

Hospital-skilled nursing facility referral linkage reduces readmission rates among Medicare patients receiving major surgery

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Background. In the health reform era, rehospitalization after discharge may result in financial penalties to hospitals. The effect of increased hospital-skilled nursing facility (SNF) linkage on readmission reduction after surgery has not been explored.

Methods. To determine whether enhanced hospital-SNF linkage, as measured by the proportion of surgical patients referred from a hospital to a particular SNF, would result in reduced 30-day readmission rates for surgical patients, we used national Medicare data (2011–2012) and evaluated patients who underwent 1 of 5 operative procedures (coronary artery bypass grafting [CABG], hip fracture repair, total hip arthroplasty, colectomy, or lumbar spine surgery). Initial evaluation was performed using regression modeling. Patient choice in SNF referral was adjusted for using instrumental variable (IV) analysis with distance between an individual's home and the SNF as the IV.

Results. A strong negative correlation ($P < .001$) was observed between the proportion of selected surgical discharges received by a SNF and the rate of hospital readmission. Increasing the proportion of surgical discharges decreased the likelihood of rehospitalization (regression coefficient, -0.04 ; 95% CI, -0.07 to -0.02). These findings were preserved in IV analysis. Increasing hospital-SNF linkage was found to reduce significantly the likelihood of readmission for patients receiving lumbar spine surgery, CABG, and hip fracture repair.

Conclusion. The benefits of increased hospital-SNF linkage seem to include meaningful reductions in hospital readmission after surgery. Overall, a 10% increase in the proportion of surgical referrals to a particular SNF is estimated to decrease readmissions by 4%. This may impact hospital-SNF networks participating in risk-based reimbursement models. (Surgery 2016;159:1461-8.)

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RECENT PROVISIONS of the Affordable Care Act not only penalize hospitals for unplanned readmissions among Medicare patients but also incentivize

improved postacute care coordination through bundled payment programs and the creation of accountable care organizations.¹⁻⁵ The intent of these initiatives is to streamline continuity of care, reduce rehospitalizations, and enhance patient-centered outcomes that may lead to shared savings for hospitals and skilled nursing facilities participating in risk-based reimbursement models.^{1,4,5}

Although it is acknowledged that hospitals are attempting to redesign care within their walls, less is known about the nature of their relationships with external providers who nevertheless affect

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performance on bundled metrics.⁴⁻⁶ Rahman et al⁶ reported that hospitals with stronger skilled nursing facility (SNF) linkages, as defined by more concentrated referral patterns, reduced 30-day readmission rates for Medicare patients. Specifically, a 10% increase in the proportion of discharges from a hospital to a particular SNF was estimated to result in a 1.2-percentage point reduction in 30-day readmissions. It is not known, however, whether such findings apply to individuals discharged to SNFs after operative procedures. Given the complexity of postacute care for many surgical patients, as well as greater risks of perioperative morbidity,^{1,2,7} it is possible that hospital-SNF linkage may have a more dramatic effect on readmission reduction among Medicare beneficiaries undergoing operation.¹

In this context, we sought to evaluate the effect of hospital-SNF linkage on 30-day rehospitalization among a sample of Medicare patients discharged to SNFs who underwent 1 of 5 common inpatient operative procedures. We hypothesized that enhanced hospital-SNF linkage, as measured by the proportion of surgical patients referred from a hospital to a particular SNF, would result in decreased 30-day readmission rates.

METHODS

Participants and databases. Data for these analyses come from 100% Medicare Part A claims (for hospital and SNF care) and Medicare enrollment data for the years 2011–2012. Additionally, we used 2011 On-line Survey & Certification Automated Record (OSCAR) data to capture SNF characteristics, the 2007 American Hospital Association Survey data for hospital characteristics and the 2010 zip code tabulation area file for zip code location.

Using Part A claims data, we identified all Medicare fee-for-service beneficiaries who were discharged directly from an acute general hospital to a SNF for postacute care between January 1, 2011, and November 30, 2012. We excluded any individual with a SNF stay in the 1-year period before their index hospitalization. We excluded patients with prior SNF use because prior nursing home residence would systematically affect SNF choice. We also excluded those who were treated in hospitals that had fewer than 15 surgical discharges to SNFs over the 2-year study period. Our final sample consisted of approximately 1.5 million Medicare fee-for-service beneficiaries discharged from 1,964 hospitals to 12,112 SNFs. Among this pool of patients, we then identified those who underwent 1 of 5 common operative interventions over the course of the 2-year period using International Classification of Diseases-9

procedure codes (available from the authors upon request). The selected procedures included coronary artery bypass grafting (CABG), total hip arthroplasty, hip fracture repair, colectomy, and lumbar spine surgery. These procedures were selected because they are representative of major operative interventions performed across general surgery, orthopedic, and neurosurgical disciplines, include urgent and elective interventions, and have been used in prior research to evaluate health system surgical performance.^{2,5,7}

Primary outcomes. Our main outcome variable was 30-day hospital readmission, defined as rehospitalization to any acute care hospital within 30 days of the date of discharge from the index surgical hospital stay.

Main explanatory variable. The main explanatory variable was hospital-SNF referral linkage, defined as the proportion of surgical patients from the originating hospital who were discharged to the treating SNF.⁶

Covariates. Patient characteristics included age, gender, race, comorbidity scores (calculated using Elixhauser⁸ and Deyo-modified Charlson⁹ scales), hospital duration of stay, and intensive care unit use. SNF attributes from the OSCAR data included the full-time equivalents of different types of nursing staff (registered nurses [RNs], licensed practical nurses [LPNs], and certified nursing assistants [CNAs]),¹⁰⁻¹³ the proportion of Medicaid paid residents,¹⁴⁻¹⁷ the weighted deficiency score based on state's inspection of the SNF,^{13,18,19} occupancy rate, chain membership, corporate ownership (for profit or not), and the presence of any physician extenders (eg, nurse practitioners, physician assistants).²⁰ Additionally, we included several facility level characteristics from the minimum data set (available at www.ltcfocus.org), including the proportion of black residents, the proportion of residents enrolled in managed care and the Resource Utilization Groups III case mix index.

We included 2 distance variables: distance from the patient's residential zip code to SNFs and distance from the discharging hospital to SNFs. We geocoded all the SNFs and hospitals using the address in the OSCAR and American Hospital Association files, respectively. We used zip code centroids as a proxy for individuals' residential location. We calculated patient to SNF distances using the Haversine formula.²¹

Statistical analyses. Our object was to estimate the effect of increasing the proportion of selected surgical patients discharged from hospital h to SNF n on readmissions (R_{ihn}), while adjusting for confounders including patient choice in selecting

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