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Multiple complications and short length of stay are associated with postoperative readmissions

Brittney M. Kohlnhofer, B.S., Sarah E. Tevis, M.D., Sharon M. Weber, M.D., Gregory D. Kennedy, M.D., Ph.D.*

Department of Surgery, University of Wisconsin, Madison, WI, USA

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Abstract

BACKGROUND: The aim of this study was to characterize patients readmitted following inpatient general surgery procedures. We hypothesized that a decreased length of stay would increase risk for readmission.

METHODS: We utilized our institutional National Surgical Quality Improvement Project database from 2006 to 2011. The main outcome of interest was 30-day readmission. Univariate and logistic regression analyses identified risk factors for readmission.

RESULTS: We identified 3,556 patients, with 322 (9%) readmitted within 30 days after discharge. Multivariable analysis demonstrated age, dyspnea, and American Society of Anesthesiologists class to be independent risk factors for readmission. In addition, patients who suffered multiple complications had a decreased risk for readmission as length of stay increased. Patients with <2 postoperative complications had an increased risk for readmission as length of stay increased.

CONCLUSIONS: Contributors to postoperative readmissions are multifactorial. Perioperative factors predict risk for readmission and may help determine a target length of stay. Prevention of postoperative complications may reduce readmission rates.

Hospital readmission has recently become a focus of many hospital quality improvement programs. In 2008, the Medicare Payment Advisory Commission reported on a series of payment reforms to encourage coordination of patient care which included bundling of payments around an episode of care, gainsharing between hospitals and physicians, and a direct incentive to reduce readmissions.[1] They found rates of readmission among patients diagnosed with an acute myocardial infarction, heart failure, or pneumonia to be upward of 17%. Using these numbers, the commission defined a number of preventable readmissions that could be avoided with improved index hospitalization patient care, discharge planning, or outpatient care coordination. Following this report, Congress enacted a hospital readmissions reduction program as part of the Patient Protection and Affordable Care Act of 2010. The hospital readmission reduction program was initiated by Centers for Medicare and Medicaid Services in 2012, which includes a penalty that results in the reduction of Medicare payments in 2013 to hospitals that had above-average rates of readmission among patients treated for acute myocardial infarction, heart failure, or pneumonia over the 3-year period from July 1, 2008 to June 30, 2011. In its most recent

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* Corresponding author. Tel.: +1-608-263-1164; fax: +1-608-263-7652.

E-mail address: kennedyg@surgery.wisc.edu

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report, Medicare Payment Advisory Commission has recommended moving to a system whereby all-cause readmissions will be reported and penalties assessed based on a target rate of readmission.[2] It is clear that surgical patients are different from medical patients and that causes of readmission are often related to underlying medical conditions rather than the initial admitting diagnosis.[3] Therefore, it is critical that we clearly understand the problem of readmissions in the surgical patient population.

Multiple studies have attempted to define the patient factors that are associated with readmission. Patients of older age and of African-American race have been shown to be more likely to be readmitted.[4,5] Other factors such as patient comorbidities, emergent surgery, transfusion requirements, and discharge to a skilled nursing facility have been associated with increased readmission rates.[5] Hospital length of stay has also been studied as a possible predictor of readmission rates in the surgical patient population, but recent literature is conflicting. One study found that patients discharged 0 to 4 days after surgery had an increased risk for readmission (odds ratio, OR = 1.45),[6] while other studies identified an association between longer length of stay and an increased risk for readmission (OR = 1.23 to 2.00).[7–10]

To decrease preventable, postoperative readmissions, we must first better understand the patient and perioperative variables which contribute to increased risk for readmission. The role of postoperative complications and risk for readmission cannot be downplayed.[11] However, it is not clear if all complications carry the same risk for readmission. Furthermore, the effect of length of stay on risk for readmission in patients who have suffered complications needs to be clarified. To better understand these issues, we have undertaken this study with the following aims: (1) to characterize patients who were readmitted following inpatient general surgical procedures from 2006 to 2011; (2) to compare and contrast those patients readmitted with those who were not readmitted within 30 days after surgery; and (3) to correlate length of stay with rates of 30-day postoperative readmissions. We hypothesized that shorter length of stay would correlate with an increased risk for readmission.

Methods

Patients who were captured in the American College of Surgeons' National Surgical Quality Improvement Project (NSQIP) database from August 1, 2006 to June 30, 2011 were evaluated. The University of Wisconsin Hospital and Clinics has participated in this project since August 1, 2006 and investigations using this database have been reviewed and approved by the University of Wisconsin-Madison Human Research Protection Program. Eligible patients included those who underwent an inpatient general surgery procedure. We excluded patients who underwent an emergency operation, an outpatient procedure, and any patient who underwent an operation not classified as general surgery as defined by the NSQIP program. Patients who died before 30 days post discharge were also excluded from the readmission risk analysis.

The NSQIP Surgical Clinical Reviewers (SCRs) prospectively collect over 20 preoperative morbidity variables and 30-day outcomes including complications, length of stay, and reoperation. In addition to preoperative variables, a number of intraoperative variables are also collected. Before 2012, readmissions were not formally collected by the NSQIP SCRs. Therefore, we linked the NSQIP database with our hospital discharge data and identified readmissions in the over 8,000 patients within our database. Readmissions occurring within 30 days of discharge from index hospitalization after a general surgery procedure were identified and studied. All readmitted patients were verified by independent review. Given that our hospital is a regional tertiary medical center, we acknowledge that some patients may be readmitted at their local hospitals and, therefore, not captured by our hospital database. To determine how frequently patients are not sent back to our hospital, we examined the discrepancy between our SCRs documentation in 2011 and our hospital database. This interrogation revealed that only 1 patient who was readmitted in 2011 was not captured in the hospital database indicating that most patients are sent back to our center for further care.

Explanatory variables included age, sex, and race. Race was identified according to the NSQIP classification system. The number of minority patients in this population was small; therefore race was categorized as Caucasian and non-Caucasian. We utilized age as a categorical variable in this study by classifying according to the following groups: <30, 30 to 49, 50 to 69, 70 to 89, and ≥ 90 years. Included in the explanatory variables were perioperative characteristics. Preoperative characteristics included the following 19 comorbid conditions: American Society of Anesthesiologists (ASA) class 1 to 5, body mass index ≥ 30, diabetes mellitus, smoking, dyspnea, preoperative functional status, chronic obstructive pulmonary disease, ascites within 30 days before surgery, congestive heart failure within 30 days before surgery, hypertension, acute renal failure, hemodialysis, disseminated cancer, open wound, steroid/immunosuppressive medication use, weight loss $>10\%$ within 6 months before surgery, bleeding disorder, transfusion of red blood cells within 72 hours before surgery, and sepsis within 48 hours before surgery. In addition, functional status was evaluated and patients were classified as independent, partially dependent, and totally dependent. Surgical specialty was also analyzed with subsets including advanced minimally invasive surgery, colorectal, endocrine, general surgery, and hepatopancreaticobiliary/soft tissue oncology. Medical home was categorized into UW-Hospital/Clinics, veterans administration Hospital/Clinics, and other. Payer was categorized into private insurance, Medicare/Medicaid, and uninsured.

Intraoperative characteristics included the following: preoperative diagnosis, procedures occurring at the time