Published in final edited form as:

Arch Phys Med Rehabil. 2016 December ; 97(12): 2068–2075. doi:10.1016/j.apmr.2016.06.005.

Social support and actual versus expected length of stay in inpatient rehabilitation facilities

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Abstract

Objectives—Describe impairment-specific patterns in shorter- and longer-than-expected lengths of stay in inpatient rehabilitation and examine the independent effects of social support on deviations from expected lengths of stay.

Design—Retrospective cohort study.

Setting—Inpatient rehabilitation facilities across the United States.

Participants—Medicare fee-for-service beneficiaries (N=119,437) who were discharged from inpatient rehabilitation facilities in 2012 following stroke, lower extremity fracture, or lower extremity joint replacement.

Intervention—Not applicable.

Main Outcome Measure—Relative length of stay (actual – expected). The Centers for Medicare and Medicaid Services posts annual expected lengths of stay based on patients' clinical profiles at admission. We created a 3-category outcome variable: short, expected, long. Our primary independent variable (social support) also included 3 categories: family/friends, paid/other, none.

Results—Mean (SD) actual lengths of stay for joint replacement, fracture, and stroke were 9.8 (3.6), 13.8 (4.5), and 15.8 (7.3) days, respectively; relative lengths of stay were –1.2 (3.1), –1.6 (3.7), and –1.7 (5.2) days. Nearly half of patients (47–48%) were discharged more than 1 day earlier than expected in all 3 groups, whereas 14% of joint replacement, 15% of fracture, and 20% of stroke patients were discharged more than 1 day later than expected. In multinomial regression analysis, using family/friends as the reference group, paid/other support was associated ($p<.05$) with higher odds of long stays in joint replacement. No social support was associated with lower

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Prior presentation: Portions of this work were presented as a poster at the 2015 ACRM Annual Conference in Dallas, TX.

odds of short stays in all 3 impairment groups and higher odds of long stays in fracture and joint replacement.

Conclusion—Inpatient rehabilitation experiences and outcomes can be substantially impacted by a patient's level of social support. More research is needed to better understand these relationships and possible unintended consequences in terms of patient access issues and provider-level quality measures.

Keywords

length of stay; rehabilitation; social support

Inpatient rehabilitation facilities (IRFs) provide intensive rehabilitation to patients following an injury, illness, or surgery.¹ In 2002, the Medicare prospective payment system for IRFs switched from a services/cost-based mechanism to a predetermined per-discharge payment based on the patient's case mix group (CMG).¹ Patients are assigned to a CMG based on rehabilitation impairment categories, age, and functional status at admission.¹ Patients are also classified into a comorbidity "tier" based on the presence of certain comorbid conditions at admission.¹ Together, the CMG and tier comorbidity categories determine the reimbursement an IRF receives for a given patient. The payment amount is set to cover the average cost (resources used, length of stay, etc.) for patients with the particular clinical profile.

Under the IRF prospective payment system, there is a financial incentive for facilities to discharge a patient earlier than his or her projected length of stay. Since the installment of the prospective payment system in 2002 there has been a dramatic decrease in IRF length of stay.^{2–6} Evidence for relationships between this overall decreasing length of stay and patient outcomes is mixed.^{2–6} Moreover, there is no information regarding patient-level variations around the expected lengths of stay or patient characteristics associated with shorter- or longer-than expected lengths of stay.

Patient sociodemographic characteristics are beyond the control of providers. However, some of these characteristics may affect discharge planning decisions and related outcomes. Social support, for example, is associated with likelihood of returning to the community.^{7–9} It is unknown whether social support is similarly associated with likelihood of shorter- or longer-than-expected lengths of stay.

The Centers for Medicare and Medicaid Services (CMS) report annual expected lengths of stay for each CMG and comorbidity tier combination. We used those values to calculate "relative" lengths of stay (actual minus expected) for Medicare beneficiaries with stroke, lower extremity fracture, and lower extremity joint replacement who were discharged from inpatient rehabilitation in 2012. Our goals were to first, describe impairment-specific patterns in relative lengths of stay and second, examine the independent effects of social support on relative length of stay.

