National evaluation of hospital readmission after pulmonary resection

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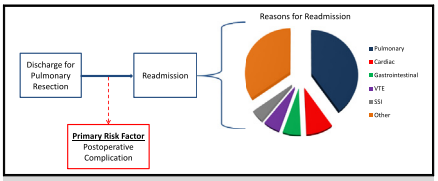
ABSTRACT

Objectives: Our objectives were to (1) assess readmission rates and timing after pulmonary resection, (2) report the most common reasons for rehospitalization, and (3) identify risk factors for unplanned readmission after pulmonary resection.

Methods: Patients who underwent pulmonary resection were identified from the 2011 American College of Surgeons National Surgical Quality Improvement Program database. We examined readmission within 30 days of surgery for all resections and 3 subgroups: open lobectomy, video-assisted thoracoscopic lobectomy, and pneumonectomy. Regression models were developed to identify factors associated with readmission.

Results: In 1847 patients, there were 899 open lobectomies (49%), 724 video-assisted thoracoscopic lobectomies (39%), and 85 pneumonectomies (5%). The overall readmission rate was 9.3% with no significant difference found among patients undergoing open lobectomy (9.1%), video-assisted thoracoscopic lobectomy (8.4%), or pneumonectomy (11.8%) ($P = .576$). The median time from operation to readmission was similar among patients undergoing open (14 days) or video-assisted thoracoscopic lobectomy (13 days). The most common cause of readmission for all groups examined was pulmonary related. In multivariable analyses, the strongest factor associated with readmission was an inpatient complication after the initial surgery in all resections (hazard ratio [HR], 4.29; 95% confidence interval [CI], 3.05-6.04), open lobectomy (HR, 4.36; 95% CI, 2.75-6.94), and video-assisted thoracoscopic lobectomy (HR, 4.60; 95% CI, 2.65-7.97). Surgical approach was not associated with readmission (video-assisted thoracoscopic vs open lobectomy: HR, 1.07; 95% CI, 0.75-1.52).

Conclusions: Experiencing a postoperative complication was strongly associated with unplanned readmission. Increased attention toward reducing postoperative complications and earlier outpatient follow-up in these patients may be a viable strategy for decreasing readmissions after pulmonary resection. (J Thorac Cardiovasc Surg 2015;■:1-7)



Primary risk factor and reasons for readmission after pulmonary resection. *VTE*, Venous thromboembolism; *SSI*, surgical site infection.

Central Message

Patients who experience a complication after pulmonary resection are at significantly increased risk for short-term readmission.

Perspective

Readmission is increasingly being used as an indicator to assess hospital quality. This study found that approximately half of readmissions after pulmonary resection were cardiopulmonary related and that the strongest risk factor was an inpatient complication. Surgeons and quality leaders seeking to reduce readmission after pulmonary resection should consider these factors when designing potential interventions.

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Abbreviations and Acronyms

ACS NSQIP = American College of Surgeons National Surgical Quality Improvement Program
CI = confidence interval
HR = hazard ratio
ICD-9 = International Classification of Diseases, 9th edition
IQR = interquartile range
VATS = video-assisted thoracoscopic surgery

Supplemental material is available online.

Healthcare increasingly is being evaluated not only by the quality of care provided but also by its overall cost and value.[1,2] Reducing hospital readmissions has been proposed as a metric to address both of these concerns. Beginning in the 2013 fiscal year, the Centers for Medicare and Medicaid Services began tying reimbursement to readmissions through its Hospital Readmissions Reduction Program.[3] Currently, the only conditions that are subjected to decreased payments are acute myocardial infarctions, heart failure, and pneumonia with recent expansion to chronic obstructive pulmonary disorder and total hip/knee arthroplasty occurring in the 2015 fiscal year. As stakeholders continue to explore ways to contain costs while improving patient care, incorporating other diagnoses and procedures is likely to occur.

