Inpatient Rehabilitation Facility Prospective Payment System Reform: Comorbidity Technical Memo

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OVERVIEW

This memo summarizes the IRF PPS: Comorbidity Evaluation analysis that explores alternative payment approaches to the comorbidity portion of the current Inpatient Rehabilitation Facility (IRF) Prospective Payment System (PPS). Section 1 of this document provides the policy context and motivation for the analysis. Section 2 outlines the methodological approach. Section 3 summarizes the main results. Finally, the Appendix contains figures and tables referenced throughout the memo.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

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1 BACKGROUND

CMS is exploring options to modernize the IRF PPS by moving away from using the current comorbidity tier system and leveraging existing comorbidity score systems such as the Non-Therapy Ancillary (NTA) comorbidity system under the Skilled Nursing Facility Patient-Driven Payment Model (SNF PDPM). The primary objective of the Comorbidity Evaluation analysis is to develop a comorbidity system that reflects the treatment cost based on the presence of multiple comorbidities as well as their severity.

The current IRF PPS model relies on a tier comorbidity system with four tiers – "no tier," "low tier," "medium tier," and "high tier." The current system assigns comorbidity tiers based on the most expensive comorbidity reported for a stay without considering the total number of comorbidities. As a result, stays with multiple comorbidities where the most severe comorbidity is categorized in the "low tier" could be paid at a lower rate even if costs incurred are higher than those of a stay in a higher tier with only one comorbidity. Therefore, there may be a need to implement a comorbidity system that accounts for both the severity and the number of comorbidities. To address these issues, Acumen conducted the Comorbidity Evaluation analysis to assist CMS in aligning aspects of the IRF PPS with the SNF PDPM. The analysis focuses on creating a new comorbidity score system based on the framework of the PDPM NTA methodology.

In aligning the two payment systems, Acumen considered several key similarities and differences between the two settings. Both IRFs and SNFs provide post-acute care (PAC) treatment that address therapy and nursing needs. However, IRFs provide more intensive therapy while SNFs focus more on skilled nursing care. The two systems are similar in how they report comorbidities – IRF PPS relies on the ICD-10 based item 24 on IRF-PAI and PDPM also relies on the ICD-10 based item I1800 on Minimum Data Set (MDS). However, PDPM also utilizes other items reported in the MDS assessment. The payment model also differs between the two as IRFs are paid on a per stay basis, covering all costs, while SNFs follow a per-diem payment model, which break costs into six components (Physical Therapy, Occupational Therapy, Speech-Language Pathology, Non-Therapy Ancillary, Nursing, and Non-Case-Mix).

2 METHODOLOGY

Section 2 highlights the methodology for the Comorbidity Evaluation analysis broken down by the relevant topics. Subsection 2.1 outlines the study population. Subsection 2.2 describes the process of cost standardization. Subsection 2.3, subsection 2.4, subsection 2.5, and subsection 2.6 detail the methodological approaches used to create the master list of comorbidities, select comorbidities, estimate comorbidity points, and produce score bins, respectively. Subsection 2.7 outlines the comorbidity model evaluation criterion and subsection 2.8 identifies the major methodological deviations from the SNF PDPM methodology.

2.1 Study Population

The study population for this analysis includes all Medicare Part A IRF stays in FY 2023 after the necessary study restrictions have been applied. The restrictions are implemented to ensure the results of the analysis would be applicable to the general Medicare fee-for-service (FFS) IRF population. The restriction types include Medicare Part A restrictions, matching restrictions, validity restrictions, and atypical stays restrictions. The detailed breakdown of the study restrictions are provided in Table 1, which summarizes the individual and cumulative frequencies of each restriction applied during the selection process.

2.2 Standardizing Cost

For each provider, Acumen calculates cost center-specific cost-to-charge ratios (CCRs) using data from Healthcare Provider Cost Reporting Information System (HCRIS). Next, for each stay, Acumen estimates cost-center-specific costs by multiplying the most relevant CCR to each cost-center-specific charge on the IRF claim. Then, Acumen sums up the costs for each cost center to estimate IRF stay total costs. Costs are standardized by removing the rural, teaching status, low-income proportion, and wage index/labor share adjustment.

2.3 Creating Master List of Conditions

Acumen compiles an initial list of potential conditions relevant to the IRF setting by consulting with their clinicians and reviewing literature. These conditions are approved by clinicians and expected to impact nursing, therapy, and NTA utilization in the IRF setting under current IRF PPS guidelines. The following sources are used to compile the initial list of variables:

- Condition categories as defined by the FY 2025 Initial Year CMS-HCCv28 (Hierarchical Condition Category Version 28) Software Mapping[1]
- Condition categories as defined by the FY 2025 Initial Year CMS-RxHCCv08 (Prescription Drug Hierarchical Condition Category Version 08) Software Mapping
- IRF-PAI (version 4.0) Sections I, K, M, and O items that are similar to the MDS items used in the PDPM NTA methodology
- Custom comorbidities such as COVID-19 and endocarditis

First, Acumen flags CCs and RxCCs for each stay by using the matched IRF-PAI assessment item 24 or the diagnosis codes on the IRF claim, except for the principal diagnosis. Next, Acumen works with their clinicians to remove redundant condition categories that overlap with one or more of the IRF-PAI items included in the initial list to avoid having multiple variables measure the same condition and/or service. Acumen clinicians identify overlaps between the CCs or RxCCs and the IRF-PAI items by investigating the ICD-10 codes mapped to the CC or RxCC. For a particular CC or RxCC, if a majority, over 50%, of the mapped ICD-10 codes can be associated with the IRF-PAI item, then it is considered to be an overlap and excluded from the analysis. Acumen then removes redundant condition categories that overlap between the two software mappings defined as the following:

- Substantial Overlap: If the CC and RxCC have the same number of ICD-10 codes and the overlapping codes represent more than 85% of the total number of ICD-10 codes for the CC or RxCC, Acumen keeps the RxCC and excludes the CC.
- Subset/superset Overlap: If the CC and RxCC have a different number of ICD-10 codes and the overlapping codes represent more than 85% of the smaller condition category (the CC or RxCC with fewer ICD-10 codes), Acumen keeps the subset condition, drops the superset condition, and redefines the superset to exclude ICD-10 codes from the subset condition.
- Partial Overlap: If the CC and RxCC have overlapping ICD-10 codes, but is neither a substantial overlap nor a subset/superset overlap, Acumen keeps both CC and RxCC.
- Other Overlap: Acumen also identifies two specific types of overlaps that require additional clinician input:

[1] Location of the mappings are located in the following link: https://www.cms.gov/medicare/payment/medicare-advantage-rates-statistics/risk-adjustment. In addition, a few terminologies to note:
- CMS-HCC: General name of Medicare Part C hierarchical condition category risk adjustment model
- CMS-RxCC: General name for Medicare Part D hierarchical condition category risk adjustment model
- CC: Name for ICD-10 diagnosis code mappings from CMS-HCC models
- RxCC: Name for ICD-10 diagnosis code mappings from CMS-RxHCC models

- Complex overlap, where multiple CCs overlap multiple RxCCs. Acumen resolves these complex overlaps by consulting their clinicians to drop either all the overlapping CCs or all the overlapping RxCCs and creating custom variables to capture excluded conditions as necessary.
- Problematic partial overlap, where one CC partially overlaps another RxCC, and the overlapping ICD-10 codes constitute a majority of the stays with either the CC or RxCC recorded. Acumen treats the problematic partial overlaps as subset/superset overlaps to retain the essential aspects of both overlapping condition categories in the analysis.

Next, Acumen makes additional refinements to the CCs by excluding their ICD-10 codes that might not be relevant to IRF care. Acumen also removes conditions and services based on clinical concerns surrounding coding reliability or lack of specificity in the ICD-10 codes.

The result of this iterative refinement process is a comprehensive "master list" of variables.

2.4 Selecting Comorbidities

Acumen specifies an ordinary least squares (OLS) linear regression model with log-transformed costs per stay as the outcome and the variables in the master list as the independent variables and Case-Mix Group (CMG) as control variables. This OLS linear regression model is referred to as the "comorbidity selection model" for this stage of the analysis.

While using log-transformed costs reflects the proportional impact of comorbidities on costs that vary by the baseline complexity of a stay, it can make coefficient interpretation less intuitive as impact on utilization are expressed in log unit. To address this, Acumen uses average marginal effects (AME) to translate the results to be in dollar terms. The AME for a comorbidity can be interpreted as the average difference in predicted costs between all stays with and without a given comorbidity, holding all else constant. Specifically, Acumen exponentiates the predicted log costs and multiplies them by the following correction factor,e^0.5s, where s represents the variance of the residuals from the model, to obtain predicted costs. Acumen then uses the predicted costs to calculate the AME for each comorbidity. Acumen selects comorbidities that have an AME of $500 or more and with a p-value less than 0.05 to identify comorbidities that substantially impact stay costs and are deemed as statistically significant. The $500 threshold was implemented since comorbidities with any amount less than that would be assigned zero point.

The result of this step is a final list of comorbidities deemed statistically significant with an AME of at least $500.

2.5 Estimating Comorbidity Points

Acumen specifies another OLS linear regression model with log-transformed costs per stay as the outcome variable, the selected comorbidities from step 2.4 as the independent variables, and CMG as the control variables. The goal of this model is to predict comorbidity points for only the selected variables. Specifically, as the coefficient of a comorbidity is sensitive to what other comorbidities are included in the linear regression model, a separate point estimation model is necessary to make sure that the final estimates capture all associated additional costs of selected comorbidities including other correlated but excluded comorbidities. To assign points, Acumen divides the AME, the predicted costs for each comorbidity in the point estimation model, by $1,000 and rounds it to the nearest integer. If the AME is less than $500, Acumen assigns it 1 point. The result of this step is a list of IRF comorbidities, each assigned a specific point value. Additionally, the comorbidity score for a stay is calculated by adding up the points for the reported comorbidities.

2.6 Assigning Score Bins

Acumen runs the Classification and Regression Tree (CART) analysis using model "Total Cost per Stay ~ IRF Comorbidity Score" to group IRF comorbidity scores into bins. Acumen specifies an option called ten-fold cross validation in the CART algorithm, which tests the output bin structure on different partitions of the data. For each fold, the algorithm calculates an average squared error (ASE). Then, the algorithm takes the average of the calculated ASE values from each fold, known as the average average squared error (AASE). The optimal number of bins is the score bins with the minimum AASE, which is 18 bins. However, to further simplify the model, Acumen considers using fewer bins. Specifically, Acumen selects four and six bins because their AASE values fall within one standard error of the minimum AASE; four bins also represents the smallest number of bins that had AASE within the range. In addition, these options align with the current four comorbidity tiers in IRF and six NTA CMGs in SNF.

2.7 Evaluating IRF Methodology

Acumen evaluates performance of the new comorbidity score models against the current tier model to assess differences in cost prediction accuracy. Model performance is compared using adjusted R-squared values. A detailed breakdown of the model performance comparison can be found in Table 2.

- *Current IRF Tier Model: log(Standardized Cost) = CMG + Comorbidity Tier * RIC*
- *New IRF Score Model: log(Standardized Cost) = CMG + Comorbidity Score Bin*

2.8 Major Deviations from SNF PDPM Methodology

Due to the different setting and payment structures, there are substantial methodological differences between the proposed IRF PPS comorbidity system and SNF PDPM NTA comorbidity system. Acumen made several key methodological adjustments to account for the unique characteristics of IRFs:

Use of Log-Transformed Total Cost per Stay

Since IRFs are reimbursed on a per-stay basis, total costs per stay is used as the outcome variable, in contrast to the per-diem structure used in SNFs, where component-specific costs per day are used as the outcome variable.

