	229	224
LE1	LE2	Full	Y	213	230
		Part A	N	270	224
CA1	CA2	Full	Y	118	123
		Part A	N	160	122
CB1	CB2	Full	Y	137	160
		Part A	Y	139	185
CC1	CC2	Full	Y	149	179
		Part A	Y	176	232
CD1	CD2	Full	Y	175	208
		Part A	Y	197	240
CE1	CE2	Full	Y	201	202
		Part A	Y	225	256

Table 54: Changes in Restorative Nursing Services and WWST for Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups		STRIVE Pop.	Follows Exp. Trend	Avg. WWST by # Restorative Nursing Services	
				0-1	2+
BA1	BA2	Full	Y	76	89
		Part A	N	103	78
BB1	BB2	Full	N	115	110
		Part A	N	137	132
PA1	PA2	Full	N	69	63
		Part A	N	109	62
PB1	PB2	Full	Y	110	112
		Part A	Y	137	149
PC1	PC2	Full	N	140	127

Comparing Groups		STRIVE Pop.	Follows Exp. Trend	Avg. WWST by # Restorative Nursing Services	
				0-1	2+
		Part A	N	174	134
PD1	PD2	Full	Y	154	160
		Part A	Y	175	203
PE1	PE2	Full	Y	174	180
		Part A	Y	173	270

Table 55: Changes in WWST for Clinically Complex, Special Care Low, and Special Care High Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups			STRIVE Pop.	Follows Exp. Trend	Avg. WWST		
					Clinical. Complex	Special Care Low	Special Care High
CB2	LB2	HB2	Full	Y	160	182	225
			Part A	Y	185	186	266
CB1	LB1	HB1	Full	Y	137	156	175
			Part A	N	139	188	187
CC2	LC2	HC2	Full	Y	179	182	210
			Part A	N	232	183	263
CC1	LC1	HC1	Full	Y	149	168	208
			Part A	Y	176	190	230
CD2	LD2	HD2	Full	N	208	203	261
			Part A	N	240	224	281
CD1	LD1	HD1	Full	Y	175	187	227
			Part A	Y	197	229	253
CE2	LE2	HE2	Full	Y	202	230	301
			Part A	N	256	224	384
CE1	LE1	HE1	Full	Y	201	213	242
			Part A	N	225	270	249

Table 56: Changes in WWST for Behavioral Symptoms and Reduced Physical Function Non-Rehabilitation RUGs in Full STRIVE and STRIVE Part A Populations

Comparing Groups		STRIVE Pop.	Follows Exp. Trend	Avg. WWST	
				Reduced Physical Function	Behavioral Symptoms & Cognitive Performance
PA2	BA2	Full	Y	63	89
		Part A	Y	62	78
PA1	BA1	Full	Y	69	76
		Part A	N	109	103
PB2	BB2	Full	N	112	110
		Part A	N	149	132
PB1	BB1	Full	Y	110	115
		Part A	Y	137	137

Acumen used the full STRIVE population to determine average WWST for non-rehabilitation RUGs. This is primarily based on the small sample sizes for a number of the case-mix groups in the STRIVE Part A population. The problems with these sample sizes and using the Part A population in general are illustrated above. As the investigations described in this section show, using the Part A population to re-calculate nursing weights would result in two main methodological vulnerabilities: it would generate many results counter to clinical expectations, and it would require a large number of adjustments to correct for this. As shown above, using the full STRIVE population generates results that conform to clinical expectations much more frequently and thus would not require major adjustments and assumptions.

3.6.5 Smoothing

After calculating the average WWST for each non-rehabilitation RUG, Acumen followed the STRIVE report methodology to smooth estimates that did not align with clinical expectations[35]. RUG-IV, from which the non-rehabilitation RUGs are derived, is a hierarchical classification in which payment should track clinical acuity. Residents who are more clinically complex or who have other indicators of acuity, including a higher ADL score, depression, or restorative nursing services, should receive higher payment. When STRIVE researchers estimated WWST for each RUG, several inversions occurred because of imprecision in the means. These are defined as WWST estimates that are not in line with clinical expectations. For example, a group that has a higher ADL score but is otherwise similar clinically to another group that has a lower ADL score is expected to have a higher resource use estimate (WWST) than the less-acute group. When the resource use estimate for the more-acute group is actually lower than

[35] Eby, Jean, Dane Pelfrey, Kathy Langenberg, Brant Fries, Robert Godbout, David Maltiz, and David Oatway, "Staff Time and Resource Intensity Verification Project Phase II."

that for the less-acute group, this is considered an inversion. Following the STRIVE methodology, Acumen smoothed WWST estimates for the following types of inversions:

- **Clinical complexity:** In the RUG-IV classification, residents in non-rehabilitation RUGs are grouped into five ADL score bands (0-1, 2-5, 6-10, 11-14, and 15-16). Within each ADL score band, residents are assigned to groups with various levels of clinical complexity. Groups with higher clinical complexity are assumed to have higher nursing utilization than less-complex groups. When WWST estimates within an ADL band did not follow the clinical hierarchy, the ratios of WWST estimates between more-complex and less-complex groups within other ADL bands were used to impute WWST for the "inverted" estimate.
- **Depression:** Depression is used to classify residents in three RUG-IV categories: Special Care High, Special Care Low, and Clinically Complex (see Figure 15). The STRIVE researchers noted that within these categories, the increase in nursing utilization associated with depression was highly variable, likely resulting from imprecision in the WWST estimates. To correct for this, the researchers used one regression to estimate the impact of depression for residents in the Special Care High or Special Care Low categories and a second regression to estimate the impact of depression for residents in the Clinically Complex category. Residents in Special Care High and Special Care Low were grouped together in this methodology because the impact of depression was generally larger for these residents than for residents in the Clinically Complex category. The estimates generated from the regressions were then used to adjust the WWST estimates for resident groups within the three categories so that the impact of depression within the two broad groupings (Special Care High and Low, and Clinically Complex) was consistent across all resident groups within each grouping. Acumen followed the same methodology to smooth WWST estimates within these categories.
- **Restorative nursing:** Use of restorative nursing services is used to classify residents in two RUG-IV categories: Behavioral Symptoms and Cognitive Performance, and Reduced Physical Function (see Figure 15). Similar to depression, the STRIVE researchers noted that the impact of restorative nursing across resident groups in these categories was highly variable. The researchers used one regression to estimate the impact of restorative nursing on residents in these categories. This estimate was then used to adjust the WWST estimates for resident groups in these categories so that the impact of restorative nursing was

the same across all groups within the two categories. Acumen followed the same methodology to smooth WWST estimates within the two categories.

3.6.6 Population Used to Re-Base Nursing Indexes

To update the nursing indexes for the non-rehabilitation RUGs, Acumen divided the average WWST for each RUG by the population overall average WWST. However, Acumen explored two options for deriving the population overall average WWST: (1) use the overall average of the STRIVE population chosen in Section 0, or (2) derive the overall average WWST for the FY 2014 study population by classifying residents into the appropriate non-rehabilitation RUGs and assigning each resident the average WWST associated with each RUG in the STRIVE population. Option 1 is consistent with the methodology established by the STRIVE study. However, Option 2 may better account for changes in the SNF resident population that may have occurred in the ten years since the STRIVE study was conducted.

Table 57 shows the weights created for each non-rehabilitation RUG using the overall average WWST from the STRIVE population and the FY 2014 population. In both cases, Acumen used the full STRIVE population to estimate WWST at the RUG level. The nursing weights are weighted and smoothed.

Because Option 2 adjusts for changes in the SNF population since the STRIVE study, Acumen decided to re-base nursing weights using the average WWST for the FY 2014 study population, and weighted them by length of stay. This ensures that the average CMI in FY 2014 is 1.

Table 57: Non-Rehabilitation RUG Weights for the STRIVE Population and Recalculated using the FY 2014 Population

Non-Rehabilitation RUG	Recalculated Nursing Weight	
	STRIVE Population	Recalculated using FY 2014 Population
Overall	**1.00**	**1.00**
ES3	3.03	2.69
ES2	2.29	2.03
ES1	2.19	1.94
HE2	1.79	1.59
HE1	1.59	1.42
HD2	1.64	1.46
HD1	1.46	1.30
HC2	1.62	1.44
HC1	1.45	1.29
HB2	1.48	1.31
HB1	1.32	1.17
LE2	1.48	1.32
LE1	1.32	1.17
LD2	1.45	1.29

Non-Rehabilitation RUG	Recalculated Nursing Weight	
	STRIVE Population	Recalculated using FY 2014 Population
LD1	1.29	1.15
LC2	1.22	1.09
LC1	1.09	0.97
LB2	1.17	1.04
LB1	1.04	0.92
CE2	1.45	1.29
CE1	1.26	1.12
CD2	1.37	1.22
CD1	1.19	1.06
CC2	1.18	1.05
CC1	1.02	0.91
CB2	1.08	0.96
CB1	0.94	0.83
CA2	0.81	0.72
CA1	0.70	0.63
BB2	0.83	0.74
BB1	0.76	0.68
BA2	0.58	0.52
BA1	0.53	0.47
PE2	1.26	1.12
PE1	1.15	1.03
PD2	1.17	1.04
PD1	1.07	0.95
PC2	0.97	0.86
PC1	0.89	0.79
PB2	0.77	0.69
PB1	0.71	0.63
PA2	0.54	0.48
PA1	0.49	0.44

3.7 Resident Classification for Non-Therapy Ancillary Component

This section describes the selection of independent variables for the NTA component, variable grouping methods, and results.

3.7.1 Selection of Independent Variables

Selection of independent variables consisted of two primary phases: (1) initial selection of resident characteristics likely to be good predictors of NTA utilization, and (2) regression analysis to identify the subset of initially explored variables that was most predictive of resource use. Acumen used relevant literature, clinical input, and feedback from technical expert panels to identify resident characteristics that were potentially predictive of NTA utilization. These included: clinical reasons for the prior inpatient stay and SNF stay, comorbidities recorded

during the SNF stay and during the year prior to the stay, services provided during the SNF stay, and age. Acumen then used regression analysis to examine the relationship between these characteristics and NTA costs per day. Three types of resident information were found to be strong predictors of NTA costs per day: comorbidities, use of extensive services, and age. Age was incorporated into Acumen's investigations of possible resident groups (described in Section3.7.2) as a continuous variable. The incorporation of comorbidities and extensive services is described in the following sub-sections. The first sub-section describes the incorporation of parenteral/IV feeding. The second sub-section describes the incorporation of comorbidities and extensive services more generally.

Incorporation of Parenteral/IV Feeding

Initially, Acumen excluded parenteral/IV feeding from consideration as a comorbidity based on clinical input. However, after receiving feedback from panelists at the Fourth TEP in October 2016, Acumen investigated the impact of receiving parenteral/IV feeding while a resident on NTA costs per day. Table 58 shows average NTA costs per day by whether a resident received parenteral/IV feeding. The table indicates that stays that received parenteral/IV feeding were on average $58 costlier per day in terms of NTA costs than stays that did not receive this service. These results were consistent with feedback from TEP panelists that parenteral/IV feeding is associated with higher NTA costs per day.

Table 58: Average NTA Costs per Day by K0510A2: Parenteral/IV Feeding

Parenteral/ IV Feeding	# of Stays	% of Stays	Avg. NTA Costs per Day
No	1,955,472	98.5%	$74
Yes	24,435	1.2%	$132
Missing	5,863	0.3%	$149

Next, Acumen investigated variation in the intensity of parenteral/IV feeding. When MDS item K0510A2: Parenteral/IV Feeding is checked, the staff is instructed to complete MDS K0710 items to report the percent and quantity of intake by artificial route. Table 59 shows the average NTA costs per day by percent and quantity of intake for residents who received parenteral/IV or tube feeding (staff is also instructed to complete these items for residents who receive tube feeding). NTA costs per day increase substantially as the amount of intake through artificial routes increases.

Table 59: Average NTA Costs per Day by Percent and Quantity of Intake by Artificial Route

Intake by Artificial Route	Intake by Artificial Route	Stays that Received Parenteral/ IV or Tube Feeding		
		# of Stays	% of Stays	Avg. NTA Costs per Day
K0710A2: % Calories by Parenteral or Tube Feeding while a Resident	K0710A2 not completed	1,875,718	94.5%	$73
K0710A2: % Calories by Parenteral or Tube Feeding while a Resident	25% or less	18,683	0.9%	$99
K0710A2: % Calories by Parenteral or Tube Feeding while a Resident	26-50%	4,387	0.2%	$109
K0710A2: % Calories by Parenteral or Tube Feeding while a Resident	51% or more	86,982	4.4%	$113
K0710B2: Average Fluid Intake per day by IV or Tube Feeding while a Resident	K0710B2 not completed	1,872,871	94.3%	$73
K0710B2: Average Fluid Intake per day by IV or Tube Feeding while a Resident	500 cc/day or less	15,631	0.8%	$106
K0710B2: Average Fluid Intake per day by IV or Tube Feeding while a Resident	500 cc/day or more	97,268	4.9%	$111

Because NTA costs per day increase as the amount of intake through artificial routes increases, Acumen decided to separate parenteral/IV feeding cases into high intensity and low intensity groups. The definitions of these groups are consistent with the RUG-IV payment criteria for residents who receive these services. To qualify for these intensity levels, a resident must satisfy the following criteria:

High Intensity: Percent of caloric intake by parenteral or tube feeding is greater than 50% while a resident.

Low intensity: Percent of caloric intake by parenteral or tube feeding is greater than 25% and average fluid intake by IV or tube feeding is at least 500 cc per day.

Parenteral/IV feeding cases satisfying neither of the above requirements are not used for payment classification under the RUG-IV model, and therefore were not considered for the comorbidity score.

Table 60 shows NTA costs per day by intensity of parenteral/IV feeding, as defined above.

Table 60: Average NTA Costs per Day by Parenteral/IV Feeding Level

Parenteral/IV Feeding Level	# of Stays	% of Stays	Avg. NTA Costs per Day
High Intensity	6,169	0.3%	$185
Low Intensity	595	0.0%	$157
Other Levels of Utilization	17,671	0.9%	$113
None	1,955,472	98.5%	$74
Missing K0510A2	5,863	0.3%	$149

Incorporation of Comorbidities and Extensive Services

Because of the relationship between comorbidities and the provision of extensive services, as well as their similar impact on NTA costs, Acumen decided to treat comorbidities and extensive services similarly, investigating their impact on costs in a single investigation that did not differentiate between conditions and services. This is similar to other Medicare payment systems such as the IRF PPS. Conditions and services were defined in three primary ways: 1) by mapping diagnosis codes to the condition categories (CCs) used in the Medicare Part C risk adjustment model, 2) using items found on the MDS assessment, and 3) using individual ICD-9 diagnosis codes. Residents with multiple diagnosis codes that map to a single CC were considered to have the same comorbidity for this analysis. To identify acute conditions or services, Acumen checked SNF claims, prior inpatient claims, and the open-ended diagnosis section of the MDS assessment. For chronic conditions, Acumen also checked all inpatient, outpatient, and Part B physician claims for a given diagnosis during a one-year lookback window prior to SNF admission.

The first step of this analysis was to use the list of conditions and services defined as described above to predict NTA costs per day. First, however, Acumen excluded stays with fewer than 8 utilization days because of the relationship between length of stay and NTA costs per day (see Figure 13). Because of this relationship, NTA costs per day could appear high for conditions associated with short stays. In these cases, NTA costs per day would reflect length of stay rather than the true relationship between a condition and NTA costs. To determine the 7-day cutoff, we plotted the standard deviation of NTA costs per day against length of stay. As shown in Figure 10, the standard deviation drops dramatically until length of stay reaches 8 utilization days, then decreases only slightly for longer stays. This indicates there is a large amount of variation in NTA costs per day for short stays, likely obscuring the relationship between comorbidities and NTA costs per day when short stays are included. Based on this evidence, Acumen excluded stays with fewer than 8 utilization days from the regression shown in Table 61.

Figure 10: Standard Deviation of Average NTA Costs per Day by Length of Stay

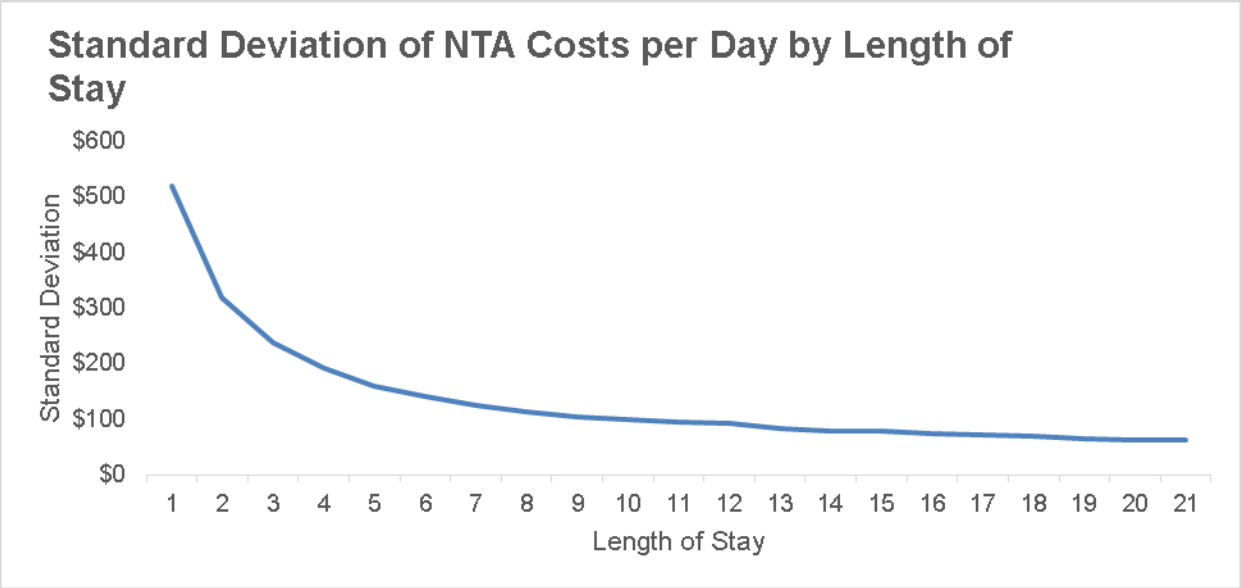


Table 61 lists all conditions and services with positive and significant coefficients at the 5% level in an OLS regression on NTA costs per day. Variables with negative coefficients are not included because conditions with a negative impact on costs (relative to the reference group of having no conditions) cannot be feasibly included in a scoring system, as there would be incentives to not report them.

In the results shown in Table 61, Acumen defined HIV/AIDS to only include residents with ICD-9 diagnosis code 042 on the first SNF claim. Prior to implementation of ICD-10, the SNF PPS used this diagnosis code to identify SNF residents eligible for the 128% add-on for HIV/AIDS. This would be operationalized using the equivalent ICD-10 code B20. Acumen chose this definition after investigations showed that residents with HIV/AIDS coded on the first SNF claim were much more costly than residents who had HIV/AIDS coded on another diagnosis source during a one-year lookback window. Given concerns about appropriately paying for the cost of services associated with this population, Acumen narrowed the definition of residents with HIV/AIDS, which results in a higher estimate of costs for this population and consequently increases the payment associated with this comorbidity.

Table 61: Comorbidities with a Positive, Significant Impact on NTA Costs per Day

Comorbidity/Extensive Service	# of Stays*	% of Stays*	OLS Estimate
Diagnosis: HIV/AIDS	3,710	0.2%	71.67
MDS: Parenteral/IV Feeding, High	4,022	0.3%	63.50
O0100H2: IV Medication	129,077	8.2%	46.77
MDS: Parenteral/IV Feeding, Low	397	0.0%	42.07
O0100F2: Ventilator/Respirator	4,784	0.3%	39.49

Comorbidity/Extensive Service	# of Stays*	% of Stays*	OLS Estimate
CC 107: Cystic Fibrosis	691	0.0%	19.21
O0100I2: Transfusion	5,244	0.3%	18.96
I5200: Multiple Sclerosis (MS)	10,488	0.7%	17.46
CC 5: Opportunistic Infections	8,259	0.5%	16.04
CC 128: Kidney Transplant Status	6,556	0.4%	14.81
Diagnosis: Infection with multi-resistant organisms	12,447	0.8%	14.72
Diagnosis: Transplant	6,967	0.4%	14.68
CC 174: Major Organ Transplant Status	6,452	0.4%	12.37
CC 181: Chemotherapy	1,679	0.1%	11.01
I6200: Asthma, COPD, or Chronic Lung Disease	411,927	26.2%	10.45
O0100E2: Tracheostomy	13,101	0.8%	9.98
O0100M2: Infection Isolation	20,774	1.3%	9.60
CC 25: End-Stage Liver Disease	34,063	2.2%	9.19
I2500: Wound Infection (other than foot)	34,415	2.2%	9.13
I2900: Diabetic Mellitus (DM)	547,431	34.8%	9.09
CC 37: Bone/Joint/Muscle Infections/Necrosis	51,369	3.3%	8.70
Diagnosis: Osteomyelitis and Endocarditis	45,377	2.9%	8.01
O0100B2: Radiation	4,159	0.3%	7.70
M0300: Highest Ulcer Stage is Stage 4	15,278	1.0%	7.63
M1040B: Diabetic Foot Ulcer	15,357	1.0%	7.57
Diagnosis: DVT/Pulmonary Embolism	64,867	4.1%	7.37
O0100D2: Suctioning	13,333	0.9%	7.36
Diagnosis: MRSA	39,982	2.5%	7.34
CC 85: Heart Infection/Inflammation, Except Rheumatic	13,077	0.8%	7.33
CC 4: Tuberculosis	833	0.1%	6.76
CC 3: Central Nervous System Infection	11,974	0.8%	6.73
CC 45: Disorders of Immunity	82,769	5.3%	6.41
I1700: Multidrug Resistant Organism (MDRO)	37,605	2.4%	6.30
CC 15-18: Diabetes[†]	428,291	27.2%	6.22
CC 130: Dialysis Status	75,196	4.8%	5.89
CC 165: Other Complications of Medical Care	54,259	3.5%	5.84
H0100D: Intermittent Catheterization	14,389	0.9%	5.73
CC 7: Metastatic Cancer and Acute Leukemia	73,919	4.7%	5.64
CC 108: Chronic Obstructive Pulmonary Disease	655,484	41.7%	5.30
CC 44: Severe Hematological Disorders	38,763	2.5%	5.02
CC 71: Polyneuropathy	376,659	24.0%	4.81
CC 175: Other Organ Transplant/Replacement	4,191	0.3%	4.72
CC 164: Major Complications of Medical Care and Trauma	103,237	6.6%	4.44
CC 38: Rheumatoid Arthritis and Inflammatory Connective Tissue Disease	178,767	11.4%	4.42
CC 79: Cardio-Respiratory Failure and Shock	245,698	15.6%	4.38

Comorbidity/Extensive Service	# of Stays*	% of Stays*	OLS Estimate
CC 6: Other Infectious Diseases	234,504	14.9%	4.12
M1040F: Burns	2,541	0.2%	4.11
CC 76: Mononeuropathy, Other Neurological Conditions/Injuries	143,242	9.1%	4.02
M1200E: Pressure Ulcer Care	239,696	15.2%	3.63
CC 110: Asthma	72,208	4.6%	3.59
CC 8: Lung, Upper Digestive Tract, and Other Severe Cancers	42,744	2.7%	3.53
CC 109: Fibrosis of Lung and Other Chronic Lung Disorders	37,809	2.4%	3.52
H0100A: Indwelling Catheter	175,011	11.1%	3.41
CC 112: Pneumococcal Pneumonia, Empyema, Lung Abscess	7,976	0.5%	3.39
CC 119: Proliferative Diabetic Retinopathy and Vitreous Hemorrhage	27,642	1.8%	3.21
CC 179: Post-Surgical States/Aftercare/Elective	1,033,063	65.7%	3.20
CC 59: Anxiety Disorders	41,939	2.7%	3.13
I5600: Malnutrition	58,103	3.7%	3.12
K0510B2: Feeding Tube	63,964	4.1%	3.11
CC 55: Major Depressive, Bipolar, and Paranoid Disorders	234,355	14.9%	3.07
CC 32: Pancreatic Disease	25,217	1.6%	3.04
CC 58: Depression	392,516	25.0%	3.03
CC 22: Other Significant Endocrine and Metabolic Disorders	99,937	6.4%	3.00
CC 167: Minor Symptoms, Signs, Findings	923,446	58.7%	2.96
CC 24: Other Endocrine/Metabolic/Nutritional Disorders	1,126,786	71.7%	2.93
CC 60: Other Psychiatric Disorders	286,476	18.2%	2.90
CC 113: Viral and Unspecified Pneumonia, Pleurisy	253,199	16.1%	2.89
CC 52: Drug/Alcohol Dependence	78,961	5.0%	2.78
CC 77: Respirator Dependence/Tracheostomy Status	46,134	2.9%	2.72
CC 36: Other Gastrointestinal Disorders	841,016	53.5%	2.71
M0300: Highest Ulcer Stage is Stage 3	26,930	1.7%	2.66
CC 72: Multiple Sclerosis	18,804	1.2%	2.62
M1040A: Foot Infection	18,645	1.2%	2.60
CC 111: Aspiration and Specified Bacterial Pneumonias	89,057	5.7%	2.56
CC 127: Other Ear, Nose, Throat, and Mouth Disorders	101,765	6.5%	2.53
CC 80: Congestive Heart Failure	829,792	52.8%	2.48
Diagnosis: Acute Respiratory Failure	166,991	10.6%	2.42
M1040D: Open Lesions Other Than Ulcers, Rashes, Cuts	28,389	1.8%	2.23
M1040E: Surgical Wounds	440,376	28.0%	2.22
CC 29: Other Hepatitis and Liver Disease	30,477	1.9%	2.21
CC 120: Diabetic and Other Vascular Retinopathies	17,255	1.1%	2.11
M1040C: Other Open Lesions on Foot	11,326	0.7%	2.09
CC 74: Seizure Disorders and Convulsions	191,899	12.2%	1.90
I5300: Parkinson's Disease	65,976	4.2%	1.86
CC 40: Osteoarthritis of Hip or Knee	134,697	8.6%	1.82

Comorbidity/Extensive Service	# of Stays*	% of Stays*	OLS Estimate
M1200G: Application of Non-Surgical Dressings	353,360	22.5%	1.71
I3100: Hyponatremia	41,966	2.7%	1.70
Diagnosis: Sepsis	131,989	8.4%	1.69
CC 9: Lymphatic, Head and Neck, Brain, and Other Major Cancers	54,224	3.4%	1.66
CC 19: Diabetes with No or Unspecified Complications	335,336	21.3%	1.54
CC 83: Angina Pectoris/Old Myocardial Infarction	269,286	17.1%	1.53
CC 54: Schizophrenia	64,235	4.1%	1.48
CC 182: Rehabilitation	810,961	51.6%	1.45
M1200F: Surgical Wound Care	387,958	24.7%	1.34
CC 89: Hypertensive Heart and Renal Disease or Encephalopathy	304,347	19.4%	1.31
CC 152: Cellulitis, Local Skin Infection	125,211	8.0%	1.27
H0100C: Ostomy	39,094	2.5%	1.24
CC 157: Vertebral Fractures	54,364	3.5%	1.15
M1200I: Application of Dressing to feet	80,910	5.1%	1.13
CC 84: Coronary Atherosclerosis/Other Chronic Ischemic Heart Disease	552,734	35.2%	1.10
CC 131: Renal Failure	530,443	33.7%	1.09
CC 47: Iron Deficiency and Other/Unspecified Anemias and Blood Disease	765,899	48.7%	1.01
CC 92: Specified Heart Arrhythmias	722,137	45.9%	0.91
CC 122: Glaucoma	82,928	5.3%	0.90
CC 39: Disorders of the Vertebrae and Spinal Discs	170,936	10.9%	0.90
CC 153: Other Dermatological Disorders	71,925	4.6%	0.81
M1200C: Turning/Repositioning Program	381,819	24.3%	0.80
CC 46: Coagulation Defects and Other Specified Hematological Disorders	125,429	8.0%	0.71
CC 21: Protein-Calorie Malnutrition	301,260	19.2%	0.68
CC 149: Chronic Ulcer of Skin, Except Decubitus	121,342	7.7%	0.67
I0200: Anemia	505,057	32.1%	0.62
O0500D: Restorative Nursing: Bed Mobility	786	0.1%	0.61
CC 23: Disorders of Fluid/Electrolyte/Acid-Base Balance	669,222	42.6%	0.41
O0500G: Restorative Nursing: Dressing and/or Grooming	1,402	0.1%	0.28

** Only includes stays with more than seven utilization days. † These conditions were collapsed based on clinical input.*

Next, Acumen considered three approaches to incorporate comorbidities into the payment model: an index model, a tier system, and a count system. An index model would assign weights to each comorbidity, and the weights for all comorbidities present would be summed to determine payment. A count system would assign payment based on the number of comorbidities a resident has upon admission to the SNF. A tier system would be similar to the system used in the IRF PPS and group comorbidities associated with similar NTA costs per day into hierarchical tiers. A simple count system would assign higher payment to residents with more comorbidities, however it would not account for differences in the costliness of those

conditions/services. A simple tier system that assigned payment based on the costliest condition/service present would account for differences in costliness but would not account for the presence of multiple comorbidities. Because of the weaknesses of these approaches, and to avoid the complexity of an index model, Acumen created a comorbidity score that combines the advantages of the count and tier approaches. The comorbidity score assigns points based on both the number and costliness of the conditions or services present.

To develop the comorbidity score, Acumen first determined which comorbidities to include in the payment model, and second the number of points to assign each selected comorbidity. We did this by first regressing NTA costs on the full set of comorbidities and then rerunning the regression on the retained set. (In both steps, stays with fewer than 8 utilization days were excluded for the reasons described above). Only conditions/services that had a notable impact on NTA costs were retained from the first step (results shown in Table 61). This methodology enables the conditions included in the model to partly capture the effect of related conditions that were excluded for clinical reasons or because they did not have a large, positive effect on NTA costs. Based on clinical feedback, attention deficit disorder (CC 66), PTSD (I6100), infectious bowel disease (CC 33), and personality disorders (CC 57) were excluded from consideration, and therefore were not included in either regression.

Finally, Acumen assigned points to each condition/service based on their coefficients in the second OLS regression of NTA costs per day. Points were generally assigned by dividing the OLS estimate by 10 and rounding to the nearest integer. Three conditions/services that would otherwise have been in separate tiers were placed in the same tier and assigned the same number of points (5) for simplicity: IV medication, "parenteral/IV feeding, low", and ventilator/respirator. The conditions and services included in the comorbidity score, frequency of stays with these conditions/services, OLS estimate of their impact on NTA costs per day, tier, and assigned points are shown in Table 62.

Table 62: Proposed Comorbidity Tiers

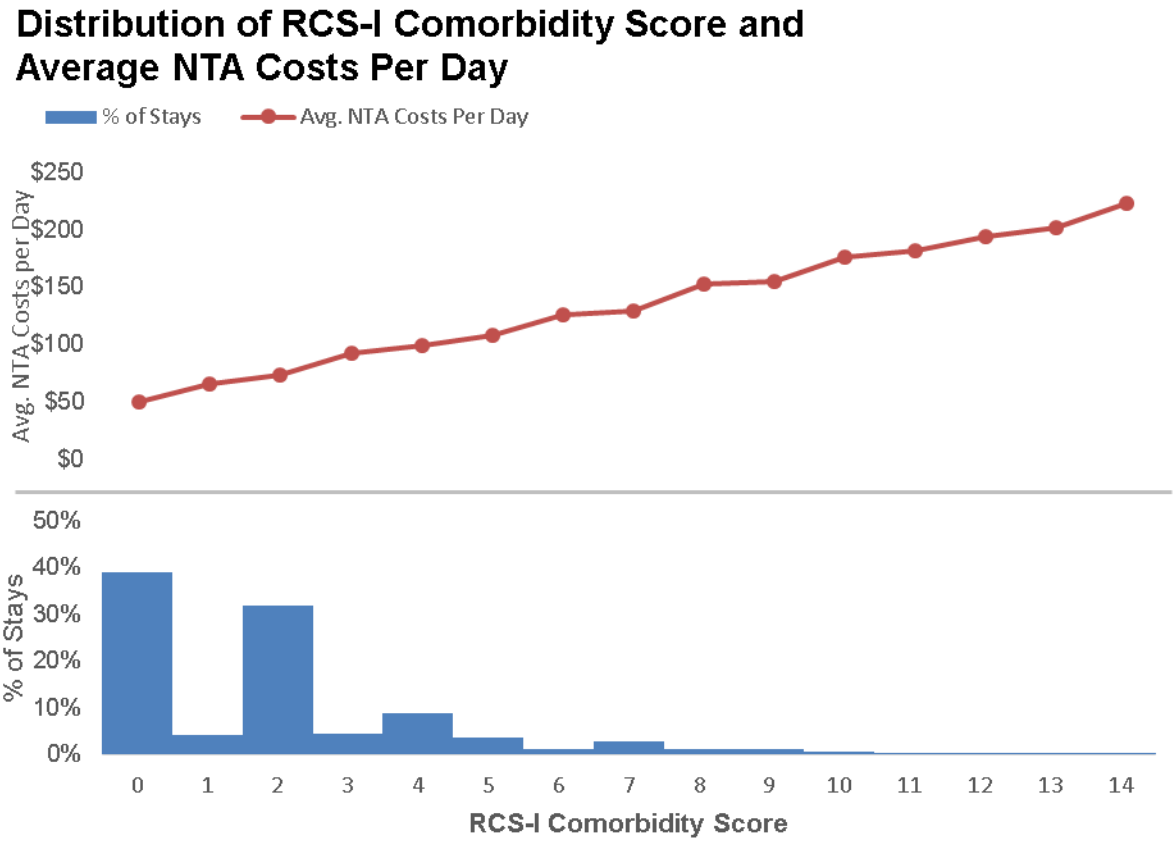
Comorbidity	# of Stays	% of All Stays	OLS Estimate*	Tier	Proposed Points
HIV/AIDS	4,599	0.2%	76.60	Ultra-High	8
MDS: Parenteral/IV Feeding, High	5,515	0.3%	68.40	Very High	7
O0100H2: IV Medication	157,403	8.5%	50.81	High	5
O0100F2: Ventilator/Respirator	6,270	0.3%	42.28	High	5
MDS: Parenteral/IV Feeding, Low	539	0.0%	42.22	High	5
O0100I2: Transfusion	6,338	0.3%	23.90	Medium	2
CC 128: Kidney Transplant Status	8,266	0.4%	22.95	Medium	2
CC 5: Opportunistic Infections	10,322	0.6%	22.11	Medium	2
Infection with multi-resistant organisms	15,024	0.8%	21.11	Medium	2
CC 174: Major Organ Transplant Status	8,184	0.4%	20.17	Medium	2

Comorbidity	# of Stays	% of All Stays	OLS Estimate*	Tier	Proposed Points
CC 107: Cystic Fibrosis	857	0.0%	19.97	Medium	2
I5200: Multiple Sclerosis (MS)	12,171	0.7%	19.79	Medium	2
I6200: Asthma, COPD, or Chronic Lung Disease	489,609	26.5%	18.14	Medium	2
O0100E2: Tracheostomy	17,451	0.9%	18.03	Medium	2
CC 181: Chemotherapy	2,153	0.1%	17.13	Medium	2
I2900: Diabetic Mellitus (DM)	648,207	35.0%	15.65	Medium	2
I2500: Wound Infection (other than foot)	40,503	2.2%	14.23	Low	1
CC 25: End-Stage Liver Disease	43,451	2.3%	14.22	Low	1
Transplant	8,712	0.5%	13.97	Low	1
O0100M2: Infection Isolation	24,947	1.4%	12.81	Low	1
MRSA	47,643	2.6%	12.55	Low	1
O0100B2: Radiation	4,856	0.3%	11.29	Low	1
M1040B: Diabetic Foot Ulcer	18,140	1.0%	11.17	Low	1
CC 37: Bone/Joint/Muscle Infections/Necrosis	60,115	3.2%	11.17	Low	1
M0300: Highest Ulcer Stage is Stage 4	18,816	1.0%	11.06	Low	1
Osteomyelitis and Endocarditis	53,527	2.9%	10.17	Low	1
O0100D2: Suctioning	18,772	1.0%	9.95	Low	1
DVT/Pulmonary Embolism	77,955	4.2%	9.00	Low	1

**Regression uses stays longer than seven utilization days.*

Figure 11 shows frequency and NTA costs per day by total comorbidity points. Total points were calculated by summing the points assigned for each comorbidity present. The figure shows there is a strong linear relationship between total comorbidity points and NTA costs per day. Very few stays had more than 12 points, and no resident in our population had more than 29 points, although this is mathematically possible.