Numerous studies have reported on readmission after general, orthopedic, and cardiac surgery.[4-8] However, there has been a paucity of data evaluating readmission after pulmonary resection. Reports that have been published regarding pulmonary resection are older, regional studies or make use of administrative data in a primarily elderly population.[9-11] Moreover, the association between postoperative inpatient complications and readmissions, although reported in other fields, has not been well established after pulmonary resection.[4,7]

Our objectives for this study were (1) to describe the prevalence and timing of readmission after pulmonary resection, (2) to report the primary causes of rehospitalization, and (3) to identify risk factors for unplanned readmission after pulmonary resection.

MATERIALS AND METHODS

This study was deemed exempt by the Northwestern University Institutional Review Board.

Data Source and Study Population

The American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) provides participating hospitals with risk-adjusted, benchmarked reports of 30-day postoperative outcomes across different surgical specialties.[12] This program uses a systematic sampling approach, built on 8-day cycles, with approximately 40 cases sampled per cycle from various surgical specialties.[13] Patient demographics and standardized preoperative, intraoperative, and postoperative variables are collected for both inpatient and outpatient surgical procedures. Perioperative data and clinical outcomes are evaluated up to 30 days from the date of surgery according to nationally specified, uniform definitions to ensure accurate cross-institutional comparisons.[13] Trained surgical reviewers prospectively ascertain information from the medical record or, if needed, by contacting physicians or patients directly, and undergo periodic audits and other quality-control checks.[14]

We identified patients who underwent pulmonary resection for any indication from the 2011 ACS NSQIP database using Current Procedural Terminology codes in use during that time period (Table E1).[15] From this cohort, we also selected 3 distinct subgroups for analysis: open lobectomy, video-assisted thoracoscopic surgery (VATS) lobectomy, and pneumonectomy. Patients not at risk for readmission were excluded (ie, those who died during the index hospitalization or remained in-house 30 days postoperatively [1.5%]). Patients without readmission data also were excluded (9.4% overall; 9.6% open lobectomy; 8.8% VATS lobectomy; and 11.5% pneumonectomy).

Study Variables

The ACS NSQIP assesses patient readmission from the date of the index procedure to 30 days postoperatively. Because patients often are readmitted to facilities other than the hospital that performed the index surgery, surgical reviewers make every effort to record readmissions that occur in any hospital through the use of detailed chart review or direct contact with patients.[9] To be deemed as a readmission, patients must have an inpatient rehospitalization. Patients initially discharged to long-term acute care or skilled nursing facilities are considered eligible for readmission. Hospital readmission is categorized as planned or unplanned. Planned readmission was determined by data abstractors and defined as one that was predetermined, such as a planned subsequent procedure. We focused our analysis on patients with an unplanned readmission, defined as a postoperative event likely related to the index hospitalization, because it has been a focus for hospital quality performance.

The primary cause of readmission was assessed and entered by the surgical reviewer. This assessment was based on medical record review and possible discussion with the treating care team and has been validated as an accurate approach to collecting readmission information.[16] The causes for readmission were entered within the ACS NSQIP as an International Classification of Diseases, 9th edition (ICD-9) code or a standardized postoperative complication (ie, pneumonia). Informed by the Healthcare Cost and Utilization Project's Clinical Classifications Software, we grouped similar ICD-9 codes and reconciled these with ACS NSQIP complications.[17] This allowed us to report major causes of readmission after pulmonary resection (Table E2).

Statistical Analysis

We reported baseline information and readmission rates using descriptive statistics. Times to readmission were evaluated using medians with interquartile ranges (IQRs). Chi-square tests were used to compare the 3 subgroups' demographic and clinical characteristics, and the proportion of patients readmitted. Fisher exact tests were used when indicated to compare infrequent events.

For our multivariable analysis, we used a time-to-event approach to assess variables predictive of unplanned hospital readmission. This approach was used because the ACS NSQIP limits data collection to 30 days from the date of surgery, and postoperative lengths of stay differ.