The decision to log-transform the total costs per stay is motivated by two factors. First, the overall IRF PPS payment model, which determines comorbidity tier weights, uses log-transformed costs as the outcome variable. Second, IRF PPS uses a per-stay payment system and does not have granular payment components, modeling comorbidities based on their potential proportional impact on total costs per stay is more appropriate. Comorbidities can influence therapy progress and overall costs differently depending on the underlying CMG, which means additional costs due to the existence of a comorbidity could be proportional instead of constant to the baseline complexity of a stay. For instance, a comorbidity could have a greater effect on costs for a high-cost, therapy-intensive stay than for a low-cost stay requiring less therapy. Comorbidities also often lead to recurring utilization of services (e.g., medications, respiratory support, etc.), meaning longer stays incur higher comorbidity-related costs.

Use of IRF-Specific Comorbidities

Acumen ran a preliminary analysis using the current list of NTA comorbidities. This approach leveraged the established SNF PDPM NTA comorbidity list and assigned a comorbidity score for each IRF stay based on the PDPM NTA methodology. Acumen determined that the PDPM NTA list did not fully capture the clinical complexities and unique needs of IRF patients. Therefore, Acumen constructed an IRF-specific comorbidity list to capture the case mix of patients being treated in the IRF setting and identify an optimal score system.

Inclusion of CMG in the Regression Models

Case mix group (CMG) is included in the comorbidity selection model and the point estimation model as controlling for CMG allows the models to isolate the impact of comorbidities on costs not already captured by the CMG.

Exclusion of First Principal Diagnosis on the IRF Claim Diagnosis Array

Both IRF-PAI item 24 and diagnosis code array from IRF claims are used to capture comorbidities. The principal diagnosis on the IRF claim diagnosis array usually reflects the

primary reason for admission. To avoid misclassifying the principal diagnosis as a comorbidity, it is excluded when gathering comorbidities for a given stay.

Switch to a Single-Stage Comorbidity Selection Model

To refine the comorbidity selection process, a single-stage comorbidity selection model instead of a multi-stage regression comorbidity selection model is used. The initial methodology, adopted from the PDPM NTA component, involves two stages and three linear regression models, designed to select comorbidities relevant to their respective settings. These different models may omit certain clinically relevant comorbidities in the selection process, which can influence the estimates and affect the final list of conditions. Combining the three models into a single one that incorporates all relevant comorbidities for the IRF setting addresses potential biases that arise from excluding certain relevant comorbidities from each model. The change primarily simplifies the process while improving the accuracy of the estimates and the final comorbidity list. In addition, by combining the two stages, the interpretation of the results becomes clearer.

Removal of Comorbidity Cap

Unlike the NTA comorbidity list, which selects the top 50 comorbidities with positive and significant estimates, there is no cap on the number of IRF comorbidities moving through each stage of the analysis to allow for a more inclusive set of comorbidities. An AME of $500 or more was chosen as the threshold (i.e., any condition estimated to contribute at least an increase of $500 for a stay), given any amount less than that would assign zero point to a comorbidity.

3 RESULTS

This section summarizes key insights from the analysis, with corresponding figures and a table provided in the appendix.

Figure 1 compares the average standardized IRF costs per stay and percentage of stays by comorbidity tiers in the current IRF PPS comorbidity system. The distribution of stays are concentrated in the "no tier" and "low tier," which together account for about 85.7% of all stays. The results indicate that the average standardized cost per stay also increases as the comorbidity tiers move up. There is considerable variation in costs within each tier, indicating that even within a given comorbidity tier, costs can vary widely.

Figure 2a and Figure 2b compare average standardized IRF costs per stay and percentage of stays by 4 and 6 comorbidity score bins respectively. The 4-bin version groups stays into bins of 0, 1-2, 3-5, and 6+, which provides broader categorization for middle-range scores and the 6-bin version groups stays into more granular bins of 0, 1, 2, 3, 4-5, 6+. The 4-bin version shows a larger share of stays in the middle range 1-2 score bin compared to other bins, while the 0 and 3-5 bins have similar shares and the 6+ bin accounts for the smallest share. The 6-bin version shows comparable overall distributions of stays across bins. In addition, in both versions, higher score bins are associated with higher average standardized costs.

Figure 3a compares percentage of stays within each comorbidity tier by comorbidity score. The four tiers are stacked vertically in order of severity with "no tier" (A) at the bottom and "high tier" (B) at the top. All stays with the same comorbidity score are assigned to one of the four tiers, meaning the percentage of stays for a given score across all tiers sum up to 100%. Scores in the lower range are concentrated in the "no tier" (A) and "low tier" (D). For instance, 66.9% of all stays with comorbidity score "0" fall into "no tier". If there were no relationship between scores and tiers, the vertical bars would have been relatively flat and consistent across tiers. The results demonstrate that as comorbidity score increases, there is a shift in the distribution, with a greater proportion of stays assigned to the higher tiers and lower scores are more likely associated with lower tiers.

Figure 3b compares average stay costs within each comorbidity score by comorbidity tier. The results show that comorbidity tiers overlap, meaning stays within the lowest tier can have costs as high as those in the highest tier, despite only being paid at the lowest tier level. A stay with high score but placed in the lower tier due to its most severe comorbidity being less expensive can end up with a higher average cost per stay because it includes multiple comorbidities whose combined costs exceed those of the highest tier stays. If there were no relationship between the number of comorbidities and costs, the data points would have located at a similar height as those in the same tier and there would not have been any overlap between

tiers across scores. The results show that as the number of comorbidities or the value of scores increases, stays in the lower tiers with more comorbidities tend to be more expensive than stays in the higher tiers with fewer comorbidities.

Table 2 compares model performance across different IRF comorbidity models. The results demonstrate that both 4-binned and 6-binned models achieved a slightly higher adjusted R-squared value of 0.3157 and 0.3180, respectively, compared to 0.2996 of the current tier model. This indicates that the new model performs better than the current tier model while simplifying and modernizing the classification process.

Table 3 shows the conditions and services included in the comorbidity score system, their frequency of stays, AME values, and assigned points.

