CLINICAL RESEARCH STUDY

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Skilled Nursing Facility Referral and Hospital Readmission Rates after Heart Failure or Myocardial Infarction

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ABSTRACT

BACKGROUND: Substantial hospital-level variation in the risk of readmission after hospitalization for heart failure (HF) or acute myocardial infarction (AMI) has been reported. Prior studies have documented considerable state-level variation in rates of discharge to skilled nursing facilities (SNFs), but evaluation of hospital-level variation in SNF rates and its relationship to hospital-level readmission rates is limited.
METHODS: Hospital-level 30-day all-cause risk-standardized readmission rates (RSRRs) were calculated using claims data for fee-for-service Medicare patients hospitalized with a principal diagnosis of HF or AMI from 2006-2008. Medicare claims were used to calculate rates of discharge to SNF following HF-specific or AMI-specific admissions in hospitals with ≥25 HF or AMI patients, respectively. Weighted regression was used to quantify the relationship between RSRRs and SNF rates for each condition.
RESULTS: Mean RSRR following HF admission among 4101 hospitals was 24.7%, and mean RSRR after AMI admission among 2453 hospitals was 19.9%. Hospital-level SNF rates ranged from 0% to 83.8% for HF and from 0% to 77.8% for AMI. No significant relationship between RSRR after HF and SNF rate was found in adjusted regression models ($P = .15$). RSRR after AMI increased by 0.03 percentage point for each 1 absolute percentage point increase in SNF rate in adjusted regression models ($P = .001$). Overall, HF and AMI SNF rates explained <1% and 4% of the variation for their respective RSRRs.
CONCLUSION: SNF rates after HF or AMI hospitalization vary considerably across hospitals, but explain little of the variation in 30-day all-cause readmission rates for these conditions.
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KEYWORDS: Acute myocardial infarction; Health services research; Heart failure; Hospitals; Readmission; Skilled nursing facilities

Referral to skilled nursing facilities (SNFs) for recuperative care after hospitalization has increased substantially.[1] Patients are thought to benefit from more intensive monitoring and treatments that SNFs provide relative to other post-acute-care options. Because inadequate medical follow-up after hospital discharge is hypothesized to be a major reason for avoidable readmissions,[2] optimizing the use of SNFs may serve as a potential strategy for reducing rehospitalizations.[3,4] Evaluating the relationship between SNF referral and readmission risk at the hospital level will become increasingly important as the Center for Medicare and Medicaid Services (CMS) and other health insurers are consid-

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ering reducing reimbursements to hospitals with high readmission rates.[5]

However, it is unclear whether hospitals with high rates of patients discharged to SNFs have lower readmission rates compared with hospitals with low SNF rates. Furthermore, while statewide variation in SNF use has been observed,[1] our understanding of hospital-level variation is limited. Accordingly, we conducted a study using Medicare data to address 2 specific aims: to examine hospital-level variation in rates of patients discharged to SNFs across the US; and to examine the relationship between hospital-level SNF rates and 30-day readmission rates. We evaluated SNF rates and risk-standardized readmission rates for 2 key illnesses—heart failure (HF) and acute myocardial infarction (AMI)—2 diagnoses targeted as priority conditions for readmission reductions by the 2010 Patient Protection and Affordable Care Act.[5]

CLINICAL SIGNIFICANCE

- Hospital-level readmission rates for heart failure and acute myocardial infarction vary considerably across the US.
- Many hospitals are able to achieve low rates of readmission regardless of high or low overall use of skilled nursing facilities.
- Hospital strategies aimed at altering use of skilled nursing facility utilization alone are unlikely to substantially alter hospital-level readmission rates after heart failure and acute myocardial infarction.

METHODS

Data Sources

We obtained a 100% sample of the Standard Analytical Files of Medicare Part A fee-for-service inpatient claims from January 1, 2006 to December 31, 2008 from the CMS, which included patient-level data on demographics, and diagnosis codes using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) for hospitalizations billed under fee-for-service Medicare. We also obtained a 100% sample of Medicare SNF administrative claims for the corresponding time period that included patient-level data on demographics, dates of service, and ICD-9-CM diagnosis codes for each SNF encounter billed under fee-for-service Medicare.

Study Sample

The study population included Medicare fee-for-service patients aged 65 years or older hospitalized with a principal discharge diagnosis of HF (ICD-9-CM codes 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, or 428.xx) or AMI (ICD-9-CM codes 410.xx, excluding codes with 410.x2, which indicate nonacute events). The study cohort consisted of patients with complete Medicare fee-for-service claims history for 12 months before index HF or AMI hospitalization in order to fully ascertain comorbidities; and at least 30 days of Medicare fee-for-service enrollment post HF or AMI discharge in order to fully ascertain readmission outcomes. Patients who were discharged alive within the first day of admission were excluded due to concerns about the accuracy of the diagnosis. To calculate stable estimates of hospital-level SNF rates, the study cohort was limited to patients admitted to hospitals with at least 25 HF or AMI patients, respectively, who were discharged alive from their index admission. Because we wanted to examine outcomes of typical HF patients, we excluded patients with a prior history of heart transplantation (ICD-9-CM procedure code 37.51) or mechanical circulatory support such as left ventricular assist devices (ICD-9-CM procedure codes 37.52-37.54, 37.62-37.68).

Risk-Standardization Readmission Rate (RSRR)

The primary outcomes were hospital-level risk-standardized readmission rates (RSRRs) representing readmissions for any reason within 30 days of discharge for HF or AMI. RSRRs were calculated using statistical models currently employed by CMS and endorsed by the National Quality Forum. The CMS models are publicly available and perform comparably to models based on clinical data-abstracted medical record.[6,7] Briefly, the RSRR model after HF contains 2 demographic, 12 cardiovascular, and 29 comorbidity variables; the RSRR measure after AMI contains 2 demographic, 13 cardiovascular, and 16 comorbidity variables. Concurrent cardiovascular and comorbid conditions were ascertained from Medicare Part A (ie, inpatient and hospital outpatient data) and Medicare Part B (ie, physician office outpatient data).

Skilled Nursing Facility (SNF) Rate

Patients discharged to an SNF were identified by linking to Medicare SNF administrative claims through unique patient identifiers. Patients were considered as discharged to SNF if they entered an SNF on the same day or the subsequent day after discharge from hospitalization for HF or AMI. Hospital-level SNF rates were calculated by dividing the number of patients discharged to SNF in a given hospital by the overall denominator of HF or AMI admissions of patients who survived the hospitalization.

Hospital Characteristics

Hospital characteristics were ascertained by linking the Medicare hospital provider number in the claims to the 2008 American Hospital Association Survey of Hospitals database. There were 153 and 83 hospitals not matched with American Hospital Association data that were excluded from the HF and AMI analyses, respectively; the relationship