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RESEARCH BRIEF

Successful Community Discharge Following Postacute Rehabilitation for Medicare Beneficiaries: Analysis of a Patient-Centered Quality Measure

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Objective. To determine the sociodemographic and clinical characteristics as well as health services use associated with successful community discharge.

Data Source. Inpatient Rehabilitation Facility-Patient Assessment Instrument and Medicare Provider Analysis and Review files.

Study Design. We retrospectively examined 167,664 Medicare beneficiaries discharged from inpatient rehabilitation facilities (IRFs) in 2013 to determine the sociodemographic and clinical characteristics as well as health services use associated with successful community discharge.

Principal Findings. In the multivariable model, sociodemographic (younger age, no disability, social support), clinical (higher motor and cognitive functional status at admission), and health services use (fewer acute care days and longer IRF days) variables were associated with successful community discharge.

Conclusions. Remaining in the community is an important patient-centered outcome that could complement other postacute rehabilitation quality measures.

Key Words. Medicare, rehabilitation services, health services research, health policy, patient outcomes

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The Improving Medicare Post-Acute Care Transformation Act (IMPACT) (2014) includes specific language for developing new postacute provider quality measures, including patient preferences about treatment and discharge options, Medicare spending per beneficiary, community discharge, and hospital readmission rates. The intent is to better align provider incentives with universal patient goals of avoiding additional institutionalization and remaining in the community (Gillsjö, Schwartz-Barcott, and von Post 2011) following discharge for one's recent illness or injury.

These health care reform efforts have brought increased attention to outcomes following postacute care, particularly for Medicare beneficiaries. Approximately 42 percent of all hospitalized Medicare beneficiaries receive postacute services after discharge; of these, 4 percent are in inpatient rehabilitation facilities (IRFs) (Medicare Payment Advisory Commission 2012). IRFs provide intensive rehabilitation services to individuals who experience functional loss due to a worsening illness or injury. The goal of IRFs is to improve a patient's independence, quality of life, and ability to return to community living. Although many studies have examined patient outcomes at IRF discharge (Kane 2007; Prvu Bettger and Stineman 2007), few studies have leveraged existing data to investigate long-term outcomes that are meaningful to patients. To advance rehabilitation-focused health services research and support the development of evidence-based health care policies, experts recommend the development of new outcome measures to evaluate the longer-term effects of postacute care (Heinemann 2008).

Successful community discharge (Research Triangle International, 2016)—defined as returning to the community and avoiding reinstitutionalization for at least 30 days following discharge from the postacute care setting—is one of the proposed quality measures originating from the IMPACT Act directive. In this study, we report the overall rates for this proposed quality outcome and examine patient characteristics independently associated with successful community discharge from the national IRF Medicare fee-for-service population.

METHODS

Study Overview and Data Source

We performed a retrospective cohort study of Medicare beneficiaries who were hospitalized and subsequently received care in an IRF to examine the extent to which sociodemographic characteristics, clinical characteristics, and

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health services use were associated with community discharge. We linked the IRF-Patient Assessment Instrument (IRF-PAI) with Medicare Provider Analysis and Review (MedPAR) files. The IRF-PAI includes data on patient demographics, social support, comorbidities, functional measures, length of stay, and discharge setting. The MedPAR contains claims data for all inpatient stays. We selected patients discharged from IRF in calendar year 2013 and then included a 1-year look-back and 30-day look-forward in the claims data to document preadmission and postdischarge health services use, respectively. This study was approved by the University's Institutional Review Board. We had a data use agreement with the Centers for Medicare and Medicaid Services (CMS).

Sample

Our study population included adults 66 years of age and older, with Medicare fee-for-service health insurance (Part A claims only), who were discharged from an acute care hospital to a Medicare-certified IRF. The initial sample included 287,309 patients. We excluded patients who were admitted to an IRF for any reason other than initial rehabilitation ($n = 11,964$), with IRF stays <3 days or >30 days ($n = 7,783$), were not living in the community prior to admission ($n = 2,462$), did not have a pre-IRF hospital stay ($n = 46,660$), were discharged against medical advice ($n = 361$), died ($n = 687$), or were discharged to another institutional setting ($n = 49,638$). After these exclusions, the final study sample was comprised of 167,664 patients.