APPENDIX – TABLES AND FIGURES

Table 1: Frequencies of Study Population Restrictions

Restrictions	Frequency		Cumulative Frequency	
	# of Stays	% of Stays	# of Stays	% of Stays
All	542,402	100.0%	542,402	100.0%
Part A Restrictions				
Beneficiary is enrolled in Part A at admission	412,850	76.1%	412,850	76.1%
Stay has positive utilization days	514,679	94.9%	402,464	74.2%
Stay has positive Medicare payment	406,341	74.9%	402,365	74.2%
Matching Restrictions				
Stay is matched to an IRF-PAI assessment	540,507	99.7%	402,134	74.1%
Provider of stay can be found in the FY2023 IRF PPS Rate Setting File (RSF)	516,972	95.3%	381,094	70.3%
Provider of stay can be found in CASPER or POS	536,720	99.0%	377,190	69.5%
A cost report can be found for the provider	533,095	98.3%	377,190	69.5%
Validity Restrictions				
Stay has nonzero charges	542,402	100.0%	377,190	69.5%
Stay log standardized costs are not missing	483,430	89.1%	371,262	68.4%
Stay does not have an estimated outlier cost (0.5th <= costs per stay <= 99.5th)	478,594	88.2%	367,975	67.8%
Atypical Stay Restrictions				
Stay does not have a Disaster-Relief (DR) waiver	523,293	96.5%	354,815	65.4%
Stay is not a short-stay transfer paid on a per diem rate nor a stay that receives a blended transfer payment (Pricer return code on claims = 02, 03, 06, 07, 12, 13, 16, or 17)	468,179	86.3%	304,508	56.1%
Stay length is longer than 3 days	524,884	96.8%	301,833	55.6%
Stay's CMG does not equal 5001, 5101, 5102, 5103, nor 5104	542,373	100.0%	301,819	55.6%
Study Population	301,819	55.6%	301,819	55.6%

Figure 1: Average Standardized Costs per Stay and Percentage of Stays by IRF Comorbidity Tier

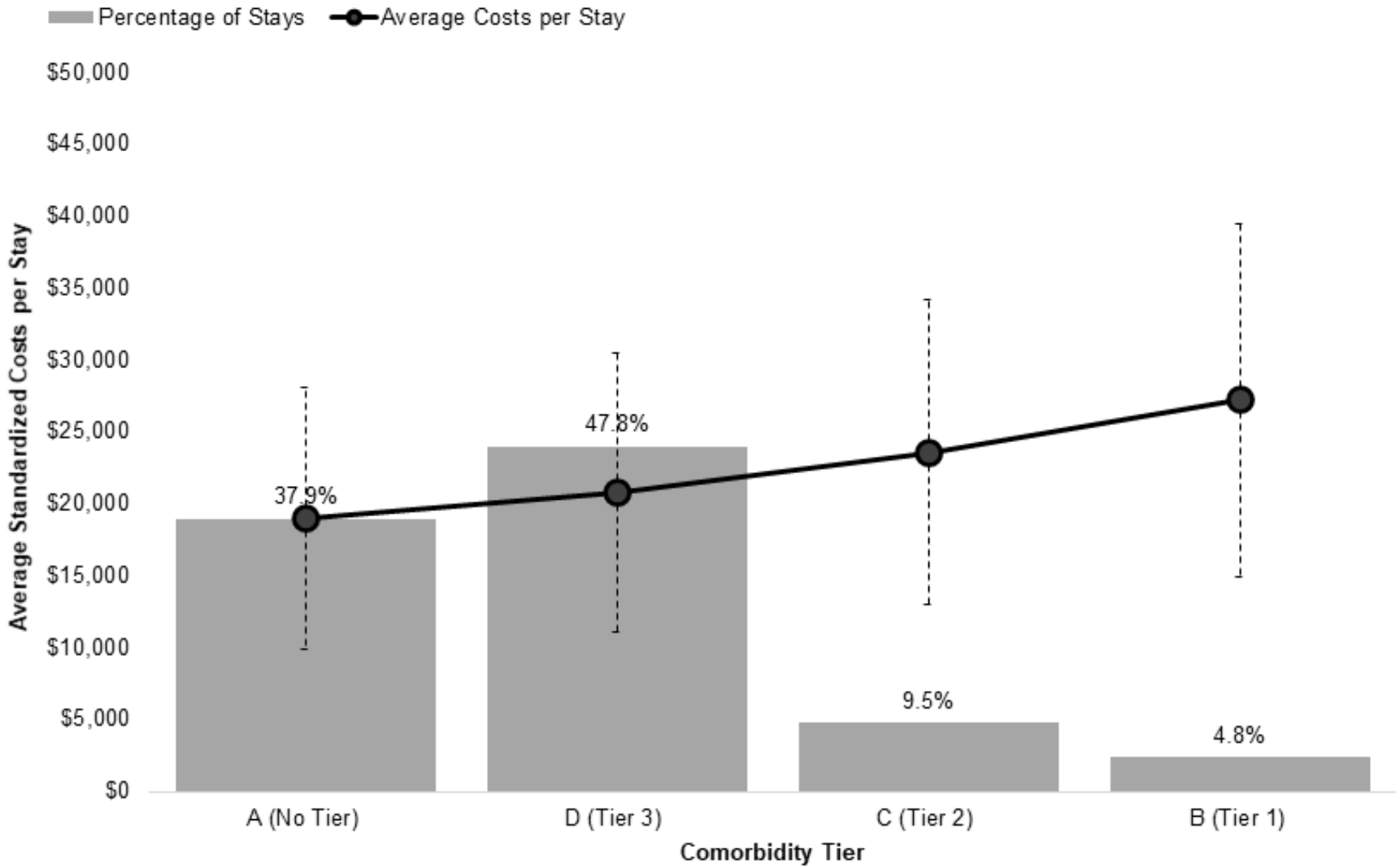

Figure 2a: Average Standardized Costs per Stay and Percentage of Stays by IRF Score Bin (Four Bins)

