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Thirty-day unplanned postoperative inpatient and emergency department visits following thoracotomy

Robyn Shaffer, BA,^a Leah Backhus, MD, MPH,^b Micaela A. Finnegan, BA,^a Austin C. Remington, BA,^a Jereen Z. Kwong, BA,^a Catherine Curtin, MD,^c and Tina Hernandez-Boussard, PhD, MPH, MS^{c,d,*}

^aStanford University School of Medicine, Stanford, California

^bDepartment of Cardiothoracic Surgery, Stanford University School of Medicine, Stanford, California

^cDepartment of Surgery, Palo Alto VA, Palo Alto, California

^dDepartment of Medicine, Stanford University School of Medicine, Stanford, California

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ABSTRACT

Background: Unplanned visits to the emergency department (ED) and inpatient setting are expensive and associated with poor outcomes in thoracic surgery. We assessed 30-d postoperative ED visits and inpatient readmissions following thoracotomy, a high morbidity procedure.

Materials and methods: We retrospectively analyzed inpatient and ED administrative data from California, Florida, and New York, 2010–2011. “Return to care” was defined as readmission to inpatient facility or ED within 30 d of discharge. Factors associated with return to care were analyzed via multivariable logistic regressions with a fixed effect for hospital variability.

Results: Of 30,154 thoracotomies, 6.3% were admitted to the ED and 10.2% to the inpatient setting within 30 d of discharge. Increased risk of inpatient readmission was associated with Medicare (odds ratio [OR] 1.30; $P < 0.001$) and Medicaid (OR 1.31; $P < 0.0001$) insurance status compared to private insurance and black race (OR 1.18; $P = 0.02$) compared to white race. Lung cancer diagnosis (OR 0.83; $P < 0.001$) and higher median income (OR 0.89; $P = 0.04$) were associated with decreased risk of inpatient readmission. Postoperative ED visits were associated with Medicare (OR 1.24; $P < 0.001$) and Medicaid insurance status (OR 1.59; $P < 0.001$) compared to private insurance and Hispanic race (OR 1.19; $P = 0.04$) compared to white race.

Conclusions: Following thoracotomy, postoperative ED visits and inpatient readmissions are common. Patients with public insurance were at high risk for readmission, while patients with underlying lung cancer diagnosis had a lower readmission risk. Emphasizing

Informed consent: This study was certified as exempted from Stanford IRB review for not obtaining or receiving individually identifiable private information on Feb 25, 2015, by the Stanford University Research Compliance Office.

* *Corresponding author.* Director, Surgical Health Services Research Unit, Associate Professor, Departments of Surgery, Medicine (Biomedical Informatics), and Biomedical Data Science, Stanford School of Medicine, 1070 Arastradero, #373, Stanford, CA 94305-5559. Tel./fax: +1 650 725 5507.

E-mail address: boussard@stanford.edu (T. Hernandez-Boussard).
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postoperative management in at-risk populations could improve health outcomes and reduce unplanned returns to care.

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Introduction

Hospital readmissions are expensive, associated with poor patient outcomes, and frequently attributed to decreased quality of care.^{1,2} As such, national initiatives from the Center for Medicare and Medicaid Services have targeted unplanned readmissions as a surrogate marker for health care quality.^{3,4} Under the Hospital Readmissions Reduction Program, hospitals are penalized if their 30-d readmissions performance is in excess of the national average for applicable medical diagnoses or surgical procedures. Hospital Readmissions Reduction Program recently expanded applicable surgeries to include cardiothoracic surgery, beginning with coronary artery bypass graft surgery in fiscal year 2017.⁵

Thoracotomy is associated with significant potential morbidity including higher rates of infection, pneumothorax, and postoperative pain leading to poor respiratory effort compared to other surgical approaches including minimally invasive thoracic surgical techniques.^{6–8} Most studies of postsurgical outcomes after thoracotomy have so far been limited to single procedure (e.g., lobectomy), single hospital, or focused on particular patient population, for example, lung cancer patients.

This descriptive study aims to answer several questions. First, we seek to define what proportion of patients undergoing open thoracotomy return to the emergency department (ED) or are readmitted to the inpatient setting within 30 d of discharge. Next, we seek to determine which diagnoses are associated with a postoperative ED visit or inpatient readmission (i.e., what is the reason for the return to care). Finally, how do patient factors—in particular, underlying lung cancer diagnosis—influence risks of returns to care following thoracotomy? A better understanding of patient factors and diagnoses associated with readmissions may help improve resource allocation to those more likely to have an unplanned return to care.

Materials and methods

Data set

Data for this retrospective cohort study came from two databases of the Healthcare Cost and Utilization Project (HCUP) of the Agency for Healthcare Research and Quality: the State Inpatient Database (SID) and the State Emergency Department Database. Index discharges were identified from the SID; the SID encompasses approximately 97% of all U.S. community hospital discharges in participating states.⁹ These data sets allowed the linkage of patients across health care encounters within a state. Discharge records were obtained for patients in California, Florida, and New York between 2010 and 2011. Our institution

determined this study was exempted from Institutional Review Board review.

Index cohort

We extracted 37,048 records for patients discharged with an International Classification of Diseases (ICD)-9-Clinical Modification primary procedure code of open thoracotomy (32.29, 32.30, 32.39, 32.41, 32.49, 32.59, 32.9, 33.28, 34.09, and 34.51). We included patients aged over 18 y with unique patient identifiers. We excluded 188 patients aged over 90 y.

We excluded 1317 patients who died during index visit and 760 patients who were admitted in the last quarter of 2011, and thus were not at-risk for a 30-d readmission. We further excluded 4629 patients discharged to a short-term hospital, skilled nursing facilities, or intermediate care facility due to the lack of information on their care or release from the facility. Our final analytic cohort consisted of 30,154 patients.

Outcome measures

Our primary outcome measure was “return to care.” This was defined as readmission to an inpatient facility (“inpatient readmission”) or a postoperative ED visit (“ED visit”) within 30 d of discharge. Readmitted patients were identified using unique person-level identifiers that track sequential visits within a state and across hospital settings. Visits to the ED that did not result in hospitalization were captured by the State Emergency Department Database, whereas patients who returned to the ED and were subsequently hospitalized were captured by the SID database as inpatient readmissions. For patients who were readmitted multiple times, only the first readmission was included.

Data were stratified by patient factors including payer and race. Primary expected payer categories “no charge,” “self-pay,” and “Other” were grouped together as “Other.” Race categories “Asian,” “Native American,” and “Other” were grouped together as “Other.” Further analysis metrics included comorbid conditions defined by Elixhauser *et al.*,¹⁰ patient location defined by an HCUP four category urban-rural designation (Metropolitan >1M, metropolitan <1M, micropolitan >10K and <50K, and rural residual), and patient median income defined by an HCUP quartile classification variable. Index surgical procedures were grouped into “Segmental Resection” (ICD-9 32.30, 32.39), “Lobectomy” (ICD-9 32.41, 32.49), “Pneumonectomy” (ICD-9 23.59), “Decortication (ICD-9 34.51), and Other (ICD-9 32.29, 32.29, 32.9, 33.28, 34.09).

Index lung cancer diagnosis was identified by the diagnosis categorization detailed in the HCUP Clinical Classification Software (CCS) with multilevel diagnostic code “2.3: cancer of bronchus; lung.”¹¹ Pre-existing chronic obstructive pulmonary disease diagnosis was identified by the HCUP CCS single-level

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