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BRIEF REPORTS

Medicare Beneficiaries Most Likely to be Readmitted

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Recent legislation requires reducing Medicare payments to hospitals with higher than expected 30-day readmission rates, but there is no consensus strategy to identify patients who should optimally be targeted with care coordination services to mitigate this risk. To determine which hospital and patient factors predict variation in all discharge hospital readmission rates, a 5% sample of all Medicare fee-for-service beneficiaries with continuous Part A and B coverage was examined for the first 9 months of 2008 in combination with other administrative data available to the Centers for Medicare and Medicaid Services. We included age, sex, race, dual-eligibility status, number of comorbid conditions, geographic region, hospital case mix, and reason for entitlement in the multiple regression model to assess how they influenced the 30-day readmission rate. Beneficiaries with 10 or more chronic conditions were more than 6 times more likely to be readmitted than beneficiaries with 1 to 4 chronic conditions. These beneficiaries represent only 8.9% of all Medicare beneficiaries (31.0% of all hospitalizations), but they were responsible for 50.2% of all readmissions. The 31.8% of beneficiaries with 5 to 9 chronic conditions (55.5% of all hospitalizations) had the second highest odds ratio (2.5) and were responsible for 45% of all readmissions. *Journal of Hospital Medicine* 2013;8:639–641. © 2013 Society of Hospital Medicine

For at least 25 years, approximately 20% of Medicare fee-for-service discharges have been followed by a hospital readmission within 30 days.[1,2] Section 3025 of the Patient Protection and Affordable Care Act (ACA)[3] created escalating penalties for hospitals with higher than expected 30-day readmission rates, and the Congressional Budget Office estimated this will reduce Medicare spending by over $7 billion between 2010 and 2019.[4]

Hospitals and physicians have begun developing strategies to identify which Medicare beneficiaries are most likely to be readmitted and use this information to design programs to reduce their readmission rate. Initially, penalties will be based on readmission rates after an index discharge with heart failure, myocardial infarction, and pneumonia.[5] Recently, the Centers for Medicare and Medicaid Services (CMS) released the Inpatient Prospective Payment System FY2014 proposed rule, which proposes to add 2 new readmission penalties beginning in FY2015: readmissions for hip/knee arthroplasty and chronic obstructive pulmonary disease.[6] Other countries are already penalizing hospitals with high readmission rates; for example, Germany is penalizing all readmissions that occur within a 30-day period following admission.[7] In this brief report, we examine the characteristics of Medicare beneficiaries most likely to be readmitted within 30 days. We focus on readmission rates for all discharge conditions and all patient readmission rates, because we believe the language in the ACA ultimately points to an all-inclusive approach.

METHODS

We used a nationally random 5% sample of all Medicare beneficiaries for the period between January 1, 2008 and September 30, 2008. To be included, beneficiaries must have both Part A and B coverage and live within the United States. Medicare Advantage patients were excluded because Medicare Advantage plans do not report the data in the same way as fee for service. We calculated the readmission rate as the number of admissions that were preceded by an at-risk discharge within 30 days divided by the total number of at-risk discharges. This definition included admissions to and discharges from sole community providers, Medicare-dependent small rural hospitals, and critical access hospitals. We counted as at risk all live discharges from short-term acute care hospitals that were not discharged against medical advice, discharged to a rehabilitation unit within an acute care hospital, or readmitted on day 0 (due to inconsistency with use of transfer coding). We only included discharges and readmissions to acute care hospitals and excluded hospitalizations in long-term care facilities, rehabilitation facilities, skilled nursing homes, and other non-acute care hospital facilities from being an index hospitalization. However, if the beneficiary was discharged to 1 of these facilities and then readmitted to an acute care hospital, the readmission was counted.

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Each discharge was recorded as an independent event and we reset the readmission clock for a fresh 30-day count each time the beneficiary was discharged. We examined the admission and readmission rate to determine if the rates varied by age, gender, reason for entitlement, racial characteristics, region of the country, number of chronic conditions, and whether the beneficiary is also enrolled in Medicaid (dual eligibles). We calculated the mean readmission rate for each diagnosis-related group (DRG) and then used the probability of having a readmission for each DRG to calculate a case mix adjustment for each hospital. To calculate the chronic illness burden, we used a previously developed methodology for counting the number of chronic disease categories reported for the patient in the preceding year (2007).[8,9] The classification system is maintained by the Agency for Health Care Research and Quality. We then used logistic regression to calculate the odds ratio of a discharge being readmitted based on these factors. We preformed statistical analysis using SAS version 9.1.3 (SAS Institute Inc., Cary, NC).