Figure 11: Average NTA Costs per Day and Percentage of Stays by Recommended Comorbidity Score



3.7.2 Variable Grouping Methods

After selecting independent variables related to NTA utilization, Acumen used the CART algorithm, described in Section 3.4.2, to explore possible payment groups. The dependent variable used in this analysis was NTA costs per day. The independent variables used were clinical categories, comorbidity score, and age. The following sections describe the steps used to create the final NTA payment groups.

Groups Created by CART Algorithm

The NTA groups created by CART depend almost entirely on the comorbidity score. As Table 63 shows, CART did not select the clinical categories to classify residents, and age was only selected for one of the comorbidity score branches.

Table 63: NTA Groups Created by CART

Comorbidity Score	Age	# of Stays	% of Stays	Avg. NTA Costs per Day
0	-*	616,838	39.4%	$40
1-2	81+	274,378	17.5%	$50
1-2	<= 80	290,192	18.6%	$61

Comorbidity Score	Age	# of Stays	% of Stays	Avg. NTA Costs per Day
3-4	-	205,605	13.1%	$73
5-7	-	115,056	7.4%	$95
8-10	-	47,846	3.1%	$130
11+	-	14,352	0.9%	$166

** A dash indicates that any value is included.*

Alternative Classification

In addition to the CART output, Acumen also developed an alternative classification, in which the splits were determined using information from the preliminary CART results. Acumen decided to exclude age from the alternative classification for the following reasons:

- A number of panelists at the Fourth TEP in October 2016 questioned the use of age as a determinant of NTA payment since it could create access issues for the older population.
- CART only selected age for one of the comorbidity score bins, as shown in Table 63.
- Acumen tested a classification option that interacts two age bins (0-80 and 81+) with each of the comorbidity score bins. The resulting increase in the R-squared value was small (from 0.115 to 0.121).

Table 64 shows average NTA costs per day for a 6-group model using only comorbidity score bins. It only departs from the CART comorbidity score bins in grouping residents with a comorbidity score of 5 with residents with scores of 3 or 4 instead of with residents with scores of 6 or 7. Acumen grouped residents with score of 5 together with residents with scores of 3-4 based on their similarity in average NTA costs per day. As the table shows, average NTA costs per day increase monotonically as comorbidity score increases across the six groups. This model was restricted to stays with 8 or more utilization days.

Table 64: Frequency and NTA Costs per Day for 6-Group Model

Comorbidity Score	# of Stays	% of Stays	Avg. NTA Costs per Day	Std. Deviation NTA Costs per Day
0	616,838	39.4%	$40	$42
1-2	564,570	36.1%	$56	$56
3-5	261,295	16.7%	$75	$76
6-7	59,366	3.8%	$104	$109
8-10	47,846	3.1%	$130	$135
11+	14,352	0.9%	$166	$164

Table 65 compares the predictive ability of the groups produced by CART and the alternative classification. The table shows that although the alternative classification does not include age and has one fewer group, it has an R-squared value only slightly lower than the CART model. Because of the concerns regarding the use of age in the payment system and the greater simplicity of the alternative option, without a notable loss of predictive ability, Acumen decided to pursue the alternative classification.

Table 65: NTA Group Options R-squared Comparison

Model	# of Groups	R-squared Value
Alternative Classification	6	0.116
CART	7	0.117

3.8 Payment Adjustment for Residents with HIV/AIDS

This section describes the current HIV/AIDS payment adjustment and Acumen's investigations into whether the recommended resident classification model appropriately compensates for costs associated with this population.

3.8.1 Background on the Existing HIV/AIDS Adjustment

Section 511 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA, Pub. L. 108-173) amended section 1888(e)(12) of the Social Security Act to enact a 128% increase in the PPS per diem payment for SNF residents with HIV/AIDS, effective for services provided on or after October 1, 2004. The adjustment for HIV/AIDS reflected research showing that SNF residents with HIV/AIDS were costlier than residents without this condition. In particular, the House Ways and Means Committee Report accompanying the MMA referenced HCFA-funded research by the Urban Institute as a justification for the adjustment[36]. The study found that SNF residents with HIV/AIDS had much higher drug and nursing costs than other residents and recommended modifying the PPS to better match the NTA and nursing utilization of this population. However, the current HIV/AIDS payment adjustment is applied to all payment components, so residents who receive high therapy minutes, placing them in high-paying RUGs, receive a much larger per-diem add-on for HIV/AIDS than residents in non-rehabilitation RUGs, although their costs related to HIV/AIDS may be similar.

Section 1888(e)(12) of the Act also contains a sunset provision stipulating that the HIV/AIDS adjustment only applies until the Secretary certifies that case-mix adjustment appropriately compensates for increased costs associated with this population.

[36] Liu, Korbin, Amanda Lockshin, Carolyn Rimes, and Cristina Baseggio, "Medicare Payments for Patients with HIV/AIDS in Skilled Nursing Facilities," *Urban Institute. Washington, DC* (2001).

3.8.2 Adequacy of HIV/AIDS Payment in RCS-I

To determine whether the case-mix adjustment under RCS-I appropriately compensates for costs of residents with HIV/AIDS, Acumen used HIV/AIDS status to separately predict costs per day for PT/OT, SLP, and NTA, controlling for case mix by including the RCS-I resident groups as independent variables. Table 66 shows the results of this investigation. HIV/AIDS was associated with a negative and statistically significant decrease in PT/OT and SLP costs per day. For NTA costs per day, the (small, negative) coefficient on HIV/AIDS was not significant at the 10% level. These results indicate HIV/AIDS is not associated with higher PT/OT or SLP costs per day, when controlling for resident group, and that the recommended NTA component (i.e., the comorbidity score, which includes HIV/AIDS in the highest tier) appropriately adjusts for increased NTA costs associated with this population.

Table 66: Results of Regressions Using HIV/AIDS to Predict Costs per Day for PT/OT, SLP, and NTA

Dependent Variable	Independent Variables	HIV/AIDS Coefficient	HIV/AIDS P-value
PT/OT Costs per Day	HIV/AIDS, PT/OT payment groups	-6.87	0.00
SLP Costs per Day	HIV/AIDS, SLP payment groups	-1.83	0.00
NTA Costs per Day*	HIV/AIDS, NTA payment groups	-1.60	0.14

** The NTA regression was restricted to stays 8 days and longer. The restriction was implemented because length of stay is strongly correlated with NTA costs per day.*

Acumen did a similar analysis to test whether the recommended nursing component appropriately compensates for increased nursing utilization associated with HIV/AIDS. Because of the lack of resident-specific nursing costs, as discussed in Section 3.2.1, Acumen used HIV/AIDS status to predict nursing WWST, a measure of nursing utilization described in Section 3.6.2. As in the regressions used for the other components, Acumen controlled for case mix by including the RCS-I resident groups (in this case, the non-rehabilitation RUGs) as independent variables. The results of this analysis are shown in Table 67. The results show that even after controlling for non-rehabilitation RUG, HIV/AIDS status is associated with a positive and significant increase in nursing utilization. An increase of 27 WWST represents a 19% increase over the weighted average nursing WWST for the full STRIVE population, 140. (The weighting adjusted this estimate to account for the deliberate over-sampling of certain sub-populations in the STRIVE study.) Based on these findings, Acumen concluded that the RCS-I nursing groups may not completely capture the additional nursing costs associated with HIV/AIDS residents. As a result, RCS-I incorporates a 19% add-on to the nursing payment for residents with HIV/AIDS.

Table 67: Results of Regression Using HIV/AIDS to Predict Nursing WWST

Dependent Variable	Independent Variables	HIV/AIDS Coefficient	HIV/AIDS P-value
Nursing WWST	HIV/AIDS, non-rehabilitation RUGs	27.48	0.00

3.8.3 Comparison of HIV/AIDS Payment under RUG-IV and RCS-I

Acumen conducted a separate investigation to compare HIV/AIDS payment under the current resident classification model (RUG-IV) and under RCS-I. The RUG-IV model does not use HIV/AIDS for case-mix adjustment. As described in Section 3.7.1, RCS-I accounts for HIV/AIDS by including HIV/AIDS as the highest tier in the comorbidity score used for NTA payment. Additionally, as described in Section 3.8.2, RCS-I incorporates a 19% add-on to nursing payments for residents with HIV/AIDS. Table 68 and Table 69 compare payments under RUG-IV and RCS-I at the day and stay levels, respectively. The payments are standardized to remove the effect of payment adjustments made based on geographic differences in wage levels. The population used in these tables matches that used in the impact analysis presented in Section 3.13. The tables show that payments for residents with HIV/AIDS under RCS-I would be much higher than payments for residents without HIV/AIDS. In contrast, under RUG-IV, payments for residents with HIV/AIDS are actually lower than payments for residents without HIV/AIDS before applying the 128% HIV/AIDS payment adjustment. These differences highlight the fact that RUG-IV does not capture the higher costs associated with HIV/AIDS through case-mix adjustment. However, when the 128% payment adjustment is applied, overall payments for residents with HIV/AIDS under RUG-IV are higher than payments for residents with HIV/AIDS under RCS-I. The RUG-IV payment is not necessarily accurate, however, because as noted in Section 3.8.1 the current HIV/AIDS payment adjustment is applied to all payment components as a multiplier and therefore provides a higher adjustment to HIV/AIDS residents in ultra-high rehabilitation RUGs even if the costs related to HIV/AIDS for these residents are not higher than for residents with lower therapy utilization.

Table 68: Comparison of RUG-IV and RCS-I Payment per Day for HIV/AIDS

HIV/AIDS Status	# of Stays	% of Stays	Avg. Payment per Day under RUG-IV		Avg. Payment per Day under RCS-I				
			With Adjustment	Without Adjustment	Total	PT/OT	SLP	NTA	Nursing
Yes	4,938	0.3%	$1,032	$454	$705	$150	$24	$296	$152
No	1,960,455	99.7%	$475	$475	$515	$155	$28	$118	$129

Table 69: Comparison of RUG-IV and RCS-I Payments per Stay for HIV/AIDS[37]

HIV/AIDS Status	# of Stays	% of Stays	Avg. Payment per Stay under RUG-IV		Avg. Payment per Stay under RCS-I				
			With Adjustment	Without Adjustment	Total	PT/OT	SLP	NTA	Nursing
Yes	4,938	0.3%	$30,412	$13,403	$18,235	$4,103	$695	$6,730	$4,376
No	1,960,455	99.7%	$14,431	$14,430	$14,486	$4,420	$871	$2,897	$3,854

3.9 Variable Per-Diem Payments

This section describes the motivation and methodology for developing variable per-diem payments, which track changes in resource use over a stay. Additionally, the recommended variable per-diem adjustment factors are presented.

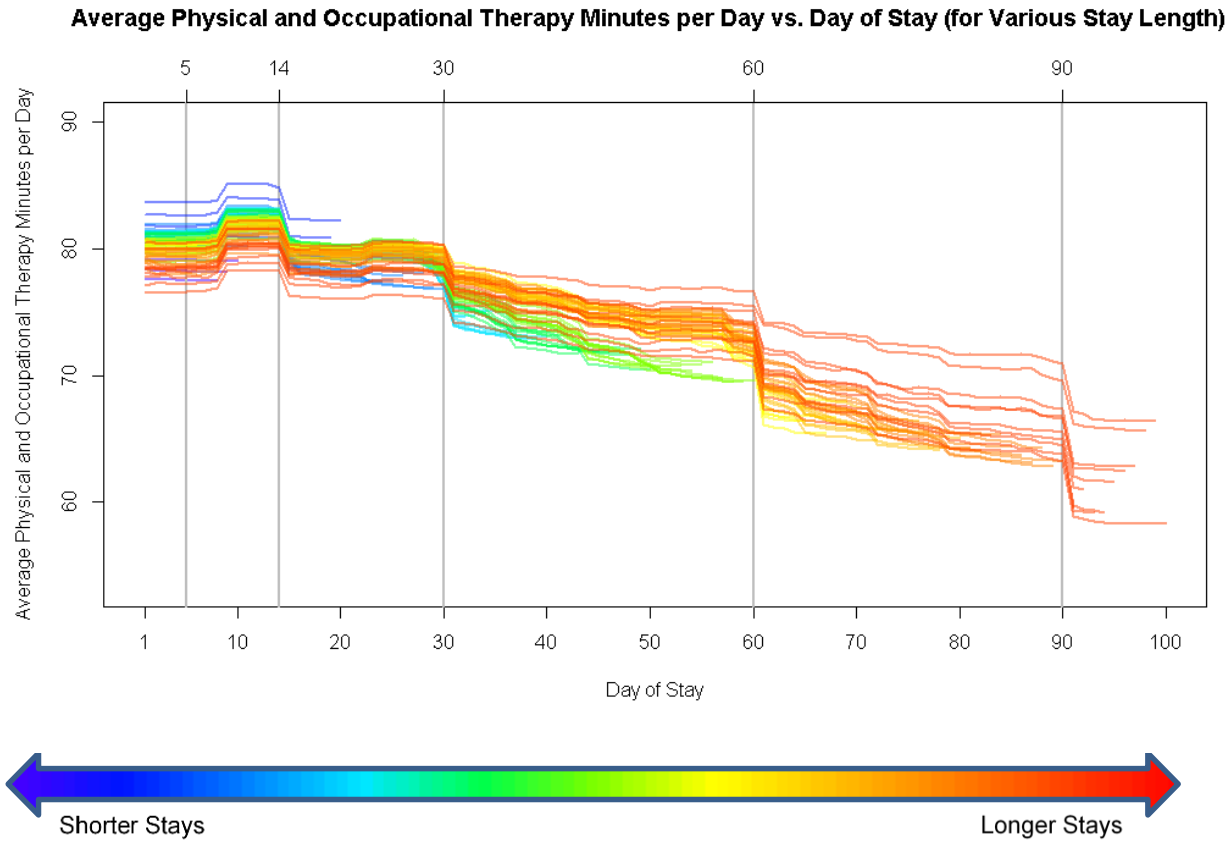
3.9.1 Motivation

Under RUG-IV, SNFs are paid a constant per diem rate through the stay based on each resident's RUG-IV classification. However, Acumen observed that resource use for certain services is not constant over a stay but varies depending on the point in the stay.

PT/OT costs decline steadily over the course of the stay. Figure 12 shows that PT/OT minutes decline over a stay for stays of various lengths, particularly after the first two weeks of the stay. Each line in the figure represents a length of stay; there are a total of 93 lines in the figure, one for each possible length of stay longer than 7 days given the 100-day limit on the SNF benefit. While data on actual therapy minutes is only available for the seven days preceding an MDS assessment, facilities must perform Change of Therapy assessments whenever therapy provision falls below the minute threshold for the rehabilitation payment category from the prior assessment. Therefore, therapy minutes for each day in the stay can be inferred using information from the prior assessment. The vertical lines in the figure indicate the scheduled PPS assessments.

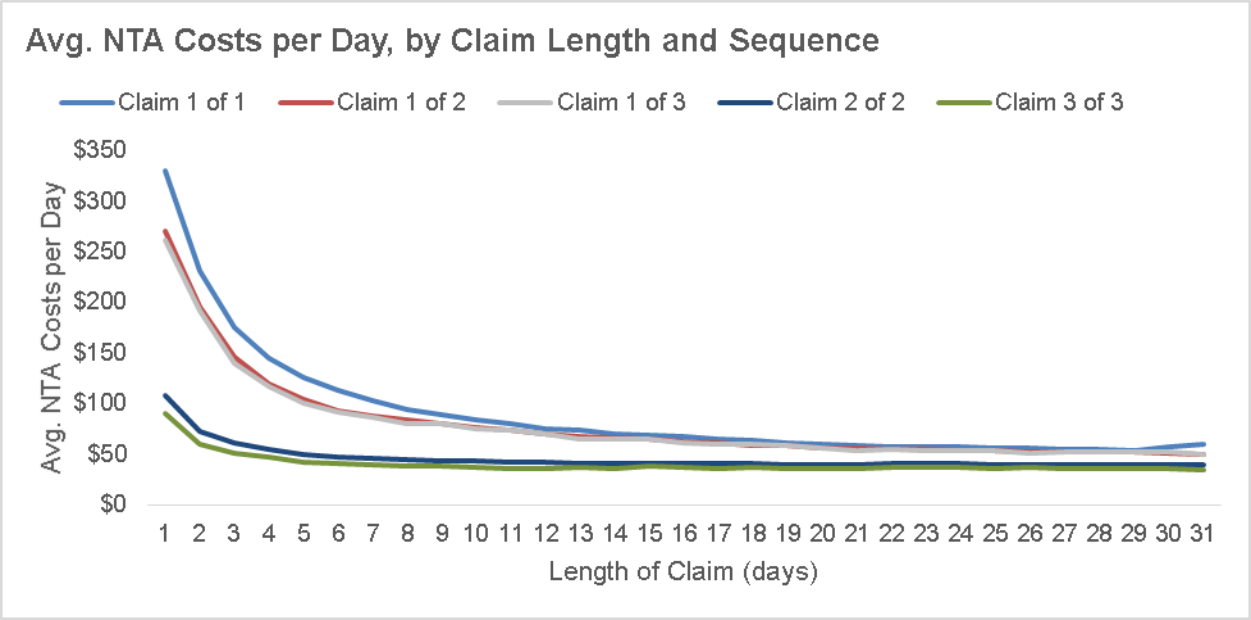
[37] The adjusted and unadjusted RUG-IV payments for residents without HIV/AIDS do not match exactly. Acumen flags stays as being associated with HIV/AIDS when the first claim of a stay has the appropriate diagnosis code. However, due to inconsistencies in coding practices across claims, there is a small number of stays that receive the AIDS adjustment in some but not all of their claims. These stays cause the adjusted and unadjusted average RUG-IV payments per stay shown here to differ slightly.

Figure 12: Declining Average PT/OT Utilization over a Stay



NTA costs, driven largely by drug costs, are concentrated at the beginning of a stay, and are much lower thereafter. This is shown in Figure 13, which utilizes the variation in the length of the first and the last claim to explore how costs are distributed across the stay. Facilities submit claims at the end of each month. Therefore, the length of the first claim is a function of the day of the month when a resident is admitted. For example, for any given 40-day stay, the first claim may be one day long if the beneficiary was admitted on the last day of the month, 30 days long if the beneficiary was admitted on the first day of the month, or any number of days between 1 and 30. The length of the last claim is equally dependent on the day of the month the resident was discharged from the facility (or exhausted their Medicare benefit). Figure 13 shows that NTA costs per day are exceptionally high in the first claim whenever the first claim is very short, regardless of the eventual length of the stay (proxied by the total number of claims in the stay). This indicates that NTA costs are clustered at the beginning of the SNF stay.

Figure 13: Declining NTA Costs over a Stay



The figures above show variation in PT/OT and NTA costs throughout the stay. Similar analyses showed that SLP costs remain relatively constant over the stay. There is no comparable data on nursing costs to measure changes in resource use throughout the stay. To reflect the changes in PT/OT and NTA resource utilization over a stay, Acumen created variable per diem payment adjustments based on point in the stay. The following sub-sections describe how these adjustments were created.

3.9.2 Overview of Variable Per-Diem Payment

RUG-IV calculates payment for each resident group by multiplying the base rate for that component by the CMI for the specific group. RCS-I maintains this calculation, but also incorporates an adjustment factor based on day in the stay. The adjustment factor is based on a variable per diem schedule and structured similarly to the Medicare Part A Inpatient Psychiatric Facility PPS. Payment for each resident group is calculated using the following equation:

$$Per\ Diem\ Payment = Component\ Base\ Rate \times Resident\ Group\ CMI \times Component\ Adjustment\ Factor$$

3.9.3 Methodology

The main difficulty in tracking costs over a stay is deriving per diem costs, since a single claim does not provide the costs of services on each utilization day separately. Costs are reported annually on facility cost reports and can be estimated at the claim and stay levels using the facility CCR, as described in Section 3.2. Costs per day can be calculated by averaging total costs for a stay by the length of the stay. However, costs per day represent the cost of an average day for a given stay, rather than the actual cost of a specific day in the stay.

To obtain a robust estimate of the cost of a specific day in a stay, Acumen took advantage of the claim submission schedule and the arbitrariness of the point in the month when a stay began. Facilities are required to submit monthly claims. Each claim covers the period from the first day during the month a resident is in the facility to the end of the month. If a resident was admitted on the first of the month and remains in the facility (and continues to have Part A SNF eligibility) until the end of the month, the claim for that month will include all days in the month. However, if a resident is admitted after the first of the month, the first claim associated with the resident's stay will be shorter than a month. Acumen used first claims of varying lengths to estimate the cost of each additional day of SNF care[38]. For example, for stays that were 10 days long, the average PT/OT costs of 4-day first claims were $487, and the average PT/OT costs of 5-day first claims were $604. Assuming the cost distribution for the first four days is the same across the two types of stays, the marginal PT/OT costs of Day 5 are $604 minus $487, or $117. Using this method, one can use the length of first claim to estimate per diem costs for the first 31 days of a stay. Similarly, one can use variation in the length of the last claim to estimate the per diem costs of the last 31 days of longer stays. Using this process, Acumen estimated PT/OT and NTA costs for each day of the stay[39].

The next step was to bin the days in the stay to remove some unnecessary variance. Acumen observed that PT/OT costs remained high for the first 14 days of a stay while NTA costs were high for the first three days of a stay, before declining in both cases. Based on this observation, Acumen binned the first 14 days of the stay for PT/OT payment and the first three days of the stay for NTA payment, then calculated the average per diem costs for this flat period. The subsequent days in the stay were then binned into 5-day groups[40].

After the data cleaning step, Acumen ran a regression to estimate the rate of decline after the initial drop in costs following the initial flat period. The regression equation is shown below, where d is the day since the start of the declining period (the period following the initial flat period), and s is the length of stay. The average initial per diem costs is the population average per diem costs of Days 1–14 for the PT/OT component, and of Day 4 for the NTA component. The output β is the estimated rate of decline in costs for each additional day of decline. Additionally, 1 is included as a constant so that the ratio equals 1 before the decline starts. Different reference points were chosen for each component because of differences in the

[38] This methodology assumes variation in the day of a month when a resident is admitted is not related to the distribution of costs over a stay.

[39] For stays longer than 62 days, however, the first and last claim methods cannot estimate per diem costs for days in the middle of the stay because the middle claim is always one month long and therefore there is no variation in the length of the middle claim (besides small variation in the length of the month). Given that for most lengths of stay, the days for which costs cannot be estimated using the first or last claim methods only comprise a small proportion of the entire stay, the missing data should not substantially influence the estimated rates of decline in costs over a stay. Only 8.6% of stays are longer than 63 days, and only 6.5% of total utilization days are affected.

[40] Acumen dropped observations with negative per diem costs.

observed pattern of resource use over a stay. PT/OT utilization declines gradually over a stay, as shown in Figure 12, whereas NTA utilization declines sharply, as seen in Figure 13. Therefore, Acumen estimated the decline in PT/OT costs as a continuous decline starting at the end of the initial flat period (Days 1-14). For the NTA component, Acumen estimated the rate of decline starting after Day 4, assuming a sharp decline between the flat period in Days 1-3 and Day 4 motivated by the trend observed in Figure 13.

$$Proportionality\ \ Factor(d,s) = \frac{Per\ Diem\ Costs(d,s)}{Average\ Initial\ Per\ Diem\ Costs} = 1 + \beta(d^{th}\ Decline\ Day)$$

The estimated rates of decline for the two components are shown in Table 70. The estimated rate of decline for PT/OT is 0.34% of the average per diem costs after the initial 14-day PT/OT flat period. The estimated rate of decline for NTA after Day 4 cannot be statistically differentiated from zero. Therefore, Acumen recommends maintaining a flat per diem payment for the NTA component after the initial decline between Days 1-3 and Day 4. As shown in Table 71, estimated per diem NTA costs decline from $150 during Days 1-3 to $47 on Days 4-100, a 69.02% decline.

Table 70: Estimated Rate of Decline

Component	Estimated % Decline	p-value
PT/OT	-0.34%	0.000
NTA	0.02%	0.790

Table 71: Average NTA Per Diem Costs for NTA Flat Periods

Flat Period	Avg. NTA Per Diem Costs
Day 1- 3	$150
Day 4-100	$47

3.9.4 Variable Per Diem Payment Adjustment Factors

Because the 0.34% estimated rate of decline for the PT/OT component is about one third of 1%, RCS-I reduces the PT/OT adjustment factor by 0.01 every three days starting from Day 15 (the first day after the flat period). A decline of 0.01 in the adjustment factor corresponds to a 1% decline if we assign a weight of 1.00 to the first 14 days of the stay. Table 72 lists the recommended PT/OT variable per diem payment adjustment factors by day in the stay. Table 73 shows the NTA adjustment factor for every day in the stay following the flat period, which is a constant 1.00, reflecting the 69.02% decline in per diem costs after the flat period and constant per diem costs thereafter, as discussed above. (The adjustment factor is set to 3.00 for days 1-3.

Acumen set the adjustment factor to 1.00 for days 4-100 because for most stays, the majority of the stay falls within this range.)

Table 72: Adjustment Factors for the PT/OT Component

Day in Stay	PT/OT Adjustment Factor
1-14	1.00
15-17	0.99
18-20	0.98
21-23	0.97
24-26	0.96
27-29	0.95
30-32	0.94
33-35	0.93
36-38	0.92
39-41	0.91
42-44	0.90
45-47	0.89
48-50	0.88
51-53	0.87
54-56	0.86
57-59	0.85
60-62	0.84
63-65	0.83
66-68	0.82
69-71	0.81
72-74	0.80
75-77	0.79
78-80	0.78
81-83	0.77
84-86	0.76
87-89	0.75
90-92	0.74
93-95	0.73
96-98	0.72
99-100	0.71

Table 73: Adjustment Factors for the NTA Component

Day in Stay	NTA Adjustment Factor
1-3	3.00
4-100	1.00

3.10 Benefit Periods with Multiple Stays

Most SNF benefit periods consist of a single stay. However, 20% of benefit periods consist of two or more stays (see Figure 14). Because this may impact the appropriate payment policy, Acumen investigated changes in health condition and costs across multiple stays in a single benefit period. These analyses are relevant to two important decisions related to benefit periods with multiple stays:

1) Should residents who have multiple stays within a single benefit period be classified into different resident groups for different stays?

2) Should the variable per diem payment schedule continue across multiple stays in a single benefit period, or should the day count restart with each new stay?

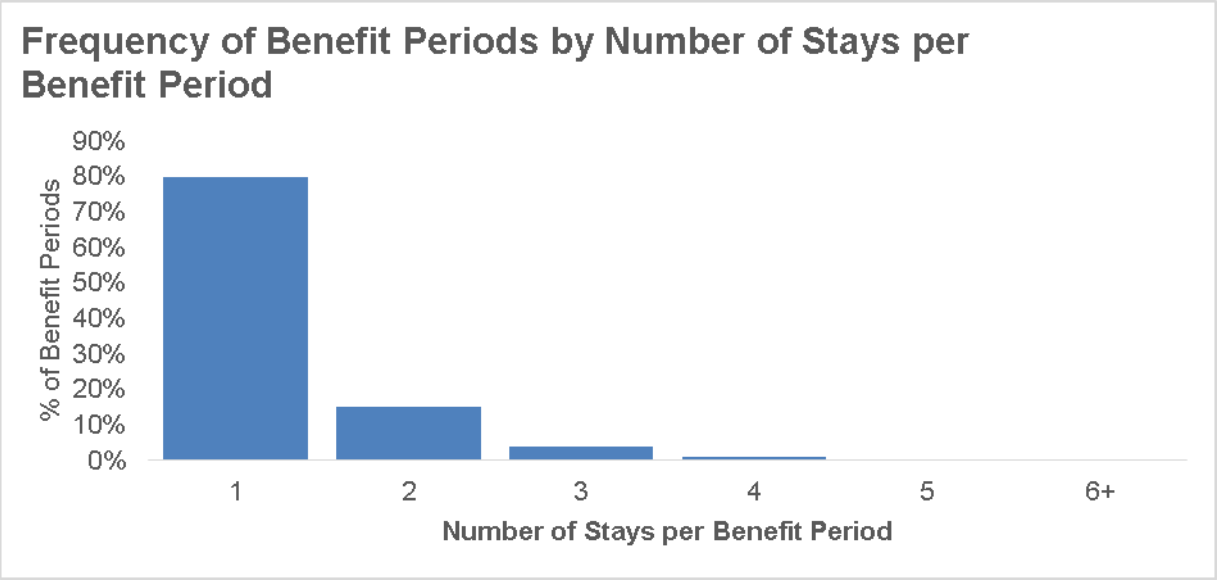
The following sub-sections summarize current benefit period policy as well as the results of these investigations.

3.10.1 Current SNF Benefit Period Policy

Medicare covers up to 100 days of SNF care per spell of illness. Each benefit period requires a hospital stay that is at least three days long[41]. In order to qualify for a new benefit period, a beneficiary must not receive any inpatient hospital care or any skilled care in a SNF for 60 consecutive days. A beneficiary may be admitted multiple times to a SNF within a given benefit period. A resident can be admitted to a SNF within 30 days of a SNF discharge without requiring a new hospitalization. SNF admissions that occur between 31 and 60 days after a SNF discharge require a new hospitalization, but fall within the same benefit period, so the count towards the 100-day limit on SNF care in a single benefit period does not reset. Figure 14 shows the distribution of benefit periods by number of stays. The vast majority of benefit periods only have one stay. Out of the benefit periods with multiple stays, over 70% of them had just two stays. To simplify the analysis of benefit periods with multiple stays, Acumen's investigations of changes in condition and costs over a benefit period with multiple stays focused on benefit periods with two stays.

[41] This requirement has been waived in some ongoing innovation projects

Figure 14: Frequency of Benefit Periods by Number of Stays per Benefit Period



3.10.2 Changes in Condition across Multiple Stays in a Benefit Period

Acumen investigated changes in condition for three types of multi-stay benefit periods:

1. SNF to SNF transfers: a resident is transferred directly from one facility to another, with no intervening hospitalization or community discharge.
2. Re-hospitalization and readmission: a resident has a hospital stay in between the two SNF stays.
3. Community discharge and readmission: a resident is discharged to the community and is subsequently re-admitted to a SNF without an intervening hospitalization.

Table 74 shows the frequency of two-stay benefit periods for each of these three types. Re-hospitalization and readmission is by far the most common type of two-stay benefit period, followed by community discharge and readmission, and SNF to SNF transfers.

Table 74: Frequency of Two-Stay Benefit Periods by Type

Type of Benefit Period	# of Benefit Periods	% of Benefit Periods
SNF to SNF transfer	20,306	10.6%
Re-hospitalization and readmission*	145,016	75.5%
Community discharge and readmission*	26,690	13.9%

**Readmissions may refer to the same facility or a different facility.*

Acumen first investigated changes in condition for re-hospitalization and readmission cases, the most common type of multiple-stay benefit period. Table 75 shows changes in clinical categories from the first to second stay. The percentages in each cell indicate the proportion of

total residents who were in the row clinical category for the first stay who fell into the column clinical category for the second stay. A large majority of residents with an intervening re-hospitalization fell into the Medical Management category during their second stay regardless of the clinical category of their first stay.