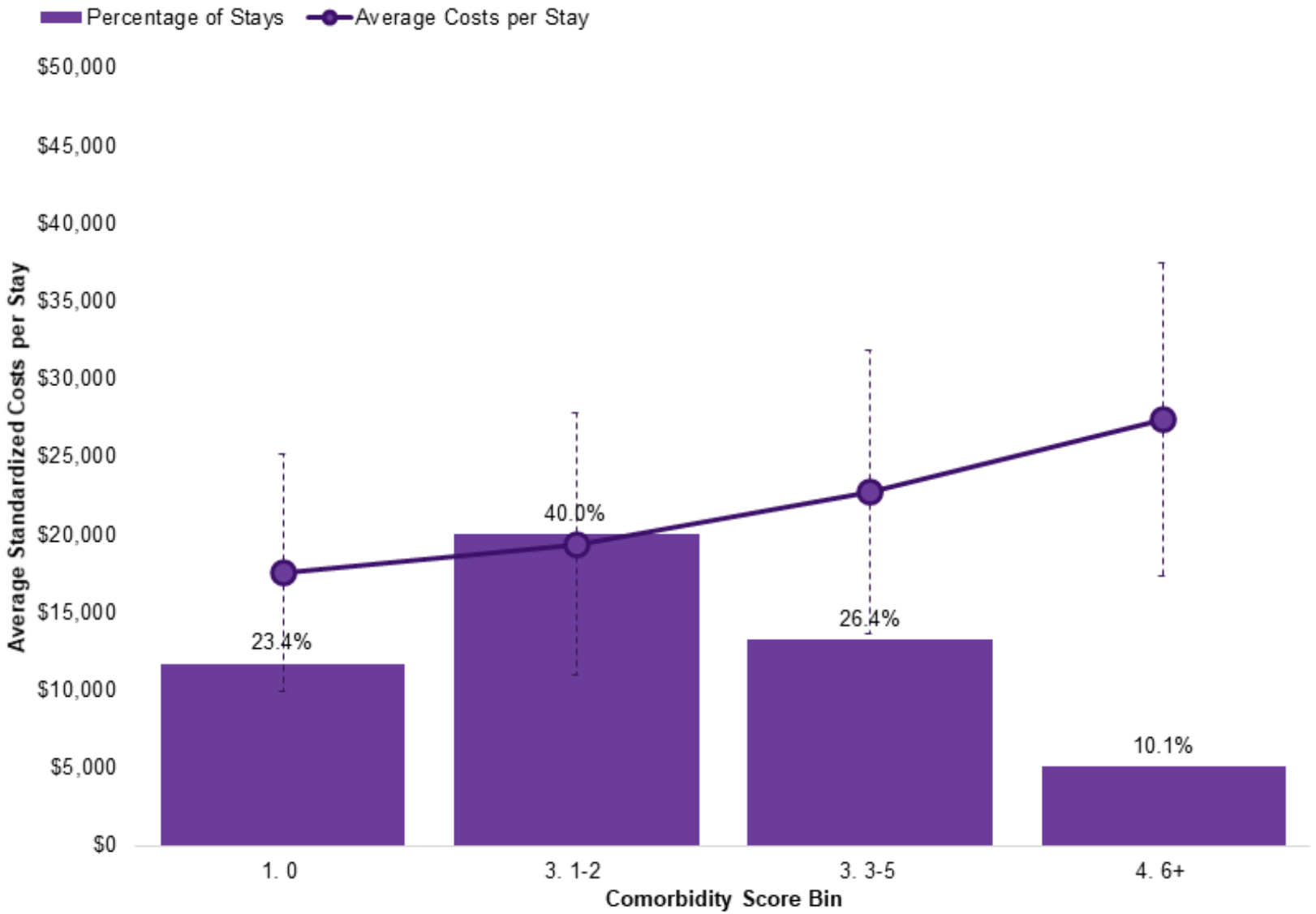

Figure 2b: Average Standardized Costs per Stay and Percentage of Stays by IRF Score Bin (Six Bins)

