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RESEARCH ARTICLE

The Relative Importance of Post-Acute Care and Readmissions for Post-Discharge Spending

Peter J. Huckfeldt, Ateev Mehrotra, and Peter S. Hussey

Objective. To understand what patterns of health care use are associated with higher post-hospitalization spending.

Data Sources. Medicare hospital, skilled nursing, inpatient rehabilitation, and home health agency claims, and Medicare enrollment data from 2007 and 2008.

Study Design. For 10 common inpatient conditions, we calculated variation across hospitals in price-standardized and case mix–adjusted Medicare spending in the 30 days following hospital discharge. We estimated the fraction of spending differences between low- and high-spending hospitals attributable to readmissions versus post-acute care, and within post-acute care between inpatient rehabilitation facility (IRF) versus skilled nursing facility (SNF) use. For each service, we distinguished between differences in probability of use and spending conditional on use.

Data Extraction Methods. We identified index hospital claims and examined hospital and post-acute care occurring within a 30-day period following hospital discharge. For each Medicare Severity Diagnosis-Related Group (MS-DRG) at each hospital, we calculated average price-standardized Medicare payments for readmissions, SNFs, IRFs, and post-acute care overall (also including home health agencies and long-term care hospitals).

Principal Findings. There was extensive variation across hospitals in Medicare spending in the 30 days following hospital discharge. For example, the interquartile range across hospitals ranged from $1,245 for chronic obstructive pulmonary disease to over $4,000 for myocardial infarction MS-DRGs. The proportion of differences attributable to readmissions versus post-acute care differed across conditions. For myocardial infarction, 74 to 93 percent of the variation was due to readmissions. For hip and femur procedures and joint replacement, 72 to 92 percent of the variation was due to differences in post-acute care spending. There was also variation in the relative importance of the type of post-acute spending. For hip and femur procedures, joint replacement, and stroke, whether patients received IRF was the key driver of variation in post-acute care spending In contrast, for pneumonia and heart failure, whether patients received SNF care was the key driver of variation in post-acute spending.

Conclusions. Through initiatives such as bundled payment, hospitals are financially responsible for spending in the post-hospitalization period. The key driver of variation in post-hospitalization spending varied greatly across conditions. For some conditions,

the key driver was having a readmission, for others it was whether patients receive any post-acute care, and for others the key driver was the type of post-acute care. These findings may help hospitals implement strategies to reduce post-discharge spending.
Key Words. Medicare, post-acute care, readmissions

Medicare spending on post-acute care and readmissions in the 30 days following hospital discharge is comparable to the initial hospitalization for some conditions (Mechanic 2014). An Institute of Medicine study found that geographic variation in Medicare spending is largely due to post-acute care spending (including home health care, skilled nursing facilities [SNFs], inpatient rehabilitation facilities [IRFs], and long-term care hospitals) (Institute of Medicine 2013; Newhouse and Garber 2013). The high level and geographic variability of Medicare spending following hospital discharge are likely driven by the incentives in current Medicare payment policy. Hospitals are paid for admissions, including the initial acute care stay and readmissions, while post-acute care providers are paid separate prospective payments. This payment system provides little incentive to coordinate care to prevent readmissions or use post-acute care efficiently (Sood et al. 2011; Chandra, Dalton, and Holmes 2013; Ackerly and Grabowski 2014).

Numerous reforms have been proposed or implemented to improve efficiency and coordination in the post-hospitalization period. The Hospital Readmissions Reduction Program reduces Medicare payments to hospitals with high readmissions for certain conditions (MedPAC 2013b). The Centers for Medicare and Medicaid Services have implemented multiple Accountable Care Organization (ACO) programs, whereby provider groups comprising of hospitals, physicians, and other providers share in savings relative to predetermined spending targets for their patients. The Medicare Bundled Payments for Care Improvement initiative is testing different bundled payment models for episodes of care, including a single bundled payment for the hospitalization and post-discharge period. More recently Medicare proposed the Comprehensive Care for Joint Replacement Model, which tests bundled payments for hip and knee replacement episodes, including a hospitalization and 90-day

Address correspondence to Peter J. Huckfeldt, Ph.D., Division of Health Policy and Management, University of Minnesota School of Public Health, 420 Delaware St. S.E., MMC 729, Minneapolis, MN 55455; e-mail: huckfeld@umn.edu. Ateev Mehrotra, M.D., M.P.H., is with the Department of Health Care Policy, Harvard Medical School, Boston, MA. Peter S. Hussey, Ph.D., is with the RAND Corporation, Boston, MA.

post-discharge period. In a departure from other bundled payment initiatives, hospitals in selected metropolitan areas are required to participate (Centers for Medicare and Medicaid Services 2015).

These reforms create incentives for hospitals to decrease readmissions and more judiciously use post-acute care. For hospitals participating in these payment reforms, however, the key opportunities for savings may be unclear. Hospitals face decisions on where to invest their resources, choosing between programs to reduce readmissions, building referral networks with efficient post-acute care facilities, or simply trying to decrease use of post-acute care. To help inform hospitals and the policy community, we compared historical patterns of spending in the 30 days following hospital discharge for 10 conditions with high hospital admission volumes.