Table 75: Change in Clinical Category from Stay 1 to Stay 2 for Re-hospitalization Cases

Clinical Category of the First Stay	% of Benefit Periods					
	Clinical Category of the Second Stay					
	Overall	Major Joint Replacement or Spinal Surgery	Other Orthopedic	Medical Management	Non-Orthopedic Surgery	Acute Neurologic
All	100.0%	3.4%	8.0%	74.6%	9.4%	4.5%
Major Joint Replacement / Spinal Surgery	6.9%	17.7%	13.9%	55.0%	10.5%	2.9%
Other Orthopedic	14.8%	7.4%	19.3%	60.9%	8.6%	3.8%
Medical Management	57.7%	1.4%	5.2%	81.7%	8.1%	3.6%
Non-Orthopedic Surgery	13.4%	1.1%	6.3%	73.2%	16.3%	3.2%
Acute Neurologic	7.2%	1.6%	5.4%	67.9%	7.9%	17.3%

This analysis was not possible for two-stay benefit periods that did not have an intervening hospitalization (SNF to SNF transfers and community discharges) because these types of benefit periods did not have new diagnosis information between the two stays. Instead, for these types of benefit periods, Acumen explored changes in the PT/OT functional score from the first to second stays. Table 76 shows changes in function for two-stay benefit periods without an intervening re-hospitalization. Although a majority of SNF to SNF transfers and community discharge cases did not change functional groups, a notable percentage of these residents did change groups. Of residents who changed functional groups, roughly equal proportions shifted into lower utilization and higher utilization groups.

Table 76: Change in Function during Two-Stay Benefit Periods (No Re-hospitalization)

Type of Benefit Period	No Change	Lower PT/OT Utilization Group	Higher PT/OT Utilization Group
SNF to SNF Transfer	72%	13%	16%
Community Discharge and Readmission	78%	12%	11%

3.10.3 Changes in Cost across Multiple Stays in a Benefit Period

Acumen also investigated changes in costs across multiple stays in a benefit period. Because this analysis is relevant to determining how the variable per diem payment adjustments

(discussed in Section 3.9) should apply to benefit periods with multiple stays, these investigations focused on PT/OT and NTA costs (Acumen is not recommending variable per diem adjustments for the SLP or nursing components). Acumen used a linear regression to estimate if the type of benefit period (SNF transfer, re-hospitalization, or community discharge) has any additional impact on costs that is not explained by the length of the stay and resident characteristics. The community discharge cases were separated into two sub-cases: when the resident returns to the same provider, and when the resident is admitted to a new provider. The following regression uses each individual stay as the unit of observation, and attempts to measure whether the second stays have significantly different costs per day. Each first stay is treated the same, regardless of whether it is from a one-stay benefit period or two-stay benefit period, and the regression uses first stays as the reference group. The model controls for the RCS-I case mix group and length of stay by including the corresponding recommended resident groups and utilization days of the stay as categorical variables.

$$Costs\ per\ Day\ = Intercept + \sum_{i=2}^{100} \alpha_i \times if(Length\ of\ Stay = i) + \sum_{j=2}^{\#\ groups} \beta_j \times Resident\ Group_j\ +\ \gamma_1 \times SNF\ to\ SNF\ Transfer +\ \gamma_2 \times Rehospitalization +\ \gamma_3 \times Community\ Discharge$$

Table 77 shows the results of the analysis. The regression results show that SNF to SNF transfers, re-hospitalizations, and multi-provider community discharges are similar to first stays in terms of PT/OT and NTA costs per day. However, readmissions to the same provider following community discharge cost about $20 less for both PT/OT and NTA costs per day. These results suggest that multiple stays in the same provider could be treated as one continuous stay, whereas stays across multiple providers could be treated as separate stays.

Table 77: Estimated Effect of Benefit Period Type on Average Costs for Second Stay

Dependent Variable	First Stay in Benefit Period	SNF to SNF Transfer	Re-hospitalization and Readmission	Community Discharge and Readmission, by Change of Provider		R-squared
				Single Provider	Multi-Provider	
Avg. PT/OT Costs per Day	Reference	-1.25**	-7.39**	-20.18**	-2.26*	0.112
Avg. NTA Costs per Day	Reference	-1.29	-2.29**	-18.68**	-5.79**	0.212

*** Significant at the 1% level. * Significant at the 5% level.*

3.11 Estimation of Base Rates for Components

Section 2.2.2 provided an overview of how the original base rates were developed. This section provides more detail on that process and details how Acumen estimated base rates for the RCS-I payment components. Estimation of base rates was necessary to study the impact of the alternative payment model, as discussed in Section 3.13.

3.11.1 Overview of Methodology

As discussed in Sections 3.3.1 and 3.3.2, RCS-I contains two therapy components (PT/OT and SLP) and two separate components for nursing and NTA. However, as discussed in Section 2.2.2, the current base rates correspond to the two case-mix components in RUG-IV (therapy and nursing) as well as the two non-case-mix components. To estimate the impacts of the alternative payment model, it was necessary to bifurcate the existing base rates for case-mix therapy and nursing into two base rates each, with each of the four resulting case-mix base rates corresponding to one of the case-mix components in RCS-I. The nursing base rate was split into separate base rates for nursing and NTA. Specifically, we estimated the NTA base rate as 43% of the current urban and rural nursing base rates, while the nursing base rate was estimated as 57% of the current nursing base rates. These estimates, discussed in further detail below, were based on guidance published by CMS regarding the portion of nursing costs attributable to NTA costs. The therapy base rate was split into separate base rates for PT/OT and SLP. Because there was no comparable guidance on the proportion of therapy costs attributable to the three therapy disciplines, Acumen independently derived the therapy split as described below. To estimate the therapy split, Acumen generally followed the methodology used by CMS (then known as HCFA) to create the original therapy base rate in 1998, with some modifications. This methodology is described in the following section.

3.11.2 Calculation of Original Base Rates

To establish base rates for the four payment components in the current SNF PPS, HCFA calculated standardized, average per-diem costs for each of the components based on cost reporting periods beginning in FY 1995, as follows:

1) Exclusion of Cost Reports: HCFA included only cost reports for cost reporting periods beginning in FY 1995 and lasting 10-13 months. Additionally, only as-submitted and settled reports were included. SNFs which had a cost limit exemption were excluded.

2) Inclusion of Part A and Part B Costs: HCFA included both Part A costs from FY 1995 cost reports and an estimate of amounts payable under Part B for covered SNF services provided to Part A SNF residents.

3) Adjustment of Costs for As-Submitted Cost Reports: HCFA adjusted as-submitted cost reports by adjusting routine costs downward by 1.31% and adjusting ancillary costs

downward by 3.26%. These adjustment factors were based on a comparison of as-submitted and settled cost reports from FY 1992 to FY 1994, and were chosen to reflect average adjustments resulting from the process of cost report settlement.

4) Exclusion of Education Costs: HCFA excluded education costs from each component in the calculation of facility per diem costs.

5) Calculation of Per Diem Costs by Facility: To calculate per diem costs for each facility, HCFA divided a facility's total costs by the total number of Medicare days on the facility cost report. For the therapy component, costs were divided by the number of Medicare days related to therapy.

6) Removal of Outliers: For each cost component, facilities with estimated per diem costs more than three standard deviations from the geometric mean costs across all facilities were considered outliers and excluded from the calculation of that component's per diem costs.

7) Updating Costs to Initial Period of PPS: After the removal of outliers, per diem costs were adjusted using the SNF Market Based Index (MBI) to reflect cost increases between the midpoint of the cost reporting period associated with the cost report and the initial period for PPS implementation (July 1, 1998 to September 30, 1998). The SNF MBI accounts for cost increases which affect routine, ancillary, and capital-related expenses. To update costs to the initial period of the PPS, costs were updated by the annual MBI minus one percentage point each year.

8) Standardization of Cost Data: Next, facility per diem costs were adjusted to account for the effects of case mix and geographic wage differences. To adjust costs for facility-level differences in case mix, given that MDS data was not available, HCFA created a crosswalk between claims data and RUG-III categories. HCFA used the facility-level distribution of residents across the RUG-III categories to estimate average case-mix index values, for nursing and therapy, for each facility. The facility-level estimated case-mix indexes were used to adjust facility-level costs to account for differences in case mix. To account for geographic wage differences, wage indexes were applied to the labor-related share of costs, estimated as 75.888%. Since SNF-specific wages were not available for the relevant time period, hospital wages from FY 1994 were used. HCFA mapped facilities to a wage index by Metropolitan Statistical Area (MSA) for urban facilities and by state for rural facilities.

9) Calculation of National Standardized Payment Rates: In calculating urban and rural base rates, urban facilities were defined as those located in an MSA or a New England County

Metropolitan Area (NECMA), while all other facilities were categorized as rural. National standardized base rates were created as follows for each of the four components:

a. Calculate average per diem costs for the Medicare Part A population in each facility, following steps 5-8.

b. Compute the average per diem costs for all freestanding facilities, weighting by the number of Medicare Part A days in each facility.

c. Compute the average per diem costs for all freestanding and hospital-based facilities, weighting by the number of Medicare Part A days in each facility.

d. Compute the arithmetic mean of the amounts from steps (b) and (c) per SSA Section 1888(e)(4)(E)(i). This amount, calculated separately by component and for urban and rural facilities, is the base rate.

3.11.3 Estimation of PT/OT and SLP Split

In order to run impact analyses that compare RUG-IV to RCS-I, Acumen split the RUG-IV therapy case-mix base rate to derive estimated PT/OT and SLP base rates under RCS-I. This required estimating the fraction of therapy costs that correspond to SLP costs. To derive this fraction, Acumen followed the original methodology used to derive the SNF PPS base rates, outlined in Section 3.11.2.

Facility cost reports from FY 1995 include costs for each of the three therapy disciplines (PT, OT, and SLP) as well as the number of Medicare Part A utilization days. Freestanding SNFs reported Medicare Part A costs for PT, OT, and SLP on CMS forms 2540-92 and 2540-96 in three cost centers corresponding to each therapy discipline. Hospital-based SNFs reported therapy costs in the same cost centers on CMS forms 2552-92 and 2552-96. Total therapy costs are calculated by summing across the three therapy cost centers.

Using this information, Acumen calculated average per diem SLP costs and average per diem total therapy costs for each facility. Acumen obtained these SNF-level costs by following the process outlined in Section 3.11.2 and using the same exclusions and adjustments wherever possible. However, there were a few ways in which the data used for the SLP percentage calculation differs from the 1998 base rates calculation. First, the 1998 calculation excludes cost reports for facilities which were exempted from cost limits in the base year. Acumen did not implement this restriction because available cost report data does not identify facilities exempted from cost limits. However, this is unlikely to have had a notable impact on Acumen's estimate since Acumen excluded facilities with per diem costs more than three standard deviations from the geometric mean across facilities. Given this exclusion, the influence of facilities with unusually high costs on the estimate of per diem costs was limited.

Second, the original base rates calculation excluded costs related to exceptions payments and approved educational activities. Available cost report data neither identified costs related to exceptions payments nor indicated the percentage of overall therapy costs or costs by therapy discipline related to approved educational activities. Therefore, these costs could not be excluded from Acumen's estimate. However, since exceptions were only granted for routine costs and not for therapy costs, the inability to implement this exclusion should not affect Acumen's estimate. Similarly, based on cost report data, educational costs comprise less than one-hundredth of one percent of overall SNF costs. If the proportion of educational costs is fairly uniform across all cost categories, then the inclusion of education costs should have a negligible impact on Acumen's estimate of the SLP percentage.

Third, as described above, the original base rates calculation incorporated estimates of amounts payable under Part B for SNF services provided to Part A SNF residents. To estimate these costs, Acumen interpreted the approach described in the 1998 interim final rule (63 FR 26256) in the following manner: Part B claims associated with a Part A SNF stay were matched to SNF cost reports. Next, for each cost center in the cost reports, Acumen calculated a ratio to estimate the amount by which Part A costs should be increased to account for the portion of costs payable under Part B. These ratios were calculated by dividing total charges from matched Part B claims by total charges from Part A SNF claims which overlapped with the cost report.

Lastly, the original base rates calculation standardized cost data to adjust for differences in facility case mix and geographic differences in wage levels. Acumen used the original methodology to standardize costs for wage differences, applying an index based on FY 1994 hospital wages to the labor-related share of costs, estimated at 75.888%. However, Acumen did not implement the case-mix adjustment used in the original calculation because the original case-mix adjustment was based on the now obsolete RUG-III classification system, and since the 1998 interim final rule did not document how SNF and inpatient claims were mapped to RUG-III clinical categories, this step could not be replicated. This should not impact the estimate of the SLP percentage in a substantial manner since the original case-mix adjustment was applied at the facility level and therefore likely affected estimates of SLP and total therapy per diem costs in a similar way.

Using the data obtained by following the process described in Section 3.11.2 with the differences noted above, Acumen followed the methodology provided in section II.A.3 of the 1998 interim rule with comment period (63 FR 26260) to estimate federal base payment rates. These steps were done separately for urban and rural facilities:

1. Acumen calculated mean SLP per diem costs and mean therapy per diem costs based on freestanding SNFs, weighting by total number of Medicare days.

2. Acumen calculated mean SLP per diem costs and mean therapy per diem costs for hospital-based and freestanding SNFs, weighting by total number of Medicare days.
3. Acumen calculated the arithmetic mean of the amounts derived in Steps 1 and 2.
4. Lastly, Acumen divided mean SLP per diem costs by mean therapy per diem costs to estimate the percentage of therapy costs corresponding to SLP.

Table 78 shows estimated total therapy and SLP per diem costs as well as the share of total therapy per diem costs accounted for by SLP. As the table shows, SLP accounts for 16% of total therapy costs in urban facilities and 18% of total therapy costs in rural facilities. As discussed at the end of this section, Acumen used these percentages to separate the RUG-IV therapy case-mix base rate into estimated PT/OT and SLP base rates under RCS-I.

Table 78: Estimated Total Therapy and SLP Per Diem Costs, FY 1995 Cost Reports

FY 1995 Cost Reports	Urban - Per Diem Costs				Rural - Per Diem Costs			
	# SNFs	Therapy Costs	SLP Costs	% SLP	# SNFs	Therapy Costs	SLP Costs	% SLP
A) Freestanding	5,135	$82	$14	-	3,028	$85	$16	-
B) Freestanding + Hospital-Based	6,005	$80	$12	-	3,586	$82	$14	-
Average of A and B	6,005	$81	$13	16%	3,586	$84	$15	18%

3.11.4 Estimation of Nursing and NTA Split

In order to run impact analyses that compare RUG-IV to RCS-I, Acumen split the RUG-IV nursing base rate to derive estimated nursing and NTA base rates under RCS-I. In this case, HCFA provided guidance which directly informs the appropriate split. The 1998 reopening of the comment period for the interim final rule (63 FR 65561) explains that NTA costs comprised 43.4 percent of the nursing base rate for urban facilities, with the remaining 56.6 percent attributable to nursing and social services costs. For rural facilities, these percentages are 42.7 and 57.3 percent respectively.

In addition to the CMS guidance, Acumen estimated NTA costs per day for urban and rural facilities using the same data (notably, the 1995 cost reports) and methodology that was used to estimate SLP and total therapy costs per day. Using this methodology, Acumen estimated average NTA costs per day of $47.7 for urban facilities and $47.3 for rural facilities. These estimates account for 43.6% and 45.1% of the 1998 urban and rural nursing base rates, respectively. Given the similarity of the CMS and Acumen estimates, Acumen decided to attribute 43% of the nursing base rates to the estimated NTA base rates.

3.11.5 Estimated Base Rates for RCS-I Components

Acumen used the splits derived as described above to estimate base rates for the four case-mix components of RCS-I. Base rates were estimated for FY 2014 to match the year of data used in the analyses. To estimate the SLP base rates, we multiplied the FY 2014 therapy base rates by 16% for urban facilities and by 18% for rural facilities. The remaining portions of the therapy base rates (84% for urban facilities and 82% for rural facilities) were attributed to the estimated PT/OT base rates.

To estimate NTA base rates, Acumen multiplied the FY 2014 nursing base rates by 43% and attributed the remaining 57% to the nursing base rates. Table 79 and Table 80 show the FY 2014 base rates and Acumen's estimated base rates for the five components (four case-mix and one non case-mix) in RCS-I. As shown in the tables, the base rates for the non-case-mix component remain unchanged because this component would not be affected by RCS-I.

Table 79: Actual RUG-IV FY 2014 Base Rates

Rate Component	Nursing Case-Mix	Therapy Case-Mix	Therapy Non-Case-Mix	Non-Case-Mix
Urban Per Diem Amount	$165.81	$124.90	$16.45	$84.62
Rural Per Diem Amount	$158.41	$144.01	$17.57	$86.19

Table 80: Estimated RCS-I FY 2014 Base Rates

Rate Component	Nursing Case-Mix	NTA Case-Mix	PT/OT Case-Mix	SLP Case Mix	Non-Case-Mix
Urban Per Diem Amount	$94.51	$71.30	$104.92	$19.98	$84.62
Rural Per Diem Amount	$90.29	$68.12	$118.09	$25.92	$86.19

3.12 Calculation of Case-Mix Indexes

This section describes the methodology for estimating CMIs for each of the recommended payment components. The following sub-sections describe the calculation of the unadjusted and adjusted CMIs. First, the unadjusted CMIs establish the relative proportionality of payments between groups for a given component. The next step was to adjust the CMIs to ensure both that RCS-I system resources would be distributed across components in proportion to the statutory base rates, and that RCS-I would be budget neutral relative to RUG-IV. Budget neutrality was assumed in order to estimate the impacts of RCS-I relative to RUG-IV. The unadjusted and adjusted CMIs are presented in Section 3.12.3.

3.12.1 Unadjusted CMI

As discussed in Section 3.9.2, the per diem payment for a resident in a given payment group depends on the product of three factors: the base rate for that component, the CMI for the payment group, and the variable per diem payment adjustment factor. Because the base rate is the same for every resident group within a component, the relative average payment per day for a given group can be expressed in terms of the relative CMI and the relative average adjustment factor of the group.

At the same time, to accurately reflect relative resource use, the relative average RCS-I payments for a group should match the relative average costs for that group. Based on these two expressions of relative RCS-I payments, we can derive the following equation:

$$Unadjusted\ CMI = \frac{Relative\ Average\ Costs\ per\ Day}{Relative\ Average\ Adjustment\ Factor} = \frac{\frac{Avg.\ Costs\ per\ Day\ for\ Group}{Avg.\ Costs\ per\ Day\ for\ Full\ Population}}{\frac{Avg.\ Adjustment\ Factor\ for\ Group}{Avg.\ Adjustment\ Factor\ for\ Full\ Population}}$$

Acumen calculated the unadjusted CMI for each case-mix group using the above equation. Payments for the SLP and nursing components are constant throughout the stay, so the relative average adjustment factor for those components is 1 for all groups. Therefore, unadjusted CMIs for those two components are determined by relative average costs per day alone.

Finally, the two factors in the calculation of unadjusted CMIs (relative average costs per day and relative average adjustment factor) are weighted averages, where the weights are length of stay. This ensures that the share of total payments for a given group equals the share of total costs for that group.

3.12.2 Adjusted CMI

The unadjusted CMIs then need to be adjusted to ensure that all RCS-I components have the same average case-mix adjustment and that total payment under RCS-I is equal to the total payment under RUG-IV. As with other analyses used to build RCS-I, FY 2014 data was used. That is, Acumen calculated adjusted CMIs such that total payments in FY 2014 if RCS-I had been in place equal total actual payments in FY 2014.

First, to align the distribution of resources across components with the statutory base rates, Acumen set CMIs such that the average product of the group CMI and the group average variable per diem adjustment factor is the same (set to 1) for each of the four case-mix-adjusted components in RCS-I. To do this, Acumen first calculated the product of the CMI and the adjustment factor for every utilization day for each component. Then, we calculated the average of this product for each component. Finally, Acumen calculated the ratio of 1 divided by the average product for each component. This ratio is the standardization multiplier, shown in Table

81 for each component. The unadjusted CMIs developed in the previous section were multiplied by the standardization multiplier to ensure that all RCS-I components have the same average case-mix adjustment.

Next, it was necessary to further adjust the CMIs to ensure budget neutrality between RCS-I and RUG-IV. The previous paragraph described how the average product of the CMIs and the per diem adjustment factor was set to 1, which is an arbitrary value. The average CMIs for both the nursing and the therapy component under RUG-IV in recent years were much higher than 1, which indicates that a substantial adjustment to the RCS-I CMIs would be required to ensure budget neutrality. The budget neutrality adjustment was implemented by multiplying the CMIs in all four components by a budget neutrality multiplier. This multiplier was developed by calculating the proportionality between total case-mix-related payments under RUG-IV and total case-mix-related payments under RCS-I.

Acumen calculated total payment under RCS-I using the estimated RCS-I component base rates (see Section 0), the adjusted CMIs from the second paragraph of this section, the variable per diem adjustment factors (see Section 3.9.4), the labor-related share, the geographic wage indexes, and the RCS-I HIV/AIDS adjustment (see Section 3.8.2). For each utilization day and each component, the base rate was multiplied by the CMI corresponding to the beneficiary's group and, in the case of the PT/OT and NTA components, by the appropriate variable per diem adjustment factor. In the case of residents with HIV/AIDS, the nursing component was multiplied by the HIV/AIDS adjustment. In order to implement the geographic adjustment, the labor-related share was multiplied by the appropriate geographic wage index for all components. The sum of the four case-mix-adjusted components was the RCS-I case-mix-related payment for that utilization day. The sum of all case-mix-related payment for all utilization days was the total RCS-I case-mix-related payment for the population.

In order to develop the budget neutrality multiplier, it was necessary to calculate the case-mix-related payment under RUG-IV. For each claim in the study population, RUG-IV payments were calculated by taking the sum of Medicare payment, beneficiary coinsurance, primary payer claim paid amount, and beneficiary blood deductible liability. The Medicare portion of payment was divided by 0.98 to add back the 2% reduction in Medicare payments under sequestration, which was in effect for FY 2014, the year of data used to develop RCS-I. The portion of payments corresponding to the non-case-mix component had to be carved out for this calculation because the non-case-mix component is the same under both RUG-IV and RCS-I. For each claim, the non-case-mix base rate, utilization days, labor share and geographic wage indexes were used to calculate non-case-mix component payments. The non-case-mix payments for the claim were calculated by multiplying the number of utilization days by the non-case-mix base rate, and then the labor share portion was multiplied by the corresponding wage index. The

result of this calculation was subtracted from the RUG-IV pre-sequestration payment to produce the RUG-IV case-mix-related payment for each claim. For the purposes of this calculation, RUG-IV case-mix-related payments include all payments associated with the 128% add-on for residents with HIV/AIDS, including the portion associated with the non-case-mix component. Because RCS-I replaces this add-on with additional payments for residents with HIV/AIDS through the NTA and nursing components (as discussed in Section 3.8), all payments associated with the add-on under RUG-IV are re-allocated to the case-mix-adjusted components in RCS-I. The sum of all RUG-IV case-mix-related payment for all claims was the total RUG-IV case-mix-related payment for the population.

Finally, the resulting ratio of case-mix-related payments in RUG-IV over case-mix-related payments in RCS-I (1.43), which is labeled "budget neutrality multiplier" in Table 81, was multiplied by the standardized CMIs from step one to arrive at the final adjusted CMIs. This method ensures equal amount of total payments under RUG-IV and RCS-I. The multiplier is large because the average therapy and nursing CMIs under RUG-IV in recent years are substantially higher than 1.

Table 81: Multipliers Used to Derive Adjusted CMIs

Component	Standardization Multiplier	Budget Neutrality Multiplier
PT/OT	1.05	1.43
SLP	1.00	
NTA	0.83	
Nursing	1.00	

3.12.3 CMI per Component

Table 82, Table 83, Table 84, and Table 85 show the estimated unadjusted and adjusted CMIs for the PT/OT, SLP, NTA, and nursing components, respectively[42].

[42] For each component shown in Tables 78 to 81, the stay population is restricted to stays that can be classified into resident groups for that component. As a result, the total number of stays varies somewhat across each of the tables.

Table 82: PT/OT Component Case-Mix Indexes

Clinical Category	Function by PT/OT Utilization	Cognition	# of Stays	% of Stays	Avg. Length of Stay	Avg. PT/OT Costs per Day	Avg. PT/OT Costs per Day Weighted by LOS	Unadjusted CMI	Adjusted CMI
Major Joint Replacement or Spinal Surgery	High	Intact	166,082	8.6%	21	$151	$144	1.21	1.82
Major Joint Replacement or Spinal Surgery	High	Impaired	8,127	0.4%	33	$128	$123	1.06	1.59
Major Joint Replacement or Spinal Surgery	Medium	Intact	15,265	0.8%	25	$142	$135	1.16	1.73
Major Joint Replacement or Spinal Surgery	Medium	Impaired	6,022	0.3%	35	$114	$112	0.97	1.45
Major Joint Replacement or Spinal Surgery	Low	Intact	963	0.0%	23	$118	$128	1.12	1.68
Major Joint Replacement or Spinal Surgery	Low	Impaired	1,224	0.1%	29	$103	$105	0.91	1.36
Other Orthopedic	High	Intact	187,879	9.7%	34	$135	$132	1.14	1.70
Other Orthopedic	High	Impaired	26,204	1.4%	36	$121	$119	1.03	1.55
Other Orthopedic	Medium	Intact	31,899	1.6%	37	$122	$121	1.05	1.58
Other Orthopedic	Medium	Impaired	18,940	1.0%	35	$106	$106	0.92	1.39
Other Orthopedic	Low	Intact	2,526	0.1%	29	$104	$105	0.92	1.38
Other Orthopedic	Low	Impaired	4,709	0.2%	29	$85	$88	0.76	1.14
Acute Neurologic	High	Intact	61,820	3.2%	32	$127	$125	1.07	1.61
Acute Neurologic	High	Impaired	17,321	0.9%	33	$116	$114	0.99	1.48
Acute Neurologic	Medium	Intact	16,063	0.8%	37	$118	$116	1.01	1.52
Acute Neurologic	Medium	Impaired	16,698	0.9%	35	$105	$104	0.91	1.36
Acute Neurologic	Low	Intact	2,008	0.1%	37	$108	$111	0.98	1.47
Acute Neurologic	Low	Impaired	7,072	0.4%	29	$84	$89	0.78	1.17
Non-Orthopedic Surgery	High	Intact	146,984	7.6%	24	$128	$123	1.04	1.57
Non-Orthopedic Surgery	High	Impaired	13,598	0.7%	28	$115	$111	0.95	1.43
Non-Orthopedic Surgery	Medium	Intact	33,630	1.7%	27	$111	$107	0.92	1.38
Non-Orthopedic Surgery	Medium	Impaired	11,512	0.6%	29	$94	$91	0.78	1.17
Non-Orthopedic Surgery	Low	Intact	3,843	0.2%	26	$86	$85	0.74	1.11
Non-Orthopedic Surgery	Low	Impaired	7,359	0.4%	27	$68	$62	0.54	0.80
Medical Management	High	Intact	645,865	33.4%	27	$123	$121	1.03	1.55
Medical Management	High	Impaired	138,139	7.1%	30	$108	$108	0.93	1.39
Medical Management	Medium	Intact	161,962	8.4%	28	$104	$105	0.90	1.36
Medical Management	Medium	Impaired	112,396	5.8%	29	$89	$91	0.78	1.17
Medical Management	Low	Intact	18,259	0.9%	25	$82	$85	0.73	1.10
Medical Management	Low	Impaired	50,122	2.6%	25	$62	$63	0.54	0.82

Table 83: SLP Component Case-Mix Indexes

Clinical Category	Swallowing Disorder or Mechanically Altered Diet	SLP Comorbidity or Cognitive Impairment	# of Stays	% of Stays	Avg. Length of Stay	Avg. SLP Costs per Day	Avg. SLP Costs per Day Weighted by LOS	Unadjusted CMI	Adjusted CMI
Acute Neurologic	Both	Both	5,790	0.3%	36	$54	$50	2.93	4.19
Acute Neurologic	Both	Either	3,701	0.2%	37	$48	$44	2.60	3.71
Acute Neurologic	Both	Neither	492	0.0%	32	$42	$40	2.36	3.37
Acute Neurologic	Either	Both	20,056	1.0%	37	$47	$43	2.57	3.67
Acute Neurologic	Either	Either	16,006	0.8%	36	$40	$37	2.19	3.12
Acute Neurologic	Either	Neither	3,086	0.2%	32	$31	$30	1.78	2.54
Acute Neurologic	Neither	Both	22,496	1.2%	34	$36	$35	2.08	2.97
Acute Neurologic	Neither	Either	32,951	1.7%	31	$25	$24	1.44	2.06
Acute Neurologic	Neither	Neither	15,230	0.8%	27	$15	$15	0.90	1.28
Non-Neurologic	Both	Both	11,341	0.6%	30	$41	$38	2.25	3.21
Non-Neurologic	Both	Either	38,585	2.0%	28	$38	$35	2.07	2.96
Non-Neurologic	Both	Neither	15,351	0.8%	30	$33	$31	1.84	2.63
Non-Neurologic	Either	Both	53,002	2.8%	31	$33	$31	1.83	2.62
Non-Neurologic	Either	Either	212,385	11.1%	30	$28	$26	1.56	2.22
Non-Neurologic	Either	Neither	105,369	5.5%	30	$21	$20	1.19	1.70
Non-Neurologic	Neither	Both	80,504	4.2%	30	$23	$23	1.34	1.91
Non-Neurologic	Neither	Either	493,843	25.8%	28	$16	$16	0.97	1.38
Non-Neurologic	Neither	Neither	785,351	41.0%	26	$7	$7	0.43	0.61

Table 84: NTA Component Case-Mix Indexes

Comorbidity Score	# of Stays	% of Stays	Avg. Length of Stay	Avg. NTA Costs per Day	Avg. NTA Costs per Day Weighted by LOS	Unadjusted CMI	Adjusted CMI
11+	17,807	1.0%	27	$203	$149	2.79	3.33
8-10	57,610	3.1%	28	$159	$115	2.17	2.59
6-7	72,060	3.9%	26	$128	$91	1.69	2.02
3-5	314,044	17.1%	27	$99	$68	1.28	1.52
1-2	660,966	36.0%	28	$73	$51	0.97	1.16
0	714,237	38.9%	28	$49	$37	0.69	0.83

Table 85: Nursing Component Case-Mix Indexes

Non-Rehabilitation RUG	# of Stays	% of Stays	Avg. Length of Stay	Avg. Nursing WWST per Day	Unadjusted CMI	Adjusted CMI
ES3	6,953	0.4%	29	427	2.69	3.84
ES2	13,124	0.7%	29	323	2.03	2.90
ES1	24,720	1.2%	28	309	1.94	2.77
HE2	5,204	0.3%	26	252	1.59	2.27
HE1	31,113	1.6%	27	225	1.42	2.02
HD2	8,546	0.4%	28	232	1.46	2.08
HD1	78,783	4.0%	28	207	1.30	1.86
HC2	7,250	0.4%	26	229	1.44	2.06
HC1	91,144	4.6%	26	205	1.29	1.84
HB2	2,694	0.1%	24	209	1.31	1.88
HB1	37,886	1.9%	21	186	1.17	1.67
LE2	5,984	0.3%	32	209	1.32	1.88
LE1	49,311	2.5%	33	186	1.17	1.68
LD2	8,450	0.4%	31	204	1.29	1.84
LD1	105,321	5.3%	32	182	1.15	1.64
LC2	6,236	0.3%	29	173	1.09	1.55
LC1	102,731	5.2%	29	154	0.97	1.39
LB2	1,595	0.1%	26	165	1.04	1.48
LB1	29,389	1.5%	24	147	0.92	1.32
CE2	5,098	0.3%	29	205	1.29	1.84
CE1	43,534	2.2%	32	178	1.12	1.60
CD2	13,572	0.7%	32	194	1.22	1.74
CD1	189,336	9.5%	32	168	1.06	1.51
CC2	14,041	0.7%	28	166	1.05	1.49
CC1	277,982	14.0%	26	144	0.91	1.30
CB2	5,629	0.3%	23	153	0.96	1.37
CB1	139,806	7.0%	19	132	0.83	1.19
CA2	3,223	0.2%	21	115	0.72	1.03
CA1	64,795	3.3%	17	99	0.63	0.89
BB2	756	0.0%	37	117	0.74	1.05
BB1	31,741	1.6%	28	107	0.68	0.97
BA2	391	0.0%	34	82	0.52	0.74
BA1	12,151	0.6%	24	75	0.47	0.68
PE2	812	0.0%	34	178	1.12	1.60
PE1	34,576	1.7%	32	163	1.03	1.47
PD2	2,379	0.1%	37	165	1.04	1.48
PD1	135,367	6.8%	34	151	0.95	1.36

Non-Rehabilitation RUG	# of Stays	% of Stays	Avg. Length of Stay	Avg. Nursing WWST per Day	Unadjusted CMI	Adjusted CMI
PC2	3,642	0.2%	37	137	0.86	1.23
PC1	245,007	12.3%	29	126	0.79	1.13
PB2	1,157	0.1%	30	109	0.69	0.98
PB1	105,366	5.3%	22	100	0.63	0.90
PA2	491	0.0%	32	76	0.48	0.68
PA1	38,484	1.9%	18	70	0.44	0.63

3.13 Impact Analysis

Acumen conducted an impact analysis to study the effect RCS-I would have on various resident and provider subpopulations. This analysis compared actual FY 2014 payments under RUG-IV to what FY 2014 payments would have been had RCS-I been in place. Both RUG-IV and RCS-I payments were calculated including the 2% reduction in Medicare payments under budget sequestration, which was in effect in FY 2014. Additionally, the impact analysis uses a different resident population than the study population used to develop RCS-I to ensure it is as inclusive as possible. Restrictions necessary to calculate costs for a stay were lifted because costs are not considered in the impact analysis. However, the impact analysis was restricted to stays that can be classified into a resident group for all payment components. Two metrics were used to measure the impact of RCS-I: dollar change and percent change in average per-stay payment.

Residents were stratified into various subpopulations based on demographic, enrollment, and service use characteristics. Demographic information used to stratify residents included sex, age, and race/ethnicity. Enrollment information included original reason for Medicare enrollment. Service use characteristics included length of SNF stay, length of qualifying inpatient stay, and various therapy utilization measures (number of therapy disciplines received, combination of therapy disciplines received, therapy level). Additionally, Acumen examined the impact of recommended payments on potentially vulnerable subpopulations, including the following traits: dual enrollment in Medicare and Medicaid, high NTA costs, use of extensive services, cognitive impairment, diabetes, wound infection, and use of IV medication. Residents with high NTA costs were incorporated into the impact analysis because NTA costs are currently reimbursed through the nursing component. Because nursing payments do not correlate with NTA costs, as discussed in Section 3.3.2, RUG-IV may not adequately reimburse for costs associated with this population. Use of extensive services was incorporated into the analysis

because the nursing payments in RUG-IV do not reflect various combinations of extensive services, therefore current payment may not appropriately pay for this population.

