
Hospital Readmissions after Surgery: How Important Are Hospital and Specialty Factors?



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- BACKGROUND:** Hospital readmission rates after surgery can represent an overall hospital effect or a combination of specialty and patient effects. We hypothesized that hospital readmission rates for procedures within specialties were more strongly correlated than rates across specialties within the same hospital.
- STUDY DESIGN:** For general, orthopaedic, and vascular specialties at Veterans Affairs hospitals during 2008 to 2014, 30-day risk-adjusted readmission rates were estimated for 6 high-volume procedures and each specialty. Relationships were assessed using the Pearson correlation coefficient.
- RESULTS:** At 84 hospitals, 64,724 orthopaedic, 24,963 general, and 10,399 vascular inpatient procedures were performed; mean readmission rates were 6.3%, 13.6%, and 16.4%, respectively. There was no correlation between specialty-specific adjusted hospital readmission rates: general and orthopaedic ($r = 0.21$; $p = 0.06$), general and vascular ($r = 0.15$; $p = 0.19$), and vascular and orthopaedic surgery ($r = 0.07$; $p = 0.55$). Within specialties, we found modest correlations between knee and hip arthroplasty readmission rates ($r = 0.39$; $p < 0.01$) and colectomy and ventral hernia repair ($r = 0.24$; $p = 0.03$), but not between lower-extremity bypass and endovascular aortic repair ($r = 0.13$; $p = 0.26$). Overall, controlling for patient-level factors, 1.9% of the variation in readmissions was attributable to specialty-level factors; only 0.6% was attributable to hospital-level factors.
- CONCLUSIONS:** Hospital readmission rates for orthopaedic, vascular, and general surgery were not correlated between specialties; within each of the 3 specialties, modest correlations were found between 2 procedures within 2 of these specialties. These findings suggest that hospital surgical readmission rates are primarily explained by patient- and procedure-specific factors and less by broader specialty and/or hospital effects. (J Am Coll Surg 2017;224:515–523. Published by Elsevier Inc. on behalf of the American College of Surgeons.)
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Hospital readmissions after surgery have emerged as a targeted quality measure, as a result of findings of significant variation across hospitals and correlation between readmission rates and other select measures of surgical quality.^{1,2} As outlined by the Hospital Readmission Reduction Program, the Centers for Medicare and Medicaid Services now reduces reimbursement to hospitals with readmission rates higher than average for several medical admissions and 2 surgical procedures, cardiac bypass and joint replacement.³ As policy makers consider expanding the number of surgical procedures included in the Hospital Readmission Reduction Program, it is important to understand what proportion of readmissions are related to hospital factors vs specialty or patient factors.

Readmissions after surgical procedures are often associated with the complications linked to the procedure that occur with known frequencies influenced by patient and procedure factors.^{4,6} In addition, surgical readmissions are difficult to predict and are more often related to post-discharge complications than to surgical complications that occur during the index hospitalization.^{5,7,8} Although there is large variation in readmission rates across surgical specialties, the majority of this variability has been attributed to patient-level factors as opposed to surgeon or sub-specialty factors.⁹ Other work has suggested that certain hospital factors, such as safety-net status, can serve as important variables that influence hospital readmission rates after surgery.^{10,11} However, it is unclear whether and to what extent common hospital factors affect readmission rates for different surgical procedures. Research into the varying effects of hospital, specialty, and patient-level factors on readmissions would help focus future quality-improvement efforts.

We evaluated the extent to which hospital readmission rates after surgery represent a global hospital effect vs the sum of specialty and patient effects. To do this, we compared risk-adjusted hospital readmission rates after surgery in different specialties and after different procedures within the same specialty. We also estimated the amount of variation in readmission that could be attributed to specialty or hospital factors. We hypothesized that hospital readmission rates within surgical specialties would be more closely related than readmission rates across specialties, and that only a small portion of the variation in readmissions would be explained by hospital or specialty factors.

METHODS

A retrospective cohort study design was used to examine hospital, specialty, and patient characteristics of surgical

procedures experienced at 84 Veterans Affairs (VA) medical centers between October 1, 2007 and September 30, 2014. The study was reviewed and approved by the VA Surgical Quality Data Use Group and the VA Central IRB with a waiver of informed consent.

Study population and data sources

The study population was limited to VA facilities performing procedures in 3 common surgical specialties—general, orthopaedic, and vascular. To reduce variation across different procedures within specialty, surgical procedures were limited to 2 high-volume inpatient procedures within each of the 3 surgical specialties based on CPT codes. These included: colectomy (CPT: 44139-44160, 44204-44208, 44210-44213) and ventral hernia repair (CPT: 49560-49611, 49568) for general, lower-extremity bypass (CPT: 35566, 35556, 35558, 35571, 35583, 35585, 35587, 35656, 35661, 35666, 35671), and endovascular aortic repair (CPT: 34802, 34800, 34804, 34803, 34805) for vascular, and hip arthroplasty (CPT: 27125-27138) and knee arthroplasty (CPT: 27420-27424, 27427-27429, 27437-27447, 27486-27487) for orthopaedic surgery. To identify inpatient procedures, patients with hospital stays of <2 days were excluded from the cohort. For patients with more than 1 surgery during the hospital stay, only the initial operative encounter was analyzed. Patients who died during the initial hospitalization were excluded. Facilities were excluded from the analysis if they performed fewer than 20 operations within any of the 3 specialties during the time period (26 of 110 facilities were excluded).

Surgical procedures were identified using the VA Surgical Quality Improvement Program (VASQIP). The VASQIP is a quality-assurance program that collects information on patients undergoing surgery within the VA healthcare system.¹² The initial data set was developed as a procedure-level data set. Additional data from the VA Corporate Data Warehouse was merged into the data set to include 30-day post-discharge follow-up for outcomes, as well as additional patient characteristics not collected by VASQIP.

Outcomes

The main end point was the occurrence of any unplanned inpatient readmission in the 30 days post discharge as identified from the Corporate Data Warehouse data. The definition of unplanned readmission used was according to current Centers for Medicare and Medicaid Services definition of unplanned readmission for the general population.¹³ In brief, the Centers for Medicare and Medicaid Services algorithm excludes potentially planned inpatient readmissions, including those for planned

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