In our analyses, we compared care patterns between hospitals in the highest and lowest quartile of post-discharge spending. The underlying assumption is that differences in care patterns illustrate where higher spending hospitals might focus to decrease spending. To describe the drivers of spending variation, we measured the fraction of variation driven by readmissions and post-acute care. For the latter, we examined both whether patients receive post-acute care at all and the setting of post-acute care. This is important, as it might drive hospitals' efforts to decrease spending. For example, among patients who receive post-acute care, if there is large variation in spending, then the hospital should focus on where the patient is sent for post-acute care. The setting of care is critical because of the numerous post-acute care options. For example, a patient needing speech therapy after a stroke could receive it in a hospital outpatient therapy department, in a SNF, or an IRF. Differences in Medicare payments across settings can be substantial: compared to SNF payments, IRF base payment rates are 20–27 percent higher for stroke and 14–31 percent higher for joint replacement (MedPAC 2014b). While the factors driving spending for a given hospital are related in part to their specific circumstances, our results identify the overall drivers of spending variation between high- and low-spending hospitals and can help highlight the most promising strategy for decreasing spending.

Prior research has identified the importance of readmissions and post-acute care in driving variation in Medicare spending for episodes of care (hospital admission and a fixed post-discharge episode) (Hackbarth, Reischauer, and Mutti 2008; MedPAC 2008, 2013a, 2014b; Birkmeyer et al. 2010; Miller et al. 2011; Schoenfeld et al. 2014; Nathan et al. 2015). Our study is most closely related to important work by Miller et al. (2011) and MedPAC (2013a, 2014b). Miller et al. (2011) found that readmissions and post-discharge

care (including post-acute care) both drive variation in episode spending for surgical admissions and that this variation persists when controlling for patient case mix and standardizing Medicare payments. However, Miller et al. (2011) did not examine nonsurgical admissions, nor did they distinguish between post-acute settings. MedPAC (2013a, 2014b) investigated a broader range of conditions and found that episodes with any post-acute care or readmission were more costly, as were episodes with IRF care (vs. other types of post-acute care). However, it is unclear from MedPAC's findings the relative importance of these factors in variation in costs across hospitals. For example, if very few AMI patients were discharged to IRFs, then post-acute setting will drive little overall variation in episode spending even if those AMI patients receiving IRF care were more costly (as MedPAC finds). To identify and address the drivers of high episode spending, it is important to identify both differences in probability of receiving a service between high- and low-spending hospitals and differences in spending conditional on admission.

We expanded on the prior literature in four key ways. First, we investigated a wider range of conditions, including high-volume surgical and nonsurgical MS-DRGs. Second, we examined how variation in spending across hospitals is driven by how post-acute care is provided—probability of use and spending conditional on use for any post-acute care and specifically IRF and SNF care. Finally, we adjusted payment and utilization measures to control for an extensive set of patient demographic and health characteristics. Thus, the differences we identified between high- and low-spending hospitals are unrelated to observable patient composition.

Data and Methods

Data

We first identified all short-term acute hospital stays occurring from December 2, 2007, through December 2, 2008, for Medicare beneficiaries aged 65 or older continuously enrolled in Parts A and B, as indicated in the Medicare Provider Analysis and Review file. We then selected for analysis hospitalizations for 10 high-volume conditions: acute myocardial infarction (AMI), heart failure, chronic obstructive pulmonary disease (COPD), gastrointestinal (GI) hemorrhage, hip fracture, kidney/urinary tract infection, joint replacement, pneumonia, septicemia, and stroke. We identified each condition based on the associated Medicare Severity Diagnosis-Related Groups (MS-DRGs) (displayed in Table 1) in the claims data. To identify "index" (or initial) hospital

Table 1: Conditions and MS-DRGs in the Sample

Condition	*MS-DRGs*
AMI	280, 281, 282
Heart failure	291, 292, 293
COPD	190, 191, 192
GI hemorrhage	377, 378, 379
Hip and femur procedures	480, 481, 482
Joint replacement	469, 470
Kidney/urinary tract infection	689, 690
Pneumonia	193, 194, 195
Septicemia	871, 872
Stroke	64, 65, 66

stays, we excluded hospitalizations that were themselves 30-day readmissions. We excluded hospital stays occurring in hospitals exempt from the Medicare Inpatient Prospective Payment System (e.g., critical access hospitals), hospital stays in Maryland hospitals (because Maryland has a separate payment system for hospitals), transfers, hospital stays where patients either died in the hospital or during the 30-day post-discharge period, and beneficiaries without continuous Part A and B enrollment during the year of discharge. By excluding post-discharge episodes with mortality, we removed some of the spending stemming from high end-of-life costs. The percentage of episodes excluded due to mortality occurring during the 30-day post-discharge period ranged from 1 percent for joint replacement to 16 percent for septicemia.