Providers were also stratified into various subpopulations based on facility type, geographic location, size, and types of stays. Facility type stratifications included freestanding/non-freestanding and for-profit/non-profit/government. Geographic stratifications included urban/rural and census division. Facility size was defined by number of beds. Finally, providers were stratified by prevalence of certain types of stays/days: stays with exactly 100 utilization days, days billed to ultra-high rehabilitation RUGs, days billed to non-rehabilitation RUGs, and stays for residents who are dually enrolled in Medicare and Medicaid.

As shown in Table 86 and Table 87, the impact analysis found that RCS-I would have distributional effects for providers based on the resident and provider subpopulations examined. The most notable impact of RCS-I would be to shift payments associated with residents receiving very high amounts of therapy under RUG-IV (which strongly incentivizes the provision of therapy) to residents with complex clinical needs. This can be seen in the estimated reduction of payments associated with residents in the highest therapy RUG (RU) and an estimated increase in payments associated with residents who receive extensive services or have high NTA costs. Additionally, we estimate that RCS-I would result in higher payments associated with the following resident types: dual enrollment in Medicare and Medicaid, end-stage renal disease (ESRD), having a longer qualifying inpatient stay, diabetes, wound infections, and use of IV medication.

Similar to the resident sub-population analysis, the facility-level analysis shows that the most notable shift in Medicare payments under RCS-I would be from facilities with a high proportion of rehabilitation residents to facilities with high proportions of non-rehabilitation residents. This can be seen in the estimated reduction of payments to facilities with a high percentage of utilization days billed as RU and an estimated increase in payments to facilities with a high percentage of utilization days billed as non-rehabilitation. Additionally, we estimate that various provider subpopulations would also receive higher payments, including non-profits, government-owned facilities, hospital-based facilities, swing bed providers, and small facilities.

Table 86: Impact Analysis by Resident Sub-Populations

Resident Characteristics	Value	Stays		Avg. Per-Stay Payment ($)			
		#	%	RUG-IV	RCS-I	Difference	% Difference
All Stays	-	1,965,393	100.0%	$14,313	$14,313	$0	0.0%
Sex	Female	1,220,582	62.1%	14,557	14,458	-99	-0.7%
Sex	Male	744,811	37.9%	13,912	14,075	163	1.2%
Age	<65 years	189,561	9.6%	13,846	14,593	747	5.4%
Age	65-74 years	418,505	21.3%	13,317	13,672	355	2.7%
Age	75-84 years	669,184	34.0%	14,090	14,051	-39	-0.3%
Age	85-89 years	379,059	19.3%	15,084	14,740	-343	-2.3%
Age	90+ years	309,084	15.7%	15,484	15,050	-434	-2.8%
Race/Ethnicity	White	1,673,584	85.2%	14,091	14,081	-11	-0.1%
Race/Ethnicity	Black	208,244	10.6%	15,238	15,297	59	0.4%
Race/Ethnicity	Hispanic	31,295	1.6%	16,589	16,562	-26	-0.2%
Race/Ethnicity	Asian	22,986	1.2%	17,940	17,799	-141	-0.8%
Race/Ethnicity	Native American	8,262	0.4%	13,741	14,644	903	6.6%
Race/Ethnicity	Other or unknown	21,022	1.1%	15,646	15,756	110	0.7%
Medicare/Medicaid Dual Status	Dually enrolled	691,422	35.2%	15,847	16,307	460	2.9%
Medicare/Medicaid Dual Status	Not dually enrolled	1,273,971	64.8%	13,480	13,230	-250	-1.9%
Original Reason for Medicare Enrollment	Aged	1,505,032	76.6%	14,385	14,209	-176	-1.2%
Original Reason for Medicare Enrollment	Disabled	442,763	22.5%	14,131	14,680	549	3.9%
Original Reason for Medicare Enrollment	ESRD	17,596	0.9%	12,675	13,937	1,261	10.0%
Original Reason for Medicare Enrollment	Unknown	2	0.0%	18,766	18,147	-619	-3.3%
Utilization Day	1-15 days	653,644	33.3%	4,048	4,694	645	15.9%
Utilization Day	16-30 days	621,852	31.6%	11,043	11,112	69	0.6%
Utilization Day	31+ days	689,897	35.1%	26,985	26,311	-674	-2.5%
Number of Utilization Days = 100	No	1,915,160	97.4%	13,423	13,457	34	0.3%
Number of Utilization Days = 100	Yes	50,233	2.6%	48,251	46,943	-1,309	-2.7%
Length of Qualifying Inpatient Stay	Missing	11,720	0.6%	13,783	13,941	159	1.2%
Length of Qualifying Inpatient Stay	0-2 days	29,311	1.5%	13,277	13,511	234	1.8%
Length of Qualifying Inpatient Stay	3 days	441,621	22.5%	13,459	13,146	-313	-2.3%
Length of Qualifying Inpatient Stay	4-30 days	1,447,426	73.6%	14,511	14,580	69	0.5%
Length of Qualifying Inpatient Stay	31+ days	35,315	1.8%	17,917	18,745	828	4.6%
Level of Complications in MS-DRG of Qualifying Inpatient Stay	No Complication	745,601	37.9%	14,078	13,754	-324	-2.3%
Level of Complications in MS-DRG of Qualifying Inpatient Stay	CC / MCC	1,219,792	62.1%	14,456	14,654	198	1.4%
Presence of Dementia in Qualifying Inpatient Stay	No	1,441,060	73.3%	13,828	13,891	64	0.5%

Resident Characteristics	Value	Stays		Avg. Per-Stay Payment ($)			
		#	%	RUG-IV	RCS-I	Difference	% Difference
Presence of Dementia in Qualifying Inpatient Stay	Yes	524,333	26.7%	15,646	15,471	-175	-1.1%
Stroke	No	1,719,110	87.5%	13,978	13,962	-16	-0.1%
Stroke	Yes	246,283	12.5%	16,648	16,758	110	0.7%
CFS Level	Cognitive Intact	1,068,033	54.3%	13,903	13,835	-68	-0.5%
CFS Level	Mildly Impaired	448,514	22.8%	14,449	14,676	227	1.6%
CFS Level	Moderately Impaired	357,921	18.2%	15,726	15,445	-281	-1.8%
CFS Level	Severely Impaired	90,925	4.6%	12,884	13,671	787	6.1%
HIV/AIDS	No	1,960,455	99.7%	14,269	14,301	32	0.2%
HIV/AIDS	Yes	4,938	0.3%	31,753	19,043	-12,710	-40.0%
IV Medication	No	1,795,825	91.4%	14,389	14,097	-292	-2.0%
IV Medication	Yes	169,568	8.6%	13,508	16,600	3,091	22.9%
Diabetes	No	1,276,833	65.0%	14,313	13,909	-404	-2.8%
Diabetes	Yes	688,560	35.0%	14,313	15,062	749	5.2%
Wound Infection	No	1,921,836	97.8%	14,311	14,252	-58	-0.4%
Wound Infection	Yes	43,557	2.2%	14,399	16,977	2,578	17.9%
Amputation/Prosthesis Care	No	1,964,728	100.0%	14,312	14,312	0	0.0%
Amputation/Prosthesis Care	Yes	665	0.0%	15,096	15,804	708	4.7%
Most Common Therapy Level	RU	1,062,281	54.0%	17,921	16,294	-1,627	-9.1%
Most Common Therapy Level	RV	445,577	22.7%	12,629	13,809	1,180	9.3%
Most Common Therapy Level	RH	152,174	7.7%	9,665	12,020	2,355	24.4%
Most Common Therapy Level	RM	73,129	3.7%	7,677	10,508	2,831	36.9%
Most Common Therapy Level	RL	1,500	0.1%	2,857	4,266	1,409	49.3%
Most Common Therapy Level	Non-Rehabilitation	230,732	11.7%	6,193	8,946	2,753	44.5%
Number of Therapy Disciplines Used	0	106,131	5.4%	7,522	9,028	1,506	20.0%
Number of Therapy Disciplines Used	1	64,896	3.3%	6,942	9,534	2,592	37.3%
Number of Therapy Disciplines Used	2	1,010,993	51.4%	12,893	13,100	207	1.6%
Number of Therapy Disciplines Used	3	783,373	39.9%	17,676	16,990	-686	-3.9%
Physical Therapy Utilization	No	142,529	7.3%	7,662	9,517	1,855	24.2%
Physical Therapy Utilization	Yes	1,822,864	92.7%	14,833	14,688	-145	-1.0%
Occupational Therapy Utilization	No	168,541	8.6%	7,577	9,458	1,882	24.8%
Occupational Therapy Utilization	Yes	1,796,852	91.4%	14,945	14,768	-177	-1.2%
Speech Language Pathology Utilization	No	1,148,108	58.4%	12,161	12,547	386	3.2%
Speech Language Pathology Utilization	Yes	817,285	41.6%	17,336	16,793	-543	-3.1%
Therapy Utilization	PT?OT+SLP	783,373	39.9%	17,676	16,990	-686	-3.9%
Therapy Utilization	PT?OT Only	990,355	50.4%	12,943	13,101	158	1.2%
Therapy Utilization	PT?SLP Only	11,747	0.6%	10,233	12,581	2,348	22.9%
Therapy Utilization	OT?SLP Only	8,891	0.5%	10,853	13,633	2,781	25.6%

Resident Characteristics	Value	Stays		Avg. Per-Stay Payment ($)			
		#	%	RUG-IV	RCS-I	Difference	% Difference
Therapy Utilization	PT Only	37,389	1.9%	6,773	9,139	2,365	34.9%
Therapy Utilization	OT Only	14,233	0.7%	6,470	9,176	2,706	41.8%
Therapy Utilization	SLP Only	13,274	0.7%	7,925	11,033	3,108	39.2%
Therapy Utilization	Non-therapy	106,131	5.4%	7,522	9,028	1,506	20.0%
NTA Costs per Day	$0-$10	214,058	10.9%	13,548	13,198	-349	-2.6%
NTA Costs per Day	$10-$50	866,290	44.1%	17,161	16,607	-554	-3.2%
NTA Costs per Day	$50-$150	631,287	32.1%	13,058	13,514	456	3.5%
NTA Costs per Day	$150+	185,417	9.4%	6,648	7,927	1,279	19.2%
NTA Costs per Day	Unknown	68,341	3.5%	12,989	13,422	433	3.3%
NTA Comorbidity Score	0	762,682	38.8%	14,573	13,449	-1,124	-7.7%
NTA Comorbidity Score	1-2	704,915	35.9%	14,251	14,207	-43	-0.3%
NTA Comorbidity Score	3-5	335,649	17.1%	13,708	14,860	1,151	8.4%
NTA Comorbidity Score	6-7	78,990	4.0%	13,311	15,869	2,558	19.2%
NTA Comorbidity Score	8-10	63,399	3.2%	15,348	18,660	3,313	21.6%
NTA Comorbidity Score	11+	19,758	1.0%	17,428	21,943	4,515	25.9%
Extensive Services Level	Tracheostomy and Ventilator/Respirator	6,887	0.4%	23,951	28,281	4,331	18.1%
Extensive Services Level	Tracheostomy or Ventilator/Respirator	11,629	0.6%	20,959	21,612	654	3.1%
Extensive Services Level	Infection Isolation	24,893	1.3%	17,909	19,507	1,598	8.9%
Extensive Services Level	Neither	1,921,984	97.8%	14,191	14,151	-40	-0.3%
Clinical Category	Major Joint Replacement or Spinal Surgery	197,691	10.1%	11,657	11,434	-223	-1.9%
Clinical Category	Other Orthopedic	283,277	14.4%	17,740	17,249	-491	-2.8%
Clinical Category	Medical Management	1,143,736	58.2%	13,852	13,948	96	0.7%
Clinical Category	Non-Orthopedic Surgery	218,521	11.1%	12,975	13,473	498	3.8%
Clinical Category	Acute Neurologic	122,168	6.2%	17,371	17,081	-290	-1.7%

Table 87: Impact Analysis by Provider Sub-Populations

Provider Characteristics	Value	Providers		Stays in Providers		Avg. Per-Stay Payment ($)			
		#	%	#	%	RUG-IV	RCS-I	Difference	% Difference
All Stays	-	14,978	100.0%	1,965,393	100.0%	$14,313	$14,313	$0	0.0%
Ownership	For-profit	10,658	71.2%	1,437,389	73.1%	15,021	14,854	-167	-1.1%
Ownership	Non-profit	3,575	23.9%	465,910	23.7%	12,287	12,671	384	3.1%
Ownership	Government	745	5.0%	62,094	3.2%	13,114	14,105	991	7.6%
Bed Size	0-49	1,684	11.2%	135,067	6.9%	10,178	10,860	682	6.7%
Bed Size	50-99	5,556	37.1%	509,981	25.9%	14,342	14,383	41	0.3%
Bed Size	100-149	5,139	34.3%	772,308	39.3%	14,396	14,314	-82	-0.6%
Bed Size	150-199	1,676	11.2%	327,036	16.6%	14,639	14,565	-73	-0.5%
Bed Size	200+	920	6.1%	220,726	11.2%	16,006	15,889	-117	-0.7%
Bed Size	Unknown	3	0.0%	275	0.0%	9,888	10,146	258	2.6%
Location	Urban	10,576	70.6%	1,605,584	81.7%	14,535	14,424	-111	-0.8%
Location	Rural	4,402	29.4%	359,809	18.3%	13,321	13,815	494	3.7%
Institution Type	Freestanding	14,229	95.0%	1,856,748	94.5%	14,667	14,591	-76	-0.5%
Institution Type	Hospital-Based / Swing Bed	749	5.0%	108,645	5.5%	8,252	9,556	1,304	15.8%
Urban by Institution Type	Freestanding	10,137	67.7%	1,522,748	77.5%	14,862	14,681	-180	-1.2%
Urban by Institution Type	Hospital-Based / Swing Bed	439	2.9%	82,836	4.2%	8,529	9,696	1,166	13.7%
Rural by Institution Type	Freestanding	4,092	27.3%	334,000	17.0%	13,781	14,179	398	2.9%
Rural by Institution Type	Hospital-Based / Swing Bed	310	2.1%	25,809	1.3%	7,361	9,107	1,745	23.7%
Census division	New England	927	6.2%	143,399	7.3%	13,271	13,552	281	2.1%
Census division	Middle Atlantic	1,675	11.2%	290,350	14.8%	15,460	15,263	-197	-1.3%
Census division	East North Central	2,978	19.9%	373,407	19.0%	14,353	14,379	26	0.2%
Census division	West North Central	1,922	12.8%	136,529	6.9%	11,623	12,422	799	6.9%
Census division	South Atlantic	2,308	15.4%	410,228	20.9%	13,579	13,476	-102	-0.8%
Census division	East South Central	983	6.6%	137,794	7.0%	12,970	13,100	130	1.0%
Census division	West South Central	1,973	13.2%	188,237	9.6%	14,572	14,353	-219	-1.5%
Census division	Mountain	704	4.7%	82,885	4.2%	13,310	13,429	118	0.9%
Census division	Pacific	1,508	10.1%	202,564	10.3%	17,714	17,485	-229	-1.3%
Urban by Region	New England	787	5.3%	127,790	6.5%	13,144	13,404	261	2.0%
Urban by Region	Middle Atlantic	1,447	9.7%	266,665	13.6%	15,652	15,393	-259	-1.7%
Urban by Region	East North Central	2,073	13.8%	300,015	15.3%	14,470	14,391	-79	-0.5%
Urban by Region	West North Central	866	5.8%	87,767	4.5%	11,854	12,306	452	3.8%
Urban by Region	South Atlantic	1,755	11.7%	342,166	17.4%	13,708	13,516	-193	-1.4%
Urban by Region	East South Central	511	3.4%	83,059	4.2%	12,680	12,695	15	0.1%
Urban by Region	West South Central	1,255	8.4%	139,005	7.1%	14,745	14,454	-291	-2.0%
Urban by Region	Mountain	491	3.3%	68,899	3.5%	13,333	13,297	-35	-0.3%
Urban by Region	Pacific	1,391	9.3%	190,218	9.7%	17,822	17,557	-265	-1.5%

Provider Characteristics	Value	Providers		Stays in Providers		Avg. Per-Stay Payment ($)			
		#	%	#	%	RUG-IV	RCS-I	Difference	% Difference
Rural by Region	New England	140	0.9%	15,609	0.8%	14,314	14,757	443	3.1%
Rural by Region	Middle Atlantic	228	1.5%	23,685	1.2%	13,293	13,800	507	3.8%
Rural by Region	East North Central	905	6.0%	73,392	3.7%	13,875	14,331	455	3.3%
Rural by Region	West North Central	1,056	7.1%	48,762	2.5%	11,206	12,630	1,424	12.7%
Rural by Region	South Atlantic	553	3.7%	68,062	3.5%	12,928	13,280	352	2.7%
Rural by Region	East South Central	472	3.2%	54,735	2.8%	13,410	13,715	305	2.3%
Rural by Region	West South Central	718	4.8%	49,232	2.5%	14,083	14,066	-18	-0.1%
Rural by Region	Mountain	213	1.4%	13,986	0.7%	13,199	14,075	876	6.6%
Rural by Region	Pacific	117	0.8%	12,346	0.6%	16,045	16,371	326	2.0%
% of Stays with 100 Utilization Days	0-10%	13,533	90.4%	1,862,391	94.8%	13,922	13,961	39	0.3%
% of Stays with 100 Utilization Days	10-25%	1,295	8.6%	96,512	4.9%	20,898	20,224	-675	-3.2%
% of Stays with 100 Utilization Days	25-100%	150	1.0%	6,490	0.3%	28,594	27,483	-1,110	-3.9%
% of Medicare/Medicaid Dual Enrollment	0-10%	1,265	8.4%	228,691	11.6%	12,578	12,365	-213	-1.7%
% of Medicare/Medicaid Dual Enrollment	10-25%	2,583	17.2%	521,751	26.5%	13,110	13,023	-87	-0.7%
% of Medicare/Medicaid Dual Enrollment	25-50%	5,312	35.5%	732,682	37.3%	14,310	14,391	80	0.6%
% of Medicare/Medicaid Dual Enrollment	50-75%	3,972	26.5%	364,468	18.5%	15,797	15,918	121	0.8%
% of Medicare/Medicaid Dual Enrollment	75-90%	1,275	8.5%	90,089	4.6%	17,973	17,905	-68	-0.4%
% of Medicare/Medicaid Dual Enrollment	90-100%	571	3.8%	27,712	1.4%	19,913	19,809	-104	-0.5%
% of Utilization Days Billed as RU	0-10%	1,869	12.5%	102,726	5.2%	8,668	11,126	2,458	28.4%
% of Utilization Days Billed as RU	10-25%	1,463	9.8%	116,230	5.9%	11,572	13,149	1,577	13.6%
% of Utilization Days Billed as RU	25-50%	3,812	25.5%	443,903	22.6%	13,176	13,910	733	5.6%
% of Utilization Days Billed as RU	50-75%	5,569	37.2%	882,333	44.9%	14,901	14,620	-281	-1.9%
% of Utilization Days Billed as RU	75-90%	1,947	13.0%	363,193	18.5%	16,418	15,259	-1,159	-7.1%
% of Utilization Days Billed as RU	90-100%	318	2.1%	57,008	2.9%	16,398	14,779	-1,619	-9.9%
% of Utilization Days Billed as Non-Rehabilitation	0-10%	10,538	70.4%	1,492,795	76.0%	14,765	14,439	-326	-2.2%
% of Utilization Days Billed as Non-Rehabilitation	10-25%	3,472	23.2%	413,292	21.0%	13,217	14,045	827	6.3%
% of Utilization Days Billed as Non-Rehabilitation	25-50%	684	4.6%	49,830	2.5%	11,069	13,302	2,234	20.2%
% of Utilization Days Billed as Non-Rehabilitation	50-75%	146	1.0%	7,221	0.4%	7,165	10,435	3,270	45.6%
% of Utilization Days Billed as Non-Rehabilitation	75-90%	35	0.2%	843	0.0%	9,338	13,523	4,185	44.8%

Provider Characteristics	Value	Providers		Stays in Providers		Avg. Per-Stay Payment ($)			
		#	%	#	%	RUG-IV	RCS-I	Difference	% Difference
% of Utilization Days Billed as Non-Rehabilitation	90-100%	103	0.7%	1,412	0.1%	10,925	15,117	4,192	38.4%

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APPENDIX

Figure 15: Summary of Resident Classification Process under RUG-IV

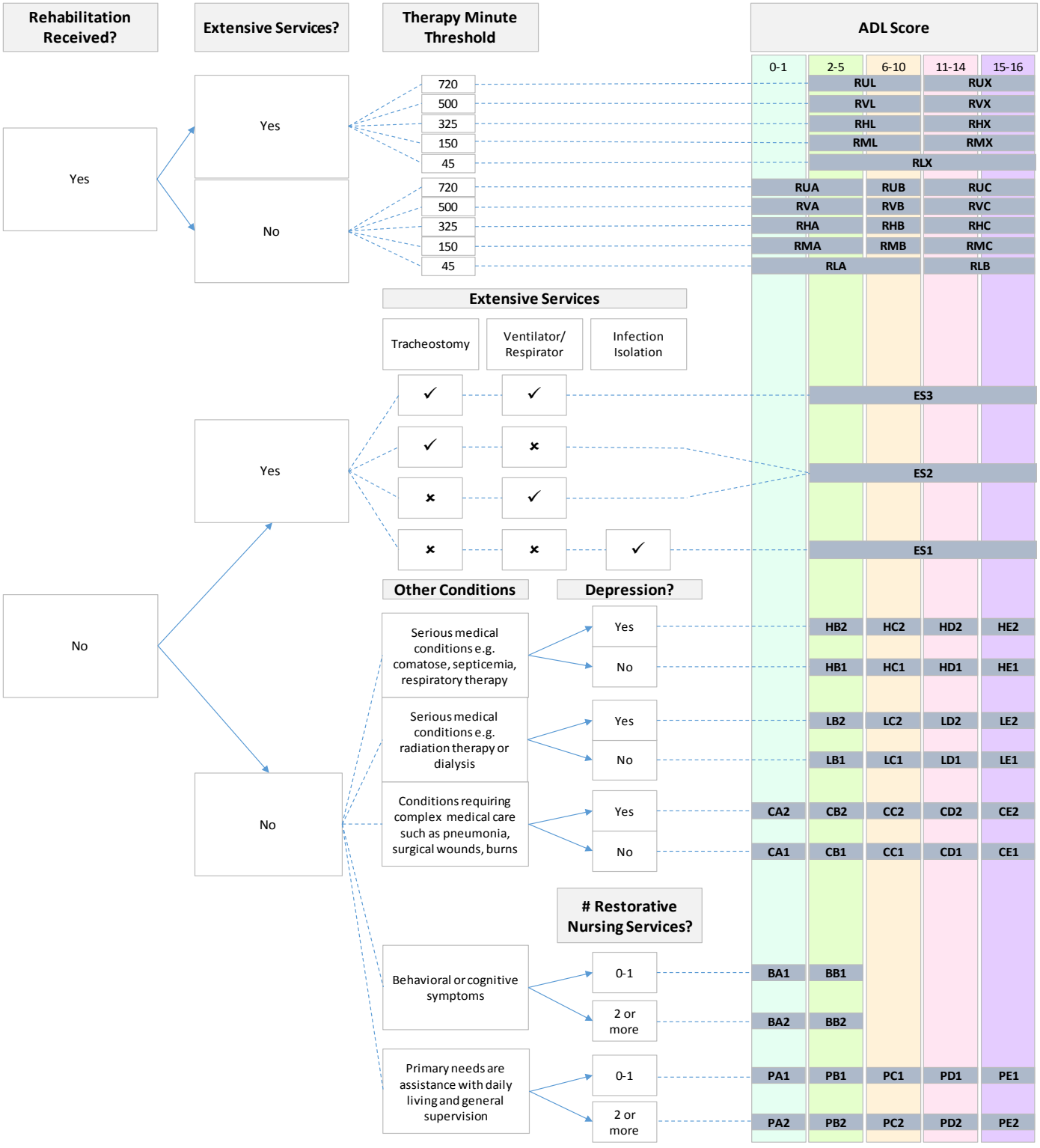

Table 88: Percentage of Utilization Days, ADL Range, and Minimum Therapy Minutes for each RUG-IV RUG sorted by RUG Hierarchy

RUG Groups	RUG	% of Utilization Days	ADL Range	Minimum Therapy Minutes
Rehabilitation Plus Extensive Services	RUX	0.58%	11-16	720
	RUL	0.43%	2-10	720
	RVX	0.23%	11-16	500
	RVL	0.19%	2-10	500
	RHX	0.08%	11-16	325
	RHL	0.06%	2-10	325
	RMX	0.05%	11-16	150
	RML	0.02%	2-10	150
	RLX	0.00%	2-16	45
Rehabilitation	RUC	18.81%	11-16	720
	RUB	25.83%	6-10	720
	RUA	13.01%	0-5	720
	RVC	8.13%	11-16	500
	RVB	8.65%	6-10	500
	RVA	6.32%	0-5	500
	RHC	2.93%	11-16	325
	RHB	2.40%	6-10	325
	RHA	1.97%	0-5	325
	RMC	1.44%	11-16	150
	RMB	0.93%	6-10	150
	RMA	0.74%	0-5	150
	RLB	0.03%	11-16	45
	RLA	0.01%	0-10	45
Extensive Services	ES3	0.24%	2-16	-
	ES2	0.14%	2-16	-
	ES1	0.14%	2-16	-
Special Care High	HE2	0.10%	15-16	-
	HE1	0.32%	15-16	-
	HD2	0.11%	11-14	-
	HD1	0.34%	11-14	-
	HC2	0.09%	6-10	-
	HC1	0.29%	6-10	-
	HB2	0.04%	2-5	-

RUG Groups	RUG	% of Utilization Days	ADL Range	Minimum Therapy Minutes
	HB1	0.30%	2-5	-
Special Care Low	LE2	0.12%	15-16	-
	LE1	0.55%	15-16	-
	LD2	0.09%	11-14	-
	LD1	0.66%	11-14	-
	LC2	0.05%	6-10	-
	LC1	0.48%	6-10	-
	LB2	0.01%	2-5	-
	LB1	0.17%	2-5	-
Clinically Complex	CE2	0.04%	15-16	-
	CE1	0.14%	15-16	-
	CD2	0.04%	11-14	-
	CD1	0.35%	11-14	-
	CC2	0.04%	6-10	-
	CC1	0.42%	6-10	-
	CB2	0.02%	2-5	-
	CB1	0.28%	2-5	-
	CA2	0.02%	0-1	-
	CA1	0.43%	0-1	-
Behavioral Symptoms and Cognitive Performance	BB2	0.01%	2-5	-
	BB1	0.09%	2-5	-
	BA2	0.00%	0-1	-
	BA1	0.06%	0-1	-
Reduced Physical Function	PE2	0.01%	15-16	-
	PE1	0.11%	15-16	-
	PD2	0.01%	11-14	-
	PD1	0.24%	11-14	-
	PC2	0.02%	6-10	-
	PC1	0.34%	6-10	-
	PB2	0.01%	2-5	-
	PB1	0.15%	2-5	-
	PA2	0.00%	0-1	-
	PA1	0.11%	0-1	-

Table 89: List of Revenue Center Codes and Categories[43]

Revenue Code	Revenue Code Description	Category
0100	All Inclusive Rate - Room & Board & Ancillary	Routine
0101	All Inclusive Rate - Room & Board	Routine
0110	Private medical or general - general classification	Routine
0111	Private medical or general-medical/surgical/GYN	Routine
0112	Private medical or general-OB	Routine
0113	Private medical or general-pediatric	Routine
0114	Private medical or general-psychiatric	Routine
0115	Private medical or general-hospice	Routine
0116	Private medical or general-detoxification	Routine
0117	Private medical or general-oncology	Routine
0118	Private medical or general-rehabilitation	Routine
0119	Private medical or general-other	Routine
0120	Semi-private 2 bed (medical or general) general classification	Routine
0121	Semi-private 2 bed (medical or general) medical/surgical/GYN	Routine
0122	Semi-private 2 bed (medical or general)-OB	Routine
0123	Semi-private 2 bed (medical or general)-pediatric	Routine
0124	Semi-private 2 bed (medical or general)-psychiatric	Routine
0125	Semi-private 2 bed (medical or general)-hospice	Routine
0126	Semi-private 2 bed (medical or general)-detoxification	Routine
0127	Semi-private 2 bed (medical or general)-oncology	Routine
0128	Semi-private 2 bed (medical or general)-rehabilitation	Routine
0129	Semi-private 2 bed (medical or general)-other	Routine
0130	Semi-private 3 and 4 beds-general classification	Routine
0131	Semi-private 3 and 4 beds-medical/surgical/GYN	Routine
0132	Semi-private 3 and 4 beds-OB	Routine
0133	Semi-private 3 and 4 beds-pediatric	Routine
0134	Semi-private 3 and 4 beds-psychiatric	Routine
0135	Semi-private 3 and 4 beds-hospice	Routine
0136	Semi-private 3 and 4 beds-detoxification	Routine
0137	Semi-private 3 and 4 beds-oncology	Routine
0138	Semi-private 3 and 4 beds-rehabilitation	Routine
0139	Semi-private 3 and 4 beds-other	Routine
0140	Private (deluxe)-general classification	Routine
0141	Private (deluxe)-medical/surgical/GYN	Routine

[43] Research Data Assistance Center (ResDAC). "Revenue Center Code." https://www.resdac.org/cms-data/variables/revenue-center-code.