METHODS

Data Source

Medicare data were obtained from the CMS. We selected patients discharged from IRFs in 2012 using the 100% inpatient rehabilitation facility-patient assessment instrument (IRF-PAI) file. We then linked the assessment data from those cases to the claims data in the Medicare Provider Analysis and Review file and the enrollment and demographic data in the beneficiary summary file.^{10,11} A data usage agreement was established with the CMS and the study was approved by the University's Institutional Review Board.

Study Sample

Patient records were included into the study if they were admitted for initial inpatient rehabilitation services after a stroke, lower extremity joint replacement, or lower extremity fracture, and were discharged from an IRF in 2012. There were 178,970 patients in the original sample. Patients were excluded if they were previously discharged from an IRF within 30 days, had no prior hospital discharge within 1 day of IRF admission, had a length of stay less than 3 days or longer than 45 days, died during rehabilitation or had an unknown discharge setting, had missing social support information, lived in an institution before being hospitalized, were classified as a short stay-transfer at the end of their IRF stay, or they were discharged against medical advice. The final sample included 119,437 patients in the following impairment groups: stroke (n=50,656), lower extremity fracture (n=34,345), and lower extremity joint replacement (n=34,436). Figure 1 outlines the selection process for the study sample.

Variables

Relative length of stay—Relative length of stay was our primary study outcome. This variable was created to determine a patient's actual length of stay relative to expected based on his or her CMG and tier comorbidity classification.¹ Relative length of stay was coded into three categories: short, expected, and long. The expected category included patients that were discharged within one (+/- 1) day of their expected discharge date. The short category included patients that were discharged earlier than 1 day of their expected discharge date. The short category was limited to patients discharged to the community as patients discharged earlier than expected to another institutional setting are classified as "short-stay transfers" and reimbursements are reduced.¹² The long category was defined as patients who were discharged more than 1 day after their expected discharge date. For example, if a patient's expected length of stay was 17 days, but was discharged on day 19, he or she was classified as longer-than-expected.

Rehabilitation Impairment Category: Patients were stratified by rehabilitation impairment category: stroke, lower extremity fracture, or lower extremity joint replacement. Each category includes several CMGs: stroke = 0101, 0102, 0103, 0104, 0105, 0106, 0107, 0108, 0109, 0110; lower extremity fracture = 0701, 0702, 0703, 0704; and joint replacement = 0801, 0802, 0803, 0804, 0805, 0806.¹ The expected lengths of stay within each impairment category range from 8–33 days for stroke, 9–19 days for lower extremity fracture, and 7–18 days for joint replacement.¹

Social Support: Social support was our primary independent variable. Patients were identified as having social support based on self-report information on their marital status and living situation prior to admission. The living situation variable includes alone, family/relatives, friends, attendant, or other. Our social support variable was coded into three categories: family/friends, paid/other, or none.

Covariates: Several sociodemographic and clinical variables at inpatient rehabilitation admission were included as covariates. Sociodemographic characteristics included: age, sex, race/ethnicity, and Medicare-Medicaid dual eligibility. Age was coded as a continuous variable. Sex (male vs female) and dual eligibility (yes vs no) were coded as dichotomous variables. Race/ethnicity was coded as a 4-level variable (White, Black, Hispanic, and Other). Clinical variables included disability, tier comorbidity, and functional status at admission. Disability was coded as a dichotomous variable (yes vs no) based on the beneficiary's original reason for Medicare eligibility. An individual's tier level reflects the level of reimbursement based on the severity of comorbid conditions.¹³ There are four tiers: tier 1 (high reimbursement), tier 2 (moderate reimbursement), tier 3 (low reimbursement), or no tier level.¹³ Functional status was obtained using items from the FIM instrument, which is part of the IRF-PAI. The FIM contains 18 items across motor and cognitive domains. The FIM motor domain contains 13-items and the FIM cognitive domain contains 5 items. Each item is scored on a scale from 1 (complete dependence) to 7 (complete independence). The reliability, validity, and responsiveness of the FIM instrument have been previously reported.^{14,15}

Statistical Analyses

Descriptive summaries of patient characteristics were first tabulated for each impairment group (fracture, joint replacement, and stroke). Frequency distributions for the relative length of stay categories were then stratified by patient characteristics within each impairment group. Lastly, we performed impairment-specific multivariable multinomial logistic regression models including social support and all covariates listed above with relative length of stay as the outcome. Multinomial logistic models were used because the study outcome had three levels: short, expected, and long stay. We chose expected length of stay (+/- 1 day) as the reference group for the outcome. The family/friends category was used as the reference group for the social support variable. Parameter estimates from the multivariable models were converted to probabilities and plotted by social support categories for easier interpretation. All analyses were performed using SAS for Windows, version 9.3 (SAS Institute, Inc., Cary, NC) and significance was determined with $\alpha=0.05$.

