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Nonelective Primary Total Hip Arthroplasty: The Effect of Discharge Destination on Postdischarge Outcomes

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ABSTRACT

Background: Medicare has enacted a mandatory bundled payment program for primary total joint arthroplasty that includes nonelective primary total hip arthroplasty (THA). Efficient postacute care management has been identified as an opportunity to improve value for patients. We aimed to identify risk factors for and compare rates of complications by discharge destination and then use those factors to risk-stratify non-elective THA patients.

Methods: Patients who underwent nonelective primary THA from 2011 to 2014 were identified in the American College of Surgeons National Surgical Quality Improvement Program database and categorized into those discharged to skilled nursing facility or inpatient rehabilitation facility vs home self-managed/home health (HHH). Bivariate and multivariate analyses of risk factors for postdischarge adverse events were performed using patient characteristics and intraoperative variables.

Results: In bivariate analysis, skilled nursing facility or inpatient rehabilitation facility patients compared with HHH patients, had lower rates of postdischarge severe adverse events (SAEs; 49% vs 58%; $P < .001$) and unplanned 30-day readmissions (71% vs 83%; $P < .001$). HHH discharged patients with 1 or more of risk factors had a 1.85–6.18 times odds of complications within the first 14 days.

Conclusion: The most important risk factors for predicting postdischarge SAE and readmission are pre-discharge SAE, dependent functional status, body mass index >40 kg/m², smoking, diabetes, chronic steroid use, and American Society of Anesthesiologists class 3/4. Nonelective THA patients without these risk factors may be safely discharged to home after THA. Orthopedic surgeons and their nonelective THA patients must agree on the most appropriate discharge destination through a shared decision-making process that takes into account these significant risk factors and other psychosocial factors.

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Reimbursement for total joint arthroplasty (TJA) is shifting to value-based models [1]. One increasingly popular example of this is bundled payments, under which providers are paid a single fee for managing all treatments during a defined episode of care (typically 3 days before and 90 days after TJA). In this model, the care team determines which postacute treatment modalities (such as physical

therapy and geriatrician appointments) will best reduce risk of 90-day readmissions and complications in their patients and bears financial risk for those decisions. Under Medicare's voluntary Bundled Payments for Care Improvement program, several pilot demonstrations for primary total hip arthroplasty (THA) and total knee arthroplasty have shown success in improving or maintaining clinical outcomes, while reducing resource utilization and costs [2–4]. Although this model has been successful for elective THA patients with osteoarthritis, its potential is less clear for patients undergoing THA because of hip fracture, acute pain, or any other nonelective reason. Studies reveal that as much as 15% of Medicare THA volume comprised urgent THA patients (mainly hip fracture), and these patients have considerably higher rates of perioperative complications and readmissions along with greater postacute care resource needs [5].

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As shown by Bozic et al [4], postacute care generally accounts for ~40% of episode costs in elective TJA patients, and this number can be up to 40%-50% higher in hip fracture patients [6,7]. Despite this, Medicare included hip fracture patients undergoing TJA in Bundled Payments for Care Improvement and has done so in the Comprehensive Care for Joint Replacement (CJR) program—a mandatory bundled payment model applying to 67 geographic areas, ~900 hospitals, and ~25% of national TJA patients [8]. Although the CJR program intends to risk-adjust financial performance targets for hip fracture patients undergoing TJA, surgeons and hospitals must understand the value (health outcomes per health care dollar spent) of nonhome (ie, inpatient rehabilitation facility [IRF], skilled nursing facility [SNF]) vs home (including home self-managed and home health [HHH]) discharge in such patients, as well as how best to risk-stratify them before nonelective THA.

Using a high-quality, nationally representative database, this study aimed to compare rates of adverse events in nonelective THA patients by nonhome vs home discharge destinations, identify significant risk factors for postdischarge adverse events in this population, and stratify these patients based on those factors.