Revenue Code	Revenue Code Description	Category
0142	Private (deluxe)-OB	Routine
0143	Private (deluxe)-pediatric	Routine
0144	Private (deluxe)-psychiatric	Routine
0145	Private (deluxe)-hospice	Routine
0146	Private (deluxe)-detoxification	Routine
0147	Private (deluxe)-oncology	Routine
0148	Private (deluxe)-rehabilitation	Routine
0149	Private (deluxe)-other	Routine
0150	Room & Board ward (medical or general)-general classification	Routine
0151	Room & Board ward (medical or general)-medical/surgical/GYN	Routine
0152	Room & Board ward (medical or general)-OB	Routine
0153	Room & Board ward (medical or general)-pediatric	Routine
0154	Room & Board ward (medical or general)-psychiatric	Routine
0155	Room & Board ward (medical or general)-hospice	Routine
0156	Room & Board ward (medical or general)-detoxification	Routine
0157	Room & Board ward (medical or general)-oncology	Routine
0158	Room & Board ward (medical or general)-rehabilitation	Routine
0159	Room & Board ward (medical or general)-other	Routine
0160	Other Room & Board-general classification	Routine
0164	Other Room & Board-sterile environment	Routine
0167	Other Room & Board-self care	Routine
0169	Other Room & Board-other	Routine
0170	Nursery-general classification	Routine
0171	Nursery-newborn level I (routine)	Routine
0172	Nursery-premature newborn-level II (continuing care)	Routine
0173	Nursery-newborn-level III	Routine
0174	Nursery-newborn-level IV	Routine
0179	Nursery-other	Routine
0180	Leave of absence-general classification	Routine
0181	Leave of absence - reserved	Routine
0182	Leave of absence-patient convenience charges billable	Routine
0183	Leave of absence-therapeutic leave	Routine
0184	Leave of absence-ICF mentally retarded-any reason	Routine
0185	Leave of absence-nursing home (hospitalization)	Routine
0189	Leave of absence-other leave of absence	Routine
0190	Subacute care - general classification	Routine
0191	Subacute care - level I	Routine

Revenue Code	Revenue Code Description	Category
0192	Subacute care - level II	Routine
0193	Subacute care - level III	Routine
0194	Subacute care - level I	Routine
0199	Other subacute care	Routine
0200	Intensive Care Unit	Routine
0201	ICU - Surgical	Routine
0202	ICU - Medical	Routine
0203	ICU - Pediatric	Routine
0204	ICU - Psychiatric	Routine
0206	Intermediate ICU	Routine
0207	ICU - Burn care	Routine
0208	ICU - Trauma	Routine
0209	Other intensive care	Routine
0210	Coronary care unit	Routine
0211	CCU - Myocardial Infarction	Routine
0212	CCU - Pulmonary Care	Routine
0213	CCU - Heart Transplant	Routine
0214	Intermediate CCU	Routine
0219	Other Coronary Care	Routine
0220	Special charges	Nursing
0221	Admission charge	Nursing
0222	Technical support charge	Nursing
0223	U.R. service charge	Nursing
0224	Late discharge, medically necessary	Nursing
0229	Other special charges	Nursing
0230	Incremental nursing charge rate	Nursing
0231	Nursery	Nursing
0232	OB	Nursing
0233	ICU	Nursing
0234	CCU	Nursing
0235	Hospice	Nursing
0239	Other incremental nursing charge rate	Nursing
0240	All inclusive Ancillary	Nursing
0241	Basic	Nursing
0242	Comprehensive	Nursing
0243	Specialty	Nursing
0249	Other all inclusive ancillary	Nursing
0250	Pharmacy	Non-Therapy Ancillary - Drug
0251	Pharmacy: Generic	Non-Therapy Ancillary - Drug

Revenue Code	Revenue Code Description	Category
0252	Pharmacy: Nongeneric	Non-Therapy Ancillary - Drug
0253	Take home drugs	Non-Therapy Ancillary - Drug
0254	Pharmacy: Incident to other diagnostic services	Non-Therapy Ancillary - Drug
0255	Pharmacy: Incident to radiology	Non-Therapy Ancillary - Drug
0256	Pharmacy: Experimental drugs	Non-Therapy Ancillary - Drug
0257	Pharmacy: Non-prescription	Non-Therapy Ancillary - Drug
0258	Pharmacy: IV solutions	Non-Therapy Ancillary - Drug
0259	Pharmacy: Other	Non-Therapy Ancillary - Drug
0260	IV Therapy	Non-Therapy Ancillary - Drug
0261	IV Therapy: Infusion pump	Non-Therapy Ancillary - Drug
0262	IV Therapy: IV Therapy, pharm services	Non-Therapy Ancillary - Drug
0263	IV Therapy: IV Therapy/drug/supp/delivery	Non-Therapy Ancillary - Drug
0264	IV Therapy: supplies	Non-Therapy Ancillary - Drug
0269	IV Therapy: Other IV therapy	Non-Therapy Ancillary - Drug
0270	Medical/Surgical Supplies	Non-Therapy Ancillary - ONTA
0271	Medical/Surgical Supplies: Nonsterile supplies	Non-Therapy Ancillary - ONTA
0272	Medical/Surgical Supplies: Sterile supplies	Non-Therapy Ancillary - ONTA
0273	Medical/Surgical Supplies: Take home supplies	Non-Therapy Ancillary - ONTA
0274	Medical/Surgical Supplies: Prosthetic/Orthotic devices	Non-Therapy Ancillary - ONTA
0275	Medical/Surgical Supplies: Pacemaker	Non-Therapy Ancillary - ONTA
0276	Medical/Surgical Supplies: Intraocular lens	Non-Therapy Ancillary - ONTA
0277	Oxygen-Take home	Non-Therapy Ancillary - ONTA
0278	Medical/Surgical Supplies: Other implants	Non-Therapy Ancillary - ONTA
0279	Medical/Surgical Supplies: Other supplies/devices	Non-Therapy Ancillary - ONTA
0280	Oncology	Non-Therapy Ancillary - ONTA
0289	Oncology: Other oncology	Non-Therapy Ancillary - ONTA
0290	Durable Medical Equipment	Nursing
0291	DME Rental	Nursing
0292	Durable Medical Equipment: Purchase - new equipment	Nursing
0293	Purchase of used DME	Nursing
0294	Supplies/Drugs for DME effectiveness (HHA only)	Nursing
0299	Durable Medical Equipment: Other equipment	Nursing
0300	Laboratory - Clinical Diagnostic	Non-Therapy Ancillary - ONTA
0301	Laboratory - Clinical Diagnostic: Chemistry	Non-Therapy Ancillary - ONTA
0302	Laboratory - Clinical Diagnostic: Immunology	Non-Therapy Ancillary - ONTA
0303	Laboratory - Clinical Diagnostic: Renal patient (home)	Nursing
0304	Laboratory - Clinical Diagnostic: Nonroutine dialysis	Non-Therapy Ancillary - ONTA
0305	Laboratory - Clinical Diagnostic: Hematology	Non-Therapy Ancillary - ONTA

Revenue Code	Revenue Code Description	Category
0306	Laboratory - Clinical Diagnostic: Bacteriology/microbiology	Non-Therapy Ancillary - ONTA
0307	Laboratory - Clinical Diagnostic: Urology	Non-Therapy Ancillary - ONTA
0309	Laboratory - Clinical Diagnostic: Other laboratory	Non-Therapy Ancillary - ONTA
0310	Laboratory - Pathology	Non-Therapy Ancillary - ONTA
0311	Laboratory - Pathology: Cytology	Nursing
0312	Laboratory - Pathology: Histology	Nursing
0314	Laboratory - Pathology: Biopsy	Non-Therapy Ancillary - ONTA
0319	Laboratory - Pathology: Other	Non-Therapy Ancillary - ONTA
0320	Radiology - Diagnostic	Non-Therapy Ancillary - ONTA
0321	Radiology - Diagnostic: Angiocardiography	Non-Therapy Ancillary - ONTA
0322	Radiology - Diagnostic: Arthrography	Non-Therapy Ancillary - ONTA
0323	Radiology - Diagnostic: Arteriography	Non-Therapy Ancillary - ONTA
0324	Radiology - Diagnostic: Chest X-ray	Non-Therapy Ancillary - ONTA
0329	Radiology - Diagnostic: Other	Non-Therapy Ancillary - ONTA
0330	Radiology - Therapeutic	Non-Therapy Ancillary - ONTA
0331	Radiology - Therapeutic: Chemotherapy - injected	Non-Therapy Ancillary - ONTA
0332	Radiology - Therapeutic: Chemotherapy - oral	Non-Therapy Ancillary - ONTA
0333	Radiology - Therapeutic: Radiation therapy	Non-Therapy Ancillary - ONTA
0335	Radiology - Therapeutic: Chemotherapy - IV	Non-Therapy Ancillary - ONTA
0339	Radiology - Therapeutic: Other	Non-Therapy Ancillary - ONTA
0340	Nuclear Medicine	Non-Therapy Ancillary - ONTA
0341	Nuclear Medicine: Diagnostic	Non-Therapy Ancillary - ONTA
0342	Nuclear Medicine: Therapeutic	Non-Therapy Ancillary - ONTA
0343	Diagnostic Radiopharms	Non-Therapy Ancillary - Drug
0344	Therapeutic Radiopharms	Non-Therapy Ancillary - Drug
0349	Nuclear Medicine: Other	Non-Therapy Ancillary - ONTA
0350	CT Scan	Non-Therapy Ancillary - ONTA
0351	CT Scan: Head	Non-Therapy Ancillary - ONTA
0352	CT Scan: Body	Non-Therapy Ancillary - ONTA
0359	CT Scan: Other CT scans	Non-Therapy Ancillary - ONTA
0360	Operating Room Services	Non-Therapy Ancillary - ONTA
0361	Operating Room Services: Minor surgery	Nursing
0362	Operating Room Services: Organ transplant, not kidney	Nursing
0367	Operating Room Services: Kidney transplant	Nursing
0369	Operating Room Services: Other operating room services	Non-Therapy Ancillary - ONTA
0370	Anesthesia	Nursing
0371	Anesthesia: Incident to radiology	Nursing
0372	Anesthesia: Incident to other diag services	Nursing

Revenue Code	Revenue Code Description	Category
0374	Acupuncture	Nursing
0379	Anesthesia: Other anesthesia	Nursing
0380	Blood	Non-Therapy Ancillary - ONTA
0381	Blood: Packed red cells	Non-Therapy Ancillary - ONTA
0382	Blood: Whole blood	Non-Therapy Ancillary - ONTA
0383	Blood: Plasma	Non-Therapy Ancillary - ONTA
0384	Blood: Platelets	Non-Therapy Ancillary - ONTA
0385	Blood: Leukocytes	Non-Therapy Ancillary - ONTA
0386	Blood: Other components	Non-Therapy Ancillary - ONTA
0387	Blood: Other derivatives	Non-Therapy Ancillary - ONTA
0389	Blood: Other blood	Non-Therapy Ancillary - ONTA
0390	Blood Storage/Processing	Nursing
0391	Blood: Administration (e.g. Transfusion)	Nursing
0392	Blood Storage/Processing	Nursing
0399	Other blood handling	Nursing
0400	Other Imaging Services	Non-Therapy Ancillary - ONTA
0401	Other Imaging Services: Diagnostic mammography	Non-Therapy Ancillary - ONTA
0402	Other Imaging Services: Ultrasound	Non-Therapy Ancillary - ONTA
0403	Other Imaging Services: Screening mammography	Nursing
0404	Other Imaging Services: PET scan	Nursing
0409	Other Imaging Services: Other imaging services	Non-Therapy Ancillary - ONTA
0410	Respiratory Services	Non-Therapy Ancillary - Respiratory
0412	Respiratory Services: Inhalation services	Non-Therapy Ancillary - Respiratory
0413	Respiratory Services: Hyperbaric oxygen therapy	Non-Therapy Ancillary - Respiratory
0419	Respiratory Services: Other respiratory services	Non-Therapy Ancillary - Respiratory
0420	Physical Therapy	Therapy Ancillary - Physical
0421	Physical Therapy: Visit charge	Therapy Ancillary - Physical
0422	Physical Therapy: Hourly charge	Therapy Ancillary - Physical
0423	Physical Therapy: Group rate	Therapy Ancillary - Physical
0424	Physical Therapy: Evaluation/re-evaluation	Therapy Ancillary - Physical
0429	Physical Therapy: Other physical therapy	Therapy Ancillary - Physical
0430	Occupational Therapy	Therapy Ancillary - Occupational
0431	Occupational Therapy: Visit charge	Therapy Ancillary - Occupational
0432	Occupational Therapy: Hourly charge	Therapy Ancillary - Occupational
0433	Occupational Therapy: Group rate	Therapy Ancillary - Occupational
0434	Occupational Therapy: Evaluation/re-evaluation	Therapy Ancillary - Occupational
0439	Occupational Therapy: Other occupational therapy	Therapy Ancillary - Occupational
0440	Speech-Language Pathology	Therapy Ancillary - Speech
0441	Speech-Language Pathology: Visit charge	Therapy Ancillary - Speech

Revenue Code	Revenue Code Description	Category
0442	Speech-Language Pathology: Hourly charge	Therapy Ancillary - Speech
0443	Speech-Language Pathology: Group rate	Therapy Ancillary - Speech
0444	Speech-Language Pathology: Evaluation/ re-evaluation	Therapy Ancillary - Speech
0449	Speech-Language Pathology: Other speech language pathology	Therapy Ancillary - Speech
0450	Emergency Room	Nursing
0451	Emergency Room: EM/EMTALA	Nursing
0452	Emergency Room: ER/ Beyond EMTALA	Nursing
0456	Emergency Room: Urgent care	Nursing
0459	Emergency Room: Other emergency room	Nursing
0460	Pulmonary Function	Non-Therapy Ancillary - Respiratory
0469	Pulmonary Function: Other	Non-Therapy Ancillary - Respiratory
0470	Audiology	Non-Therapy Ancillary - ONTA
0471	Audiology: Diagnostic	Non-Therapy Ancillary - ONTA
0472	Audiology: Treatment	Non-Therapy Ancillary - ONTA
0479	Audiology: Other audiology	Non-Therapy Ancillary - ONTA
0480	Cardiology	Non-Therapy Ancillary - ONTA
0481	Cardiology: Cardiac catheter lab	Non-Therapy Ancillary - ONTA
0482	Cardiology: Stress test	Non-Therapy Ancillary - ONTA
0483	Cardiology: Echocardiology	Non-Therapy Ancillary - ONTA
0489	Cardiology: Other cardiology	Non-Therapy Ancillary - ONTA
0490	Ambulatory Surgery	Nursing
0499	Ambulatory Surgery: Other ambulatory surgical care	Nursing
0500	Outpatient Services	Nursing
0509	Other outpatient services	Nursing
0510	Clinic	Nursing
0511	Clinic: Chronic pain center	Nursing
0512	Clinic: Dental clinic	Nursing
0513	Clinic: Psychiatric clinic	Nursing
0514	Clinic: OB/GYN clinic	Nursing
0515	Clinic: Pediatric clinic	Nursing
0516	Clinic: Urgent care clinic	Nursing
0517	Clinic: Family clinic	Nursing
0519	Clinic: Other clinic	Nursing
0520	Free-Standing Clinic	Nursing
0521	Free-Standing clinic-Clinic visit by a member to RHC/FQHC	Nursing
0522	Free-Standing clinic-Home visit by a member to RHC/FQHC	Nursing
0523	Family Practice Clinic	Nursing
0524	RHC/FQHC visit in Part A covered SNF	Nursing

Revenue Code	Revenue Code Description	Category
0525	RHC/FQHC visit in noncovered SNF, NF, ICFMR or other	Nursing
0526	Urgent Care Clinic	Nursing
0527	Nurse visit to home in a HH shortage area	Nursing
0528	RHC/FQHC visit to other non RHC/FQHC site	Nursing
0529	Free-Standing Clinic: Other	Nursing
0530	Osteopathic Services	Therapy Ancillary - Physical
0531	Osteopathic Services: Osteopathic therapy	Therapy Ancillary - Physical
0539	Osteopathic Services: Other osteopathic services	Therapy Ancillary - Physical
0540	Ambulance	Nursing
0541	Supplies	Nursing
0542	Medical Transport	Nursing
0543	Heart Mobile	Nursing
0544	Oxygen	Nursing
0545	Air ambulance	Nursing
0546	Neonatal ambulance services	Nursing
0547	Pharmacy	Nursing
0548	Telephone Transmission EKG	Nursing
0549	Other ambulance	Nursing
0550	Skilled nursing	Nursing
0551	Visit charge	Nursing
0552	Hourly charge	Nursing
0559	Other skilled nursing	Nursing
0560	Home Health (HH) -- Medical Social Services	Nursing
0561	Home Heath (HH) Medical Social Services: Visit charge	Nursing
0562	Home Health (HH) Medical Social Services: Hourly charge	Nursing
0569	Home Health (HH) Medical Social Services: Other Medical Social Services	Nursing
0570	Home health-Home health aide	Nursing
0571	Visit charge	Nursing
0572	Hourly charge	Nursing
0579	Other home health aide	Nursing
0580	Home health-other visits	Nursing
0581	Visit charge	Nursing
0582	Hourly charge	Nursing
0583	Assessment	Nursing
0589	Other home health visit	Nursing
0590	Home health-units of service	Nursing
0600	Home health-oxygen	Nursing
0601	Oxygen-state/equip/suppl/ or cont	Nursing

Revenue Code	Revenue Code Description	Category
0602	Oxygen-state/equip/suppl/ or under 1 LPM	Nursing
0603	Oxygen-state/equip/over 4 LPM	Nursing
0604	Oxygen-Portable Add-on	Nursing
0610	Magnetic Resonance Tech. (MRT)	Non-Therapy Ancillary - ONTA
0611	Magnetic Resonance Tech. (MRT): Brain (incl. Brainstem)	Non-Therapy Ancillary - ONTA
0612	Magnetic Resonance Tech. (MRT): Spinal cord (incl. spine)	Non-Therapy Ancillary - ONTA
0614	Magnetic Resonance Tech. (MRT): MRI - Other	Non-Therapy Ancillary - ONTA
0615	Magnetic Resonance Tech. (MRT): MRA - Head and Neck	Non-Therapy Ancillary - ONTA
0616	Magnetic Resonance Tech. (MRT): MRA - Lower Ext	Non-Therapy Ancillary - ONTA
0618	Magnetic Resonance Tech. (MRT): MRA - Other	Non-Therapy Ancillary - ONTA
0619	Magnetic Resonance Tech. (MRT): Other MRT	Non-Therapy Ancillary - ONTA
0621	Med - Surg Supplies Ext. of 270: Incident to radiology	Non-Therapy Ancillary - ONTA
0622	Med - Surg Supplies Ext. of 270: Incident to other diag.	Non-Therapy Ancillary - ONTA
0623	Surgical dressings	Non-Therapy Ancillary - ONTA
0624	Med - Surg Supplies Ext. of 270: Investigational Device (IDE)	Nursing
0631	Drugs Require Specific ID: Single source drug	Non-Therapy Ancillary - Drug
0632	Drugs Require Specific ID: Multiple source drug	Non-Therapy Ancillary - Drug
0633	Drugs Require Specific ID: Restrictive prescription	Non-Therapy Ancillary - Drug
0634	Drugs Require Specific ID: EPO under 10,000 units	Non-Therapy Ancillary - Drug
0635	Drugs Require Specific ID: EPO over 10,000 units	Non-Therapy Ancillary - Drug
0636	Drugs Require Specific ID: Drugs requiring detail coding	Non-Therapy Ancillary - Drug
0637	Drugs Require Specific ID: Self admin drugs (insulin admin in emergency-diabetes coma)	Non-Therapy Ancillary - Drug
0640	Home IV Therapy Services	Nursing
0641	Nonroutine nursing, central line	Nursing
0642	IV site care, Central line	Nursing
0643	IV start/change, peripheral line	Nursing
0644	Nonroutine nursing, peripheral line	Nursing
0645	Training patient/caregiver, central line	Nursing
0646	Training, Disabled patient, central line	Nursing
0647	Training, patient/caregiver, peripheral line	Nursing
0648	Training, disabled patient, peripheral line	Nursing
0649	Other IV therapy services	Nursing
0650	Hospice service	Nursing
0651	Routine home care	Nursing
0652	Continuous home care	Nursing
0655	Inpatient respite care	Nursing

Revenue Code	Revenue Code Description	Category
0656	General inpatient care (non-respite)	Nursing
0657	Physician services	Nursing
0658	Hospice Room & Board-Nursing facility	Nursing
0659	Other hospice service	Nursing
0660	Respite Care	Nursing
0661	Hourly Respite Care Charge Nursing	Nursing
0662	Hourly Respite Care Charge Aide/Homemaker/Companion	Nursing
0663	Daily Respite Charge	Nursing
0669	Other respite care	Nursing
0670	Outpatient Special Residence Charges	Nursing
0671	Hospital based	Nursing
0672	Contracted	Nursing
0679	Other special residence charge	Nursing
0681	Trauma Response: Level I	Nursing
0682	Trauma Response: Level II	Nursing
0683	Trauma Response: Level III	Nursing
0684	Trauma Response: Level IV	Nursing
0689	Trauma Response: Other	Nursing
0700	Cast Room	Non-Therapy Ancillary - ONTA
0709	Other cast room	Non-Therapy Ancillary - ONTA
0710	Recovery Room	Non-Therapy Ancillary - ONTA
0719	Recovery Room: Other	Non-Therapy Ancillary - ONTA
0720	Labor Room	Nursing
0721	Labor Room: Labor	Nursing
0722	Labor Room: Delivery	Nursing
0723	Labor Room: Circumcision	Nursing
0724	Labor Room: Birthing center	Nursing
0729	Labor Room: Other labor room/delivery	Nursing
0730	EKG/ECG	Non-Therapy Ancillary - ONTA
0731	EKG/ECG: Holter monitor	Non-Therapy Ancillary - ONTA
0732	EKG/ECG: Telemetry	Non-Therapy Ancillary - ONTA
0739	EKG/ECG: Other EKG/ECG	Non-Therapy Ancillary - ONTA
0740	EEG	Non-Therapy Ancillary - ONTA
0749	EEG: Other	Non-Therapy Ancillary - ONTA
0750	Gastrointestinal	Non-Therapy Ancillary - ONTA
0759	Gastrointestinal: Other	Non-Therapy Ancillary - ONTA
0760	Treatment/Observation Room	Nursing
0761	Treatment/Observation Room: Treatment room	Nursing
0762	Treatment/Observation Room: Observation room	Nursing

Revenue Code	Revenue Code Description	Category
0769	Treatment/Observation Room: Other treatment room	Nursing
0770	Preventive Care Services	Nursing
0771	Preventive Care Services: Admin. of vaccine	Nursing
0780	Telemedicine	Nursing
0790	Extra-Corp Shock Wave Therapy	Nursing
0799	Extra-Corp Shock Wave Therapy: Other	Nursing
0800	Inpatient Dialysis	Non-Therapy Ancillary - ONTA
0801	Inpatient Hemodialysis	Non-Therapy Ancillary - ONTA
0802	Inpatient peritoneal dialysis	Non-Therapy Ancillary - ONTA
0803	inpatient dialysis CAPD	Non-Therapy Ancillary - ONTA
0804	Inpatient dialysis CCPD	Non-Therapy Ancillary - ONTA
0809	Other inp dialysis	Non-Therapy Ancillary - ONTA
0810	Organ Acquisition	Nursing
0811	Organ Acquisition: Living donor	Nursing
0812	Organ Acquisition: Cadaver donor	Nursing
0813	Organ Acquisition: Unknown donor	Nursing
0814	Organ Acquisition: Unsuccessful Organ Search Donor Bank Charges	Nursing
0819	Organ Acquisition: Other donor	Nursing
0820	Hemo OPD/Home	Nursing
0821	Hemo OPD/Home: Hemodialysis comp or other rate	Nursing
0822	Hemo OPD/Home supplies	Nursing
0823	Hemo OPD/home equipment	Nursing
0824	Hemo OPD/Home Maintenance 100%	Nursing
0825	Hemo OPD/Home Support Services	Nursing
0829	Hemo OPD/Home: Other HEMO outpatient	Nursing
0830	Peritoneal OPD/Home	Nursing
0831	Peritoneal OPD/Home: Peritoneal comp or other rate	Nursing
0832	Home supplies	Nursing
0833	Home equipment	Nursing
0834	Maintenance/100%	Nursing
0835	Support services	Nursing
0839	Peritoneal OPD/Home: Other peritoneal dialysis	Nursing
0840	CAPD OPD/Home	Nursing
0841	CAPD OPD/Home: CAPD comp or other rate	Nursing
0842	Home supplies	Nursing
0843	Home equipment	Nursing
0844	Maintenance/100%	Nursing
0845	Support services	Nursing
0849	CAPD OPD/Home: Other CAPD dialysis	Nursing

Revenue Code	Revenue Code Description	Category
0850	CCPD OPD/Home	Nursing
0851	CCPD OPD/Home: CCPD comp or other rate	Nursing
0852	Home supplies	Nursing
0853	Home equipment	Nursing
0854	Maintenance/100%	Nursing
0855	Support services	Nursing
0859	CCPD OPD/Home: Other CCPD dialysis	Nursing
0880	Miscellaneous Dialysis	Nursing
0881	Miscellaneous Dialysis: Ultrafiltration	Nursing
0882	Home dialysis aid visit	Nursing
0889	Miscellaneous Dialysis: Other misc dialysis	Nursing
0900	Behavior Health Treatment/Services - general classification	Nursing
0901	Behavior Health Treatment/Services - electroshock treatment	Nursing
0902	Behavior Health Treatment/Services - milieu therapy	Nursing
0903	Behavior Health/Therapy/Services - play therapy	Nursing
0904	Behavior Health Therapy/Services - activity therapy	Nursing
0905	Behavior Health Therapy/Services - intensive outpatient services-psychiatric	Nursing
0906	Behavior Health Therapy/Services - intensive outpatient services-chemical dependency	Nursing
0907	Behavior Health Therapy/Services - community behavioral health program-day treatment	Nursing
0911	Behavioral Health Treatment/Services-rehabilitation	Nursing
0912	Behavioral Health Treatment/Services-partial hospitalization-less intensive	Nursing
0913	Behavioral Health Treatment/Services-partial hospitalization-intensive	Nursing
0914	Behavioral Health Treatment/Services-individual therapy	Nursing
0915	Behavioral Health Treatment/Services-group therapy	Nursing
0916	Behavioral Health Treatment/Services-family therapy	Nursing
0917	Behavioral Health Treatment/Services-biofeedback	Nursing
0918	Behavioral Health Treatment/Services-testing	Nursing
0919	Behavioral Health Treatment/Services-other	Nursing
0920	Other Diagnostic Services	Non-Therapy Ancillary - ONTA
0921	Other Diagnostic Services: Peripheral vascular lab	Non-Therapy Ancillary - ONTA
0922	Other Diagnostic Services: Electromyelogram	Non-Therapy Ancillary - ONTA
0923	Other Diagnostic Services: Pap smear	Nursing
0924	Other Diagnostic Services: Allergy test	Nursing
0925	Other Diagnostic Services: Pregnancy test	Nursing
0929	Other Diagnostic Services: Other diagnostic services	Non-Therapy Ancillary - ONTA
0931	Medical rehab; half day	Nursing

Revenue Code	Revenue Code Description	Category
0932	Medical rehab; full day	Nursing
0940	Other Therapeutic Serv	Nursing
0941	Other Therapeutic Serv: Recreation Rx	Nursing
0942	Other Therapeutic Serv: Educ/training	Nursing
0943	Other Therapeutic Serv: Cardiac rehab	Nursing
0944	Other Therapeutic Serv: Drug rehab	Nursing
0945	Other Therapeutic Serv: Alcohol rehab	Nursing
0946	Complex medical equipment-Routine	Nursing
0947	Complex medical equipment-Ancillary	Nursing
0948	Pulmonary Rehabilitation	Nursing
0949	Other Therapeutic Serv: Additional RX SVS	Nursing
0951	Other therapeutic services-(940x) Athletic training	Nursing
0952	Other therapeutic services-(940x) Kinesiotherapy	Nursing
0960	Professional fees	Nursing
0961	Psychiatric	Nursing
0962	Ophthalmology	Nursing
0963	Anesthesiologist (MD)	Nursing
0964	Anesthetist (CRNA)	Nursing
0969	Other professional fee	Nursing
0971	Professional fees (096x) Laboratory	Nursing
0972	Professional fees (096x) Radiology-Diagnostic	Nursing
0973	Professional fees (096x) Radiology-Therapeutic	Nursing
0974	Professional fees (096x) Radiology-nuclear medicine	Nursing
0975	Professional fees (096x) Operating room	Nursing
0976	Professional fees (096x) Respiratory Therapy	Nursing
0977	Professional fees (096x) Physical therapy	Nursing
0978	Professional fees (096x) Occupational therapy	Nursing
0979	Professional fees (096x) Speech pathology	Nursing
0981	Professional fees (096x) Emergency room	Nursing
0982	Professional fees (096x) Outpatient services	Nursing
0983	Professional fees (096x) clinic	Nursing
0984	Professional fees (096x) medical social services	Nursing
0985	Professional fees (096x) EKG	Nursing
0986	Professional fees (096x) EEK	Nursing
0987	Professional fees (096x) Hospital visit	Nursing
0988	Professional fees (096x) Consultation	Nursing
0989	Private duty nurse	Nursing
0990	Patient convenience items	Nursing
0991	Cafeteria/guest tray	Nursing

Revenue Code	Revenue Code Description	Category
0992	private linen service	Nursing
0993	telephone/telegraph	Nursing
0994	TV/radio	Nursing
0995	Nonpatient room rentals	Nursing
0996	Late discharge charge	Nursing
0997	admission kits	Nursing
0998	Beauty shop/barber	Nursing
0999	Other patient convenience item	Nursing

Table 90: List of Ancillary Service Cost Centers on Form "SNF CMS 2540-10" (Freestanding SNFs)

Ancillary Service Cost Center	Category
Radiology	Non-Therapy Ancillary - ONTA
Laboratory	Non-Therapy Ancillary - ONTA
Intravenous Therapy	Non-Therapy Ancillary - Drug
Oxygen (Inhalation) Therapy	Non-Therapy Ancillary - Respiratory
Physical Therapy	Physical Therapy
Occupational Therapy	Occupational Therapy
Speech Pathology	Speech Pathology
Electrocardiology	Non-Therapy Ancillary - ONTA
Medical Supplies Charged to Patients	Non-Therapy Ancillary - ONTA
Drugs Charged to Patients	Non-Therapy Ancillary - Drug
Dental Care - Title XIX Only	Non-Therapy Ancillary - ONTA
Support Surfaces	Non-Therapy Ancillary - ONTA
Other Ancillary Service Cost	Non-Therapy Ancillary - ONTA

Table 91: List of Ancillary Service Cost Centers on Form "CMS 2552-10" (Hospital-based SNFs and Swing Bed Facilities)

Ancillary Service Cost Center	Category
Operating Room	Non-Therapy Ancillary - ONTA
Recovery Room	Non-Therapy Ancillary - ONTA
Labor Room and Delivery Room	Non-Therapy Ancillary - ONTA
Anesthesiology	Non-Therapy Ancillary - ONTA
Radiology- Diagnostic	Non-Therapy Ancillary - ONTA
Radiology-Therapeutic	Non-Therapy Ancillary - ONTA
Radioisotope	Non-Therapy Ancillary - ONTA

Ancillary Service Cost Center	Category
Computed Tomography (CT) Scan	Non-Therapy Ancillary - ONTA
Magnetic Resonance Imaging (MRI)	Non-Therapy Ancillary - ONTA
Cardiac Catheterization	Non-Therapy Ancillary - ONTA
Laboratory	Non-Therapy Ancillary - ONTA
PBP Clinical Laboratory Services - Prgm. Only	Excluded
Whole Blood & Packed Red Blood Cells	Non-Therapy Ancillary - ONTA
Blood Storing, Processing, & Trans.	Non-Therapy Ancillary - ONTA
Intravenous Therapy	Non-Therapy Ancillary - Drug
Respiratory Therapy	Non-Therapy Ancillary - Respiratory
Physical Therapy	Physical Therapy
Occupational Therapy	Occupational Therapy
Speech Pathology	Speech Pathology
Electrocardiology	Non-Therapy Ancillary - ONTA
Electroencephalography	Non-Therapy Ancillary - ONTA
Medical Supplies Charged to Patients	Non-Therapy Ancillary - ONTA
Implantable Devices Charged to Patients	Non-Therapy Ancillary - ONTA
Drugs Charged to Patients	Non-Therapy Ancillary - Drug
Renal Dialysis	Non-Therapy Ancillary - ONTA
ASC(Non-Distinct Part)	Non-Therapy Ancillary - ONTA
Other Ancillary (specify)	Non-Therapy Ancillary - ONTA

Table 92: Variables Included in the OLS Index Models

MDS Item or ICD-9 Code	Variable Name	MDS Item or ICD-9 Code	Variable Name
-	Age	I3100	Active Diagnoses: Hyponatremia Code
-	Age	I3200	Active Diagnoses: Hyperkalemia Code
B0200	Hearing Code	I3300	Active Diagnoses: Hyperlipidemia Code
B0300	Hearing Aide Code	I3900	Active Diagnoses: Hip Fracture Code
B0600	Speech Clarity Code	I4000	Active Diagnoses: Other Fracture Code
B0700	Makes Self Understood Code	I4200	Active Diagnoses: Alzheimer's Disease Code
B0800	Ability to Understand Others Code	I4300	Active Diagnoses: Aphasia Code
B1000	Vision Code	I4400	Active Diagnoses: Cerebral Palsy Code
B1200	Corrective Lenses Code	I4500	Active Diagnoses: Stroke (CVA or TIA or Stroke) Code
-	Long Term Memory Ability	I4800	Active Diagnoses: Dementia Code
-	Recall Ability	I4900	Active Diagnoses: Hemiplegia Code
-	Short Term Memory Ability	I5000	Active Diagnoses: Paraplegia Code
-	Presence of Delirium	I5100	Active Diagnoses: Quadriplegia Code
-	Brief Interview for Mental Status (BIMS) Score Number	I5200	Active Diagnoses: Multiple Sclerosis Code
-	Condition Category	I5250	Active Diagnoses: Huntington's Code
-	Trouble Concentrating	I5300	Active Diagnoses: Parkinson's Code
-	Feeling Down	I5350	Active Diagnoses: Tourette's Code
-	Loss of Interest	I5400	Active Diagnoses: Seizure Code
-	Little Energy	I5500	Active Diagnoses: Traumatic Brain Injury (TBI) Code
-	Source of Mood Assessment	I5600	Active Diagnoses: Malnutrition Code
-	Different Movement and Speech	I5700	Active Diagnoses: Anxiety Disorder Code
-	Experiencing Negative Thoughts	I5800	Active Diagnoses: Depression Code
-	Poor Appetite	I5900	Active Diagnoses: Manic Depression Code
-	Self-Deprecation	I5950	Active Diagnoses: Psychotic Code
-	Trouble Sleeping	I6000	Active Diagnoses: Schizophrenia Code
-	Total Mood score	I6100	Active Diagnoses: Post-traumatic Stress Disorder (PTSD) Code
161.XX	Laryngeal Cancer	I6200	Active Diagnoses: Asthma COPD Chronic Lung Disease Code

MDS Item or ICD-9 Code	Variable Name	MDS Item or ICD-9 Code	Variable Name
438.81	Apraxia	I6300	Active Diagnoses: Respiratory Failure Code
438.82	Dysphagia	-	Section I Diagnosis Count
438.13	Dysarthria	-	Section I Diagnosis Count
335.20	ADL	-	Frequency of Pain
333.4X	Huntington's Disease	-	Intensity of Pain
140.XX, 141.XX, 143.XX, 144.XX, 146.XX, 149.XX, 145.0, 145.1, 145.2, 145.3, 145.5, 145.6, 145.8, 145.9	Oral Cancer	-	Treatment for pain
438.1X	Speech and Language Deficits	-	Pain Assessment Source
290.XX, 294.1X, 294.2X, 331.0, 331.11,331.19, 331.2, 331.6, 331.7, 331.81	Dementia	J0500A	Pain Assessment Interview: Pain Effect Sleep Code
V42.0, V42.1, V42.6, V42.7, V42.83, V42.84	Transplant	J0500B	Pain Assessment Interview: Pain Effect Activity Code
585.6, V45.11	ESRD	J1100A	Shortness of Breath With Exertion Code
038.12, 041.12	MRSA	J1100B	Shortness of Breath When Sitting Code
391.1, 093.20, 093.21, 093.22, 093.23, 093.24, 394.XX, 730.XX, 421.XX	Osteomyelitis and Endocarditis	J1100C	Shortness of Breath When Lying Flat Code
038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 995.91, 335.92	Sepsis	J1800	Falls Since Admission or Prior Assessment Code
038.9	Unspecified Sepsis	-	Fall within 30 days prior to admission
453.4, 415.9, 451.1, 453.4X, 415.1X, 451.1X	DVT/Pulmonary Embolism	-	Fall between 31 and 180 days prior to admission
V46.11, V46.12, V46.13	Respirator	-	Fall since the last assessment that resulted in a non-major injury
V09.8X, V09.9X	Infection with multi-resistant organisms	-	Fall since the last assessment that resulted in a major injury
518.81, 518.84	Acute Respiratory Failure	-	Fall since the last assessment that did not result in an injury
E0100Z	Behavior: Psychosis Code	-	Fracture related to a fall in the six months prior to admission
E0800	Rejection of Care: Presence and Frequency	K0100A	Swallowing Disorder: Loss Mouth Eating Code
E0900	Wandering: Presence and Frequency	K0100B	Swallowing Disorder: Hold Food Mouth Code
G0110A1	ADL Bed Mobility (Self-Performance)	K0100C	Swallowing Disorder: Choke Drinking Meal Code