RESULTS

There were 434,999 hospital discharges that occurred in the first 9 months of 2008 in the 5% sample. There were 20.6% of Medicare beneficiaries hospitalized, and the overall readmission rate was 19.5%. Table 1 shows the odds ratios and 95% confidence intervals for the probability that a Medicare beneficiary will be readmitted within 30 days for variables including: age, sex, race, dual-eligibility status, number of comorbid conditions, geographic region, and reason for entitlement. Of note, beneficiaries with 10 or more chronic conditions were more than 6 times more likely, and beneficiaries with 5 to 9 chronic conditions were more than 2.5 times more likely, to be readmitted than beneficiaries with 1 to 4 chronic conditions.

TABLE 1. Odds Ratios for 30-Day Readmission for Patients With Fee-for-Service Medicare 2008

Variable	Estimate	95% Confidence Limits
Age 1–44 years	1.634	1.507–1.771
Age 45–64 years	1.231	1.142–1.327
Age 75–84 years	1.048	1.027–1.069
Age 85+ years	1.141	1.115–1.168
Age 65–74 years	REF	
Male	1.201	1.183–1.220
Black	1.250	1.221–1.280
Other race	1.071	1.033–1.111
White	REF	
Dual eligibles	1.173	1.151–1.195
Northeast region	1.146	1.115–1.178
Midwest region	1.092	1.063–1.122
South region	1.037	1.011–1.063
West region	REF	
0 comorbidities	0.255	0.148–0.441
5–9 comorbidities	2.533	2.449–2.621
10+ comorbidities	6.119	5.913–6.332
1–4 comorbidities	REF	
Disabled	0.817	0.757–0.880
ESRD	1.327	1.223–1.440
Age >64 years	REF	

NOTE: **Abbreviations:** ESRD, end-stage renal disease.

DISCUSSION

The most interesting finding is that beneficiaries with 10 or more chronic conditions were more than 6 times more likely to be readmitted than beneficiaries with 1 to 4 chronic conditions. Beneficiaries with 10 or more chronic conditions represent only 8.9% of all Medicare beneficiaries (31.0% of all hospitalizations), but they were responsible for 50.2% of all readmissions. The 31.8% of beneficiaries with 5 to 9 chronic conditions (55.5% of all hospitalizations) had the second highest odds ratio (2.5) and were responsible for 45% of all readmissions. The 59.3% of beneficiaries with <5 comorbidities (13.6% of all hospitalizations) were associated with only 4.7% of all readmissions. This strongly suggests that hospitals focus their attention on beneficiaries with 10 or more comorbidities. These results were despite correction for DRG diagnosis in the model.

We recognize that the number of chronic conditions is a crude measure of health status because it weighs hundreds of different clinical conditions equally; however, it seems a good proxy for 3 closely allied concepts: (1) the overall burden of chronic illness carried by the patient, (2) the patient's level of engagement with the healthcare system (including number of unique providers), and (3) the number of conditions being treated. By providing a 1-year window of a patient's health status, it is a more complete picture than any single hospital claim submission or indices based solely on hospital discharge data.

The other variables are less predictive of 30-day readmissions. Beneficiaries over 85 years old are only 14% more likely, whereas disabled Medicare beneficiaries <44 years old are 63% more likely to be readmitted than beneficiaries between 65 and 74 years old. Men are 20% more likely to be readmitted than women. Black race and dual-eligibility slightly increase rates of readmission. Beneficiaries located in the West have the lowest readmission rates. In comparison to those who are aged, those with end-stage renal disease (ESRD) have a higher rate of readmission, and those with a disability have a lower rate of readmission. In considering the age and reason for entitlement findings, one would assume that ESRD was the driver of higher readmission rates in the younger Medicare population.

CMS will need to analyze which hospitals have higher than expected readmission rates, and this will require risk adjustment at each hospital. In addition to the number of chronic conditions and other variables shown in Table 1, other factors CMS might want to include when it starts doing readmissions for all

discharges is the discharge diagnosis (because our results suggest there are significant differences in the probability of a readmission across DRGs). In addition, CMS will need to consider how to capture additional data not currently in the claims data, such as social factors like homelessness.

We recognize significant limitations to these findings. First, this analysis uses only information that is available from Medicare claims and administrative data. Claims give almost no information on how well the hospital planned the discharge, instructed the patient and family, or engaged follow-up providers. Also, claims data tell us virtually nothing about a patient's health literacy or social situation. Second, the analysis relies on claims data, but this has little clinical detail. Third, these data are limited to persons enrolled in fee-for-service Medicare. Fourth, we included all readmissions, including some readmissions (such as chemotherapy and staged percutaneous coronary interventions) that were part of a planned treatment protocol.[10] Fifth, we were unable to distinguish same-day readmissions versus transfers, and therefore excluded all same-day readmissions from measurement.

As hospitals and physicians begin to plan for the regulations that will penalize hospitals with high readmission rates, they will need to strongly consider targeting beneficiaries with more than 10 chronic conditions.

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