We identified all claims for post-acute care (including home health agencies, IRFs, long-term care hospitals, and SNFs) and any hospital stays occurring within 30 days following the discharge from the index hospital stay. We calculated total Medicare spending for the index hospital stay and the entire episode (i.e., the index hospital stay and 30-day post-hospitalization period). We also separately computed any utilization and total spending for hospital readmissions, IRFs, SNFs, and all post-acute care (also including care provided by home health agencies and long-term care hospitals).[1]

We standardized spending to remove variation stemming from Medicare adjustments for wages, medical education, and other adjustments, using an approach developed by Gottlieb et al. (2010). First, we calculated a wage index based on the CBSA-specific Medicare wage index for 2008. For index hospital stays and readmissions, we generated standardized spending as the MS-DRG weighted price for a given MS-DRG plus any outlier payment on the claim divided by the wage index. For long-term

care hospital, SNF, and home health agency payments, we calculated standardized spending by dividing actual payments by the wage index. Finally, for IRFs, we subtracted any indirect medical education, disproportionate share, and rural payment adjustments from the claim. Then, we divided by the wage index. For all post-acute care and readmission stays that straddled the end of the 30-day post-discharge episode, we prorated payments for the portion that occurred prior to the end of the episode. Next, we adjusted spending and utilization measures to account for differences in patient characteristics and comorbidity. Using multivariate linear regression, we adjusted for race (white vs. non-white), age (indicators for 5-year age bands), Medicaid coverage (as a control for socio-economic status), gender, and comorbidities from the list identified by Elixhauser et al. (1998) for use with administrative data.[2]

Finally, we constructed averages of the spending and utilization measures for each hospital and MS-DRG combination as the unit of analysis. We omitted from the analysis hospital/MS-DRG combinations with fewer than 10 observations.

Methods

We performed a descriptive cross-sectional analysis of spending that included the initial hospital stay and the 30-day post-discharge period for each hospital/MS-DRG combination meeting the volume criteria. First, we examined the distribution of total episode and post-hospitalization spending across hospitals. Next, we divided hospitals into quartiles of total episode spending separately for each MS-DRG. We examined whether hospitals that exhibited high or low post-hospitalization spending for one MS-DRG were high or low for other MS-DRGs. We decomposed the percentage difference in post-hospitalization Medicare spending between the high and low quartiles due to readmissions and post-acute care. We also computed average spending, probability of use, and average spending conditional on use for readmissions and post-acute care separately for the high and low quartile for each MS-DRG. Average spending conditional on use is calculated as the average spending for a particular setting across episodes with positive spending for that setting. We used these estimates to investigate whether differences in spending between the high and low quartiles were driven by the occurrence of readmissions or post-acute care versus spending conditional on use. Finally, for each MS-DRG, we calculated average spending, probability of use, and spending conditional on

use for IRFs and SNFs for the high and low quartiles. These estimates show average IRF and SNF spending for hospitals in the high and low quartiles, and whether differences between the high and low quartiles were driven by variation in admissions to IRF or SNFs versus spending conditional on use.

RESULTS

Among hospitals caring for Medicare fee-for-service beneficiaries, 3,217 met the volume threshold (at least 10 eligible discharges) for 1 or more of the 27 study MS-DRGs (Table 2) and on average met the volume criteria for 16. The majority (62 percent) of hospitals in the sample were nonprofit, 21 percent were for-profit, and 17 percent government-owned. The average daily census was 146 patients, with Medicare patients accounting for an average of 50 percent of hospital days. Twenty-three percent of hospitals in the sample housed an accredited residency program.

Wide Variation in Post-Hospitalization Spending

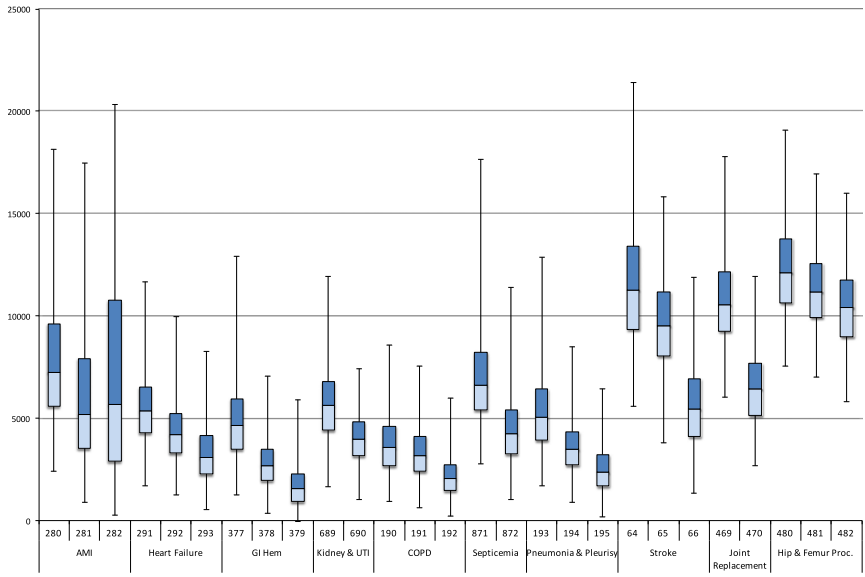
Average risk-adjusted post-hospitalization spending varied widely across hospitals (Figure 1), ranging from $1,768 for MS-DRG 379 (GI hemorrhage) to $12,369 for MS-DRG 480 (hip and femur procedures). The interquartile range varied from $1,245 for MS-DRG 192 (COPD) to $4,393 for MS-DRG 281 and $7,874 for MS-DRG 282 (both AMI).

Table 2: Description of Hospitals Used in Analyses

Characteristic	*Mean*
Hospital ownership	
Nonprofit	62%
For-profit	21%
Government	17%
Accredited residency program	23%
Average daily census	146 (159)
Medicare share of all hospital days	0.50 (0.14)
Medical and surgical beds	119 (108)

Notes. Cells display means and (and standard deviations for continuous variables in parentheses). Note that 66 of the hospitals in our sample were not present in the AHA survey. The number of medical and surgical beds was only present for 2,739 respondent hospitals.