Outcome

We created a dichotomous variable indicating successful community discharge (yes/no) based on the definition of the proposed quality measure, which stipulates returning to the community and remaining there for 30 days following postacute discharge (Research Triangle International, 2016). We operationalized *successful discharge* as surviving with no claim for an acute or postacute admission for 30 days post-IRF discharge. Alternatively, patients who died or had any claim for an acute or postacute admission within 30 days were coded *unsuccessful*. Postacute settings included skilled nursing facilities, long-term acute care hospitals, IRFs, and psychiatric hospitals. Hospice or palliative care services that treat patients suffering from serious and chronic illnesses were not included in our definition of unsuccessful discharge.

Covariates

Sociodemographic Characteristics. Age at time of IRF admission, gender; self-reported race/ethnicity as White, Black, Hispanic, or Other (Asian, American Indian, Alaska Native, Native Hawaiian, Pacific Islander); and disability status were considered sociodemographic characteristics. Age was converted to a categorical variable (66–75, 76–85, or 86 + years) for entry in the multivariable model. In addition, disability was a dichotomous (yes/no) variable indicating whether a beneficiary was originally entitled to Medicare benefits due to a chronic disability. Lastly, we combined marital status and prior living arrangement into a single social support variable with three categories: (1) married and/or living with family or friends; (2) paid attendant or other; or (3) living alone (none) prior to hospitalization.

Clinical Characteristics. Rehabilitation impairment category, functional status at admission, and tiered comorbidity category were considered clinical characteristics. Rehabilitation impairment categories are classification codes assigned by grouper software to determine case mix group payment. We collapsed the 21 rehabilitation impairment categories into six categories (central nervous system, spinal cord injury, neurological, musculoskeletal, endurance, and other) based on shared functional prognoses (Stineman et al. 2003). Functional status at admission was measured with items from the functional independence measure, which assesses both motor abilities (13 items covering self-care, sphincter control, mobility, and locomotion domains) and cognitive abilities (five items covering communication and social cognition domains). Each item is rated on a 7-point scale (range: total assistance = 1 to complete independence = 7). The functional independence measure has been found to be reliable and valid (Cavallo and Saucedo 1995). Motor and cognition subscale scores were converted to approximate tertiles for inclusion in the multivariable model. Comorbidities at admission were assessed as the presence or absence of comorbidities categorized at four levels (Tier 1—most severe; Tier 2—moderately severe; Tier 3—mild; or No tier). The CMS uses the tier system to adjust IRF reimbursement for comorbidities that increase care burden and resource use (Carter and Totten 2005).

Health Services Use. Three measures of health services use prior to IRF discharge were included (1) total number of inpatient days in the year prior to the index hospital admission; (2) length of stay for the index hospitalization; and (3) length of stay during inpatient rehabilitation. All three variables were

converted to practical categories for inclusion in the multivariable model: (1) prior inpatient days (1–4 days, 5–14 days, 15 + days); (2) hospital length of stay (1–3 days, 4–6 days, 7 + days); and (3) IRF length of stay (3–10 days, 11–15 days, 16 + days).

Data Analysis

Distributions for all covariates were stratified by the dichotomous successful community discharge variable (yes/no). Bivariate differences were assessed using chi-square tests. We then used multivariate logistic regression to examine the independent effects of sociodemographic characteristics, clinical characteristics, and health services use on successful community discharge. IBM SPSS Statistics v23 was used for all analyses. Statistical significance was set at $p < .05$.

