

Predictors of Readmission following Outpatient Urological Surgery

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Purpose: The Patient Protection and Affordable Care Act increases oversight of surgical outcomes and ties hospital readmissions to Medicare reimbursement. Given the increasing volume of outpatient urological procedures, to our knowledge this study provides the first multi-institutional multivariate analysis of patient factors that contribute to readmission.

Materials and Methods: Using the 2011 National Surgical Quality Improvement Program database we identified 7,795 patients. Multiple logistic regression was used to predict 30-day unplanned hospital readmissions controlling for demographics, clinical characteristics and comorbidities. Readmission rates of the 5 most common procedures were calculated along with the rate of postoperative complications associated with readmission.

Results: Outpatient urological surgery had an overall 3.7% readmission rate. The 5 most common procedures were cystourethroscopy and resection of bladder tumor (readmission rate 4.97%), laser prostatectomy (4.27%), transurethral resection of prostate (4.24%), hydrocele excision (1.92%) and sling surgery for urinary incontinence (0.85%). The most common comorbidities in readmitted patients were hypertension, diabetes and smoking. Risk adjusted multiple regression indicated that cancer history (OR 3.48), bleeding disorder (OR 2.03), male gender (OR 1.38), ASA[®] level 3 or 4 (OR 1.34) and age (OR 1.01) were significant predictors of readmission. Readmitted patients also had a higher 30-day complication rate.

Conclusions: Readmission after outpatient urological surgery occurs at a rate of 3.7%. A history of cancer, bleeding disorder, male gender, ASA level 3 or 4 and age were associated with readmission along with greater rates of medical and surgical complications. Our results may help guide risk reduction initiatives and prevent costly readmissions.

Key Words: urinary bladder; prostate; Patient Protection and Affordable Care Act; patient readmission; surgical procedures, operative

Abbreviations and Acronyms

ASA = American Society of Anesthesiologists[®]

COPD = chronic obstructive pulmonary disease

NSQIP = National Surgical Quality Improvement Program

SSI = surgical site infection

TURBT = transurethral resection of bladder tumor

TURP = transurethral resection of prostate

Accepted for publication December 19, 2013.
Study received institutional review board approval.

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HOSPITAL readmission rates have come under increased scrutiny due to their significant contribution to increasing medical costs in the United States.^{1,2} The CMS (Centers for Medicare and Medicaid Services) estimated that readmissions cost Medicare \$17.5

billion in 2010 and other groups estimated that about 27% of readmissions were avoidable.^{3,4} Readmission rates have also emerged as a key metric for healthcare quality and are in the early stages of being tied to reimbursement. The PPACA (Patient

Protection and Affordable Care Act) includes the HRRP (Hospital Readmissions Reduction Program). This program establishes a penalty against institutions with above average readmission rates for complications such as pneumonia, myocardial infarction and heart failure.⁵ They quantify unacceptable readmission rates based on the 30-day national average at a given hospital. The CMS already penalizes providers for catheter associated urinary tract infections and it is likely that urological complications will be added to the upcoming readmission penalty list, potentially as early as 2015.⁶

With enhanced patient safety and demonstrated cost savings an increasing number of urological procedures are done at outpatient facilities rather than in the traditional hospital environment.^{7,8} Almost 53 million outpatient procedures are performed each year in the United States and the rate of ambulatory surgery visits increased by 300% in the last decade.⁸ Previous literature estimates the readmission rate to be 0.58% to 3.00% across multiple specialties after outpatient surgery.^{9–12} Including inpatient procedures the readmission rate after urological surgery can be up to 6.5%.^{9,13,14}

Little has been written on readmission in outpatient urology. A Brazilian single center study described a 0.5% readmission rate after ambulatory surgery.¹⁵ In another single center study from 1996 urology was identified as the only surgical specialty statistically associated with an increased risk of 30-day readmission compared to other specialties.¹⁰ There is a dearth of information on hospital readmission rates, predictors of these readmissions and their associated complications.

We investigated causes of readmission after outpatient urological surgery using a validated surgical outcomes database with data from more than 400 hospitals across the United States. This analysis provides risk adjusted reasons for readmission and useful benchmarks for readmission rates that can be used by providers, patients and policy makers.

METHODS

Population

We retrospectively reviewed the ACS (American College of Surgeons) NSQIP participant use file for all outpatient urology procedures and identified 7,795 of a total pool of 153,228 outpatient procedures. NSQIP data collection methods were previously described in detail.^{16,17} Briefly, 240 variables are prospectively collected, including patient demographics, comorbidities, clinical characteristics, laboratory values and postoperative complications. Analysis of chart reviewers established data reliability with a 1.96% rate of interobserver disagreement across tracked

variables and a recent analysis of NSQIP readmission data showed high agreement with manual chart review.^{18,19}

Outcomes

Our primary outcome of interest was 30-day readmission. ACS NSQIP tracks 2 variables relating to readmission. Readmission refers to readmission to the same or a different hospital for any reason within 30 days post-operatively. Unplanned readmission refers to readmission to the same or a different hospital for a postoperative complication related to primary surgery. Because the variable specifically relates to the outpatient surgical procedure, we used unplanned readmission for analysis.

We calculated medical and surgical complications. Medical complications included pneumonia, unplanned intubation, pulmonary embolism, failure to wean from mechanical ventilation, progressive renal insufficiency, acute renal failure, urinary tract infection, peripheral nerve injury, stroke, coma, cardiac arrest, myocardial infarction, bleeding requiring transfusion, deep venous thrombosis and sepsis/septic shock. Surgical complications included superficial SSI, deep SSI, organ/space SSI, wound disruption/dehiscence and graft failure.

Risk Adjustment Factors

Patient demographics, clinical characteristics and comorbidities were considered in this analysis. Demographic data included age, body mass index, gender and race. Clinical characteristics included smoking status, alcohol use, functional independence before illness and surgery, prior operation within 30 days, steroid use, pregnancy, ASA physical status 3 or 4, emergency and do not resuscitate status. General comorbidities included diabetes, rest leg pain, gangrene, acute renal failure, dialysis, hemiplegia, ascites, esophageal varices, disseminated cancer, open wound infection, weight loss, bleeding disorders (vitamin K deficiency, hemophilia, thrombocytopenia and chronic anticoagulation therapy), transfusion, history of chemotherapy within 30 days, history of radiotherapy within 90 days and sepsis. Pulmonary risk factors were COPD, ventilator dependence, pneumonia and dyspnea. Cardiac risk factors were history of myocardial infarction, chronic heart failure, angina, previous cardiac surgery or percutaneous coronary intervention, hypertension and revascularization/amputation for peripheral vascular disease. Neurological risk factors included prior transient ischemic attack, cerebrovascular accident with and without neurological defect, central nervous system tumor, coma, paraplegia and quadriplegia status, and impaired sensorium. Total relative value units per procedure were also included to adjust for added complexity and concurrent procedures as described previously.²⁰

Statistical Analysis

Patient demographics, risk factors and postoperative outcomes were calculated by frequency analysis. The readmission rate after outpatient surgery was calculated for each tracked specialty in NSQIP. Rates were also independently determined for the 5 most common outpatient urological surgery procedures independently, including cystourethroscopy and resection of bladder tumor, sling

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