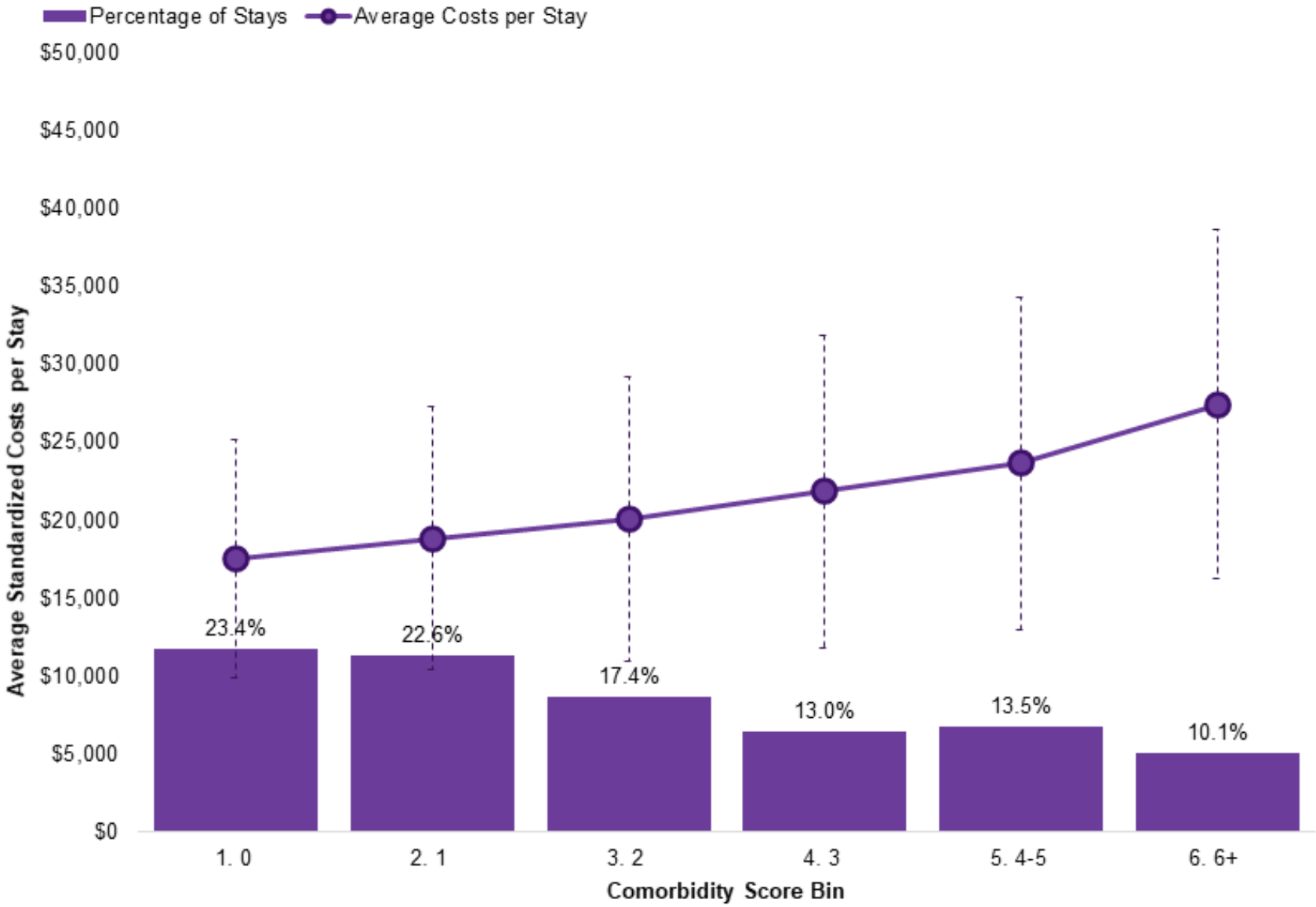

Figure 3a: Percentage of Stays Within Each Comorbidity Tier Stratified by Comorbidity Score

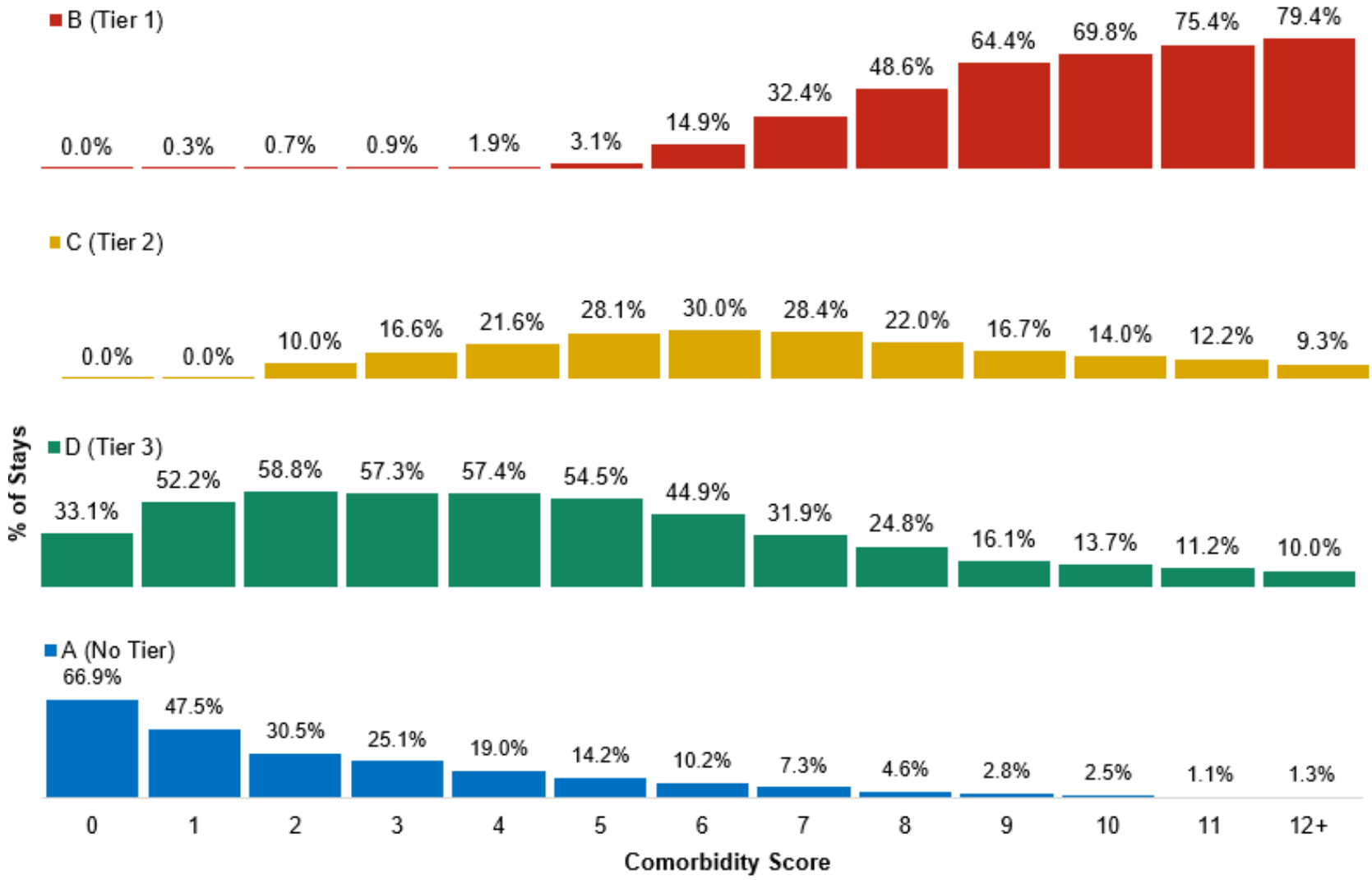

Figure 3b: Average Stay Costs Within Each Comorbidity Score Stratified by Comorbidity Tier