Figure 1: Distribution of Thirty-Day Post-Hospitalization Medicare Spending Across Hospitals, by MS-DRG



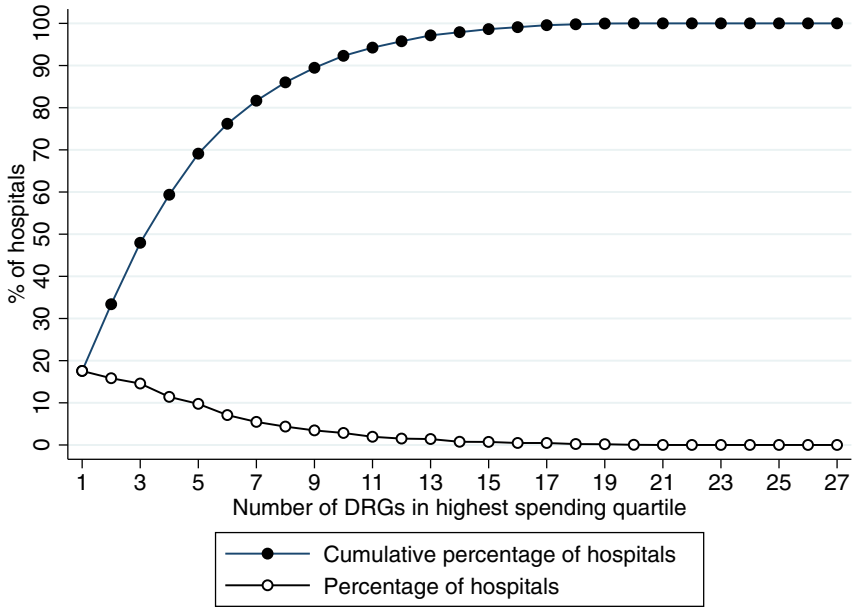
Notes. Figure shows the distribution of 30-day post-hospitalization spending across hospitals using box and whisker plots, by MS-DRG. The whiskers represent the 1st and 99th percentile payment, the top line of the higher box represents the 75th percentile payment, the middle line indicates the median payment, and the bottom line of the lower box indicates the 25th percentile payment.

Variation in Medicare spending for the index hospital stay accounted for a small percentage of the difference between the high and low quartiles (3 percent on average across the 27 MS-DRGs). Thus, the distribution of episode spending including the index hospital stay had a higher mean but shows similar variation to Figure 1, which only focuses on post-discharge spending.

Figure 2: Concentration of Hospitals in High- and Low-Spending Quartiles Across DRGs. (A) Percentage of Hospitals by Number of DRGs in Highest Spending Quartiles. (B) Percentage of Hospitals by Number of DRGs in Lowest Spending Quartile

Notes.(A) Includes hospitals with at least one MS-DRG in highest spending quartile. (B) Includes hospitals with at least one MS-DRG in lowest spending quartile.

A


% of hospitals
0 10 20 30 40 50 60 70 80 90 100
1 3 5 7 9 11 13 15 17 19 21 23 25 27
Number of DRGs in highest spending quartile
Cumulative percentage of hospitals
Percentage of hospitals

B

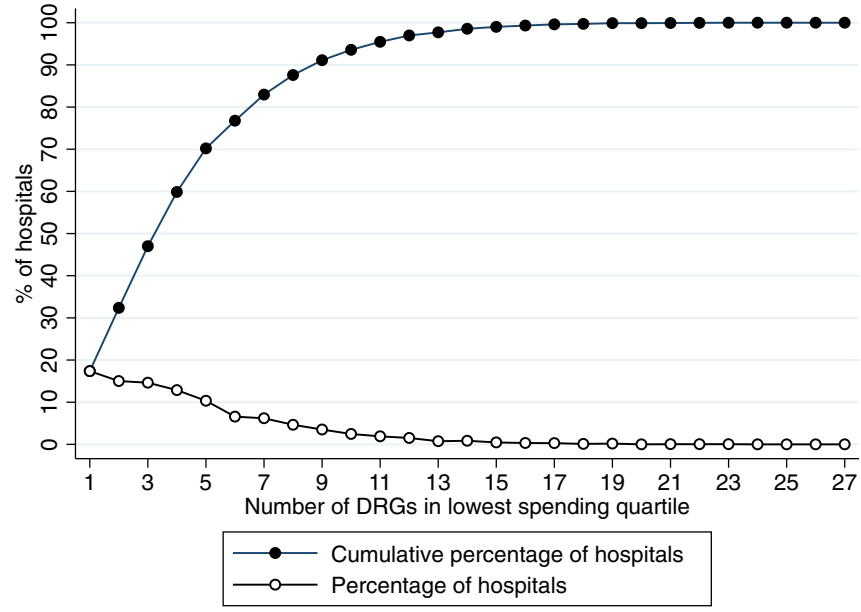
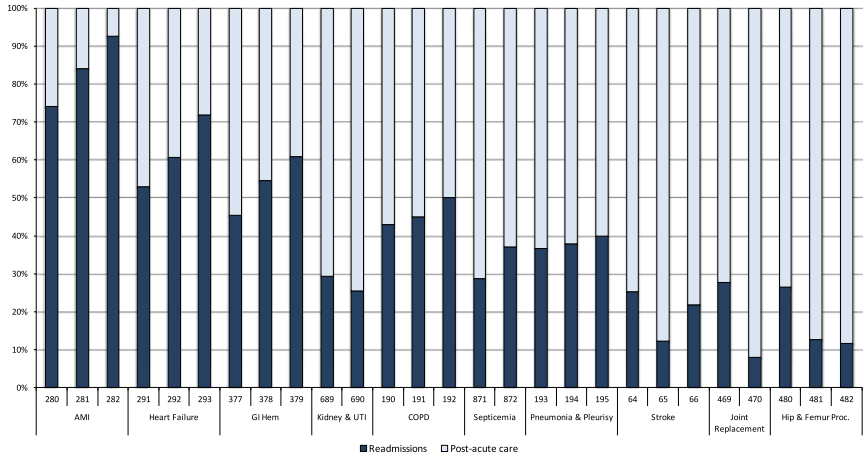