MDS Item or ICD-9 Code	Variable Name	MDS Item or ICD-9 Code	Variable Name
G0110A2	ADL Assistance: Bed Mobility Support Provided Code	K0100D	Swallowing Disorder: Complaint Swallowing Code
G0110B1	ADL Transfer (Self-Performance)	M0300X1	Highest Stage of Unhealed Pressure Ulcer
G0110B2	ADL Assistance: Transfer Support Provided Code	M0300X2	Highest Stage of Unhealed Pressure Ulcer that is Present upon admission
G0110H1	ADL Eating (Self-Performance)	M0300X3	Unhealed unstageable ulcer
G0110H2	ADL Assistance: Eating Support Provided Code	M0300X4	Unhealed unstageable ulcer present upon admission
G0110I1	ADL Toilet Use (Self-Performance)	M0150	Pressure Ulcer Risk Code
G0110I2	ADL Assistance: Toilet Use Support Provided Code	M0210	One or More Stage 1 or Higher Unhealed Pressure Ulcer Code
G0110C1	ADL Walk in room (Self-Performance)	M1030	Number of venous or arterial ulcers present
G0110C2	ADL Assistance: Walk In Room Support Provided Code	M1040A	Other Foot Skin Problems: Foot Infection Code
G0110D1	ADL Walk in corridor (Self-Performance)	M1040B	Other Foot Skin Problems: Diabetic Foot Ulcer Code
G0110D2	ADL Assistance: Walk In Corridor Support Provided Code	M1040C	Other Foot Skin Problems: Other Open Lesion on Foot Code
G0110E1	ADL Locomotion on unit (Self-Performance)	M1040D	Other Skin Problems: Open Lesions Other Than Ulcers Rashes Cuts Code
G0110E2	ADL Assistance: Locomotion On Support Provided Code	M1040E	Other Skin Problems: Surgical Wound(s) Code
G0110F1	ADL Locomotion off unit (Self-Performance)	M1040F	Other Skin Problems: Burn(s) Code
G0110F2	ADL Assistance: Locomotion Off Support Provided Code	M1040G	Other Skin Problems: Skin Tear(s) Code
G0110G1	ADL Dressing (Self-Performance)	M1040H	Other Skin Problems: Moisture Associated Skin Damage Code
G0110G2	ADL Assistance: Dress Support Provided Code	M1200A	Skin and Ulcer Treatments: Pressure Reducing Device in Chair Code
G0110J1	ADL Personal hygiene (Self-Performance)	M1200B	Skin and Ulcer Treatments: Pressure Reducing Device in Bed Code
G0110J2	ADL Assistance: Personal Hygiene Support Provided Code	M1200C	Skin and Ulcer Treatments: Turning/Repositioning Program Code
G0120A	ADL Bathing (Self-Performance)	M1200D	Skin and Ulcer Treatments: Nutrition/Hydration Code
G0120B	ADL Assistance: Bathing Support Provided Code	M1200E	Skin and Ulcer Treatments: Ulcer Care Code
-	Limited Range of Motion	M1200F	Skin and Ulcer Treatments: Surgical Wound Care Code
-	Feeling Unsteady	M1200G	Skin and Ulcer Treatments: Application Nonsurgical Dressing Code
G0300A	Balance: Moving from seated to standing position	M1200H	Skin and Ulcer Treatments: Application Ointments/Medications Code
G0300B	Balance: Walking	M1200I	Skin and Ulcer Treatments: Application Dressings to Foot Code
G0300C	Balance: Turning around	-	DRG - Complications

MDS Item or ICD-9 Code	Variable Name	MDS Item or ICD-9 Code	Variable Name
G0300D	Balance: Moving on and off toilet	-	DRG - Group
G0300E	Balance: Surface to surface transfer	N0350A	Insulin Injections in Past Seven Days
G0400A	Functional Limitation in Range of Motion: Upper extremity	N0410A	Antipsychotic Medication
G0400B	Functional Limitation in Range of Motion: Lower extremity	N0410B	Antianxiety Medication
G0600A	Mobility Devices: Cane/crutch	N0410C	Antidepressant Medication
G0600B	Mobility Devices: Walker	N0410D	Hypnotic Medication
G0600C	Mobility Devices: Wheelchair	N0410E	Anticoagulant
G0600D	Mobility Devices: Limb prosthesis	N0410F	Antibiotic
G0600Z	Mobility Devices: None of the above	N0410G	Diuretic
H0100A	Bladder and Bowel Appliances: Indwelling Catheter Code	O0100A1	Special Treatments/Programs: Chemotherapy Pre-admit Code
H0200A	Trial Urinary Toileting Program	O0100A2	Special Treatments/Programs: Chemotherapy Post-admit Code
H0300	Urinary Continence Code	O0100B1	Special Treatments/Programs: Radiation Pre-admit Code
H0400	Bowel Continence Code	O0100B2	Special Treatments/Programs: Radiation Post-admit Code
H0500	Bowel Toileting Program Code	O0100C1	Special Treatments/Programs: Oxygen Pre-admit Code
I0200	Active Diagnoses: Anemia Code	O0100C2	Special Treatments/Programs: Oxygen Post-admit Code
I0600	Active Diagnoses: Heart Failure (CHF) Code	O0100D1	Special Treatments/Programs: Suctioning Pre-admit Code
I0700	Active Diagnoses: Hypertension Code	O0100D2	Special Treatments/Programs: Suctioning Post-admit Code
I0800	Active Diagnoses: Orthostatic Hypotension Code	O0100E1	Special Treatments/Programs: Tracheostomy Pre-admit Code
I0900	Active Diagnoses: Peripheral Vascular Disease (PVD) Code	O0100E2	Special Treatments/Programs: Tracheostomy Post-admit Code
I1550	Active Diagnoses: Neurogenic Bladder Code	O0100F1	Special Treatments/Programs: Ventilator Pre-admit Code
I1650	Active Diagnoses: Obstructive Uropathy Code	O0100F2	Special Treatments/Programs: Ventilator Post-admit Code
I1700	Active Diagnoses: Multi-Drug Resistant Organism (MDRO) Code	O0100H1	Special Treatments/Programs: Intravenous Medication Pre-admit Code
I2000	Active Diagnoses: Pneumonia Code	O0100H2	Special Treatments/Programs: Intravenous Medication Post-admit Code
I2100	Active Diagnoses: Septicemia Code	O0100I1	Special Treatments/Programs: Transfusion Pre-admit Code
I2200	Active Diagnoses: Tuberculosis Code	O0100I2	Special Treatments/Programs: Transfusion Post-admit Code
I2300	Active Diagnoses: Urinary Tract Infection (UTI) Code	O0100J1	Special Treatments/Programs: Dialysis Pre-admit Code
I2400	Active Diagnoses: Viral Hepatitis Code	O0100J2	Special Treatments/Programs: Dialysis Post-admit Code
I2500	Active Diagnoses: Wound Infection Code	O0100K2	Special Treatments/Programs: Hospice Post-admit Code

MDS Item or ICD-9 Code	Variable Name	MDS Item or ICD-9 Code	Variable Name
I2900	Active Diagnoses: Diabetes Mellitus (DM) Code	O0100M2	Special Treatments/Programs: Isolation Post-admit Code

Table 93: Comparison of Constructed WWST and STRIVE WWST for Non-Rehabilitation RUGs

RUG-IV	Constructed Number of Stays	Constructed Avg. WWST	STRIVE Number of Stays*	STRIVE Avg. WWST*
BA1	595	73.0	595	71.7
BA2	37	94.7	34	93.2
BB1	519	105.6	528	103.2
BB2	102	106.5	102	104.5
CA1	330	90.6	369	90.0
CA2	80	112.1	85	92.4
CB1	152	129.5	169	115.6
CB2	53	128.5	63	128.1
CC1	265	123.2	282	122.1
CC2	93	134.2	99	129.8
CD1	168	152.8	187	148.9
CD2	69	198.6	74	191.3
CE1	63	160.9	71	160.8
CE2	27	180.4	33	176.7
ES1	40	275.1	40	261.9
ES2	104	317.2	101	302.0
ES3	176	412.9	200	404.7
HB1	114	137.2	123	138.7
HB2	34	306.1	40	290.0
HC1	122	176.3	147	174.7
HC2	36	194.3	45	191.4
HD1	119	187.4	141	176.3
HD2	38	258.4	49	245.5
HE1	93	212.0	103	204.6
HE2	19	228.0	21	229.9
LB1	75	121.2	85	125.9
LB2	17	178.1	19	174.2
LC1	199	144.8	202	142.2
LC2	70	162.0	69	160.0
LD1	254	145.9	255	146.0
LD2	72	191.0	75	191.7
LE1	210	179.2	206	175.7
LE2	48	202.9	48	203.0
PA1	815	68.1	822	64.4
PA2	50	48.3	51	46.7
PB1	362	84.2	387	83.6

RUG-IV	Constructed Number of Stays	Constructed Avg. WWST	STRIVE Number of Stays*	STRIVE Avg. WWST*
PB2	69	106.2	67	113.5
PC1	739	130.4	751	120.6
PC2	167	110.5	160	109.4
PD1	472	149.3	466	145.8
PD2	97	155.9	94	153.0
PE1	226	161.2	223	160.9
PE2	41	165.5	36	161.7

**Table 5-3 in the STRIVE Report.*

Table 94: OLS Estimates from Regressions of PT/OT, PT, and OT Costs per Day on Selected Resident Characteristics

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
BIMS Score	0	-13.03**	-7.47**	-5.56**	-7.09	-5.94
BIMS Score	1	-13.03**	-7.77**	-5.26**	-7.09	-5.94
BIMS Score	2	-12.05**	-6.97**	-5.08**	-6.56	-5.50
BIMS Score	3	-13.08**	-7.6**	-5.48**	-7.12	-5.96
BIMS Score	4	-10.72**	-6.36**	-4.36**	-5.83	-4.89
BIMS Score	5	-10.78**	-6.41**	-4.37**	-5.86	-4.92
BIMS Score	6	-9.08**	-5.4**	-3.69**	-4.94	-4.14
BIMS Score	7	-8.53**	-5.14**	-3.39**	-4.64	-3.89
BIMS Score	8	-7.45**	-4.54**	-2.92**	-4.05	-3.40
BIMS Score	9	-7.11**	-4.41**	-2.7**	-3.87	-3.24
BIMS Score	10	-5.26**	-3.46**	-1.8**	-2.86	-2.40
BIMS Score	11	-4.36**	-2.94**	-1.42**	-2.37	-1.99
BIMS Score	12	-3.08**	-2.19**	-0.89**	-1.67	-1.40
BIMS Score	13	-1.62**	-1.29**	-0.33**	-0.88	-0.74
BIMS Score	14	-0.68**	-0.7**	0.02	-0.37	-0.31
BIMS Score	15	Ref.	Ref.	Ref.	Ref.	Ref.
BIMS Score	99 (unsuccessful)	-12.93**	-7.57**	-5.36**	-7.03	-5.90
BIMS Score	Skipped/blank	-5.83**	-3.71**	-2.12**	-3.17	-2.66
B0700 Makes Self Understood	Understood	Ref.	Ref.	Ref.	Ref.	Ref.
B0700 Makes Self Understood	Usually understood	-3.68**	-1.92**	-1.75**	-2.00	-1.68
B0700 Makes Self Understood	Sometimes understood	-7.95**	-3.99**	-3.96**	-4.33	-3.63
B0700 Makes Self Understood	Rarely/never understood	-21.58**	-11.28**	-10.3**	-11.74	-9.84

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
G0110A1: Bed Mobility - Self Performance	Unable to Determine	-29**	-19.27**	-9.74**	-15.78	-13.22
G0110A1: Bed Mobility - Self Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110A1: Bed Mobility - Self Performance	Supervision	-0.13	-0.52	0.39	-0.07	-0.06
G0110A1: Bed Mobility - Self Performance	Limited Assistance	0.89	0.04	0.85**	0.49	0.41
G0110A1: Bed Mobility - Self Performance	Extensive Assistance	-0.13	-0.58	0.45	-0.07	-0.06
G0110A1: Bed Mobility - Self Performance	Total Dependence	-0.39	-1.09	0.7*	-0.21	-0.18
G0110A1: Bed Mobility - Self Performance	Activity Occurred Only Once or Twice	-10.42**	-5.48**	-4.93**	-5.67	-4.75
G0110A1: Bed Mobility - Self Performance	Activity Did Not Occur	-9.17**	-6.08**	-3.09*	-4.99	-4.18
G0110A2: Bed Mobility - Support Provided	Unable to Determine	18.55*	9.44	9.11*	10.09	8.46
G0110A2: Bed Mobility - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110A2: Bed Mobility - Support Provided	Setup Help Only	-1.49**	-0.38	-1.11**	-0.81	-0.68
G0110A2: Bed Mobility - Support Provided	One Person Physical Assist	-1.99**	-0.67	-1.32**	-1.08	-0.91
G0110A2: Bed Mobility - Support Provided	Two+ Persons Physical Assist	-2.74**	-1.07*	-1.66**	-1.49	-1.25
G0110B1: Transfer - Self-Performance	Unable to Determine	5.2	0.7	4.5	2.83	2.37
G0110B1: Transfer - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110B1: Transfer - Self-Performance	Supervision	5.06**	3.48**	1.59**	2.76	2.31
G0110B1: Transfer - Self-Performance	Limited Assistance	9.34**	5.83**	3.51**	5.08	4.26
G0110B1: Transfer - Self-Performance	Extensive Assistance	11.75**	7.22**	4.53**	6.39	5.36
G0110B1: Transfer - Self-Performance	Total Dependence	6.05**	3.9**	2.15**	3.29	2.76
G0110B1: Transfer - Self-Performance	Activity Occurred Only Once or Twice	-3.2**	-1.08*	-2.12**	-1.74	-1.46
G0110B1: Transfer - Self-Performance	Activity Did Not Occur	-4.63**	-2.49**	-2.13**	-2.52	-2.11
G0100B2: Transfer - Support Provided	Unable to Determine	1.14	0.25	0.89	0.62	0.52
G0100B2: Transfer - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0100B2: Transfer - Support Provided	Setup Help Only	3.98**	2.42**	1.56**	2.16	1.81
G0100B2: Transfer - Support Provided	One Person Physical Assist	5.76**	3.29**	2.47**	3.13	2.63
G0100B2: Transfer - Support Provided	Two+ Persons Physical Assist	6.05**	3.35**	2.7**	3.29	2.76
G0110C1: Walk in Room - Self-Performance	Unable to Determine	-6.42	-0.31	-6.11*	-3.49	-2.93
G0110C1: Walk in Room - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110C1: Walk in Room - Self-Performance	Supervision	0.84	0.79*	0.05	0.46	0.38
G0110C1: Walk in Room - Self-Performance	Limited Assistance	3**	2.33**	0.68*	1.63	1.37
G0110C1: Walk in Room - Self-Performance	Extensive Assistance	4.71**	3.34**	1.37**	2.56	2.15
G0110C1: Walk in Room - Self-Performance	Total Dependence	3.65**	2.79**	0.86	1.99	1.66
G0110C1: Walk in Room - Self-Performance	Activity Occurred Only Once or Twice	2.68**	1.97**	0.71*	1.46	1.22
G0110C1: Walk in Room - Self-Performance	Activity Did Not Occur	6.01**	4.25**	1.76**	3.27	2.74
G0110C2: Walk in Room - Support Provided	Unable to Determine	8.41*	0.24	8.18**	4.58	3.84
G0110C2: Walk in Room - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110C2: Walk in Room - Support Provided	Setup Help Only	2.24**	1.37**	0.87**	1.22	1.02
G0110C2: Walk in Room - Support Provided	One Person Physical Assist	2.45**	1.52**	0.93**	1.33	1.12

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
G0110C2: Walk in Room - Support Provided	Two+ Persons Physical Assist	5.72**	3.36**	2.36**	3.11	2.61
G0110D1: Walk in Corridor - Self-Performance	Unable to Determine	13.33*	5.48	7.85**	7.25	6.08
G0110D1: Walk in Corridor - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110D1: Walk in Corridor - Self-Performance	Supervision	4.71**	2.55**	2.16**	2.56	2.15
G0110D1: Walk in Corridor - Self-Performance	Limited Assistance	6.17**	3.22**	2.96**	3.36	2.82
G0110D1: Walk in Corridor - Self-Performance	Extensive Assistance	4.81**	2.34**	2.46**	2.61	2.19
G0110D1: Walk in Corridor - Self-Performance	Total Dependence	6.61**	2.92**	3.7**	3.60	3.02
G0110D1: Walk in Corridor - Self-Performance	Activity Occurred Only Once or Twice	4.48**	2.01**	2.47**	2.43	2.04
G0110D1: Walk in Corridor - Self-Performance	Activity Did Not Occur	5.56**	3.06**	2.5**	3.03	2.54
G0110D2: Walk in Corridor - Support Provided	Unable to Determine	-7.49	-0.42	-7.08**	-4.08	-3.42
G0110D2: Walk in Corridor - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110D2: Walk in Corridor - Support Provided	Setup Help Only	2.84**	1.96**	0.87**	1.54	1.29
G0110D2: Walk in Corridor - Support Provided	One Person Physical Assist	1.91**	1.46**	0.45**	1.04	0.87
G0110D2: Walk in Corridor - Support Provided	Two+ Persons Physical Assist	1.88**	1.56**	0.31	1.02	0.86
G0110E1: Locomotion on Unit - Self-Performance	Unable to Determine	-11.18**	-6.15*	-5.03**	-6.08	-5.10
G0110E1: Locomotion on Unit - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110E1: Locomotion on Unit - Self-Performance	Supervision	2.59**	1.89**	0.71**	1.41	1.18
G0110E1: Locomotion on Unit - Self-Performance	Limited Assistance	4.41**	2.97**	1.44**	2.40	2.01
G0110E1: Locomotion on Unit - Self-Performance	Extensive Assistance	3.8**	2.57**	1.23**	2.07	1.73
G0110E1: Locomotion on Unit - Self-Performance	Total Dependence	3.76**	2.28**	1.48**	2.05	1.72
G0110E1: Locomotion on Unit - Self-Performance	Activity Occurred Only Once or Twice	2.4**	1.5**	0.9**	1.31	1.10
G0110E1: Locomotion on Unit - Self-Performance	Activity Did Not Occur	0.46	0.69	-0.23*	0.25	0.21
G0110E2: Locomotion on Unit - Support Provided	Unable to Determine	11.67	5.91	5.76	6.35	5.32
G0110E2: Locomotion on Unit - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110E2: Locomotion on Unit - Support Provided	Setup Help Only	1.46**	0.98**	0.48	0.79	0.67
G0110E2: Locomotion on Unit - Support Provided	One Person Physical Assist	2.32**	1.41**	0.92**	1.26	1.06
G0110E2: Locomotion on Unit - Support Provided	Two+ Persons Physical Assist	1.9**	1.74**	0.16	1.03	0.87
G0110F1: Locomotion off Unit - Self-Performance	Unable to Determine	3.93**	5.76**	-1.83	2.14	1.79
G0110F1: Locomotion off Unit - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110F1: Locomotion off Unit - Self-Performance	Supervision	0.9*	0.45*	0.45*	0.49	0.41
G0110F1: Locomotion off Unit - Self-Performance	Limited Assistance	1.86**	0.87**	0.99**	1.01	0.85
G0110F1: Locomotion off Unit - Self-Performance	Extensive Assistance	4.77**	3.18**	1.59**	2.59	2.17
G0110F1: Locomotion off Unit - Self-Performance	Total Dependence	6.69**	5.18**	1.51**	3.64	3.05
G0110F1: Locomotion off Unit - Self-Performance	Activity Occurred Only Once or Twice	2.31**	2.08**	0.23	1.26	1.05
G0110F1: Locomotion off Unit - Self-Performance	Activity Did Not Occur	4.34**	4.77**	-0.43	2.36	1.98
G0110F2: Locomotion off Unit - Support Provided	Unable to Determine	5.71	2.83	2.88	3.11	2.61
G0110F2: Locomotion off Unit - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110F2: Locomotion off Unit - Support Provided	Setup Help Only	-0.83	-0.41	-0.42	-0.45	-0.38

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
G0110F2: Locomotion off Unit - Support Provided	One Person Physical Assist	1.6**	1.37**	0.23	0.87	0.73
G0110F2: Locomotion off Unit - Support Provided	Two+ Persons Physical Assist	1.32	1.2*	0.11	0.72	0.60
G0110G1: Dressing - Self-Performance	Unable to Determine	-15	-8.84	-6.16	-8.16	-6.84
G0110G1: Dressing - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110G1: Dressing - Self-Performance	Supervision	-0.6	-0.98**	0.39	-0.33	-0.27
G0110G1: Dressing - Self-Performance	Limited Assistance	0.1	-0.99*	1.08**	0.05	0.04
G0110G1: Dressing - Self-Performance	Extensive Assistance	-2.41**	-2.66**	0.25	-1.31	-1.10
G0110G1: Dressing - Self-Performance	Total Dependence	-3.61**	-3.37**	-0.24	-1.96	-1.65
G0110G1: Dressing - Self-Performance	Activity Occurred Only Once or Twice	6.37**	1.31**	5.06**	3.47	2.91
G0110G1: Dressing - Self-Performance	Activity Did Not Occur	-0.94	-1.19	0.25	-0.51	-0.43
G0110G2: Dressing - Support Provided	Unable to Determine	16.6*	14.55**	2.05	9.03	7.57
G0110G2: Dressing - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110G2: Dressing - Support Provided	Setup Help Only	4.31**	2.07**	2.25**	2.35	1.97
G0110G2: Dressing - Support Provided	One Person Physical Assist	6.07**	3.01**	3.06**	3.30	2.77
G0110G2: Dressing - Support Provided	Two+ Persons Physical Assist	6.9**	3.1**	3.8**	3.76	3.15
G0110H1: Eating - Self-Performance	Unable to Determine	-12.56	-3.92	-8.64*	-6.83	-5.73
G0110H1: Eating - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110H1: Eating - Self-Performance	Supervision	-4.31**	-2.7**	-1.62**	-2.35	-1.97
G0110H1: Eating - Self-Performance	Limited Assistance	-3.98**	-2.2**	-1.78**	-2.16	-1.81
G0110H1: Eating - Self-Performance	Extensive Assistance	-10.47**	-5.93**	-4.54**	-5.70	-4.78
G0110H1: Eating - Self-Performance	Total Dependence	-12.06**	-6.29**	-5.76**	-6.56	-5.50
G0110H1: Eating - Self-Performance	Activity Occurred Only Once or Twice	-13.14**	-6.91**	-6.23**	-7.15	-5.99
G0110H1: Eating - Self-Performance	Activity Did Not Occur	-45.61**	-26.88**	-18.73**	-24.81	-20.80
G0110H2: Eating - Support Provided	Unable to Determine	-7.75	-6.89	-0.86	-4.21	-3.53
G0110H2: Eating - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110H2: Eating - Support Provided	Setup Help Only	-4.48**	-4.04	-0.44**	-2.44	-2.04
G0110H2: Eating - Support Provided	One Person Physical Assist	-6.76**	-5.64**	-1.13**	-3.68	-3.08
G0110H2: Eating - Support Provided	Two+ Persons Physical Assist	-6.5**	-5.61**	-0.89**	-3.53	-2.96
G0110I1: Toileting - Self-Performance	Unable to Determine	5.32	2.3	3.03	2.90	2.43
G0110I1: Toileting - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110I1: Toileting - Self-Performance	Supervision	0.71	0.26	0.45	0.39	0.32
G0110I1: Toileting - Self-Performance	Limited Assistance	-0.22	-0.52	0.31	-0.12	-0.10
G0110I1: Toileting - Self-Performance	Extensive Assistance	-2.46**	-2.29**	-0.17	-1.34	-1.12
G0110I1: Toileting - Self-Performance	Total Dependence	-2**	-1.92**	-0.08	-1.09	-0.91
G0110I1: Toileting - Self-Performance	Activity Occurred Only Once or Twice	-4.69**	-3.25**	-1.44	-2.55	-2.14
G0110I1: Toileting - Self-Performance	Activity Did Not Occur	-3.23	-1.95*	-1.28	-1.76	-1.47
G0110I2: Toileting - Support Provided	Unable to Determine	-11.85	-3.04	-8.81	-6.44	-5.40
G0110I2: Toileting - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
G0110I2: Toileting - Support Provided	Setup Help Only	-0.75	-0.23	-0.52	-0.41	-0.34
G0110I2: Toileting - Support Provided	One Person Physical Assist	-1.3	-0.55	-0.75	-0.70	-0.59
G0110I2: Toileting - Support Provided	Two+ Persons Physical Assist	-1.89*	-0.86	-1.03*	-1.03	-0.86
G0110J1: Personal Hygiene - Self-Performance	Unable to Determine	13.5	2.89	10.61*	7.34	6.16
G0110J1: Personal Hygiene - Self-Performance	Independent	Ref.	Ref.	Ref.	Ref.	Ref.
G0110J1: Personal Hygiene - Self-Performance	Supervision	-3.23**	-2.17**	-1.06**	-1.76	-1.47
G0110J1: Personal Hygiene - Self-Performance	Limited Assistance	-2.98**	-2.48**	-0.5	-1.62	-1.36
G0110J1: Personal Hygiene - Self-Performance	Extensive Assistance	-3.78**	-2.74**	-1.04**	-2.06	-1.73
G0110J1: Personal Hygiene - Self-Performance	Total Dependence	-7.23**	-4.52**	-2.72**	-3.93	-3.30
G0110J1: Personal Hygiene - Self-Performance	Activity Occurred Only Once or Twice	0.55	-0.34	0.89*	0.30	0.25
G0110J1: Personal Hygiene - Self-Performance	Activity Did Not Occur	-9.45**	-6.63**	-2.82**	-5.14	-4.31
G0110J2: Personal Hygiene - Support Provided	Unable to Determine	-30.98**	-18.23**	-12.75**	-16.85	-14.13
G0110J2: Personal Hygiene - Support Provided	No Setup	Ref.	Ref.	Ref.	Ref.	Ref.
G0110J2: Personal Hygiene - Support Provided	Setup Help Only	1.88**	0.84**	1.04**	1.02	0.86
G0110J2: Personal Hygiene - Support Provided	One Person Physical Assist	-1.5**	-1.23**	-0.26**	-0.81	-0.68
G0110J2: Personal Hygiene - Support Provided	Two+ Persons Physical Assist	-3.12**	-2.18**	-0.95**	-1.70	-1.42
G0300A Balance: Moving from Seated to Standing Position	Unable to Determine	-8.4**	-7.24**	-1.16*	-4.57	-3.83
G0300A Balance: Moving from Seated to Standing Position	Steady at all times	Ref.	Ref.	Ref.	Ref.	Ref.
G0300A Balance: Moving from Seated to Standing Position	Not Steady, able to stabilize without staff assistance	3.09**	1.29**	1.79**	1.68	1.41
G0300A Balance: Moving from Seated to Standing Position	Not Steady, only able to stabilize with staff assistance	3.02**	1.18**	1.84**	1.64	1.38
G0300A Balance: Moving from Seated to Standing Position	Activity Did Not Occur	-7.58**	-5.24**	-2.34**	-4.13	-3.46
G0300B Balance: Walking	Unable to Determine	-1.99*	-0.89	-1.11*	-1.08	-0.91
G0300B Balance: Walking	Steady at all times	Ref.	Ref.	Ref.	Ref.	Ref.
G0300B Balance: Walking	Not Steady, able to stabilize without staff assistance	0.96	0.89**	0.07	0.52	0.44
G0300B Balance: Walking	Not Steady, only able to stabilize with staff assistance	0	0.44	-0.44*	0.00	0.00
G0300B Balance: Walking	Activity Did Not Occur	-6.73**	-3.68**	-3.05**	-3.66	-3.07
G0300C Balance: Turning Around	Unable to Determine	1.42*	0.38	1.04**	0.77	0.65
G0300C Balance: Turning Around	Steady at all times	Ref.	Ref.	Ref.	Ref.	Ref.
G0300C Balance: Turning Around	Not Steady, able to stabilize without staff assistance	3.98**	2.45**	1.53**	2.17	1.82
G0300C Balance: Turning Around	Not Steady, only able to stabilize with staff assistance	3.58**	1.91**	1.68**	1.95	1.63
G0300C Balance: Turning Around	Activity Did Not Occur	3.8**	1.74**	2.06**	2.06	1.73
G0300D Balance: Moving On and Off Toilet	Unable to Determine	11.78**	6.75**	5.03**	6.41	5.37
G0300D Balance: Moving On and Off Toilet	Steady at all times	Ref.	Ref.	Ref.	Ref.	Ref.
G0300D Balance: Moving On and Off Toilet	Not Steady, able to stabilize without staff assistance	-0.47	0.05	-0.52	-0.26	-0.22

Resident Characteristics	Value	OLS Estimates – Avg. Costs per Day			Use PT/OT Model to Estimate PT/OT Costs by % of Costs	
		PT/OT	PT	OT	PT	OT
G0300D Balance: Moving On and Off Toilet	Not Steady, only able to stabilize with staff assistance	-0.75	-0.12	-0.63	-0.41	-0.34
G0300D Balance: Moving On and Off Toilet	Activity Did Not Occur	-2.41**	-0.93*	-1.48**	-1.31	-1.10
G0300E Balance: Surface to Surface Transfer	Unable to Determine	-6.25**	-2.21**	-4.04**	-3.40	-2.85
G0300E Balance: Surface to Surface Transfer	Steady at all times	Ref.	Ref.	Ref.	Ref.	Ref.
G0300E Balance: Surface to Surface Transfer	Not Steady, able to stabilize without staff assistance	-1.72**	-1.22**	-0.51**	-0.94	-0.78
G0300E Balance: Surface to Surface Transfer	Not Steady, only able to stabilize with staff assistance	-1.67**	-1.19**	-0.48*	-0.91	-0.76
G0300E Balance: Surface to Surface Transfer	Activity Did Not Occur	-0.74**	-0.41**	-0.33*	-0.40	-0.34
Clinical Categories	Medical Management	Ref.	Ref.	Ref.	Ref.	Ref.
Clinical Categories	Acute Infections	0.28*	0.35**	-0.08	0.15	0.13
Clinical Categories	Acute Neurologic	9.55**	5.18**	4.37**	5.19	4.35
Clinical Categories	Cancer	-1.36**	-0.69**	-0.68**	-0.74	-0.62
Clinical Categories	Cardiovascular and Coagulations	1.95**	0.95**	0.99**	1.06	0.89
Clinical Categories	Non-Surgical Orthopedic/Musculoskeletal	10.39**	5.96**	4.43**	5.65	4.74
Clinical Categories	Pulmonary	0.55**	0.24*	0.31**	0.30	0.25
Clinical Categories	Non-Orthopedic Surgery	5.44**	3.12**	2.32**	2.96	2.48
Clinical Categories	Major Joint Replacement/Spinal Surgery	25.43**	18.9**	6.53**	13.83	11.59
Clinical Categories	Surgical - Orthopedic - Surg Extremities not Major Joint	15.39**	9.42**	5.98**	8.37	7.02
Age	-	0.06**	0.04**	0.02**	0.03	0.03

*** Significant at the 1% level. * Significant at the 5% level.*

Table 95: Nursing Index and Average NTA Costs per Day by RUG

RUG	# of Stays*	% of Stays	FY 2014 Nursing Index	Avg. NTA Costs per Day
ES3	4,992	0.3%	3.58	$211
ES2	3,928	0.2%	2.67	$197
RUX	9,581	0.5%	2.67	$101
RVX	4,265	0.2%	2.61	$113
RUL	7,665	0.4%	2.57	$78
RHX	1,759	0.1%	2.55	$125
RMX	1,178	0.1%	2.47	$148
ES1	4,410	0.2%	2.32	$175
RLX	55	0.0%	2.26	$275
HE2	2,753	0.1%	2.22	$109
RML	483	0.0%	2.19	$156
RVL	3,754	0.2%	2.19	$99
RHL	1,443	0.1%	2.15	$121

RUG	# of Stays*	% of Stays	FY 2014 Nursing Index	Avg. NTA Costs per Day
HD2	2,990	0.2%	2.04	$129
LE2	2,213	0.1%	1.96	$87
HC2	2,356	0.1%	1.89	$128
HB2	970	0.0%	1.86	$147
LD2	1,986	0.1%	1.86	$108
HE1	10,299	0.5%	1.74	$129
CE2	1,139	0.1%	1.68	$91
HD1	13,934	0.7%	1.60	$166
CD2	1,538	0.1%	1.56	$113
LC2	1,147	0.1%	1.56	$134
RUB	472,521	23.8%	1.56	$51
RUC	311,874	15.7%	1.56	$57
LE1	10,909	0.5%	1.54	$107
RVC	144,612	7.3%	1.51	$72
CE1	6,073	0.3%	1.50	$119
PE2	112	0.0%	1.50	$39
RLB	1,271	0.1%	1.50	$169
HC1	12,604	0.6%	1.48	$178
HB1	10,410	0.5%	1.46	$184
LD1	16,273	0.8%	1.46	$140
LB2	361	0.0%	1.45	$127
RHC	57,153	2.9%	1.45	$85
PE1	3,850	0.2%	1.40	$95
CD1	17,191	0.9%	1.38	$148
PD2	191	0.0%	1.38	$63
RMC	31,518	1.6%	1.36	$95
CC2	1,375	0.1%	1.29	$131
PD1	9,761	0.5%	1.28	$115
LC1	13,508	0.7%	1.22	$162
RMB	22,393	1.1%	1.22	$108
RHB	47,172	2.4%	1.19	$87
CB2	652	0.0%	1.15	$156
CC1	21,715	1.1%	1.15	$164
LB1	5,161	0.3%	1.14	$190
RVB	156,216	7.9%	1.11	$67
PC2	303	0.0%	1.10	$58
RVA	128,788	6.5%	1.10	$71
CB1	15,347	0.8%	1.02	$177
PC1	14,987	0.8%	1.02	$129

RUG	# of Stays*	% of Stays	FY 2014 Nursing Index	Avg. NTA Costs per Day
RUA	262,548	13.2%	0.99	$56
BB2	95	0.0%	0.97	$65
RHA	42,197	2.1%	0.91	$88
BB1	3,770	0.2%	0.90	$116
CA2	770	0.0%	0.88	$185
PB2	74	0.0%	0.84	$45
RMA	19,442	1.0%	0.84	$109
CA1	17,749	0.9%	0.78	$206
PB1	9,038	0.5%	0.78	$154
RLA	594	0.0%	0.71	$196
BA2	38	0.0%	0.70	$52
BA1	2,935	0.1%	0.64	$116
PA2	26	0.0%	0.59	$93
PA1	7,315	0.4%	0.54	$175

**Stay counts do not add up to the full study population because for a small number of stays the longest reported RUG is SD, which is not a valid RUG-IV value.*

Table 96: Change in Resident Groups for PT/OT, SLP, NTA, and Nursing

Type of Change in Resident Group		PT/OT		SLP		NTA		Nursing	
		# of Stays	% of Stays	# of Stays	# of Stays	# of Stays	% of Stays	# of Stays	% of Stays
No change	One assessment	617,136	31.8%	634,031	33.0%	626,545	34.1%	656,152	33.0%
	Multiple assessments	990,954	51.1%	1,005,402	52.3%	1,059,346	57.6%	525,079	26.4%
One or more changes	Does not move to higher-cost group, relative to initial group	167,263	8.6%	163,252	8.5%	83,550	4.5%	574,954	29.0%
	Moves to higher-cost group, relative to initial group	163,678	8.4%	119,320	6.2%	68,490	3.7%	229,585	11.6%

Table 97: Mapping between MS-DRG Groups and Clinical Categories

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
001	Heart Transplant Or Implant Of Heart Assist System W MCC	Non-Orthopedic Surgery	Non-Neurologic
002	Heart Transplant Or Implant Of Heart Assist System W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
003	Ecmo Or Trach W Mv 96+ Hrs Or Pdx Exc Face, Mouth & Neck W Maj O.R.	Non-Orthopedic Surgery	Non-Neurologic
004	Trach W Mv 96+ Hrs Or Pdx Exc Face, Mouth & Neck W/O Maj O.R.	Non-Orthopedic Surgery	Non-Neurologic
005	Liver Transplant W MCC Or Intestinal Transplant	Non-Orthopedic Surgery	Non-Neurologic
006	Liver Transplant W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
007	Lung Transplant	Non-Orthopedic Surgery	Non-Neurologic
008	Simultaneous Pancreas/Kidney Transplant	Non-Orthopedic Surgery	Non-Neurologic
010	Pancreas Transplant	Non-Orthopedic Surgery	Non-Neurologic
011	Tracheostomy For Face,Mouth & Neck Diagnoses W MCC	Non-Orthopedic Surgery	Non-Neurologic
012	Tracheostomy For Face,Mouth & Neck Diagnoses W CC	Non-Orthopedic Surgery	Non-Neurologic
013	Tracheostomy For Face,Mouth & Neck Diagnoses W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
014	Allogeneic Bone Marrow Transplant	Non-Orthopedic Surgery	Non-Neurologic
016	Autologous Bone Marrow Transplant W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
017	Autologous Bone Marrow Transplant W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
020	Intracranial Vascular Procedures W Pdx Hemorrhage W MCC	Non-Orthopedic Surgery	Non-Neurologic
021	Intracranial Vascular Procedures W Pdx Hemorrhage W CC	Non-Orthopedic Surgery	Non-Neurologic
022	Intracranial Vascular Procedures W Pdx Hemorrhage W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
023	Cranio W Major Dev Impl/Acute Complex Cns Pdx W MCC Or Chemo Implant	Acute Neurologic	Acute Neurologic
024	Cranio W Major Dev Impl/Acute Complex Cns Pdx W/O MCC	Acute Neurologic	Acute Neurologic
025	Craniotomy & Endovascular Intracranial Procedures W MCC	Acute Neurologic	Acute Neurologic
026	Craniotomy & Endovascular Intracranial Procedures W CC	Acute Neurologic	Acute Neurologic

[44] Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services (HHS), "FY 2014 Final Rule Tables," *CMS.gov*, https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/FY-2014-IPPS-Final-Rule-Home-Page-Items/FY-2014-IPPS-Final-Rule-CMS-1599-F-Tables.html.