Methods

American College of Surgeons National Surgical Quality Improvement Program Database

The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) is a national surgical database that prospectively collects patient data from over 370 participating institutions. All data are validated with strict adherence guidelines including routine audits to ensure high-quality data. Trained clinical reviewers collect data up to 30 days postoperatively using medical records, operative reports, and patient interviews. In addition, the ACS-NSQIP provides patient demographics such as age, gender, race, smoking status, and functional status among others, as well as patient medical comorbidities including, diabetes, cardiac, pulmonary, renal, cancer, and American Society of Anesthesiologists (ASA) class. Perioperative and intraoperative variables including days from admission to operation, operative time, type of anesthesia, days from operation to discharge, and discharge destination are included as well.

Outcomes of Interest

Adverse events within 30 days of operation are tracked by the ACS-NSQIP and were classified into the following categories for analysis: severe adverse events (SAEs), minor adverse events, and unplanned readmission [9]. SAEs included death, myocardial infarction, cerebrovascular accident, renal failure, pulmonary embolism, venous thromboembolism, sepsis, septic shock, unplanned intubation, peripheral nerve injury, deep wound infection, organ/space infection, and return to operating room. Minor adverse events included superficial wound infection, urinary tract infection, and pneumonia. SAEs were considered pre-discharge if they happened on or before the day of nonelective THA, and postdischarge if they happened after the day of surgery. The outcomes of interest for this analysis were postdischarge SAE and unplanned readmission, which by definition are all post-discharge complications.

Inclusion Population and Categorization

A retrospective review of the ACS-NSQIP database was conducted to identify all patients who underwent nonelective

primary THA from 2011 to 2014. The ACS-NSQIP defines nonelective cases as those with patients who are inpatient at an acute care hospital, transferred from an emergency department (ED), undergo an emergent/urgent surgical case, or are admitted to the hospital on the day(s) before a scheduled procedure for any reason. Primary THA patients were identified using corresponding Current Procedural Terminology code 27130. Patients with incomplete data were removed from the analysis.

Based on the discharge destination field, all nonelective THA patients were categorized into nonhome (IRF or SNF) vs home (HHH) discharged cohorts. Patients who passed away before discharge or had “other” discharge destination were removed from the analysis. Although the ACS-NSQIP data collection goes back to 2007, discharge destination data are only available starting from 2011; therefore, only 2011-2014 data were analyzed.

Statistical Analysis

Statistical analysis was conducted using SAS (version 9.3) software with a 2-tailed alpha of 0.05. Bivariate analysis was conducted to compare demographics, comorbidities, intraoperative variable, pre-discharge outcomes, and 30-day outcomes between nonhome and home discharge destination THA cohorts. Categorical analysis was conducted with the chi-square and the Fisher exact test where appropriate. Continuous variables were analyzed using the Student *t* test or the Mann-Whitney *U* test after testing for normality and equal variance. Multivariate logistic regression models only included predictors which yielded a *P* value of $\leq .20$ from bivariate analysis. SAEs pre-discharge predictors were included in the multivariate logistic regression model regardless of the *P* value from bivariate analysis. All variables were assessed for confounding and interaction where appropriate. Final models were assessed for goodness of fit using the Hosmer-Lemeshow test and by calculating the area under the receiver-operating characteristics curve (c-statistic).

Risk Stratification Analysis

Patients in both cohorts were risk stratified into those with 0, 1, and ≥ 2 risk factors using 5 significant risk factors for postdischarge SAEs and 6 significant risk factors for unplanned readmission. Rates of postdischarge complications within 0-14 and ≥ 15 days post-surgery were compared across these 3 groups for nonhome and home nonelective THA patients.

Results

Comparison of Patient Characteristics and Comorbidities

A total of 3120 nonelective primary TJA patients from 2011 to 2014 were included for analysis. The discharge destinations included home, SNF, and IRF. Compared with those discharged HHH, SNF/IRF-bound patients tended to be older, female, non-smokers, and less likely to have a body mass index (BMI) >40 kg/m² (all *P* $\leq .03$; Table 1). Nonhome patients were more likely to have diabetes, pulmonary disease, cardiac disease, hypertension, bleeding-causing disorders, ASA class 3/4, and greater days from admission to operation (*P* $\leq .001$).

Comparison of Adverse Events

Rates of pre-discharge SAEs were higher in nonhome patients compared with those of home (61% vs 53%; *P* = .01). In particular, rates of unplanned intubation (10% vs 3.8%), myocardial infarction

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