RESULTS

Table 1 summarizes the sample characteristics stratified by community days post-IRF discharge. Overall, 84 percent of IRF patients were discharged to the community and experienced no subsequent inpatient service use for at least 30 days. Looking at sociodemographic characteristics, patients who were younger, male, in the “Other” race/ethnicity category, not entitled to Medicare due to disability, or those patients reporting paid social support, all demonstrated greater probabilities of successful community discharge. Under clinical characteristics, patients with musculoskeletal conditions, higher admission cognition and motor functioning, and no tier comorbidities were all more likely to experience successful discharge. Similarly, under health services use, patients with fewer inpatient days over the previous year and shorter hospital and IRF lengths of stay were also much more likely to experience successful community discharge.

Table 2 presents results from the multivariate logistic regression with the two-category successful community discharge variable as the outcome (target group: successful discharge = yes). Younger age was associated with higher odds for successful community discharge. Males demonstrated higher odds for successful community discharge than females. Medicare beneficiaries belonging to the “Other” category (vs. Whites), as well as patients without Medicare disability entitlement (vs. those with disability entitlement), demonstrated higher odds for successful community discharge. Using no social

Table 1: Sample Characteristics Stratified by Successful Community Discharge

	<i>n</i>	<i>Successful Community Discharge</i>		<i>p-Value</i>
		<i>No</i>	<i>Yes</i>	
Total	167,664	16.5%	83.5%	
Age				
66–75 years	62,200	14.9%	85.1%	<.001
76–85 years	69,256	16.7%	83.3%	
>85 years	36,208	18.8%	81.2%	
Sex				
Male	68,213	18.0%	82.0%	<.001
Female	99,451	15.5%	84.5%	
Race/ethnicity				
White	141,954	16.5%	83.5%	<.001
Black	12,800	17.8%	82.2%	
Hispanic	8,235	16.9%	83.1%	
Other	4,307	13.3%	86.7%	
Disability benefits				
No	147,070	16.1%	83.9%	<.001
Yes	20,594	19.7%	80.3%	
Social support				
Family/friends	115,430	16.5%	83.5%	.222
Paid/other	1,443	17.2%	82.8%	
None	50,689	16.4%	83.6%	
Impairment group				
CNS	43,525	17.9%	82.1%	<.001
SCI	6,776	14.6%	85.4%	
Neurological	17,274	22.8%	77.2%	
Musculoskeletal	60,693	10.4%	89.6%	
Endurance	15,937	23.2%	76.8%	
Other	23,459	21.2%	78.8%	
Admit cognition				
5–20	49,205	21.4%	78.6%	<.001
21–27	64,477	16.4%	83.6%	
>27	53,982	12.2%	87.8%	
Admit motor				
13–32	49,027	22.3%	77.7%	<.001
33–43	57,753	15.7%	84.3%	
>43	60,884	12.6%	87.8%	
Tier comorbidity				
No tier	103,073	13.3%	86.7%	<.001
Tier 3	49,876	20.4%	79.6%	
Tier 2	13,041	24.8%	75.2%	
Tier 1	1,674	32.4%	67.6%	

Continued

Table 1. *Continued*

	<i>n</i>	<i>Successful Community Discharge</i>		<i>p-Value</i>
		<i>No</i>	<i>Yes</i>	
Prior inpatient days				
1–4 days	57,253	9.3%	90.7%	<.001
5–14 days	66,502	16.7%	83.3%	
>14 days	43,909	25.6%	74.4%	
Hospital LOS				
1–3 days	57,281	11.3%	88.7%	<.001
4–6 days	59,685	15.7%	84.3%	
>6 days	50,698	23.3%	76.7%	
IRF LOS				
3–10 days	65,548	14.2%	85.8%	<.001
11–15 days	64,068	16.6%	83.4%	
>15 days	38,048	20.3%	79.7%	

p-value < .001 for all bivariate comparison using chi-square.
CNS, central nervous system; IRF, inpatient rehabilitation facility; LOS, length of stay; SCI, spinal cord injury.

support as the reference group, both paid/other and family/friends were associated with higher odds for successful community discharge.