RESULTS

Table 1 provides sample characteristics for the three impairment groups. Mean (SD) ages ranged from 73.2 (9.2) years for joint replacement to 79.7 (9.4) years for fracture. The percentages of patients reporting they have family and/or friends for social support for fracture, joint replacement, and stroke were 62%, 65%, and 69%, respectively. Admission FIM motor ratings ranged from 35.8 (10.0) for fracture to 42.7 (9.2) for joint replacement. The percentages of patients with no tier comorbidities were similar across the three groups:

71% (joint replacement), 72% (stroke), and 73% (fracture). Actual lengths of stay for joint replacement, fracture, and stroke were 9.8 (3.6), 13.8 (4.5), and 15.8 (7.3) days, respectively, and the resultant mean relative lengths of stay were -1.2 (3.1), -1.6 (3.7), and -1.7 (5.2) days.

Table 2 shows the distributions of the relative length of stay categories across patient demographic and clinical characteristics within each impairment group. Overall, nearly half of patients (47–48%) were discharged more than 1 day earlier than expected in all three groups. Approximately 14% of joint replacement, 15% of fracture, and 20% of stroke patients were discharged more than 1 day later than expected. The largest row percentages within the short and long stay categories demonstrated interesting patterns across impairment groups. Short stays were most common in family/friends support for fracture and joint replacement and in paid/other support for stroke. Long stays were most common in paid/other support for joint replacement and in no support for fracture and stroke. Regarding the two variables directly related to determining the expected lengths of stay, short stays were most common in the highest quartile of motor functioning across all three impairment groups. Tier comorbidities demonstrated variable patterns of association across impairment groups. Short stays were most common in tier 1 for stroke, no tier for fracture, and tier 2 for joint replacement. Long stays were most common in tier 3 for stroke and tier 1 for fracture and joint replacement.

Results from the multinomial logistic regression models are shown in Table 3. Expected length of stay was used as the reference category for the relative length of stay outcome variable. Using family/friends as the reference group, paid/other support was associated with long stays in joint replacement only: odds ratio (OR) 1.72 (95% confidence interval [95% CI] 1.21, 2.43). No social support was associated with lesser likelihood of short stays in all 3 impairment groups (stroke OR 0.68 (0.65, 0.71), fracture OR 0.66 (0.63, 0.69), and joint replacement OR 0.81 (0.77, 0.85)) and with long stays in fracture (OR 1.08 (1.01, 1.16)) and joint replacement (OR 1.35 (1.26, 1.45)). Figure 2 shows these relationships converted to probabilities. Motor functioning and comorbidity status also demonstrated interesting patterns in the regression models (Table 3). Compared to the lowest motor functioning quartile, higher motor functioning quartiles in stroke and fracture were associated with greater likelihood of short stays (ORs ranged from 1.20 (1.13, 1.27) to 1.73 (1.61, 1.85)) and lesser likelihood of long stays (ORs ranged from 0.69 (0.63, 0.74) to 0.93 (0.87, 1.00)). The associations between motor functioning and relative length of stay were mixed in joint replacement; ORs for short stays ranged from 0.89 (0.83, 0.95) to 0.99 (0.92, 1.06) and for long stays ranged from 0.73 (0.66, 0.81) to 1.10 (1.00, 1.20). The various tier comorbidity levels (reference group = none) were generally associated with greater likelihood of both short (max OR 1.87 (1.61, 2.17)) and long (max OR 2.19 (1.58, 3.04)) stays across the three impairment groups, with one exception; tier 1 was associated with lesser likelihood of short stays in fracture (OR 0.84 (0.71, 0.99)). Tier 1 also demonstrated a trend for lesser likelihood of short stays in joint replacement, but the effect was not statistically significant (OR 0.73 (0.53, 1.01)).

