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Predictors of 30-d readmissions after gastrectomy for malignancy

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ABSTRACT

Background: The objective of this study is to identify risk factors associated with readmission after gastrectomy to potentially identify potential areas for targeted improvements. Hospital readmission after surgery is a topic of interest in health-care policy among hospitals, payers, and providers. Readmissions are associated with increased costs, morbidity, and mortality. Readmission rates have been proposed as a quality metric for hospitals and quality indicator of individual surgeon's performance. In addition, the Centers for Medicare and Medicaid Services has reduced payments to hospitals with excessive readmissions for certain diagnoses.

Materials and methods: All gastrectomy procedures for malignancy in patients aged ≥18 y from 2005 to 2011 were queried from the California State Inpatient Database. Patients who died during index admission were excluded. Descriptive statistics were examined between all baseline variables and readmission status. Logistic regression models were adjusted for age, race, sex, and insurance status.

Results: A total of 6985 patients underwent gastrectomy for malignancy; 16.5% of the patients were readmitted after postoperative discharge. Readmission rate did not change significantly over time. Multivariable analysis demonstrated that the occurrence of any postoperative complications, postoperative length of stay greater than 10 d, discharge to skilled nursing facility or home health care, combined resection with distal pancreatectomy and/or splenectomy, and patient comorbidities like diabetes mellitus and renal failure were independently associated with readmissions.

Conclusions: The findings suggest that focusing on quality improvement efforts by targeting reduction of postoperative complications may reduce readmission rates.

Introduction

Reducing hospital readmissions has become a focus in the realm of health-care policy and inpatient care quality improvement. In Medicare patient population, approximately 16% of surgical patients and 21% of medical patients had an unplanned readmission in 2004, accounting for $17 billion in excess health-care costs.[1,2] On average, the cost per readmission for any cause is $11,200.[3] The Affordable Care Act requires the establishment of a Hospital Readmission

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Reduction Program. The purpose of the program is to improve quality and lower costs while attempting to ensure that patients are fully prepared and safe for continued care outside the hospital setting at the time of discharge. The program is designed to penalize hospitals with excessive 30-d readmissions by withholding 1% of Medicare reimbursement starting from the fiscal year 2013 and increasing the penalty to 3% for the fiscal year 2015.

The American Cancer Society estimates over 26,000 new stomach cancer diagnoses and more than 10,000 deaths in the Unites States in 2016.[4] Gastrectomy provides the only chance for cure. Gastrectomy for malignancy is a complex surgical procedure, and readmission rates after this procedure have been estimated to be up to 20%.[5-13] Patient and hospital-level factors have been found to be associated with readmissions.

The goal of this study is to identify factors associated with readmissions after gastrectomy for malignancy, thus informing future interventions to improve care, reduce excess readmissions, and curtail health-care costs.

Materials and methods

The present study was deemed exempt from approval by our hospital's Institutional Review Board of Case Western Reserve University.

Data source

This study represents a retrospective cross-sectional secondary data analysis of the California State Inpatient Database (CA SID) file. State Inpatient Databases (SIDs) are state-specific files that contain all inpatient care records of respective participating states; they were developed as a part of the Healthcare Cost and Utilization Project (HCUP). The SIDs encompass 97% of all US hospital discharges. Over 100 clinical and nonclinical data elements are available, including demographics, hospital characteristics, primary and secondary diagnoses, inpatient procedures, insurance type, discharge status, length of stay (LOS), and total charges, among others. The CA SID is one of the few SIDs that also allows for tracking hospital readmissions, given that it includes a synthetic patient identifier and a variable that reflects the lapse of time between two hospital admissions.

Study population

Cases that were not assigned a Clinical Classification Software code for neoplasm (Clinical Classification Software 11-47; $n = 29{,}531$) or did not have a diagnosis of malignant neoplasm of the stomach (ICD-9 diagnosis code 151; $n = 35{,}430$) were excluded. In addition, admissions for individuals under the age of 18 y or those who died during the index admission were excluded from analysis, leaving the study population at 6985 individuals.

Outcomes of interest

The outcomes of interest were 30-d readmissions and postoperative complications. Thirty-day readmission was defined as any unplanned (or unscheduled) admission to a hospital within 30 d of discharge from the index admission. Postoperative complications were identified using specific definitions (Appendix). In addition, "any complication" was defined as one or more of these postoperative complications.

Independent variables

The independent variables used in the statistical models are as follows: (1) patient demographics such as age, sex, race, and insurance; (2) discharge status; (3) hospital teaching status; and (4) patient comorbidities. The variables were defined as those recorded by the HCUP with a few category modifications to facilitate model specification. Age was grouped as 18-49, 50-59, 51-60, 60-69, 70-79, and ≥80 y. Race was categorized as white, black, Hispanic, and other. Insurance status was identified as Medicare, Medicaid, private/health maintenance organization, uninsured/self-pay, and other. Discharge status was classified as routine, skilled nursing facility, home health care, and other. Comorbidities were identified and classified using the Comorbidity Software provided by the Agency for Healthcare Research and Quality.[14] LOS was grouped into three categories based on the median LOS of 10 d, as 1-10, 11-20, and ≥21 d. In addition, blood transfusion was identified based on ICD-9 procedure codes 99.00, 99.02, 99.03, and 99.04.

Statistical analysis

All analyses were performed using SAS System for Windows, version 9.3 (SAS Institute Inc, Cary, NC). We calculated the distribution of data and descriptive statistics for all baseline variables included in the analyses for all gastrectomy patients and those who were readmitted. Median LOS for readmitted and not readmitted patients was also calculated for each baseline variable. Annual trend in gastrectomy procedures and readmission rates were also examined. Univariate comparisons were made using Pearson's chi-squared test for categorical variables. We calculated the complication rates and comorbidity rates by using readmission and discharge status, as well as the comorbidity rates of patients with any complication by using readmission status. We compared the discharge status after index admission based on index LOS and the complication rates based on index LOS and surgery type. Logistic regression models, adjusted for age, race, sex, and insurance, were fit to examine the relationship between readmission and a combination of factors (LOS, discharge status, any complications, blood transfusion, and comorbidities). Finally, we identified the causes for readmission based on the time to readmission, categorized as 1-7, 8-14, and ≥15 d.

Results

A total of 6985 patients who underwent gastrectomy for malignancy are included in this analysis. Of these patients, 1152 (16.5%) required readmission. Median postoperative LOS for all patients was 10 d. The median LOS after readmission was 5 d. Also, 1972 patients (28.2%) underwent total gastrectomy, 2511 patients (35.95%) suffered a postoperative complication,