% of hospitals
0 10 20 30 40 50 60 70 80 90 100
1 3 5 7 9 11 13 15 17 19 21 23 25 27
Number of DRGs in lowest spending quartile
Cumulative percentage of hospitals
Percentage of hospitals

Figure 3: Percentage of Post-Hospitalization Spending Differences between High and Low Quartiles Attributable to Readmissions versus Post-Acute Care, by MS-DRG



Likelihood of Hospitals Being Low or High Cost Across MS-DRGs

Few hospitals are consistently high or low-cost across MS-DRGs (Figure 2). Only 3 percent of hospitals are in the highest cost quartile for 14 or more of the 27 MS-DRGs (Figure 2A) and only 2 percent of hospitals are in the lowest cost quartile for 14 or more MS-DRGs (Figure 2B).

Importance of Readmission versus Post-Acute Care in Driving Variation in Spending

The percentage of differences in post-hospitalization spending attributable to readmissions versus post-acute care varied by condition (Figure 3). When comparing high- and low-quartile hospitals, readmissions were attributable for most of the difference in costs for AMI MS-DRGs (74–93 percent). Post-acute care was responsible for most of the cost difference for joint replacement (72 and 92 percent), stroke (75–88 percent), and hip and femur procedures (74–88 percent). For other conditions, readmissions and post-acute care more evenly contributed to the differences in spending.

Figures 4 and 5 show differences between high- and low-quartile hospitals in spending on post-acute care and readmissions (Figure 4) and IRFs and SNFs (Figure 5). Each figure has three panels, in which we

Figure 4: Post-Acute Care and Readmissions during Thirty-Day Post-Hospitalization Period, by Spending Quartile and MS-DRG. Average Spending for Post-Acute Care and Readmissions. (B) Probability of Post-Acute Care and Readmissions. (C) Spending on Post-Acute care and Readmissions, Conditional on Use

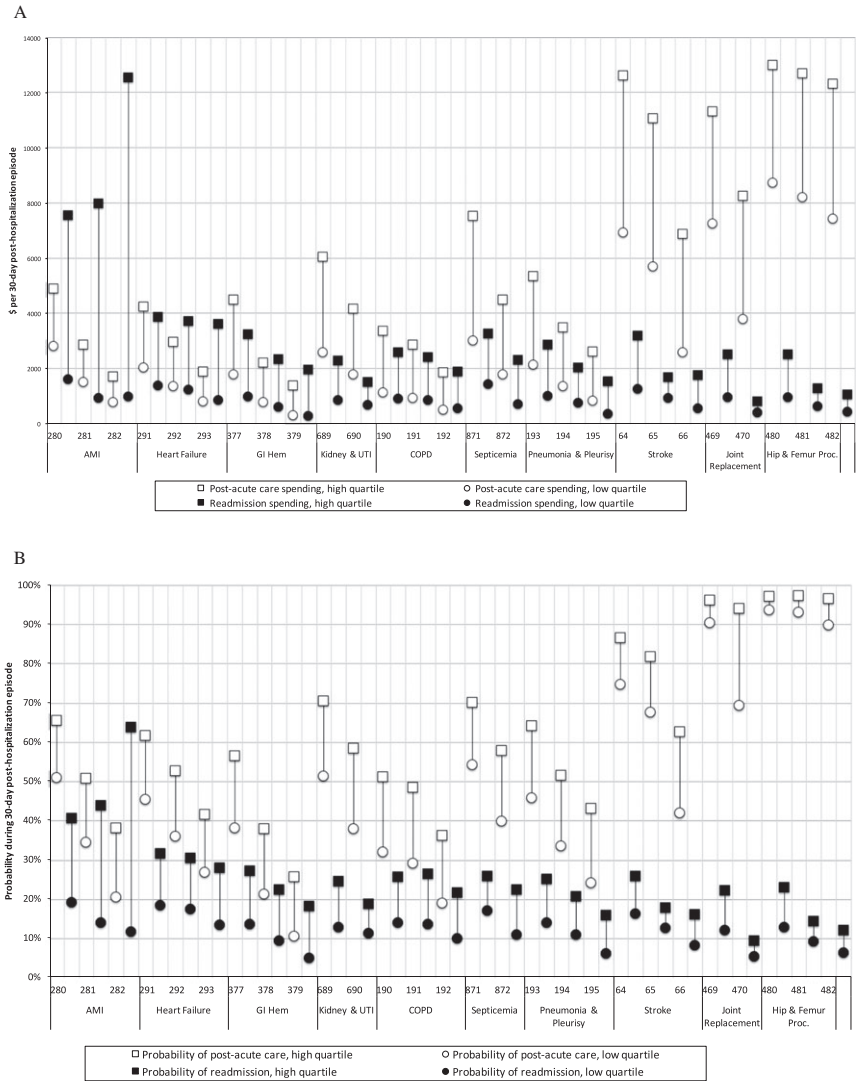
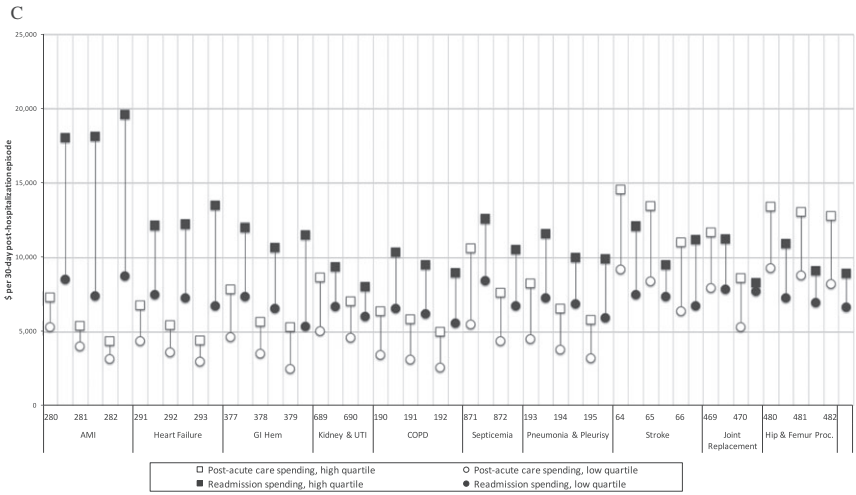