DISCUSSION

Many studies have reported on the trend in decreasing lengths of stay since implementation of the IRF prospective payment system and have examined the potential impacts of these shorter stays on clinical outcomes.²⁻⁵ However, there is no published information on the degree to which the Medicare inpatient rehabilitation population deviates from their condition-specific expected lengths of stay or on patient characteristics that may be associated with either shorter-than- or longer-than-expected lengths of stay. We assessed impairment-specific patterns in relative lengths of stay (calculated as actual days minus expected days) and examined the independent effects of social support on relative lengths of stay in Medicare beneficiaries with stroke, lower extremity fracture, or lower extremity joint replacement who were discharged from inpatient rehabilitation in 2012.

Reimbursements under the IRF prospective payment system are based on the average resource utilization for a patient within a given CMG / tier comorbidity combination.¹ Some patients use less than the projected resources and represent a positive contribution to a facility's financial margin, whereas others use more resources than projected and effectively reduce a facility's margin. Thus, in the prospective payment environment, it is generally in a facility's best (financial) interest to reduce lengths of stay as much as possible while still providing quality care. There are two provisions in the payment system to 1) minimize the incentive for decreasing lengths of stay by transferring patients to other institutions (short-stay transfers)¹ and 2) offset the extraordinary costs of providing care to atypical patients with excessive needs who require prolonged lengths of stay (outlier payments).¹

The impairment-specific means for actual lengths of stay (stroke 16 days, fracture 14 days, and joint replacement 10 days) in our study are similar to those previously reported by others.^{5,6} Means for the differences in relative lengths of stay were all between -1 and -2 days across the 3 impairment groups. Nearly half of the patients were discharged more than one day earlier than expected and the pattern was consistent across impairment groups: percentages ranged from 47 to 48%. Conversely, the percentage of patients staying more than one day longer than expected was higher for stroke (20%) than for fracture (15%) and joint replacement (14%).

Our primary findings indicate that the presence of social support influences a patient's relative length of stay. Approximately 1 in 3 patients reported having no direct social support. Compared to patients with family/friends support, a lack of social support was associated with lesser likelihood of short stays and greater likelihood of long stays after controlling for other probable factors. The paid/other category of social support includes a small, yet heterogeneous group of patients. The only statistically significant effect of paid/other versus family/friends was for greater likelihood of long stays in joint replacement.

We found only one previous article that used a comparable relative length of stay outcome. Tan and colleagues¹⁶ examined factors associated with delayed discharges (longer-than-planned durations) from inpatient stroke rehabilitation in Singapore. Among the four broad categories of potential contributing factors (individual, caregiver, medical, and organizational), caregiver-related issues were by far the dominant factor being linked to

nearly 80% of delayed discharges. Others have shown that social support is strongly associated with discharge destination.^{7,9,17} Young and colleagues¹⁸ also recently concluded that caregiver commitment, capacity, and preparedness are key factors in ‘long-term’ outcomes for patients with stroke following discharge from inpatient rehabilitation.

Current provider quality reporting metrics emphasize risk-adjustment for differences in patient clinical profiles, but explicitly exclude most sociodemographic information, including a patient’s reported social support situation.¹⁹ However, the National Quality Forum recently published a technical report titled *Risk Adjustment for Socioeconomic Status*²⁰ or *Other Sociodemographic Factors* suggesting growing support toward reversing this well-established viewpoint. Our results confirm the importance that patient-level factors beyond the control of providers can have on patient outcomes.

Given that expected lengths of stay within each impairment group are calculated directly from combinations of admission motor function and tier comorbidity levels,¹ the relatively robust patterns of association between both variables and deviations from the expected lengths of stay were surprising. An interaction term for these two variables may better capture the cumulative impacts of functioning and comorbidity burden on expected length of stay. Additional research is needed to explore potential patterns in deviations across levels of functioning and tier comorbidity.

Study Limitations and Strengths

Our results are limited to three impairment categories within inpatient rehabilitation and patients living at home prior to impairment onset. This restricts the generalizability of our findings; however, our subjects are representative of the three largest impairment categories in IRFs. In addition, while we were able to identify the presence of social support using a combination of prior living situation and marital status, we were unable to measure the actual contributions of the potential caregivers during or following inpatient rehabilitation.

CONCLUSIONS

Almost half of Medicare beneficiaries receiving inpatient rehabilitation services for stroke, lower extremity fracture, and joint replacement are discharged more than one day earlier than expected. Our findings provide new information on variables influencing length of stay to the growing body of evidence that inpatient rehabilitation experiences and outcomes can be substantially impacted by a patient’s level of social support. More research is needed to better understand the effects of social support on relative length of stay and other patient outcomes, particularly those included in or being considered for provider quality reporting metrics.

