Risk Factors for 30-Day Hospital Readmission among General Surgery Patients

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BACKGROUND: Hospital readmission within 30 days of an index hospitalization is receiving increased scrutiny as a marker of poor-quality patient care. This study identifies factors associated with 30-day readmission after general surgery procedures.

STUDY DESIGN: Using standard National Surgical Quality Improvement Project protocol, preoperative, intraoperative, and postoperative outcomes were collected on patients undergoing inpatient general surgery procedures at a single academic center between 2009 and 2011. Data were merged with our institutional clinical data warehouse to identify unplanned 30-day readmissions. Demographics, comorbidities, type of procedure, postoperative complications, and ICD-9 coding data were reviewed for patients who were readmitted. Univariate and multivariate analysis was used to identify risk factors associated with 30-day readmission.

RESULTS: One thousand four hundred and forty-two general surgery patients were reviewed. One hundred and sixty-three (11.3%) were readmitted within 30 days of discharge. The most common reasons for readmission were gastrointestinal problem/complication (27.6%), surgical infection (22.1%), and failure to thrive/malnutrition (10.4%). Comorbidities associated with risk of readmission included disseminated cancer, dyspnea, and preoperative open wound ($p < 0.05$ for all variables). Surgical procedures associated with higher rates of readmission included pancreatectomy, colectomy, and liver resection. Postoperative occurrences leading to increased risk of readmission were blood transfusion, postoperative pulmonary complication, wound complication, sepsis/shock, urinary tract infection, and vascular complications. Multivariable analysis demonstrates that the most significant independent risk factor for readmission is the occurrence of any postoperative complication (odds ratio = 4.20; 95% CI, 2.89–6.13).

CONCLUSIONS: Risk factors for readmission after general surgery procedures are multifactorial, however, postoperative complications appear to drive readmissions in surgical patients. Taking appropriate steps to minimize postoperative complications will decrease postoperative readmissions. (J Am Coll Surg 2012;215:322–330. © 2012 by the American College of Surgeons)

In June of 2009, the Centers for Medicare and Medicaid Services (CMS) began publishing 30-day readmission data for selected medical diseases. As a result, hospital readmissions quickly became an important metric for measuring quality of patient care. In March 2010, the Patient Protection and Affordable Care act was signed into law and within it, Section 3025 brought substance to holding hospitals accountable for 30-day hospital readmissions.[1] When implemented, hospital reimbursements will be reduced based on an adjustment factor determined by an institution's expected vs observed 30-day readmission rate. Section 3025 started the focus on readmissions for selected medical diseases, but left the door open for CMS to extend this readmission policy to surgical procedures in fiscal year 2015. The CMS has already confirmed it will begin monitoring readmissions for vascular surgery procedures. Con-

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Abbreviations and Acronyms

ASA = American Society of Anesthesiologists
CMS = Centers for Medicare and Medicaid Services
NSQIP = National Surgical Quality Improvement Project
OR = odds ratio
UTI = urinary tract infection

sequently, there is an intense focus on decreasing unnecessary surgical readmissions.[2,3]

From 2003 to 2004, 19.5% of all Medicare beneficiaries who were discharged from a hospital were readmitted within 30 days, leading to a cost of $17.4 billion. Kent and colleagues estimate that a single readmission after pancreatic resection costs an average of $16,000 or more.[4] In addition to the financial implications of hospital readmission, a patient's unplanned return to the hospital further limits hospital resources. For each patient readmitted, there is an opportunity lost to treat another patient who needs care. Regardless of the strain a readmission places on the health care system, it negatively impacts the patient's quality of life. Reducing the number of 30-day readmissions after surgery is important not only for institutions, but also for patients.

The readmission problem is fundamentally different in surgical patients compared with medical patients.[5,6] A majority (70.5%) of readmissions after a surgical procedure are due to a medical condition. Of Medicare beneficiaries undergoing major bowel surgery in 2003 and 2004, 16.6% were readmitted for gastrointestinal problems, and only 6.4% were readmitted with a postoperative infection.[7] Surgical patients have underlying comorbidities similar to medical patients; however, what differentiates the surgical patient is the notion that they undergo a specific procedure that, in and of itself, carries an associated risk of readmission. The other major differentiating factor for surgical patients is that the intervention that puts these patients at risk for readmission, ie, their operation, is planned. This suggests that there is an opportunity to intervene preoperatively to decrease the risk of readmission postoperatively.

There is a paucity of information that focuses on readmission rates among surgical patients. Most of the studies that do exist focus on procedure-specific readmission rates within precise patient populations.[4,8-13] A recent study that followed 33,936 patients after coronary artery bypass graft surgery showed that 16.5% were readmitted within 30 days or discharge.[13] The most common reason for readmission was postoperative infection (16.9%). The authors identified a risk profile for patients who were at increased risk for postoperative infection. High-risk factors included women, obesity, unplanned reoperations, and patients who had a longer hospital length of stay. Similarly, a recent series investigated readmission after 149,622 colorectal surgery cases for colon cancer.[11] The authors note that hospital length of stay, comorbidities, and postoperative complications are each significantly associated with readmission. Finally, in a series that analyzed 1,643 pancreaticoduodenectomies, younger age, considerable blood loss, postoperative complications, and vessel resection were found to be independent risk factors for readmission.[8]

These previous studies highlight the importance of decreasing readmissions after complex general surgery procedures. The purpose of this study is to examine factors associated with 30-day hospital readmission after a variety of general surgery procedures among a diverse patient population. We acknowledge that factors associated with 30-day readmission after general surgery procedures are multifactorial. The current study was undertaken to better understand which factors appear to be most commonly associated with readmission. Specifically, we hypothesize that postoperative complications in particular increase the chance of a patient returning to the hospital.

METHODS

Study population and methods

This is a retrospective study using patients who were enrolled in American College of Surgeons National Surgical Quality Improvement Program (NSQIP) and underwent inpatient general surgery procedures at Emory University Hospital between October 2009 and July 2011. Outpatient procedures were excluded. Standard NSQIP data were gathered prospectively by the American College of Surgeons NSQIP trained nurses at our institution. One hundred and thirty-five variables were analyzed, including preoperative risk factors, intraoperative variables, and 30-day postoperative morbidity and mortality outcomes for patients undergoing general surgery procedures in the inpatient setting.[14]

After a protocol approved by our Institutional Review Board, each patient's index admission was linked via identifier codes to our institution's clinical data warehouse to search for unplanned readmissions within 30 days of discharge. Comorbid factors for each patient were obtained and outcomes data were ascertained at 30-day follow-up as described previously. We further determined if patients experienced a postoperative complication and, if so, when this occurred relative to readmission. Lastly, we identified the ICD-9 codes associated with readmission in an effort to determine why the patient was readmitted. Patients were excluded from the study if they died during their index hospitalization or if the readmission was a planned aspect of their postoperative course (eg, chemotherapy).