Using central nervous system impairments as the reference group, musculoskeletal and SCI impairments demonstrated the higher odds, whereas neurological and endurance conditions demonstrated lower odds for successful community discharge. Lower admission cognition and admission motor function scores, as well as the presence of tier comorbidities, were all associated with lower odds of successful community discharge.

Higher number of inpatient days over the prior year and longer hospital lengths of stay were associated with lower odds for successful community discharge. Conversely, longer IRF lengths of stay were associated with slightly higher odds of successful community discharge.

DISCUSSION

Ability to return to and remain in the community is a goal of IRF care, a desired patient outcome, and currently considered as a measure for CMS quality. This is the first study of successful community discharge following IRF discharge among a national sample of Medicare beneficiaries. In our study, 84 percent of patients successfully discharged to the community

Table 2: Effects of Sociodemographic Characteristics, Clinical Characteristics, and Health Services Use on Successful Community Discharge

	<i>Odds Ratio (95% CI)</i>	<i>p-Value</i>
Age (66–75 years)		
76–85 years	0.90 (0.87–0.93)	<.001
>85 years	0.78 (0.75–0.81)	<.001
Male (female)	0.94 (0.92–0.97)	<.001
Race/ethnicity (White)		
Black	1.03 (0.98–1.09)	.207
Hispanic	1.05 (0.98–1.12)	.140
Other	1.27 (1.15–1.39)	<.001
No disability benefits	1.21 (1.16–1.26)	<.001
Social support (none)		
Paid/other	1.19 (1.03–1.37)	.016
Family/friends	1.09 (1.06–1.13)	<.001
Impairment group (CNS)		
SCI	1.12 (1.04–1.21)	.002
Neurological	0.92 (0.88–0.97)	<.001
Musculoskeletal	1.52 (1.46–1.58)	<.001
Endurance	0.80 (0.77–0.84)	<.001
Other	0.96 (0.92–1.00)	.043
Admit cognition (>27)		
21–27	0.86 (0.83–0.90)	<.001
5–20	0.73 (0.70–0.76)	<.001
Admit motor (>43)		
33–43	0.82 (0.79–0.85)	<.001
13–32	0.62 (0.60–0.65)	<.001
Tier comorbidity (none)		
Tier 3	0.75 (0.73–0.77)	<.001
Tier 2	0.74 (0.70–0.77)	<.001
Tier 1	0.57 (0.51–0.64)	<.001
Prior inpatient days (1–4 days)		
5–14 days	0.69 (0.67–0.72)	<.001
>14 days	0.46 (0.44–0.48)	<.001
Hospital LOS (1–3 days)		
4–6 days	0.93 (0.89–0.96)	<.001
>6 days	0.81 (0.78–0.85)	<.001
IRF LOS (3–10 days)		
11–15 days	1.05 (1.02–1.09)	.002
>15 days	1.05 (1.01–1.10)	.011

without subsequent readmission or death within 30 days. Rates varied by impairment group, ranging from 76 percent in the endurance impairment group to 89 percent in the musculoskeletal impairment group.

Our results are consistent with previous findings that older age predicts higher risk of unsuccessful community discharge among patients receiving

postacute rehabilitation (Leland et al. 2015). This study also revealed a gender disparity: Men were less likely to experience a successful community discharge. Other sociodemographic characteristics such as race/ethnicity may influence health service use following inpatient rehabilitation (Freburger, Holmes, and Ku 2012; Freburger et al. 2011; Freburger, Holmes, and Ku 2012). In our study, patients classified as “Other” were less likely to be readmitted to inpatient settings than Whites. Those with paid and/or family/friends for social support were much less likely to spend time in institutional settings compared to older adults with no social support.