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
027	Craniotomy & Endovascular Intracranial Procedures W/O CC/MCC	Acute Neurologic	Acute Neurologic
028	Spinal Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
029	Spinal Procedures W CC Or Spinal Neurostimulators	Non-Orthopedic Surgery	Non-Neurologic
030	Spinal Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
031	Ventricular Shunt Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
032	Ventricular Shunt Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
033	Ventricular Shunt Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
034	Carotid Artery Stent Procedure W MCC	Non-Orthopedic Surgery	Non-Neurologic
035	Carotid Artery Stent Procedure W CC	Non-Orthopedic Surgery	Non-Neurologic
036	Carotid Artery Stent Procedure W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
037	Extracranial Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
038	Extracranial Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
039	Extracranial Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
040	Periph/Cranial Nerve & Non-Neurologic Nerv Syst Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
041	Periph/Cranial Nerve & Non-Neurologic Nerv Syst Proc W CC Or Periph Neurostim	Non-Orthopedic Surgery	Non-Neurologic
042	Periph/Cranial Nerve & Non-Neurologic Nerv Syst Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
052	Spinal Disorders & Injuries W CC/MCC	Acute Neurologic	Acute Neurologic
053	Spinal Disorders & Injuries W/O CC/MCC	Acute Neurologic	Acute Neurologic
054	Nervous System Neoplasms W MCC	Medical Management	Non-Neurologic
055	Nervous System Neoplasms W/O MCC	Medical Management	Non-Neurologic
056	Degenerative Nervous System Disorders W MCC	Medical Management	Non-Neurologic
057	Degenerative Nervous System Disorders W/O MCC	Medical Management	Non-Neurologic
058	Multiple Sclerosis & Cerebellar Ataxia W MCC	Acute Neurologic	Acute Neurologic
059	Multiple Sclerosis & Cerebellar Ataxia W CC	Acute Neurologic	Acute Neurologic
060	Multiple Sclerosis & Cerebellar Ataxia W/O CC/MCC	Acute Neurologic	Acute Neurologic
061	Acute Ischemic Stroke W Use Of Thrombolytic Agent W MCC	Acute Neurologic	Acute Neurologic
062	Acute Ischemic Stroke W Use Of Thrombolytic Agent W CC	Acute Neurologic	Acute Neurologic
063	Acute Ischemic Stroke W Use Of Thrombolytic Agent W/O CC/MCC	Acute Neurologic	Acute Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
064	Intracranial Hemorrhage Or Cerebral Infarction W MCC	Acute Neurologic	Acute Neurologic
065	Intracranial Hemorrhage Or Cerebral Infarction W CC Or Tpa In 24 Hrs	Acute Neurologic	Acute Neurologic
066	Intracranial Hemorrhage Or Cerebral Infarction W/O CC/MCC	Acute Neurologic	Acute Neurologic
067	Nonspecific Cva & Precerebral Occlusion W/O Infarct W MCC	Acute Neurologic	Acute Neurologic
068	Nonspecific Cva & Precerebral Occlusion W/O Infarct W/O MCC	Acute Neurologic	Acute Neurologic
069	Transient Ischemia	Acute Neurologic	Acute Neurologic
070	Nonspecific Cerebrovascular Disorders W MCC	Medical Management	Non-Neurologic
071	Nonspecific Cerebrovascular Disorders W CC	Medical Management	Non-Neurologic
072	Nonspecific Cerebrovascular Disorders W/O CC/MCC	Medical Management	Non-Neurologic
073	Cranial & Peripheral Nerve Disorders W MCC	Medical Management	Non-Neurologic
074	Cranial & Peripheral Nerve Disorders W/O MCC	Medical Management	Non-Neurologic
075	Viral Meningitis W CC/MCC	Acute Neurologic	Acute Neurologic
076	Viral Meningitis W/O CC/MCC	Acute Neurologic	Acute Neurologic
077	Hypertensive Encephalopathy W MCC	Acute Neurologic	Acute Neurologic
078	Hypertensive Encephalopathy W CC	Acute Neurologic	Acute Neurologic
079	Hypertensive Encephalopathy W/O CC/MCC	Acute Neurologic	Acute Neurologic
080	Nontraumatic Stupor & Coma W MCC	Medical Management	Non-Neurologic
081	Nontraumatic Stupor & Coma W/O MCC	Medical Management	Non-Neurologic
082	Traumatic Stupor & Coma, Coma >1 Hr W MCC	Acute Neurologic	Acute Neurologic
083	Traumatic Stupor & Coma, Coma >1 Hr W CC	Acute Neurologic	Acute Neurologic
084	Traumatic Stupor & Coma, Coma >1 Hr W/O CC/MCC	Acute Neurologic	Acute Neurologic
085	Traumatic Stupor & Coma, Coma <1 Hr W MCC	Acute Neurologic	Acute Neurologic
086	Traumatic Stupor & Coma, Coma <1 Hr W CC	Acute Neurologic	Acute Neurologic
087	Traumatic Stupor & Coma, Coma <1 Hr W/O CC/MCC	Acute Neurologic	Acute Neurologic
088	Concussion W MCC	Acute Neurologic	Acute Neurologic
089	Concussion W CC	Acute Neurologic	Acute Neurologic
090	Concussion W/O CC/MCC	Acute Neurologic	Acute Neurologic
091	Non-Neurologic Disorders Of Nervous System W MCC	Acute Neurologic	Acute Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
092	Non-Neurologic Disorders Of Nervous System W CC	Acute Neurologic	Acute Neurologic
093	Non-Neurologic Disorders Of Nervous System W/O CC/MCC	Acute Neurologic	Acute Neurologic
094	Bacterial & Tuberculous Infections Of Nervous System W MCC	Medical Management	Non-Neurologic
095	Bacterial & Tuberculous Infections Of Nervous System W CC	Medical Management	Non-Neurologic
096	Bacterial & Tuberculous Infections Of Nervous System W/O CC/MCC	Medical Management	Non-Neurologic
097	Non-Bacterial Infect Of Nervous Sys Exc Viral Meningitis W MCC	Acute Neurologic	Acute Neurologic
098	Non-Bacterial Infect Of Nervous Sys Exc Viral Meningitis W CC	Acute Neurologic	Acute Neurologic
099	Non-Bacterial Infect Of Nervous Sys Exc Viral Meningitis W/O CC/MCC	Acute Neurologic	Acute Neurologic
100	Seizures W MCC	Medical Management	Non-Neurologic
101	Seizures W/O MCC	Medical Management	Non-Neurologic
102	Headaches W MCC	Medical Management	Non-Neurologic
103	Headaches W/O MCC	Medical Management	Non-Neurologic
113	Orbital Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
114	Orbital Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
115	Extraocular Procedures Except Orbit	Non-Orthopedic Surgery	Non-Neurologic
116	Intraocular Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
117	Intraocular Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
121	Acute Major Eye Infections W CC/MCC	Medical Management	Non-Neurologic
122	Acute Major Eye Infections W/O CC/MCC	Medical Management	Non-Neurologic
123	Neurological Eye Disorders	Medical Management	Non-Neurologic
124	Non-Neurologic Disorders Of The Eye W MCC	Medical Management	Non-Neurologic
125	Non-Neurologic Disorders Of The Eye W/O MCC	Medical Management	Non-Neurologic
129	Major Head & Neck Procedures W CC/MCC Or Major Device	Non-Orthopedic Surgery	Non-Neurologic
130	Major Head & Neck Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
131	Cranial/Facial Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
132	Cranial/Facial Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
133	Non-Neurologic Ear, Nose, Mouth & Throat O.R. Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
134	Non-Neurologic Ear, Nose, Mouth & Throat O.R. Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
135	Sinus & Mastoid Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
136	Sinus & Mastoid Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
137	Mouth Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
138	Mouth Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
139	Salivary Gland Procedures	Non-Orthopedic Surgery	Non-Neurologic
146	Ear, Nose, Mouth & Throat Malignancy W MCC	Medical Management	Non-Neurologic
147	Ear, Nose, Mouth & Throat Malignancy W CC	Medical Management	Non-Neurologic
148	Ear, Nose, Mouth & Throat Malignancy W/O CC/MCC	Medical Management	Non-Neurologic
149	Dysequilibrium	Medical Management	Non-Neurologic
150	Epistaxis W MCC	Medical Management	Non-Neurologic
151	Epistaxis W/O MCC	Medical Management	Non-Neurologic
152	Otitis Media & Uri W MCC	Medical Management	Non-Neurologic
153	Otitis Media & Uri W/O MCC	Medical Management	Non-Neurologic
154	Non-Neurologic Ear, Nose, Mouth & Throat Diagnoses W MCC	Medical Management	Non-Neurologic
155	Non-Neurologic Ear, Nose, Mouth & Throat Diagnoses W CC	Medical Management	Non-Neurologic
156	Non-Neurologic Ear, Nose, Mouth & Throat Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
157	Dental & Oral Diseases W MCC	Medical Management	Non-Neurologic
158	Dental & Oral Diseases W CC	Medical Management	Non-Neurologic
159	Dental & Oral Diseases W/O CC/MCC	Medical Management	Non-Neurologic
163	Major Chest Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
164	Major Chest Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
165	Major Chest Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
166	Non-Neurologic Resp System O.R. Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
167	Non-Neurologic Resp System O.R. Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
168	Non-Neurologic Resp System O.R. Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
175	Pulmonary Embolism W MCC	Medical Management	Non-Neurologic
176	Pulmonary Embolism W/O MCC	Medical Management	Non-Neurologic
177	Respiratory Infections & Inflammations W MCC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
178	Respiratory Infections & Inflammations W CC	Medical Management	Non-Neurologic
179	Respiratory Infections & Inflammations W/O CC/MCC	Medical Management	Non-Neurologic
180	Respiratory Neoplasms W MCC	Medical Management	Non-Neurologic
181	Respiratory Neoplasms W CC	Medical Management	Non-Neurologic
182	Respiratory Neoplasms W/O CC/MCC	Medical Management	Non-Neurologic
183	Major Chest Trauma W MCC	Medical Management	Non-Neurologic
184	Major Chest Trauma W CC	Medical Management	Non-Neurologic
185	Major Chest Trauma W/O CC/MCC	Medical Management	Non-Neurologic
186	Pleural Effusion W MCC	Medical Management	Non-Neurologic
187	Pleural Effusion W CC	Medical Management	Non-Neurologic
188	Pleural Effusion W/O CC/MCC	Medical Management	Non-Neurologic
189	Pulmonary Edema & Respiratory Failure	Medical Management	Non-Neurologic
190	Chronic Obstructive Pulmonary Disease W MCC	Medical Management	Non-Neurologic
191	Chronic Obstructive Pulmonary Disease W CC	Medical Management	Non-Neurologic
192	Chronic Obstructive Pulmonary Disease W/O CC/MCC	Medical Management	Non-Neurologic
193	Simple Pneumonia & Pleurisy W MCC	Medical Management	Non-Neurologic
194	Simple Pneumonia & Pleurisy W CC	Medical Management	Non-Neurologic
195	Simple Pneumonia & Pleurisy W/O CC/MCC	Medical Management	Non-Neurologic
196	Interstitial Lung Disease W MCC	Medical Management	Non-Neurologic
197	Interstitial Lung Disease W CC	Medical Management	Non-Neurologic
198	Interstitial Lung Disease W/O CC/MCC	Medical Management	Non-Neurologic
199	Pneumothorax W MCC	Medical Management	Non-Neurologic
200	Pneumothorax W CC	Medical Management	Non-Neurologic
201	Pneumothorax W/O CC/MCC	Medical Management	Non-Neurologic
202	Bronchitis & Asthma W CC/MCC	Medical Management	Non-Neurologic
203	Bronchitis & Asthma W/O CC/MCC	Medical Management	Non-Neurologic
204	Respiratory Signs & Symptoms	Medical Management	Non-Neurologic
205	Non-Neurologic Respiratory System Diagnoses W MCC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
206	Non-Neurologic Respiratory System Diagnoses W/O MCC	Medical Management	Non-Neurologic
207	Respiratory System Diagnosis W Ventilator Support 96+ Hours	Medical Management	Non-Neurologic
208	Respiratory System Diagnosis W Ventilator Support <96 Hours	Medical Management	Non-Neurologic
215	Non-Neurologic Heart Assist System Implant	Non-Orthopedic Surgery	Non-Neurologic
216	Cardiac Valve & Oth Maj Cardiothoracic Proc W Card Cath W MCC	Non-Orthopedic Surgery	Non-Neurologic
217	Cardiac Valve & Oth Maj Cardiothoracic Proc W Card Cath W CC	Non-Orthopedic Surgery	Non-Neurologic
218	Cardiac Valve & Oth Maj Cardiothoracic Proc W Card Cath W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
219	Cardiac Valve & Oth Maj Cardiothoracic Proc W/O Card Cath W MCC	Non-Orthopedic Surgery	Non-Neurologic
220	Cardiac Valve & Oth Maj Cardiothoracic Proc W/O Card Cath W CC	Non-Orthopedic Surgery	Non-Neurologic
221	Cardiac Valve & Oth Maj Cardiothoracic Proc W/O Card Cath W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
222	Cardiac Defib Implant W Cardiac Cath W Ami/Hf/Shock W MCC	Non-Orthopedic Surgery	Non-Neurologic
223	Cardiac Defib Implant W Cardiac Cath W Ami/Hf/Shock W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
224	Cardiac Defib Implant W Cardiac Cath W/O Ami/Hf/Shock W MCC	Non-Orthopedic Surgery	Non-Neurologic
225	Cardiac Defib Implant W Cardiac Cath W/O Ami/Hf/Shock W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
226	Cardiac Defibrillator Implant W/O Cardiac Cath W MCC	Non-Orthopedic Surgery	Non-Neurologic
227	Cardiac Defibrillator Implant W/O Cardiac Cath W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
228	Non-Neurologic Cardiothoracic Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
229	Non-Neurologic Cardiothoracic Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
230	Non-Neurologic Cardiothoracic Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
231	Coronary Bypass W Ptca W MCC	Non-Orthopedic Surgery	Non-Neurologic
232	Coronary Bypass W Ptca W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
233	Coronary Bypass W Cardiac Cath W MCC	Non-Orthopedic Surgery	Non-Neurologic
234	Coronary Bypass W Cardiac Cath W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
235	Coronary Bypass W/O Cardiac Cath W MCC	Non-Orthopedic Surgery	Non-Neurologic
236	Coronary Bypass W/O Cardiac Cath W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
237	Major Cardiovasc Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
238	Major Cardiovasc Procedures W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
239	Amputation For Circ Sys Disorders Exc Upper Limb & Toe W MCC	Non-Neurologic Orthopedic	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
240	Amputation For Circ Sys Disorders Exc Upper Limb & Toe W CC	Non-Neurologic Orthopedic	Non-Neurologic
241	Amputation For Circ Sys Disorders Exc Upper Limb & Toe W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
242	Permanent Cardiac Pacemaker Implant W MCC	Non-Orthopedic Surgery	Non-Neurologic
243	Permanent Cardiac Pacemaker Implant W CC	Non-Orthopedic Surgery	Non-Neurologic
244	Permanent Cardiac Pacemaker Implant W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
245	Aicd Generator Procedures	Non-Orthopedic Surgery	Non-Neurologic
246	Perc Cardiovasc Proc W Drug-Eluting Stent W MCC Or 4+ Vessels/Stents	Non-Orthopedic Surgery	Non-Neurologic
247	Perc Cardiovasc Proc W Drug-Eluting Stent W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
248	Perc Cardiovasc Proc W Non-Drug-Eluting Stent W MCC Or 4+ Ves/Stents	Non-Orthopedic Surgery	Non-Neurologic
249	Perc Cardiovasc Proc W Non-Drug-Eluting Stent W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
250	Perc Cardiovasc Proc W/O Coronary Artery Stent W MCC	Non-Orthopedic Surgery	Non-Neurologic
251	Perc Cardiovasc Proc W/O Coronary Artery Stent W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
252	Non-Neurologic Vascular Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
253	Non-Neurologic Vascular Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
254	Non-Neurologic Vascular Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
255	Upper Limb & Toe Amputation For Circ System Disorders W MCC	Non-Neurologic Orthopedic	Non-Neurologic
256	Upper Limb & Toe Amputation For Circ System Disorders W CC	Non-Neurologic Orthopedic	Non-Neurologic
257	Upper Limb & Toe Amputation For Circ System Disorders W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
258	Cardiac Pacemaker Device Replacement W MCC	Non-Orthopedic Surgery	Non-Neurologic
259	Cardiac Pacemaker Device Replacement W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
260	Cardiac Pacemaker Revision Except Device Replacement W MCC	Non-Orthopedic Surgery	Non-Neurologic
261	Cardiac Pacemaker Revision Except Device Replacement W CC	Non-Orthopedic Surgery	Non-Neurologic
262	Cardiac Pacemaker Revision Except Device Replacement W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
263	Vein Ligation & Stripping	Non-Orthopedic Surgery	Non-Neurologic
264	Non-Neurologic Circulatory System O.R. Procedures	Non-Orthopedic Surgery	Non-Neurologic
265	Aicd Lead Procedures	Non-Orthopedic Surgery	Non-Neurologic
280	Acute Myocardial Infarction, Discharged Alive W MCC	Medical Management	Non-Neurologic
281	Acute Myocardial Infarction, Discharged Alive W CC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
282	Acute Myocardial Infarction, Discharged Alive W/O CC/MCC	Medical Management	Non-Neurologic
283	Acute Myocardial Infarction, Expired W MCC	Medical Management	Non-Neurologic
284	Acute Myocardial Infarction, Expired W CC	Medical Management	Non-Neurologic
285	Acute Myocardial Infarction, Expired W/O CC/MCC	Medical Management	Non-Neurologic
286	Circulatory Disorders Except Ami, W Card Cath W MCC	Medical Management	Non-Neurologic
287	Circulatory Disorders Except Ami, W Card Cath W/O MCC	Medical Management	Non-Neurologic
288	Acute & Subacute Endocarditis W MCC	Medical Management	Non-Neurologic
289	Acute & Subacute Endocarditis W CC	Medical Management	Non-Neurologic
290	Acute & Subacute Endocarditis W/O CC/MCC	Medical Management	Non-Neurologic
291	Heart Failure & Shock W MCC	Medical Management	Non-Neurologic
292	Heart Failure & Shock W CC	Medical Management	Non-Neurologic
293	Heart Failure & Shock W/O CC/MCC	Medical Management	Non-Neurologic
294	Deep Vein Thrombophlebitis W CC/MCC	Medical Management	Non-Neurologic
295	Deep Vein Thrombophlebitis W/O CC/MCC	Medical Management	Non-Neurologic
296	Cardiac Arrest, Unexplained W MCC	Medical Management	Non-Neurologic
297	Cardiac Arrest, Unexplained W CC	Medical Management	Non-Neurologic
298	Cardiac Arrest, Unexplained W/O CC/MCC	Medical Management	Non-Neurologic
299	Peripheral Vascular Disorders W MCC	Medical Management	Non-Neurologic
300	Peripheral Vascular Disorders W CC	Medical Management	Non-Neurologic
301	Peripheral Vascular Disorders W/O CC/MCC	Medical Management	Non-Neurologic
302	Atherosclerosis W MCC	Medical Management	Non-Neurologic
303	Atherosclerosis W/O MCC	Medical Management	Non-Neurologic
304	Hypertension W MCC	Medical Management	Non-Neurologic
305	Hypertension W/O MCC	Medical Management	Non-Neurologic
306	Cardiac Congenital & Valvular Disorders W MCC	Medical Management	Non-Neurologic
307	Cardiac Congenital & Valvular Disorders W/O MCC	Medical Management	Non-Neurologic
308	Cardiac Arrhythmia & Conduction Disorders W MCC	Medical Management	Non-Neurologic
309	Cardiac Arrhythmia & Conduction Disorders W CC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
310	Cardiac Arrhythmia & Conduction Disorders W/O CC/MCC	Medical Management	Non-Neurologic
311	Angina Pectoris	Medical Management	Non-Neurologic
312	Syncope & Collapse	Medical Management	Non-Neurologic
313	Chest Pain	Medical Management	Non-Neurologic
314	Non-Neurologic Circulatory System Diagnoses W MCC	Medical Management	Non-Neurologic
315	Non-Neurologic Circulatory System Diagnoses W CC	Medical Management	Non-Neurologic
316	Non-Neurologic Circulatory System Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
326	Stomach, Esophageal & Duodenal Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
327	Stomach, Esophageal & Duodenal Proc W CC	Non-Orthopedic Surgery	Non-Neurologic
328	Stomach, Esophageal & Duodenal Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
329	Major Small & Large Bowel Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
330	Major Small & Large Bowel Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
331	Major Small & Large Bowel Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
332	Rectal Resection W MCC	Non-Orthopedic Surgery	Non-Neurologic
333	Rectal Resection W CC	Non-Orthopedic Surgery	Non-Neurologic
334	Rectal Resection W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
335	Peritoneal Adhesiolysis W MCC	Non-Orthopedic Surgery	Non-Neurologic
336	Peritoneal Adhesiolysis W CC	Non-Orthopedic Surgery	Non-Neurologic
337	Peritoneal Adhesiolysis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
338	Appendectomy W Complicated Principal Diag W MCC	Non-Orthopedic Surgery	Non-Neurologic
339	Appendectomy W Complicated Principal Diag W CC	Non-Orthopedic Surgery	Non-Neurologic
340	Appendectomy W Complicated Principal Diag W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
341	Appendectomy W/O Complicated Principal Diag W MCC	Non-Orthopedic Surgery	Non-Neurologic
342	Appendectomy W/O Complicated Principal Diag W CC	Non-Orthopedic Surgery	Non-Neurologic
343	Appendectomy W/O Complicated Principal Diag W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
344	Minor Small & Large Bowel Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
345	Minor Small & Large Bowel Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
346	Minor Small & Large Bowel Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
347	Anal & Stomal Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
348	Anal & Stomal Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
349	Anal & Stomal Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
350	Inguinal & Femoral Hernia Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
351	Inguinal & Femoral Hernia Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
352	Inguinal & Femoral Hernia Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
353	Hernia Procedures Except Inguinal & Femoral W MCC	Non-Orthopedic Surgery	Non-Neurologic
354	Hernia Procedures Except Inguinal & Femoral W CC	Non-Orthopedic Surgery	Non-Neurologic
355	Hernia Procedures Except Inguinal & Femoral W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
356	Non-Neurologic Digestive System O.R. Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
357	Non-Neurologic Digestive System O.R. Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
358	Non-Neurologic Digestive System O.R. Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
368	Major Esophageal Disorders W MCC	Medical Management	Non-Neurologic
369	Major Esophageal Disorders W CC	Medical Management	Non-Neurologic
370	Major Esophageal Disorders W/O CC/MCC	Medical Management	Non-Neurologic
371	Major Gastrointestinal Disorders & Peritoneal Infections W MCC	Medical Management	Non-Neurologic
372	Major Gastrointestinal Disorders & Peritoneal Infections W CC	Medical Management	Non-Neurologic
373	Major Gastrointestinal Disorders & Peritoneal Infections W/O CC/MCC	Medical Management	Non-Neurologic
374	Digestive Malignancy W MCC	Medical Management	Non-Neurologic
375	Digestive Malignancy W CC	Medical Management	Non-Neurologic
376	Digestive Malignancy W/O CC/MCC	Medical Management	Non-Neurologic
377	G.I. Hemorrhage W MCC	Medical Management	Non-Neurologic
378	G.I. Hemorrhage W CC	Medical Management	Non-Neurologic
379	G.I. Hemorrhage W/O CC/MCC	Medical Management	Non-Neurologic
380	Complicated Peptic Ulcer W MCC	Medical Management	Non-Neurologic
381	Complicated Peptic Ulcer W CC	Medical Management	Non-Neurologic
382	Complicated Peptic Ulcer W/O CC/MCC	Medical Management	Non-Neurologic
383	Uncomplicated Peptic Ulcer W MCC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
384	Uncomplicated Peptic Ulcer W/O MCC	Medical Management	Non-Neurologic
385	Inflammatory Bowel Disease W MCC	Medical Management	Non-Neurologic
386	Inflammatory Bowel Disease W CC	Medical Management	Non-Neurologic
387	Inflammatory Bowel Disease W/O CC/MCC	Medical Management	Non-Neurologic
388	G.I. Obstruction W MCC	Medical Management	Non-Neurologic
389	G.I. Obstruction W CC	Medical Management	Non-Neurologic
390	G.I. Obstruction W/O CC/MCC	Medical Management	Non-Neurologic
391	Esophagitis, Gastroent & Misc Digest Disorders W MCC	Medical Management	Non-Neurologic
392	Esophagitis, Gastroent & Misc Digest Disorders W/O MCC	Medical Management	Non-Neurologic
393	Non-Neurologic Digestive System Diagnoses W MCC	Medical Management	Non-Neurologic
394	Non-Neurologic Digestive System Diagnoses W CC	Medical Management	Non-Neurologic
395	Non-Neurologic Digestive System Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
405	Pancreas, Liver & Shunt Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
406	Pancreas, Liver & Shunt Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
407	Pancreas, Liver & Shunt Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
408	Biliary Tract Proc Except Only Cholecyst W Or W/O C.D.E. W MCC	Non-Orthopedic Surgery	Non-Neurologic
409	Biliary Tract Proc Except Only Cholecyst W Or W/O C.D.E. W CC	Non-Orthopedic Surgery	Non-Neurologic
410	Biliary Tract Proc Except Only Cholecyst W Or W/O C.D.E. W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
411	Cholecystectomy W C.D.E. W MCC	Non-Orthopedic Surgery	Non-Neurologic
412	Cholecystectomy W C.D.E. W CC	Non-Orthopedic Surgery	Non-Neurologic
413	Cholecystectomy W C.D.E. W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
414	Cholecystectomy Except By Laparoscope W/O C.D.E. W MCC	Non-Orthopedic Surgery	Non-Neurologic
415	Cholecystectomy Except By Laparoscope W/O C.D.E. W CC	Non-Orthopedic Surgery	Non-Neurologic
416	Cholecystectomy Except By Laparoscope W/O C.D.E. W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
417	Laparoscopic Cholecystectomy W/O C.D.E. W MCC	Non-Orthopedic Surgery	Non-Neurologic
418	Laparoscopic Cholecystectomy W/O C.D.E. W CC	Non-Orthopedic Surgery	Non-Neurologic
419	Laparoscopic Cholecystectomy W/O C.D.E. W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
420	Hepatobiliary Diagnostic Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
421	Hepatobiliary Diagnostic Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
422	Hepatobiliary Diagnostic Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
423	Non-Neurologic Hepatobiliary Or Pancreas O.R. Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
424	Non-Neurologic Hepatobiliary Or Pancreas O.R. Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
425	Non-Neurologic Hepatobiliary Or Pancreas O.R. Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
432	Cirrhosis & Alcoholic Hepatitis W MCC	Medical Management	Non-Neurologic
433	Cirrhosis & Alcoholic Hepatitis W CC	Medical Management	Non-Neurologic
434	Cirrhosis & Alcoholic Hepatitis W/O CC/MCC	Medical Management	Non-Neurologic
435	Malignancy Of Hepatobiliary System Or Pancreas W MCC	Medical Management	Non-Neurologic
436	Malignancy Of Hepatobiliary System Or Pancreas W CC	Medical Management	Non-Neurologic
437	Malignancy Of Hepatobiliary System Or Pancreas W/O CC/MCC	Medical Management	Non-Neurologic
438	Disorders Of Pancreas Except Malignancy W MCC	Medical Management	Non-Neurologic
439	Disorders Of Pancreas Except Malignancy W CC	Medical Management	Non-Neurologic
440	Disorders Of Pancreas Except Malignancy W/O CC/MCC	Medical Management	Non-Neurologic
441	Disorders Of Liver Except Malig,Cirr,Alc Hepa W MCC	Medical Management	Non-Neurologic
442	Disorders Of Liver Except Malig,Cirr,Alc Hepa W CC	Medical Management	Non-Neurologic
443	Disorders Of Liver Except Malig,Cirr,Alc Hepa W/O CC/MCC	Medical Management	Non-Neurologic
444	Disorders Of The Biliary Tract W MCC	Medical Management	Non-Neurologic
445	Disorders Of The Biliary Tract W CC	Medical Management	Non-Neurologic
446	Disorders Of The Biliary Tract W/O CC/MCC	Medical Management	Non-Neurologic
453	Combined Anterior/Posterior Spinal Fusion W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
454	Combined Anterior/Posterior Spinal Fusion W CC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
455	Combined Anterior/Posterior Spinal Fusion W/O CC/MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
456	Spinal Fus Exc Cerv W Spinal Curv/Malig/Infec Or 9+ Fus W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
457	Spinal Fus Exc Cerv W Spinal Curv/Malig/Infec Or 9+ Fus W CC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
458	Spinal Fus Exc Cerv W Spinal Curv/Malig/Infec Or 9+ Fus W/O CC/MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
459	Spinal Fusion Except Cervical W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
460	Spinal Fusion Except Cervical W/O MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
461	Bilateral Or Multiple Major Joint Procs Of Lower Extremity W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
462	Bilateral Or Multiple Major Joint Procs Of Lower Extremity W/O MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
463	Wnd Debrid & Skn Grft Exc Hand, For Musculo-Conn Tiss Dis W MCC	Non-Neurologic Orthopedic	Non-Neurologic
464	Wnd Debrid & Skn Grft Exc Hand, For Musculo-Conn Tiss Dis W CC	Non-Neurologic Orthopedic	Non-Neurologic
465	Wnd Debrid & Skn Grft Exc Hand, For Musculo-Conn Tiss Dis W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
466	Revision Of Hip Or Knee Replacement W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
467	Revision Of Hip Or Knee Replacement W CC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
468	Revision Of Hip Or Knee Replacement W/O CC/MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
469	Major Joint Replacement Or Reattachment Of Lower Extremity W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
470	Major Joint Replacement Or Reattachment Of Lower Extremity W/O MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
471	Cervical Spinal Fusion W MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
472	Cervical Spinal Fusion W CC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
473	Cervical Spinal Fusion W/O CC/MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
474	Amputation For Musculoskeletal Sys & Conn Tissue Dis W MCC	Non-Neurologic Orthopedic	Non-Neurologic
475	Amputation For Musculoskeletal Sys & Conn Tissue Dis W CC	Non-Neurologic Orthopedic	Non-Neurologic
476	Amputation For Musculoskeletal Sys & Conn Tissue Dis W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
477	Biopsies Of Musculoskeletal System & Connective Tissue W MCC	Non-Neurologic Orthopedic	Non-Neurologic
478	Biopsies Of Musculoskeletal System & Connective Tissue W CC	Non-Neurologic Orthopedic	Non-Neurologic
479	Biopsies Of Musculoskeletal System & Connective Tissue W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
480	Hip & Femur Procedures Except Major Joint W MCC	Non-Neurologic Orthopedic	Non-Neurologic
481	Hip & Femur Procedures Except Major Joint W CC	Non-Neurologic Orthopedic	Non-Neurologic
482	Hip & Femur Procedures Except Major Joint W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
483	Major Joint & Limb Reattachment Proc Of Upper Extremity W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
484	Major Joint & Limb Reattachment Proc Of Upper Extremity W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
485	Knee Procedures W Pdx Of Infection W MCC	Non-Neurologic Orthopedic	Non-Neurologic
486	Knee Procedures W Pdx Of Infection W CC	Non-Neurologic Orthopedic	Non-Neurologic
487	Knee Procedures W Pdx Of Infection W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
488	Knee Procedures W/O Pdx Of Infection W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
489	Knee Procedures W/O Pdx Of Infection W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
490	Back & Neck Proc Exc Spinal Fusion W CC/MCC Or Disc Device/Neurostim	Major Joint Replacement/Spinal Surgery	Non-Neurologic
491	Back & Neck Proc Exc Spinal Fusion W/O CC/MCC	Major Joint Replacement/Spinal Surgery	Non-Neurologic
492	Lower Extrem & Humer Proc Except Hip,Foot,Femur W MCC	Non-Neurologic Orthopedic	Non-Neurologic
493	Lower Extrem & Humer Proc Except Hip,Foot,Femur W CC	Non-Neurologic Orthopedic	Non-Neurologic
494	Lower Extrem & Humer Proc Except Hip,Foot,Femur W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
495	Local Excision & Removal Int Fix Devices Exc Hip & Femur W MCC	Non-Neurologic Orthopedic	Non-Neurologic