Figure 4: Continued



Notes. Panel A plots average spending for post-acute care (white) and readmissions (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles). (B) Panel B plots probability of post-acute care (white) and readmission (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles). (C) Panel C plots spending conditional on use for post-acute care (white) and readmissions (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles).

show average spending (a function of both probability of use of care and spending on care conditional on use), the probability of use, and spending conditional on use. We illustrate the underlying drivers of spending variation by focusing on three representative conditions: AMI, hip and femur procedures (characterized by high variation in post-acute care spending), and pneumonia (variation in both readmissions and post-acute care spending).

Acute Myocardial Infarction

For AMI, there was wide variation in spending on readmissions between high- and low-quartile hospitals (Figure 4A). This was driven by both probability of having a readmission (Figure 4B) and spending conditional on having a readmission (Figure 4C). For example, for AMI MS-DRG 282 the probability of having a readmission in high-quartile hospitals was 64 percent, compared with

12 percent in low-quartile hospitals—a striking 52-percentage point difference. For the same AMI MS-DRG 282, spending conditional on having a readmission in the high-quartile ($19,599) was more than double that in the low-quartile ($8,788) hospitals. In contrast, the probability of post-acute care varied less than readmission between the high and low quartile (Figure 4B) and spending conditional on use of post-acute care varied only slightly between the high and low quartile (Figure 4C) for MS-DRG 282. The variation in post-acute spending that did exist for AMI was driven almost entirely

Figure 5: IRF and SNF Use during Thirty-Day Post-Hospitalization Period, by Spending Quartile and MS-DRG. (A) Average Spending. (B) Probability of Admission. (C) Spending Conditional on Use