Acknowledgments

Financial support: This work was funded in part by research grants from the National Institutes of Health (P2CHD065702) and National Institute on Disability, Independent Living, and Rehabilitation Research (H133G140127).

The authors would like to acknowledge Jessica M. Jarvis, BS, and Ioannis Malagaris, MS, for their contributions and feedback during the development of this manuscript.

List of abbreviations

CMG	Case mix group
CMS	Centers for Medicare and Medicaid Services
IRF	Inpatient rehabilitation facilities
IRF-PAI	Inpatient rehabilitation facility-patient assessment instrument

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Figure 1.
Exclusion criteria for sample selection.

Figure 2.

Adjusted probabilities for relative length of stay by social support categories. Values were obtained from multinomial regression models controlling for all variables listed in Table 3.

Table 1

Characteristics and outcome measure for patients receiving inpatient rehabilitation services for stroke, lower extremity fracture, and lower extremity joint replacement.

	Stroke	Fracture	Joint Replacement
N	50,656	34,345	34,436
Age, years	75.6 ± 10.1	79.7 ± 9.4	73.2 ± 9.2
< 65	10.4%	5.4%	11.5%
65–74	32.9%	20.7%	43.4%
75–84	36.8%	39.6%	33.8%
85+	19.9%	34.2%	11.2%
Female	54.2%	73.2%	68.2%
Race/ethnicity			
White	75.1%	87.7%	82.0%
Black	15.4%	4.2%	9.7%
Hispanic	6.1%	5.4%	5.9%
Other	3.5%	2.6%	2.4%
Social support			
Family/friends	68.9%	61.6%	64.8%
Paid/other	0.9%	1.1%	0.7%
None	30.2%	37.2%	34.5%
Medicaid eligible			
No	80.4%	85.2%	85.3%
Yes	19.6%	14.8%	14.7%
Disability			
No	79.7%	86.4%	78.8%
Yes	20.3%	13.6%	21.2%
Admit FIM cognition	20.0 ± 7.0	24.3 ± 6.6	27.9 ± 5.2
Admit FIM motor	37.6 ± 13.2	35.8 ± 10.0	42.7 ± 9.2
Tier comorbidity			
No tier	71.9%	72.9%	71.1%
Tier 3	24.5%	19.3%	26.3%
Tier 2	1.3%	5.6%	2.0%
Tier 1	2.3%	2.2%	0.7%
Length of stay, days	15.8 ± 7.3	13.8 ± 4.5	9.8 ± 3.6
Relative length of stay, days *	-1.7 ± 5.2	-1.6 ± 3.7	-1.2 ± 3.1

* relative length of stay = actual – expected.

Table 2

Relative lengths of stay by patient characteristics within each impairment category.

	Stroke			Fracture			Joint Replacement		
	Short	Expected	Long	Short	Expected	Long	Short	Expected	Long
Overall	48.2%	31.8%	20.0%	47.7%	37.7%	14.6%	46.9%	38.6%	14.4%
Social support									
Family/friends	50.8%	30.0%	19.2%	51.9%	34.8%	13.2%	50.1%	37.5%	12.5%
Paid/other	55.3%	28.7%	16.1%	49.1%	38.4%	12.5%	40.7%	37.3%	22.0%
None	42.0%	35.9%	22.0%	40.6%	42.4%	17.0%	41.2%	40.8%	17.9%
Age									
< 65	51.8%	27.5%	20.6%	55.6%	31.0%	13.4%	47.9 %	37.3 %	14.7 %
65–74	48.0%	30.4%	21.6%	58.5%	30.4%	11.1%	51.8%	36.2%	12.0%
75–84	48.8%	31.7%	19.5%	47.9%	37.6%	14.5%	43.3%	40.6%	16.2%
85+	45.6%	36.3%	18.1%	39.5%	43.4%	17.1%	38.3%	43.6%	18.1%
Gender									
Male	47.7%	31.1%	21.2%	46.4%	37.4%	16.1%	49.6 %	36.2 %	14.3 %
Female	48.6%	32.3%	19.1%	48.1%	37.8%	14.1%	45.7%	39.8%	14.5%
Race/ethnicity									
White	47.5%	32.2%	20.3%	47.6%	37.6%	14.7%	48.6%	37.6%	13.8%
Black	49.3%	30.5%	20.2%	46.0%	35.8%	18.2%	38.0%	42.8%	19.2%
Hispanic	54.4%	29.6%	16.0%	49.6%	39.4%	11.0%	39.5%	44.1%	16.4%
Other	48.1%	31.5%	20.4%	47.8%	39.1%	13.1%	44.5%	43.3%	12.3%
Medicaid eligible									
No	47.8%	31.8%	20.4%	48.0%	37.3%	14.7%	48.0%	38.0%	14.0%
Yes	50.1%	31.6%	18.3%	45.6%	40.1%	14.3%	40.7%	42.5%	16.8%
Disability									
No	47.2%	32.5%	20.4%	47.0%	38.2%	14.8%	47.2 %	38.7 %	14.1 %
Yes	52.3%	29.0%	18.7%	51.8%	34.4%	13.8%	46.1%	38.3%	15.6%
Admit FIM cognition									
Q1 (lowest)	43.7%	34.5%	21.8%	39.1%	44.4%	16.5%	44.3%	40.0%	15.8%
Q2	46.0%	32.7%	21.2%	46.4%	38.9%	14.7%	45.1%	39.8%	15.2%