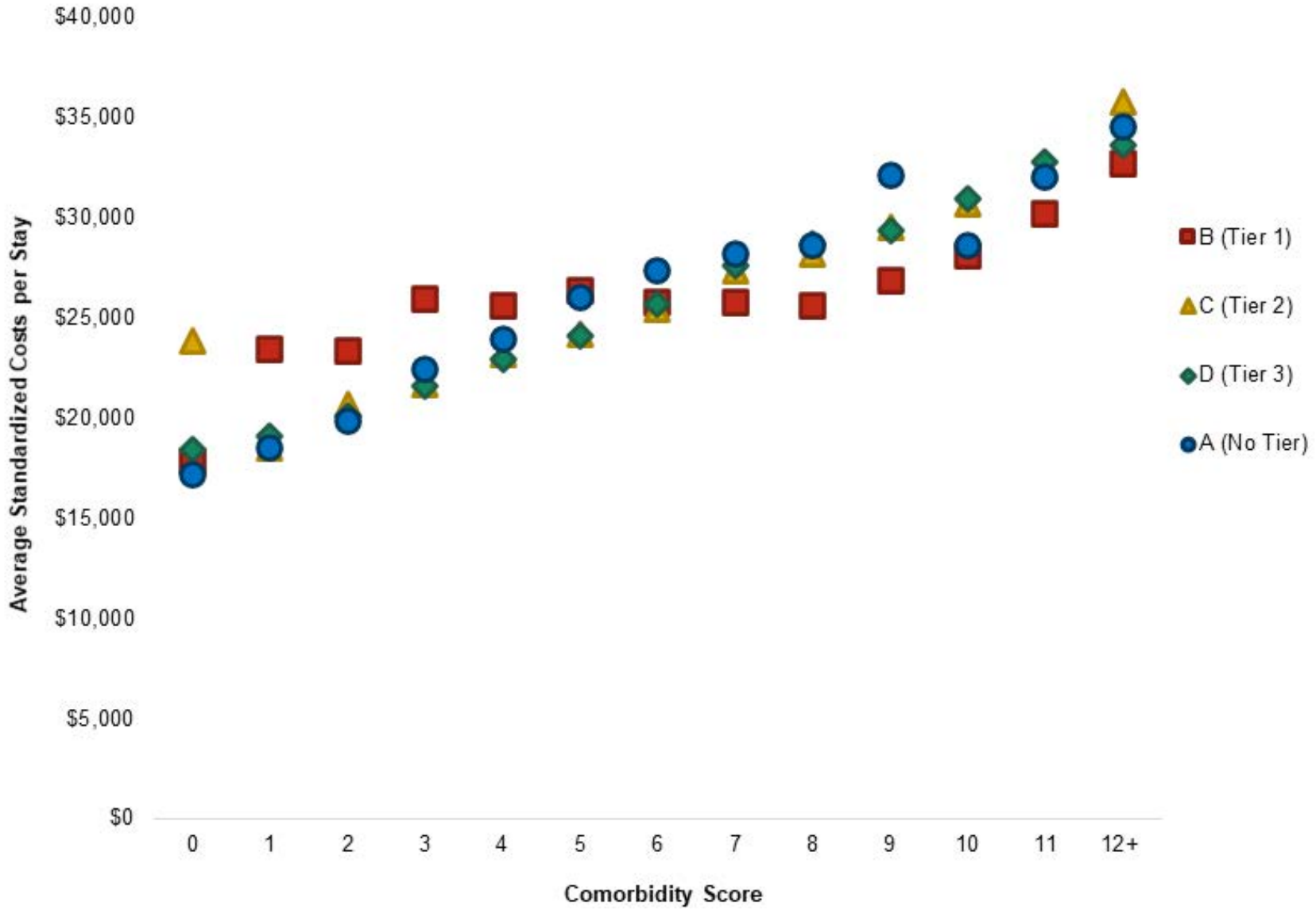

Table 2: System Comparison

System	System Specification	Adjusted R-Squared
Base Model	Log(Std Cost) = Intercept + CMG	0.2718
Current Tier Model	Log(Std Cost) = Intercept + CMG + RIC * Comorbidity Tier	0.2996
New Score Model (IRF Comorbidities and Additive Score 4-Bin)	Log(Std Cost) = Intercept + CMG + Comorbidity Score Bin	0.3157
New Score Model (IRF Comorbidities and Additive Score 6-Bin)	Log(Std Cost) = Intercept + CMG + Comorbidity Score Bin	0.3180

Table 3: Comorbidities Included in Comorbidity Score and Assigned Points

Comorbidity	Percentage of Stays	Average Marginal Effect (AME)	Points
CC405: Traumatic Amputations and Complications	0.0%	$13,279	13
CC276: Lung Transplant Status/Complications	0.1%	$6,077	6
CC278: Idiopathic Pulmonary Fibrosis and Lung Involvement in Systemic Sclerosis Except: RXCC226: Idiopathic Pulmonary Fibrosis and Systemic Sclerosis with Lung Involvement	0.0%	$5,349	5
IRF O0110J1A Other Treatments/Therapies: Dialysis (Admission) Code	3.9%	$4,527	5
IRF O0110F1A Therapies: Invasive Mechanical Ventilator (Admission) Code	0.0%	$4,270	4
RXCC228: Severe Persistent Asthma	0.0%	$3,984	4
CC402: Hip Fracture/Dislocation	0.4%	$3,776	4
CC221: Heart Transplant Status/Complications	0.1%	$3,736	4
RXCC183: Pulmonary Arterial Hypertension	0.1%	$3,689	4
CC401: Vertebral Fractures without Spinal Cord Injury	0.7%	$3,281	3
IRF O0110B1A Treatment: Radiation (Admission) Code	0.1%	$3,260	3
CC249: Ischemic or Unspecified Stroke	0.5%	$3,134	3
RXCC161: Parkinson Disease Except: CC199: Parkinson and Other Degenerative Disease of Basal Ganglia	0.0%	$2,902	3
DGN: Brain Compression/Anoxic Damage (Modified CC202)	0.8%	$2,863	3
RXCC163: Intractable Epilepsy	0.0%	$2,858	3
CC263: Atherosclerosis of Arteries of the Extremities with Ulceration or Gangrene	0.5%	$2,761	3
CC399: Major Head Injury without Loss of Consciousness	0.2%	$2,607	3
RXCC99: Immune Disorders Except: CC114: Common Variable and Combined Immunodeficiencies	0.8%	$2,500	2
RXCC56: Chronic Viral Hepatitis B and Other Specified Chronic Viral Hepatitis	0.1%	$2,425	2
CC298: Severe Diabetic Eye Disease, Retinal Vein Occlusion, and Vitreous Hemorrhage	0.1%	$2,420	2
CC248: Intracranial Hemorrhage	0.4%	$2,413	2
CC283: Empyema, Lung Abscess	0.1%	$2,375	2
DGN: Bacterial Infection (Current Tier 2)	2.4%	$2,363	2
IRF K0520B1 Nutritional Approaches (Admission): Feeding tube Code	1.9%	$2,351	2
CC92: Bone/Joint/Muscle/Severe Soft Tissue Infections/Necrosis Except: RXCC80: Aseptic Necrosis of Bone	1.5%	$2,266	2
DGN: Dysphagia or Aphagia (Current Tier 2)	13.9%	$2,244	2