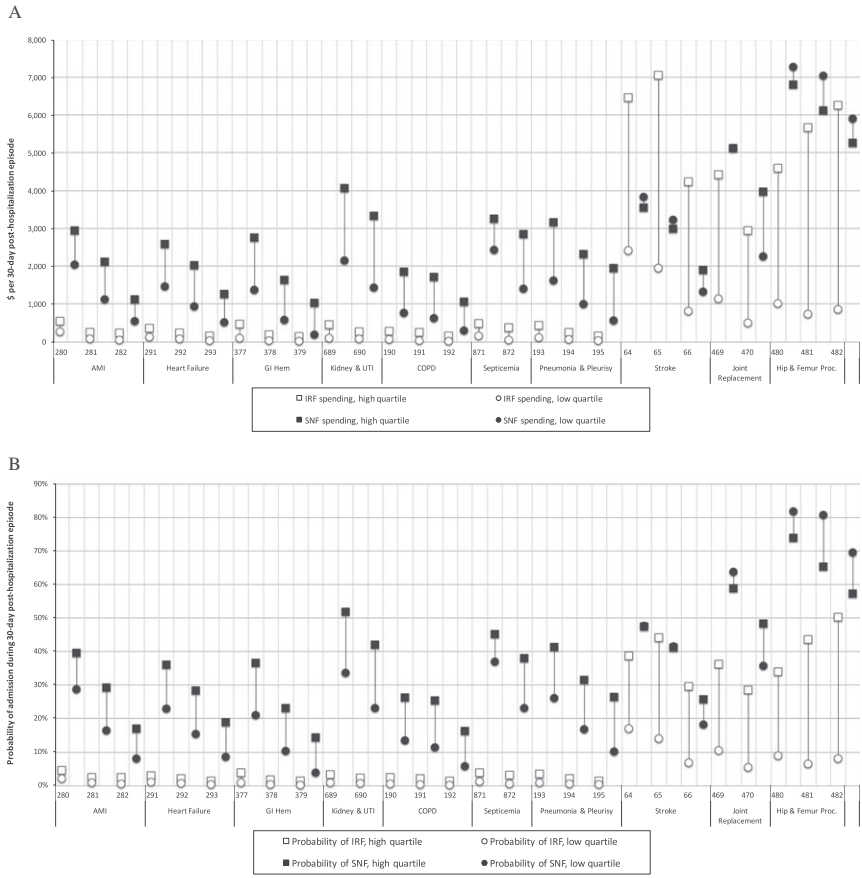
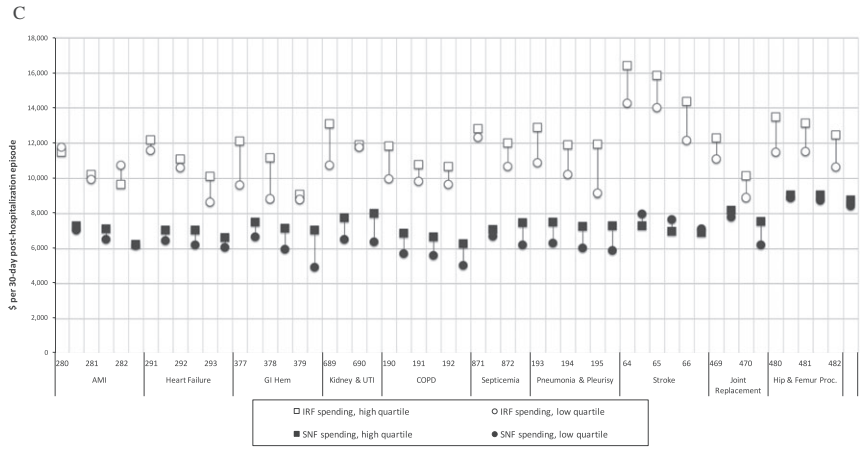


Figure 5: Continued



Notes. Panel A plots average spending on IRFs (white) and SNFs (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles). Panel B plots probability of admission to an IRF (white) and SNF (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles). Panel C plots spending conditional on admission to IRFs (white) and SNFs (black) for hospitals in the high episode spending quartile (squares) and low-spending quartile (circles).

by the probability of SNF admission (Figure 5B). Conditional on use, SNF spending varied little between the high and low quartile (Figure 5C), and average IRF spending and admissions were uniformly low (Figure 5A and B).

In summary, for AMI, differences in spending between high- and low-quartile hospitals were driven almost entirely by readmissions. There was striking interhospital variation in both the probability of readmission and also spending conditional on readmission.

Hip and Femur Procedures

Post-acute care spending was the highest for hip and femur procedures, and these MS-DRGs also exhibited among the highest variation in spending between the high and low quartile (Figure 4A). However, there was relatively little variation in the probability of post-acute care for hip and femur procedures, with the vast majority of patients (over 89 percent) in both high- and low-quartile hospitals receiving post-acute care (Figure 4B). In contrast, there

was substantial variation in post-acute care spending conditional on use (Figure 4C). For example, for MS-DRG 482, conditional spending was $12,789 for the high quartile compared to $8,211 for the low quartile, a difference of over 50 percent (Figure 4C).

Next, we examined whether this variation was driven by type of post-acute care (SNF or IRF) versus spending conditional on the type of post-acute care received. For hip and femur procedures, variation in spending was driven by IRF rather than SNF spending (Figure 5A). For example, for MS-DRG 482, the difference in average IRF spending between the high and low quartile was $5,389. This difference was driven by high-quartile hospitals being much more likely to send patients to IRFs than low-quartile hospitals (Figure 5B). Fifty percent of high-quartile discharges were admitted to IRFs compared to 8 percent of low-quartile discharges for MS-DRG 482. In addition, high-quartile hospitals were *less* likely to send patients to SNFs than low-quartile hospitals. Spending conditional on admission to an SNF or IRF was relatively constant between high- and low-quartile hospitals (Figure 5C).

In summary, for hip and femur procedures, the variation in spending between high- and low-quartile hospitals was driven by post-acute care spending, and more specifically, variation in the probability of IRF admission.

Pneumonia and Pleurisy

For pneumonia and pleurisy, variation in spending for readmissions between high- and low-quartile hospitals was considerably lower than AMI, but slightly higher than hip fracture (Figure 4A). Variation in readmission spending was driven both by probability of readmission (Figure 4B) and spending conditional on readmission (Figure 4C).

Pneumonia and pleurisy also exhibited large variation in spending for post-acute care (Figure 4A). For example, for MS-DRG 193, the high quartile spent $5,339 on post-acute care compared to $2,135 for the low quartile. This variation was driven both by variation in probability of post-acute care (Figure 4B) and post-acute care spending conditional on use (Figure 4C). Variation in post-acute care spending was driven nearly entirely by variation in SNF spending (Figure 5A). Probability of SNF admission varied considerably between high and low quartiles, more than AMI or hip and femur procedures (Figure 5B). The difference in SNF spending conditional on admission between high- and low-quartile hospitals was also greater than for AMI or hip and femur procedures, but still low (Figure 5C). While there was variation in IRF spending conditional on admission (Figure 5C), the probability of IRF

admission for pneumonia and pleurisy was close to zero for both high and low quartiles (Figure 5B).