	Stroke			Fracture			Joint Replacement		
	Short	Expected	Long	Short	Expected	Long	Short	Expected	Long
Q3	49.7%	31.3%	18.9%	50.8%	34.8%	14.4%	48.9%	37.3%	13.7%
Q4 (highest)	54.8%	27.8%	17.4%	55.5%	31.8%	12.7%	50.9%	36.8%	12.3%
Admit FIM motor									
Q1 (lowest)	40.9%	34.5%	24.7%	34.8%	45.6%	19.6%	46.4%	38.5%	15.1%
Q2	51.6%	28.7%	19.7%	51.2%	35.8%	12.9%	44.8%	38.7%	16.5%
Q3	48.9%	32.3%	18.8%	50.9%	36.2%	12.9%	45.3%	39.2%	15.6%
Q4 (highest)	52.1%	31.3%	16.6%	54.2%	32.8%	13.0%	51.3%	38.2%	10.5%
Tier comorbidity									
No tier	47.8%	32.5%	19.7%	48.1%	38.0%	13.9%	47.1%	38.9%	14.0%
Tier 3	47.6%	31.0%	21.4%	46.1%	37.1%	16.7%	46.6%	38.4%	15.0%
Tier 2	57.0%	22.2%	20.7%	47.5%	36.1%	16.3%	51.2%	33.5%	15.3%
Tier 1	63.9%	21.3%	14.8%	45.6%	37.0%	17.5%	32.5%	36.8%	30.7%

Table 3

Results from multinomial logistic regression models for relative length of stay. Values reported as odds ratio (95% confidence intervals); ref category for outcome variable = expected length of stay (+/-1 day).