Comorbidity	Percentage of Stays	Average Marginal Effect (AME)	Points
CC181: Paraplegia	0.9%	$2,119	2
RXCC207: Spastic Hemiplegia	0.2%	$2,089	2
CC78: Intestinal Obstruction/Perforation	1.3%	$2,070	2
CC300: Exudative Macular Degeneration	0.1%	$2,067	2
CC223: Heart Failure with Heart Assist Device/Artificial Heart	0.2%	$2,057	2
IRF O0110I1A Other Treatments/Therapies: Transfusions (Admission) Code	0.5%	$1,966	2
IRF K0520A1 Nutritional Approaches (Admission): Parenteral Code	0.4%	$1,891	2
CC213: Cardio-Respiratory Failure and Shock	9.3%	$1,859	2
CC180: Quadriplegia	0.7%	$1,794	2
RXCC67: Inflammatory Bowel Disease Except: CC80: Crohn's Disease (Regional Enteritis), CC81: Ulcerative Colitis	0.1%	$1,740	2
RXCC5: Opportunistic Infections	0.3%	$1,722	2
DGN: Larynx Paralysis or Edema (Current Tier 1)	0.2%	$1,682	2
CC229: Unstable Angina and Other Acute Ischemic Heart Disease	0.4%	$1,640	2
RXCC243: Glaucoma, Open-Angle or Moderate/Severe Stage	0.2%	$1,628	2
RXCC395: Stem Cell, Including Bone Marrow, Transplant Status/Complications	0.2%	$1,613	2
RXCC43: Pituitary, Adrenal Gland, and Other Endocrine and Metabolic Disorders	5.1%	$1,580	2
CC62: Liver Transplant Status/Complications	0.3%	$1,574	2
RXCC100: Immune Thrombocytopenic Purpura	0.2%	$1,474	1
RXCC80: Aseptic Necrosis of Bone	0.1%	$1,466	1
RXCC215: Venous Thromboembolism	4.3%	$1,448	1
CC182: Spinal Cord Disorders/Injuries Except: RXCC155: Spinal Cord Disorders	0.3%	$1,368	1
DGN: HIV/AIDS (claims only)	0.1%	$1,328	1
RXCC54: Chronic Viral Hepatitis C	0.2%	$1,224	1
CC253: Hemiplegia/Hemiparesis Except: RXCC207: Spastic Hemiplegia	12.6%	$1,212	1
RXCC184: Pulmonary Hypertension, Except Arterial, and Other Pulmonary Heart Disease	3.3%	$1,209	1
RXCC133: Anxiety and Other Psychiatric Disorders	10.4%	$1,195	1
CC197: Muscular Dystrophy	0.1%	$1,185	1
DGN: Hydrocephalus (Modified CC127)	0.7%	$1,111	1

Comorbidity	Percentage of Stays	Average Marginal Effect (AME)	Points
DGN: Endocarditis	0.3%	$1,103	1
RXCC66: Pancreatic Disorders and Intestinal Malabsorption, Except Pancreatitis	0.7%	$1,037	1
CC2: Septicemia, Sepsis, Systemic Inflammatory Response Syndrome/Shock	2.4%	$1,016	1
CC199: Parkinson and Other Degenerative Disease of Basal Ganglia	3.4%	$992	1
RXCC153: Myasthenia Gravis and Other Myoneural Disorders	0.4%	$932	1
RXCC227: Pulmonary Fibrosis, Except Idiopathic	1.2%	$929	1
CC112: Immune Thrombocytopenia and Specified Coagulation Defects and Hemorrhagic Conditions Except: RXCC100: Immune Thrombocytopenic Purpura	0.2%	$893	1
CC238: Specified Heart Arrhythmias Except: RXCC193: Atrial Arrhythmias	2.7%	$890	1
RXCC226: Idiopathic Pulmonary Fibrosis and Systemic Sclerosis with Lung Involvement	0.1%	$885	1
CC63: Chronic Liver Failure/End-Stage Liver Disorders	0.6%	$874	1
CC282: Aspiration and Specified Bacterial Pneumonias	1.4%	$873	1
RXCC159: Multiple Sclerosis	0.6%	$827	1
RXCC81: Psoriatic Arthropathy	0.3%	$826	1
CC254: Monoplegia, Other Paralytic Syndromes	0.8%	$804	1
CC109: Acquired Hemolytic, Aplastic, and Sideroblastic Anemias	1.0%	$802	1
CC/RxCC: Stage 3 or higher chronic kidney disease (CC326, CC327, CC328, CC329, RXCC262 or RXCC263)	19.7%	$767	1
RXCC19: Leukemias and Other Hematologic Cancers	1.1%	$728	1
RXCC17: Secondary Cancer of Bone and Kidney	0.9%	$694	1
IRF O0110H1A Other Treatments/Therapies: IV Medications (Admission) Code	17.0%	$668	1
RXCC21: Lymphomas and Other Hematologic Cancers	0.9%	$628	1
IRF O0110A1A Treatment: Chemotherapy (Admission) Code	1.2%	$626	1
RXCC16: Multiple Myeloma and Other Hematologic Cancers	0.6%	$614	1
CC81: Ulcerative Colitis	0.4%	$610	1
RXCC186: Heart Failure	26.4%	$602	1
RXCC168: Trigeminal and Postherpetic Neuralgia	0.5%	$586	1
RXCC155: Spinal Cord Disorders	1.7%	$572	1
RXCC316: Psoriasis, Except with Arthropathy	0.5%	$567	1

Comorbidity	Percentage of Stays	Average Marginal Effect (AME)	Points
RXCC260: Kidney Transplant Status	0.8%	$537	1