For pneumonia and pleurisy, variation in spending between high- and low-quartile hospitals was driven both by readmissions and post-acute care. Readmissions variation was driven both by probability of readmission and spending conditional on readmission. Post-acute care spending variation was driven primarily by probability of SNF admission.

DISCUSSION

Payment reforms like bundled payment require hospitals and other providers to take on greater financial risk. High-cost providers need effective strategies to reduce spending. Comparing treatment patterns of providers with high and low Medicare spending may indicate key leverage points for reducing spending. We find spending in the post-discharge period varies considerably across hospitals, even when removing Medicare payment adjustments and controlling for patient demographic characteristics and severity. The key factors driving the differences in spending between high- and low-cost hospitals vary by condition. For example, readmissions drive the bulk of the difference for AMI and heart failure, while spending on post-acute care was responsible for most of the difference for stroke and orthopedic conditions such as hip fracture and joint replacement. Among conditions where post-acute care was important, the mechanism also varied. For the orthopedic conditions, the differences in spending were driven by the relative ratio of IRF versus SNF care (lower spending hospitals used more SNF rather than IRF). For nonorthopedic admissions, patients were more likely to receive any SNF care at higher cost hospitals.

Our findings echo and further extend prior work on what drives variation in spending in the post-hospitalization period. Similar to Miller et al. (2011), we found that the extent to which post-acute care and readmissions drive variation in post-discharge spending varies across conditions. We extend this prior work by demonstrating that the variation in post-acute care spending for conditions such as hip fracture and joint replacement is driven primarily by the use of IRF versus SNF care, while for conditions such as pneumonia and septicemia, it is driven by whether patients are admitted to SNFs. While MedPAC (2013a) found that episodes using IRF care are more expensive across a wide range of conditions, we showed that IRF use is quite low for conditions such as AMI, heart failure, and pneumonia and thus IRF care drives

very little variation in costs relative to hip and femur procedures, stroke, and joint replacement.

The patterns we observe may inform effective cost-reduction strategies. Hospitals with high AMI episode spending might focus on readmission prevention programs and whether repeat procedures are likely to occur on the readmission. For orthopedic procedures and stroke, higher cost hospitals might focus on how to more judiciously use IRFs. For pneumonia and pleurisy and other conditions such as heart failure, COPD, and septicemia, spending reduction may be achieved by focusing both on readmissions and post-acute spending, with more efficient use of SNFs being the focus of a post-acute strategy. There is no one-size-fits-all strategy across conditions, and hospitals are not consistently high or low cost across all conditions.

Current CMS policy might explain why IRFs are a key driver in variation in costs for hip and femur procedures, joint replacement, and stroke. CMS' rule is that 60 percent of IRF admissions must be from 13 conditions determined to require intensive rehabilitation; these three conditions are among the 13 while the remaining seven conditions we studied are not (MedPAC 2014b). Given that 80 percent of IRFs are hospital-based units and thus the hospital receives an additional payment under traditional Medicare payment policies, hospitals have a financial incentive to use IRF care (MedPAC 2014a,b). Our results therefore support proposals by MedPAC and others for greater site neutrality in payments to IRFs and SNFs (MedPAC 2014b).

Our study has a number of limitations. First, we only investigated hospital and post-acute care in the post-discharge period. Outpatient physician visits and other services could vary between the high- and low-quartile hospitals. To the extent they are beneficial, they may reduce use of readmissions or hospital care, or alternatively they may further exacerbate spending differences between the high and low quartiles. We also did not account for differences in outcomes or quality of care across hospitals with different levels of episode spending. For example, while IRF care is more expensive than SNF care, Gage et al. (2011) find greater improvements in self-care function for patients in IRFs. An important area for future research is to better understand whether there are relative improvements in functional status or other measures of patient well-being for the hospitals using post-discharge care more intensively (e.g., using IRF care rather than SNF care). Prior research focusing on a few conditions has shown some benefits for using any institutional post-acute care relative to being discharged home, but they concluded that the overall benefits of IRF over SNF care are small (Buntin et al. 2010; MedPAC 2014b).

For policy makers, our results emphasize the variation in post-hospitalization spending and treatment that exists within supposedly homogenous groups of patients across hospitals; these differences highlight potential savings to be achieved through bundled payment, ACOs, and other payment reforms.

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Disclosures: None.

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NOTES

1. We did not separately focus on home health agency spending (because it is a fraction of institutional post-acute spending) or long-term care hospital spending (because such admissions are relatively rare).
2. Comorbidity controls included indicators for congestive heart failure, valvular disease, disease of pulmonary circulation, peripheral vascular disease, paralysis, other neurological disorders, chronic pulmonary disease, diabetes, diabetes with complications, hypothyroidism, renal failure, liver disease, peptic ulcer disease, AIDS, lymphoma, metastatic cancer, solid tumor without mets, rheumatoid arthritis, coagulopathy, obesity, weight loss, fluid and electrolyte disorders, blood loss and anemia, deficiency anemia, alcohol abuse, drug abuse, psychoses, and depression.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.