Clinical characteristics were all strong predictors of community days following IRF discharge. Musculoskeletal conditions demonstrated the lowest risk for additional inpatient days, which may reflect better overall prior health in older adults with these impairments compared to other chronic conditions. Policy changes have led to substantial decreases in the number of patients with musculoskeletal conditions (joint replacement in particular) admitted to IRFs over the past two decades (Buntin, Colla, and Escarce 2009; Cary, Baernholdt, and Merwin 2016). Nevertheless, given the steady growth of musculoskeletal conditions and the importance of reducing readmission rates among these patients, intensive rehabilitation might be a more cost-effective postacute care option (Riggs et al. 2010). As expected, higher admission cognitive and motor function scores, as well as the absence of tier comorbidities, were associated with successful community discharge. Lower motor functioning (functional independence measure <32) placed patients at particularly high risk for shorter community stays. Our findings are consistent with prior studies examining long-term outcomes following IRF discharge (Young, Xiong, and Pruzek 2011; Berges et al. 2012; Bindawas et al. 2014).

Prior inpatient days demonstrated strong positive associations with shorter community days, as seen in past research. Our results support the well-established relationship between index hospital admissions and risk for future admissions (Donze et al. 2013). Longer index hospital stays, which may serve as a proxy for relative severity, were negatively associated with successful community discharge. Conversely, longer IRF stays were positively associated with successful community discharge. This might simply be a reflection of interim changes in the rehabilitation program. As many as 30 percent of IRF patients are discharged directly to another inpatient setting (Granger et al. 2009, 2011); however, those patients are not included in the community discharge quality measure and were excluded from our sample. Among those who were initially discharged to the community, unadjusted IRF length of stay was negatively associated with probability of remaining in the community

(Table 1). After adjusting for medical conditions, functional status, and other clinical factors that influence rehabilitation needs and health services use, IRF length of stay was positively associated with remaining in the community (Table 2). This suggests for a patient with a given clinical profile, additional rehabilitation may improve capacity for remaining in the community—at least for the first month following discharge.

Health Policy Implications

We take our findings in support of using community days, a comprehensive outcome measure that could be used to complement other quality postacute rehabilitation endpoints and inform health care policy. According to the FY 2017 IRF PPS Rule, successful discharge to the community (home/self-care with or without home health services) in the 31 days after discharge from IRF care will be considered an important quality measure for institution-based PAC settings. “Successful” in this context means risk-standardized rate of Medicare FFS patients discharged to community who (1) are not readmitted to acute hospital or LTCH and (2) remain alive during the 31 days following IRF discharge. Currently, risk is adjusted for patient-level characteristics contributing to likelihood of readmission or death but is not adjusted for sociodemographic status (SDS). We see this as a limitation, which our study overcomes. Our study uses SDS variables, including race, social support, and receiving disability benefits, that suggest future CMS payment calculations be adjusted accordingly. Identifying PAC facility and regional-level covariates (Leland et al. 2015; Reistetter et al. 2015), which might also account for differences in postacute outcomes, is also needed to inform future risk adjustment and warrants further investigation.

Several limitations were noted in our study. First, the design of this study limits our ability to interpret any findings as causal. Second, as our sample focused solely on Medicare beneficiaries, it is unclear whether our findings apply to younger patients or beneficiaries in other postacute settings (e.g., skilled nursing facilities). Third, we examined administrative data of patients who used inpatient rehabilitation only and did not account for the selection bias that might exist due to the selection process or criteria used to admit patients into IRFs. Fourth, we were only able to capture inpatient claims covered by Medicare Part A, so we cannot account for stays in other settings such as long-term care nursing homes. We did not assess the geographic availability of postacute services; as a result, some patients may have remained in the community due to access rather than a favorable

recovery trajectory. Finally, we did not account for differences in cultural background, health beliefs, or lack of financial resources that might influence time in the community.

In conclusion, we believe that an individual's ability to remain in the community after an acute hospitalization and IRF stay is an important patient-centered outcome measure that could complement other postacute rehabilitation quality metrics. Our study provides robust evidence that sociodemographic characteristics, clinical characteristics, and prior health services use are all independently associated with successful community discharge from inpatient rehabilitation. Research is needed to establish fair risk-standardized provider rankings for this quality outcome. Furthermore, policy makers, administrators, and clinicians should identify and promote postacute rehabilitation services that prolong community independence following postacute care.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.