	Stroke		Fracture		Joint Replacement	
	Short	Long	Short	Long	Short	Long
Social support						
Family/friends	1.00	1.00	1.00	1.00	1.00	1.00
Paid/other	1.20 (0.97, 1.50)	0.93 (0.69, 1.25)	1.10 (0.88, 1.37)	0.84 (0.61, 1.17)	0.84 (0.63, 1.13)	1.72 (1.21, 2.43)
None	0.68 (0.65, 0.71)	1.06 (1.00, 1.12)	0.66 (0.63, 0.69)	1.08 (1.01, 1.16)	0.81 (0.77, 0.85)	1.35 (1.26, 1.45)
Age						
<65	1.00	1.00	1.00	1.00	1.00	1.00
65–74	0.98 (0.90, 1.08)	0.77 (0.69, 0.87)	0.94 (0.82, 1.07)	0.88 (0.73, 1.07)	0.88 (0.80, 0.98)	1.01 (0.88, 1.17)
75–84	1.02 (0.93, 1.13)	0.65 (0.57, 0.73)	0.66 (0.58, 0.76)	0.95 (0.78, 1.15)	0.65 (0.59, 0.73)	1.20 (1.03, 1.39)
85+	0.91 (0.82, 1.00)	0.51 (0.45, 0.58)	0.53 (0.46, 0.61)	0.97 (0.79, 1.18)	0.54 (0.48, 0.61)	1.21 (1.02, 1.44)
Gender						
Female	1.00	1.00	1.00	1.00	1.00	1.00
Male	0.94 (0.90, 0.98)	1.12 (1.06, 1.18)	0.89 (0.85, 0.94)	1.15 (1.06, 1.24)	1.12 (1.06, 1.18)	1.15 (1.07, 1.24)
Race/ethnicity						
White	1.00	1.00	1.00	1.00	1.00	1.00
Black	1.03 (0.97, 1.09)	1.01 (0.94, 1.09)	1.00 (0.88, 1.13)	1.28 (1.09, 1.49)	0.68 (0.63, 0.74)	1.20 (1.08, 1.33)
Hispanic	1.18 (1.08, 1.29)	0.84 (0.75, 0.95)	1.08 (0.97, 1.20)	0.72 (0.61, 0.85)	0.70 (0.63, 0.78)	1.05 (0.92, 1.21)
Other	1.00 (0.89, 1.12)	1.02 (0.89, 1.17)	0.92 (0.80, 1.07)	0.89 (0.72, 1.10)	0.77 (0.66, 0.89)	0.83 (0.66, 1.04)
Medicaid eligible						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.00 (0.95, 1.06)	0.85 (0.80, 0.92)	0.88 (0.82, 0.95)	0.92 (0.83, 1.02)	0.84 (0.78, 0.90)	0.98 (0.88, 1.08)
Disability						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.17 (1.09, 1.25)	0.81 (0.74, 0.88)	0.92 (0.84, 1.01)	1.01 (0.90, 1.15)	0.90 (0.83, 0.98)	1.16 (1.04, 1.30)
Admit FIM cognition						
Q1 (lowest)	1.00	1.00	1.00	1.00	1.00	1.00
Q2	1.05 (1.00, 1.11)	1.09 (1.02, 1.16)	1.15 (1.08, 1.23)	1.09 (1.00, 1.20)	1.02 (0.95, 1.08)	1.00 (0.92, 1.10)

	Stroke		Fracture		Joint Replacement	
	Short	Long	Short	Long	Short	Long
Q3	1.18 (1.11, 1.25)	1.04 (0.96, 1.12)	1.31 (1.22, 1.41)	1.23 (1.12, 1.36)	1.14 (1.07, 1.22)	1.02 (0.93, 1.12)
Q4 (highest)	1.46 (1.37, 1.56)	1.12 (1.04, 1.22)	1.45 (1.34, 1.56)	1.21 (1.09, 1.35)	1.17 (1.09, 1.25)	0.97 (0.87, 1.07)
Admit FIM motor						
Q1 (lowest)	1.00	1.00	1.00	1.00	1.00	1.00
Q2	1.46 (1.37, 1.55)	0.93 (0.87, 1.00)	1.73 (1.61, 1.85)	0.80 (0.73, 0.88)	0.92 (0.86, 0.98)	1.10 (1.00, 1.20)
Q3	1.20 (1.13, 1.27)	0.77 (0.72, 0.83)	1.58 (1.47, 1.70)	0.77 (0.70, 0.85)	0.89 (0.83, 0.95)	1.04 (0.95, 1.14)
Q4 (highest)	1.28 (1.20, 1.36)	0.69 (0.63, 0.74)	1.68 (1.56, 1.82)	0.85 (0.77, 0.95)	0.99 (0.92, 1.06)	0.73 (0.66, 0.81)
Tier comorbidity						
No tier	1.00	1.00	1.00	1.00	1.00	1.00
Tier 3	1.04 (0.99, 1.09)	1.10 (1.03, 1.16)	0.99 (0.93, 1.05)	1.22 (1.12, 1.32)	0.98 (0.92, 1.03)	1.07 (0.99, 1.15)
Tier 2	1.86 (1.53, 2.26)	1.43 (1.13, 1.81)	1.29 (1.16, 1.44)	1.22 (1.06, 1.41)	1.36 (1.15, 1.61)	1.19 (0.94, 1.50)
Tier 1	1.87 (1.61, 2.17)	1.04 (0.85, 1.27)	0.84 (0.71, 0.99)	1.30 (1.05, 1.62)	0.73 (0.53, 1.01)	2.19 (1.58, 3.04)