496	Local Excision & Removal Int Fix Devices Exc Hip & Femur W CC	Non-Neurologic Orthopedic	Non-Neurologic
497	Local Excision & Removal Int Fix Devices Exc Hip & Femur W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
498	Local Excision & Removal Int Fix Devices Of Hip & Femur W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
499	Local Excision & Removal Int Fix Devices Of Hip & Femur W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
500	Soft Tissue Procedures W MCC	Non-Neurologic Orthopedic	Non-Neurologic
501	Soft Tissue Procedures W CC	Non-Neurologic Orthopedic	Non-Neurologic
502	Soft Tissue Procedures W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
503	Foot Procedures W MCC	Non-Neurologic Orthopedic	Non-Neurologic
504	Foot Procedures W CC	Non-Neurologic Orthopedic	Non-Neurologic
505	Foot Procedures W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
506	Major Thumb Or Joint Procedures	Non-Neurologic Orthopedic	Non-Neurologic
507	Major Shoulder Or Elbow Joint Procedures W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
508	Major Shoulder Or Elbow Joint Procedures W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
509	Arthroscopy	Non-Neurologic Orthopedic	Non-Neurologic
510	Shoulder,Elbow Or Forearm Proc,Exc Major Joint Proc W MCC	Non-Neurologic Orthopedic	Non-Neurologic
511	Shoulder,Elbow Or Forearm Proc,Exc Major Joint Proc W CC	Non-Neurologic Orthopedic	Non-Neurologic
512	Shoulder,Elbow Or Forearm Proc,Exc Major Joint Proc W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
513	Hand Or Wrist Proc, Except Major Thumb Or Joint Proc W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
514	Hand Or Wrist Proc, Except Major Thumb Or Joint Proc W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
515	Non-Neurologic Musculoskelet Sys & Conn Tiss O.R. Proc W MCC	Non-Neurologic Orthopedic	Non-Neurologic
516	Non-Neurologic Musculoskelet Sys & Conn Tiss O.R. Proc W CC	Non-Neurologic Orthopedic	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
517	Non-Neurologic Musculoskelet Sys & Conn Tiss O.R. Proc W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
533	Fractures Of Femur W MCC	Non-Neurologic Orthopedic	Non-Neurologic
534	Fractures Of Femur W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
535	Fractures Of Hip & Pelvis W MCC	Non-Neurologic Orthopedic	Non-Neurologic
536	Fractures Of Hip & Pelvis W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
537	Sprains, Strains, & Dislocations Of Hip, Pelvis & Thigh W CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
538	Sprains, Strains, & Dislocations Of Hip, Pelvis & Thigh W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
539	Osteomyelitis W MCC	Medical Management	Non-Neurologic
540	Osteomyelitis W CC	Medical Management	Non-Neurologic
541	Osteomyelitis W/O CC/MCC	Medical Management	Non-Neurologic
542	Pathological Fractures & Musculoskelet & Conn Tiss Malig W MCC	Non-Neurologic Orthopedic	Non-Neurologic
543	Pathological Fractures & Musculoskelet & Conn Tiss Malig W CC	Non-Neurologic Orthopedic	Non-Neurologic
544	Pathological Fractures & Musculoskelet & Conn Tiss Malig W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
545	Connective Tissue Disorders W MCC	Non-Neurologic Orthopedic	Non-Neurologic
546	Connective Tissue Disorders W CC	Non-Neurologic Orthopedic	Non-Neurologic
547	Connective Tissue Disorders W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
548	Septic Arthritis W MCC	Medical Management	Non-Neurologic
549	Septic Arthritis W CC	Medical Management	Non-Neurologic
550	Septic Arthritis W/O CC/MCC	Medical Management	Non-Neurologic
551	Medical Back Problems W MCC	Non-Neurologic Orthopedic	Non-Neurologic
552	Medical Back Problems W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
553	Bone Diseases & Arthropathies W MCC	Non-Neurologic Orthopedic	Non-Neurologic
554	Bone Diseases & Arthropathies W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
555	Signs & Symptoms Of Musculoskeletal System & Conn Tissue W MCC	Non-Neurologic Orthopedic	Non-Neurologic
556	Signs & Symptoms Of Musculoskeletal System & Conn Tissue W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
557	Tendonitis, Myositis & Bursitis W MCC	Non-Neurologic Orthopedic	Non-Neurologic
558	Tendonitis, Myositis & Bursitis W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
559	Aftercare, Musculoskeletal System & Connective Tissue W MCC	Non-Neurologic Orthopedic	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
560	Aftercare, Musculoskeletal System & Connective Tissue W CC	Non-Neurologic Orthopedic	Non-Neurologic
561	Aftercare, Musculoskeletal System & Connective Tissue W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
562	Fx, Sprn, Strn & Disl Except Femur, Hip, Pelvis & Thigh W MCC	Non-Neurologic Orthopedic	Non-Neurologic
563	Fx, Sprn, Strn & Disl Except Femur, Hip, Pelvis & Thigh W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
564	Non-Neurologic Musculoskeletal Sys & Connective Tissue Diagnoses W MCC	Non-Neurologic Orthopedic	Non-Neurologic
565	Non-Neurologic Musculoskeletal Sys & Connective Tissue Diagnoses W CC	Non-Neurologic Orthopedic	Non-Neurologic
566	Non-Neurologic Musculoskeletal Sys & Connective Tissue Diagnoses W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
570	Skin Debridement W MCC	Non-Orthopedic Surgery	Non-Neurologic
571	Skin Debridement W CC	Non-Orthopedic Surgery	Non-Neurologic
572	Skin Debridement W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
573	Skin Graft For Skin Ulcer Or Cellulitis W MCC	Non-Orthopedic Surgery	Non-Neurologic
574	Skin Graft For Skin Ulcer Or Cellulitis W CC	Non-Orthopedic Surgery	Non-Neurologic
575	Skin Graft For Skin Ulcer Or Cellulitis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
576	Skin Graft Exc For Skin Ulcer Or Cellulitis W MCC	Non-Orthopedic Surgery	Non-Neurologic
577	Skin Graft Exc For Skin Ulcer Or Cellulitis W CC	Non-Orthopedic Surgery	Non-Neurologic
578	Skin Graft Exc For Skin Ulcer Or Cellulitis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
579	Non-Neurologic Skin, Subcut Tiss & Breast Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
580	Non-Neurologic Skin, Subcut Tiss & Breast Proc W CC	Non-Orthopedic Surgery	Non-Neurologic
581	Non-Neurologic Skin, Subcut Tiss & Breast Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
582	Mastectomy For Malignancy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
583	Mastectomy For Malignancy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
584	Breast Biopsy, Local Excision & Non-Neurologic Breast Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
585	Breast Biopsy, Local Excision & Non-Neurologic Breast Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
592	Skin Ulcers W MCC	Medical Management	Non-Neurologic
593	Skin Ulcers W CC	Medical Management	Non-Neurologic
594	Skin Ulcers W/O CC/MCC	Medical Management	Non-Neurologic
595	Major Skin Disorders W MCC	Medical Management	Non-Neurologic
596	Major Skin Disorders W/O MCC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
597	Malignant Breast Disorders W MCC	Medical Management	Non-Neurologic
598	Malignant Breast Disorders W CC	Medical Management	Non-Neurologic
599	Malignant Breast Disorders W/O CC/MCC	Medical Management	Non-Neurologic
600	Non-Malignant Breast Disorders W CC/MCC	Medical Management	Non-Neurologic
601	Non-Malignant Breast Disorders W/O CC/MCC	Medical Management	Non-Neurologic
602	Cellulitis W MCC	Medical Management	Non-Neurologic
603	Cellulitis W/O MCC	Medical Management	Non-Neurologic
604	Trauma To The Skin, Subcut Tiss & Breast W MCC	Medical Management	Non-Neurologic
605	Trauma To The Skin, Subcut Tiss & Breast W/O MCC	Medical Management	Non-Neurologic
606	Minor Skin Disorders W MCC	Medical Management	Non-Neurologic
607	Minor Skin Disorders W/O MCC	Medical Management	Non-Neurologic
614	Adrenal & Pituitary Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
615	Adrenal & Pituitary Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
616	Amputat Of Lower Limb For Endocrine,Nutrit,& Metabol Dis W MCC	Non-Neurologic Orthopedic	Non-Neurologic
617	Amputat Of Lower Limb For Endocrine,Nutrit,& Metabol Dis W CC	Non-Neurologic Orthopedic	Non-Neurologic
618	Amputat Of Lower Limb For Endocrine,Nutrit,& Metabol Dis W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
619	O.R. Procedures For Obesity W MCC	Non-Orthopedic Surgery	Non-Neurologic
620	O.R. Procedures For Obesity W CC	Non-Orthopedic Surgery	Non-Neurologic
621	O.R. Procedures For Obesity W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
622	Skin Grafts & Wound Debrid For Endoc, Nutrit & Metab Dis W MCC	Non-Orthopedic Surgery	Non-Neurologic
623	Skin Grafts & Wound Debrid For Endoc, Nutrit & Metab Dis W CC	Non-Orthopedic Surgery	Non-Neurologic
624	Skin Grafts & Wound Debrid For Endoc, Nutrit & Metab Dis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
625	Thyroid, Parathyroid & Thyroglossal Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
626	Thyroid, Parathyroid & Thyroglossal Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
627	Thyroid, Parathyroid & Thyroglossal Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
628	Non-Neurologic Endocrine, Nutrit & Metab O.R. Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
629	Non-Neurologic Endocrine, Nutrit & Metab O.R. Proc W CC	Non-Orthopedic Surgery	Non-Neurologic
630	Non-Neurologic Endocrine, Nutrit & Metab O.R. Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
637	Diabetes W MCC	Medical Management	Non-Neurologic
638	Diabetes W CC	Medical Management	Non-Neurologic
639	Diabetes W/O CC/MCC	Medical Management	Non-Neurologic
640	Misc Disorders Of Nutrition,Metabolism,Fluids/Electrolytes W MCC	Medical Management	Non-Neurologic
641	Misc Disorders Of Nutrition,Metabolism,Fluids/Electrolytes W/O MCC	Medical Management	Non-Neurologic
642	Inborn And Non-Neurologic Disorders Of Metabolism	Medical Management	Non-Neurologic
643	Endocrine Disorders W MCC	Medical Management	Non-Neurologic
644	Endocrine Disorders W CC	Medical Management	Non-Neurologic
645	Endocrine Disorders W/O CC/MCC	Medical Management	Non-Neurologic
652	Kidney Transplant	Non-Orthopedic Surgery	Non-Neurologic
653	Major Bladder Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
654	Major Bladder Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
655	Major Bladder Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
656	Kidney & Ureter Procedures For Neoplasm W MCC	Non-Orthopedic Surgery	Non-Neurologic
657	Kidney & Ureter Procedures For Neoplasm W CC	Non-Orthopedic Surgery	Non-Neurologic
658	Kidney & Ureter Procedures For Neoplasm W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
659	Kidney & Ureter Procedures For Non-Neoplasm W MCC	Non-Orthopedic Surgery	Non-Neurologic
660	Kidney & Ureter Procedures For Non-Neoplasm W CC	Non-Orthopedic Surgery	Non-Neurologic
661	Kidney & Ureter Procedures For Non-Neoplasm W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
662	Minor Bladder Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
663	Minor Bladder Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
664	Minor Bladder Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
665	Prostatectomy W MCC	Non-Orthopedic Surgery	Non-Neurologic
666	Prostatectomy W CC	Non-Orthopedic Surgery	Non-Neurologic
667	Prostatectomy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
668	Transurethral Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
669	Transurethral Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
670	Transurethral Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
671	Urethral Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
672	Urethral Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
673	Non-Neurologic Kidney & Urinary Tract Procedures W MCC	Non-Orthopedic Surgery	Non-Neurologic
674	Non-Neurologic Kidney & Urinary Tract Procedures W CC	Non-Orthopedic Surgery	Non-Neurologic
675	Non-Neurologic Kidney & Urinary Tract Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
682	Renal Failure W MCC	Medical Management	Non-Neurologic
683	Renal Failure W CC	Medical Management	Non-Neurologic
684	Renal Failure W/O CC/MCC	Medical Management	Non-Neurologic
685	Admit For Renal Dialysis	Medical Management	Non-Neurologic
686	Kidney & Urinary Tract Neoplasms W MCC	Medical Management	Non-Neurologic
687	Kidney & Urinary Tract Neoplasms W CC	Medical Management	Non-Neurologic
688	Kidney & Urinary Tract Neoplasms W/O CC/MCC	Medical Management	Non-Neurologic
689	Kidney & Urinary Tract Infections W MCC	Medical Management	Non-Neurologic
690	Kidney & Urinary Tract Infections W/O MCC	Medical Management	Non-Neurologic
691	Urinary Stones W Esw Lithotripsy W CC/MCC	Medical Management	Non-Neurologic
692	Urinary Stones W Esw Lithotripsy W/O CC/MCC	Medical Management	Non-Neurologic
693	Urinary Stones W/O Esw Lithotripsy W MCC	Medical Management	Non-Neurologic
694	Urinary Stones W/O Esw Lithotripsy W/O MCC	Medical Management	Non-Neurologic
695	Kidney & Urinary Tract Signs & Symptoms W MCC	Medical Management	Non-Neurologic
696	Kidney & Urinary Tract Signs & Symptoms W/O MCC	Medical Management	Non-Neurologic
697	Urethral Stricture	Medical Management	Non-Neurologic
698	Non-Neurologic Kidney & Urinary Tract Diagnoses W MCC	Medical Management	Non-Neurologic
699	Non-Neurologic Kidney & Urinary Tract Diagnoses W CC	Medical Management	Non-Neurologic
700	Non-Neurologic Kidney & Urinary Tract Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
707	Major Male Pelvic Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
708	Major Male Pelvic Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
709	Penis Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
710	Penis Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
711	Testes Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
712	Testes Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
713	Transurethral Prostatectomy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
714	Transurethral Prostatectomy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
715	Non-Neurologic Male Reproductive System O.R. Proc For Malignancy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
716	Non-Neurologic Male Reproductive System O.R. Proc For Malignancy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
717	Non-Neurologic Male Reproductive System O.R. Proc Exc Malignancy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
718	Non-Neurologic Male Reproductive System O.R. Proc Exc Malignancy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
722	Malignancy, Male Reproductive System W MCC	Medical Management	Non-Neurologic
723	Malignancy, Male Reproductive System W CC	Medical Management	Non-Neurologic
724	Malignancy, Male Reproductive System W/O CC/MCC	Medical Management	Non-Neurologic
725	Benign Prostatic Hypertrophy W MCC	Medical Management	Non-Neurologic
726	Benign Prostatic Hypertrophy W/O MCC	Medical Management	Non-Neurologic
727	Inflammation Of The Male Reproductive System W MCC	Medical Management	Non-Neurologic
728	Inflammation Of The Male Reproductive System W/O MCC	Medical Management	Non-Neurologic
729	Non-Neurologic Male Reproductive System Diagnoses W CC/MCC	Medical Management	Non-Neurologic
730	Non-Neurologic Male Reproductive System Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
734	Pelvic Evisceration, Rad Hysterectomy & Rad Vulvectomy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
735	Pelvic Evisceration, Rad Hysterectomy & Rad Vulvectomy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
736	Uterine & Adnexa Proc For Ovarian Or Adnexal Malignancy W MCC	Non-Orthopedic Surgery	Non-Neurologic
737	Uterine & Adnexa Proc For Ovarian Or Adnexal Malignancy W CC	Non-Orthopedic Surgery	Non-Neurologic
738	Uterine & Adnexa Proc For Ovarian Or Adnexal Malignancy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
739	Uterine,Adnexa Proc For Non-Ovarian/Adnexal Malig W MCC	Non-Orthopedic Surgery	Non-Neurologic
740	Uterine,Adnexa Proc For Non-Ovarian/Adnexal Malig W CC	Non-Orthopedic Surgery	Non-Neurologic
741	Uterine,Adnexa Proc For Non-Ovarian/Adnexal Malig W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
742	Uterine & Adnexa Proc For Non-Malignancy W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
743	Uterine & Adnexa Proc For Non-Malignancy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
744	D&C, Conization, Laparoscopy & Tubal Interruption W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
745	D&C, Conization, Laparoscopy & Tubal Interruption W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
746	Vagina, Cervix & Vulva Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
747	Vagina, Cervix & Vulva Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
748	Female Reproductive System Reconstructive Procedures	Non-Orthopedic Surgery	Non-Neurologic
749	Non-Neurologic Female Reproductive System O.R. Procedures W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
750	Non-Neurologic Female Reproductive System O.R. Procedures W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
754	Malignancy, Female Reproductive System W MCC	Medical Management	Non-Neurologic
755	Malignancy, Female Reproductive System W CC	Medical Management	Non-Neurologic
756	Malignancy, Female Reproductive System W/O CC/MCC	Medical Management	Non-Neurologic
757	Infections, Female Reproductive System W MCC	Acute Neurologic	Acute Neurologic
758	Infections, Female Reproductive System W CC	Acute Neurologic	Acute Neurologic
759	Infections, Female Reproductive System W/O CC/MCC	Acute Neurologic	Acute Neurologic
760	Menstrual & Non-Neurologic Female Reproductive System Disorders W CC/MCC	Medical Management	Non-Neurologic
761	Menstrual & Non-Neurologic Female Reproductive System Disorders W/O CC/MCC	Medical Management	Non-Neurologic
765	Cesarean Section W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
766	Cesarean Section W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
767	Vaginal Delivery W Sterilization &/Or D&C	Non-Orthopedic Surgery	Non-Neurologic
768	Vaginal Delivery W O.R. Proc Except Steril &/Or D&C	Non-Orthopedic Surgery	Non-Neurologic
769	Postpartum & Post Abortion Diagnoses W O.R. Procedure	Non-Orthopedic Surgery	Non-Neurologic
770	Abortion W D&C, Aspiration Curettage Or Hysterotomy	Non-Orthopedic Surgery	Non-Neurologic
774	Vaginal Delivery W Complicating Diagnoses	Medical Management	Non-Neurologic
775	Vaginal Delivery W/O Complicating Diagnoses	Medical Management	Non-Neurologic
776	Postpartum & Post Abortion Diagnoses W/O O.R. Procedure	Medical Management	Non-Neurologic
777	Ectopic Pregnancy	Medical Management	Non-Neurologic
778	Threatened Abortion	Medical Management	Non-Neurologic
779	Abortion W/O D&C	Medical Management	Non-Neurologic
780	False Labor	Medical Management	Non-Neurologic
781	Non-Neurologic Antepartum Diagnoses W Medical Complications	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
782	Non-Neurologic Antepartum Diagnoses W/O Medical Complications	Medical Management	Non-Neurologic
789	Neonates, Died Or Transferred To AnNon-Neurologic Acute Care Facility	Medical Management	Non-Neurologic
790	Extreme Immaturity Or Respiratory Distress Syndrome, Neonate	Medical Management	Non-Neurologic
791	Prematurity W Major Problems	Medical Management	Non-Neurologic
792	Prematurity W/O Major Problems	Medical Management	Non-Neurologic
793	Full Term Neonate W Major Problems	Medical Management	Non-Neurologic
794	Neonate W Non-Neurologic Significant Problems	Medical Management	Non-Neurologic
795	Normal Newborn	Medical Management	Non-Neurologic
799	Splenectomy W MCC	Non-Orthopedic Surgery	Non-Neurologic
800	Splenectomy W CC	Non-Orthopedic Surgery	Non-Neurologic
801	Splenectomy W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
802	Non-Neurologic O.R. Proc Of The Blood & Blood Forming Organs W MCC	Non-Orthopedic Surgery	Non-Neurologic
803	Non-Neurologic O.R. Proc Of The Blood & Blood Forming Organs W CC	Non-Orthopedic Surgery	Non-Neurologic
804	Non-Neurologic O.R. Proc Of The Blood & Blood Forming Organs W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
808	Major Hematol/Immun Diag Exc Sickle Cell Crisis & Coagul W MCC	Medical Management	Non-Neurologic
809	Major Hematol/Immun Diag Exc Sickle Cell Crisis & Coagul W CC	Medical Management	Non-Neurologic
810	Major Hematol/Immun Diag Exc Sickle Cell Crisis & Coagul W/O CC/MCC	Medical Management	Non-Neurologic
811	Red Blood Cell Disorders W MCC	Medical Management	Non-Neurologic
812	Red Blood Cell Disorders W/O MCC	Medical Management	Non-Neurologic
813	Coagulation Disorders	Medical Management	Non-Neurologic
814	Reticuloendothelial & Immunity Disorders W MCC	Medical Management	Non-Neurologic
815	Reticuloendothelial & Immunity Disorders W CC	Medical Management	Non-Neurologic
816	Reticuloendothelial & Immunity Disorders W/O CC/MCC	Medical Management	Non-Neurologic
820	Lymphoma & Leukemia W Major O.R. Procedure W MCC	Non-Orthopedic Surgery	Non-Neurologic
821	Lymphoma & Leukemia W Major O.R. Procedure W CC	Non-Orthopedic Surgery	Non-Neurologic
822	Lymphoma & Leukemia W Major O.R. Procedure W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
823	Lymphoma & Non-Acute Leukemia W Non-Neurologic O.R. Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
824	Lymphoma & Non-Acute Leukemia W Non-Neurologic O.R. Proc W CC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
825	Lymphoma & Non-Acute Leukemia W Non-Neurologic O.R. Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
826	Myeloprolif Disord Or Poorly Diff Neopl W Maj O.R. Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
827	Myeloprolif Disord Or Poorly Diff Neopl W Maj O.R. Proc W CC	Non-Orthopedic Surgery	Non-Neurologic
828	Myeloprolif Disord Or Poorly Diff Neopl W Maj O.R. Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
829	Myeloprolif Disord Or Poorly Diff Neopl W Non-Neurologic O.R. Proc W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
830	Myeloprolif Disord Or Poorly Diff Neopl W Non-Neurologic O.R. Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
834	Acute Leukemia W/O Major O.R. Procedure W MCC	Medical Management	Non-Neurologic
835	Acute Leukemia W/O Major O.R. Procedure W CC	Medical Management	Non-Neurologic
836	Acute Leukemia W/O Major O.R. Procedure W/O CC/MCC	Medical Management	Non-Neurologic
837	Chemo W Acute Leukemia As Sdx Or W High Dose Chemo Agent W MCC	Medical Management	Non-Neurologic
838	Chemo W Acute Leukemia As Sdx W CC Or High Dose Chemo Agent	Medical Management	Non-Neurologic
839	Chemo W Acute Leukemia As Sdx W/O CC/MCC	Medical Management	Non-Neurologic
840	Lymphoma & Non-Acute Leukemia W MCC	Medical Management	Non-Neurologic
841	Lymphoma & Non-Acute Leukemia W CC	Medical Management	Non-Neurologic
842	Lymphoma & Non-Acute Leukemia W/O CC/MCC	Medical Management	Non-Neurologic
843	Non-Neurologic Myeloprolif Dis Or Poorly Diff Neopl Diag W MCC	Medical Management	Non-Neurologic
844	Non-Neurologic Myeloprolif Dis Or Poorly Diff Neopl Diag W CC	Medical Management	Non-Neurologic
845	Non-Neurologic Myeloprolif Dis Or Poorly Diff Neopl Diag W/O CC/MCC	Medical Management	Non-Neurologic
846	ChemNon-Neurologicapy W/O Acute Leukemia As Secondary Diagnosis W MCC	Medical Management	Non-Neurologic
847	ChemNon-Neurologicapy W/O Acute Leukemia As Secondary Diagnosis W CC	Medical Management	Non-Neurologic
848	ChemNon-Neurologicapy W/O Acute Leukemia As Secondary Diagnosis W/O CC/MCC	Medical Management	Non-Neurologic
849	RadiNon-Neurologicapy	Medical Management	Non-Neurologic
853	Infectious & Parasitic Diseases W O.R. Procedure W MCC	Non-Orthopedic Surgery	Non-Neurologic
854	Infectious & Parasitic Diseases W O.R. Procedure W CC	Non-Orthopedic Surgery	Non-Neurologic
855	Infectious & Parasitic Diseases W O.R. Procedure W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
856	Postoperative Or Post-Traumatic Infections W O.R. Proc W MCC	Non-Orthopedic Surgery	Non-Neurologic
857	Postoperative Or Post-Traumatic Infections W O.R. Proc W CC	Non-Orthopedic Surgery	Non-Neurologic
858	Postoperative Or Post-Traumatic Infections W O.R. Proc W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
862	Postoperative & Post-Traumatic Infections W MCC	Medical Management	Non-Neurologic
863	Postoperative & Post-Traumatic Infections W/O MCC	Medical Management	Non-Neurologic
864	Fever	Medical Management	Non-Neurologic
865	Viral Illness W MCC	Medical Management	Non-Neurologic
866	Viral Illness W/O MCC	Medical Management	Non-Neurologic
867	Non-Neurologic Infectious & Parasitic Diseases Diagnoses W MCC	Medical Management	Non-Neurologic
868	Non-Neurologic Infectious & Parasitic Diseases Diagnoses W CC	Medical Management	Non-Neurologic
869	Non-Neurologic Infectious & Parasitic Diseases Diagnoses W/O CC/MCC	Medical Management	Non-Neurologic
870	Septicemia Or Severe Sepsis W Mv 96+ Hours	Medical Management	Non-Neurologic
871	Septicemia Or Severe Sepsis W/O Mv 96+ Hours W MCC	Medical Management	Non-Neurologic
872	Septicemia Or Severe Sepsis W/O Mv 96+ Hours W/O MCC	Medical Management	Non-Neurologic
876	O.R. Procedure W Principal Diagnoses Of Mental Illness	Non-Orthopedic Surgery	Non-Neurologic
880	Acute Adjustment Reaction & Psychosocial Dysfunction	Medical Management	Non-Neurologic
881	Depressive Neuroses	Medical Management	Non-Neurologic
882	Neuroses Except Depressive	Medical Management	Non-Neurologic
883	Disorders Of Personality & Impulse Control	Medical Management	Non-Neurologic
884	Organic Disturbances & Mental Retardation	Medical Management	Non-Neurologic
885	Psychoses	Medical Management	Non-Neurologic
886	Behavioral & Developmental Disorders	Medical Management	Non-Neurologic
887	Non-Neurologic Mental Disorder Diagnoses	Medical Management	Non-Neurologic
894	Alcohol/Drug Abuse Or Dependence, Left Ama	Medical Management	Non-Neurologic
895	Alcohol/Drug Abuse Or Dependence W Rehabilitation Therapy	Medical Management	Non-Neurologic
896	Alcohol/Drug Abuse Or Dependence W/O Rehabilitation Therapy W MCC	Medical Management	Non-Neurologic
897	Alcohol/Drug Abuse Or Dependence W/O Rehabilitation Therapy W/O MCC	Medical Management	Non-Neurologic
901	Wound Debridements For Injuries W MCC	Non-Orthopedic Surgery	Non-Neurologic
902	Wound Debridements For Injuries W CC	Non-Orthopedic Surgery	Non-Neurologic
903	Wound Debridements For Injuries W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
904	Skin Grafts For Injuries W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
905	Skin Grafts For Injuries W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
906	Hand Procedures For Injuries	Non-Orthopedic Surgery	Non-Neurologic
907	Non-Neurologic O.R. Procedures For Injuries W MCC	Non-Orthopedic Surgery	Non-Neurologic
908	Non-Neurologic O.R. Procedures For Injuries W CC	Non-Orthopedic Surgery	Non-Neurologic
909	Non-Neurologic O.R. Procedures For Injuries W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
913	Traumatic Injury W MCC	Non-Neurologic Orthopedic	Non-Neurologic
914	Traumatic Injury W/O MCC	Non-Neurologic Orthopedic	Non-Neurologic
915	Allergic Reactions W MCC	Medical Management	Non-Neurologic
916	Allergic Reactions W/O MCC	Medical Management	Non-Neurologic
917	Poisoning & Toxic Effects Of Drugs W MCC	Medical Management	Non-Neurologic
918	Poisoning & Toxic Effects Of Drugs W/O MCC	Medical Management	Non-Neurologic
919	Complications Of Treatment W MCC	Medical Management	Non-Neurologic
920	Complications Of Treatment W CC	Medical Management	Non-Neurologic
921	Complications Of Treatment W/O CC/MCC	Medical Management	Non-Neurologic
922	Non-Neurologic Injury, Poisoning & Toxic Effect Diag W MCC	Medical Management	Non-Neurologic
923	Non-Neurologic Injury, Poisoning & Toxic Effect Diag W/O MCC	Medical Management	Non-Neurologic
927	Extensive Burns Or Full Thickness Burns W Mv 96+ Hrs W Skin Graft	Non-Orthopedic Surgery	Non-Neurologic
928	Full Thickness Burn W Skin Graft Or Inhal Inj W CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
929	Full Thickness Burn W Skin Graft Or Inhal Inj W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
933	Extensive Burns Or Full Thickness Burns W Mv 96+ Hrs W/O Skin Graft	Medical Management	Non-Neurologic
934	Full Thickness Burn W/O Skin Grft Or Inhal Inj	Medical Management	Non-Neurologic
935	Non-Extensive Burns	Medical Management	Non-Neurologic
939	O.R. Proc W Diagnoses Of Non-Neurologic Contact W Health Services W MCC	Non-Orthopedic Surgery	Non-Neurologic
940	O.R. Proc W Diagnoses Of Non-Neurologic Contact W Health Services W CC	Non-Orthopedic Surgery	Non-Neurologic
941	O.R. Proc W Diagnoses Of Non-Neurologic Contact W Health Services W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
945	Rehabilitation W CC/MCC	Medical Management	Non-Neurologic
946	Rehabilitation W/O CC/MCC	Medical Management	Non-Neurologic
947	Signs & Symptoms W MCC	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
948	Signs & Symptoms W/O MCC	Medical Management	Non-Neurologic
949	Aftercare W CC/MCC	Medical Management	Non-Neurologic
950	Aftercare W/O CC/MCC	Medical Management	Non-Neurologic
951	Non-Neurologic Factors Influencing Health Status	Medical Management	Non-Neurologic
955	Craniotomy For Multiple Significant Trauma	Non-Orthopedic Surgery	Non-Neurologic
956	Limb Reattachment, Hip & Femur Proc For Multiple Significant Trauma	Non-Neurologic Orthopedic	Non-Neurologic
957	Non-Neurologic O.R. Procedures For Multiple Significant Trauma W MCC	Non-Orthopedic Surgery	Non-Neurologic
958	Non-Neurologic O.R. Procedures For Multiple Significant Trauma W CC	Non-Orthopedic Surgery	Non-Neurologic
959	Non-Neurologic O.R. Procedures For Multiple Significant Trauma W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
963	Non-Neurologic Multiple Significant Trauma W MCC	Non-Neurologic Orthopedic	Non-Neurologic
964	Non-Neurologic Multiple Significant Trauma W CC	Non-Neurologic Orthopedic	Non-Neurologic
965	Non-Neurologic Multiple Significant Trauma W/O CC/MCC	Non-Neurologic Orthopedic	Non-Neurologic
969	Hiv W Extensive O.R. Procedure W MCC	Non-Orthopedic Surgery	Non-Neurologic
970	Hiv W Extensive O.R. Procedure W/O MCC	Non-Orthopedic Surgery	Non-Neurologic
974	Hiv W Major Related Condition W MCC	Medical Management	Non-Neurologic
975	Hiv W Major Related Condition W CC	Medical Management	Non-Neurologic
976	Hiv W Major Related Condition W/O CC/MCC	Medical Management	Non-Neurologic
977	Hiv W Or W/O Non-Neurologic Related Condition	Medical Management	Non-Neurologic
981	Extensive O.R. Procedure Unrelated To Principal Diagnosis W MCC	Non-Orthopedic Surgery	Non-Neurologic
982	Extensive O.R. Procedure Unrelated To Principal Diagnosis W CC	Non-Orthopedic Surgery	Non-Neurologic
983	Extensive O.R. Procedure Unrelated To Principal Diagnosis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
984	Prostatic O.R. Procedure Unrelated To Principal Diagnosis W MCC	Non-Orthopedic Surgery	Non-Neurologic
985	Prostatic O.R. Procedure Unrelated To Principal Diagnosis W CC	Non-Orthopedic Surgery	Non-Neurologic
986	Prostatic O.R. Procedure Unrelated To Principal Diagnosis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
987	Non-Extensive O.R. Proc Unrelated To Principal Diagnosis W MCC	Non-Orthopedic Surgery	Non-Neurologic
988	Non-Extensive O.R. Proc Unrelated To Principal Diagnosis W CC	Non-Orthopedic Surgery	Non-Neurologic
989	Non-Extensive O.R. Proc Unrelated To Principal Diagnosis W/O CC/MCC	Non-Orthopedic Surgery	Non-Neurologic
998	Principal Diagnosis Invalid As Discharge Diagnosis	Medical Management	Non-Neurologic

MS-DRG	MS-DRG Description[44]	Clinical Category Mapping	
		PT/OT	SLP
999	Ungroupable	Medical Management	Non-Neurologic