

Society of Black Academic Surgeons

# Racial disparity in in-hospital mortality after lobectomy for lung cancer



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## KEYWORDS:

Lung cancer;  
VATS;  
Racial disparity;  
Lobectomy;  
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Sample

## Abstract

**BACKGROUND:** Using data from the Nationwide Inpatient Sample, we investigated the impact of surgical approach and race on in-hospital mortality after lobectomy for lung cancer.

**METHODS:** Logistic regression was used to model odds ratios for in-hospital mortality related to surgical technique (thoracotomy vs video assisted thoracoscopic surgery [VATS]) and race using discharge data from the Nationwide Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality (2008 to 2011).

**RESULTS:** VATS lobectomies increased each year (25.9% to 39.2%,  $P = .001$ ) in the 19,353 patients identified. A racial disparity was noted, with black patients being 66% more likely to die in the hospital (odds ratio 1.66, 95% confidence interval 1.17 to 2.37,  $P = .005$ ). Excluding 2010 data suggests that there is evidence of benefit associated with VATS; however, no evidence of an association between race and in-hospital mortality exists.

**CONCLUSIONS:** This study elucidates race-related mortality in lobectomy patients. Although racial disparities are present throughout health care, this finding emphasizes one of the challenges in using large databases to assess such disparities.

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Pulmonary lobectomy is the standard of care for early-stage lung cancer. This procedure is most often achieved via either the thoracotomy or the less invasive video-

assisted thoracic surgery (VATS) approach. VATS is gaining favor and is well established as an approach for surgical resection in lung cancer patients. Many case series have demonstrated the feasibility of VATS lobectomy as a cancer operation and its use as an oncologic surgery is on the rise.<sup>1</sup> Data from well-designed studies have demonstrated that VATS lobectomy is associated with similar 5-year survival rates compared with open thoracotomy, and is associated with fewer complications and shorter length of stay.<sup>2-4</sup> Despite these advantages, the

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majority of lung resection in the United States is still performed via thoracotomy.

It is not clear that the advantages of VATS lobectomy are demonstrated universally across all patient populations. Disparities across races, geographic locations, and hospital sizes are well documented. Previous studies have demonstrated that, compared with white patients, black patients obtain surgery for lung cancer less often, are less likely to have surgery recommended, and are more likely to refuse surgery.<sup>5</sup> In addition, after having surgery, black patients have experienced higher mortality rates.<sup>6</sup>

In this study, we sought to evaluate the impact of race on the approach to resection for lung cancer and on in-hospital mortality after such resections. Using the Nationwide Inpatient Sample (NIS) Database,<sup>7</sup> discharge data were analyzed to investigate the relationships between race, surgical approach, and in-hospital mortality in patients receiving lobectomy for lung cancer in the United States.

## Patients and Methods

### Cohort selection

There were a total of 31,786,048 discharges captured in the NIS between the years 2008 and 2011. Of these 31.8 million discharges, 29,267 contained an International Classification of Diseases, Clinical Modification (ICD-9-CM) procedure code of 32.4x indicating that a lobectomy was performed. These 29,267 constitute our starting sample. We excluded 5,209 discharges, which did not list lung cancer (ICD-9 diagnosis 162.xx) as a primary or secondary diagnosis ( $n = 24,058$ ). We further excluded 240 discharges with a redo procedure (ICD-9 procedure code 34.03). We excluded 17 discharges listing both an open thoracotomy (32.4 or 32.49) and VATS (32.41) procedure and a further 18 for listing a length of stay of 0 days. We further excluded discharges with missing in-hospital mortality information and demographic characteristics, including race, hospital characteristics, population density, income, and insurance status. Thus, our working sample size is 19,353 lobectomies, of which 6,154 are VATS and 13,199 are open thoracotomies (Fig. 1). The NIS dataset includes discharge and hospital weights to extrapolate the observed discharges to a national scale. Using these discharge weights to extrapolate to the national level, our sample constitutes 95,411 lobectomies (30,305 VATS and 65,106 open thoracotomies).

### Statistical analyses

To correctly account for the underlying sampling design in the NIS data, the appropriate stratum, cluster, and sampling weight variables were used in all analyses. In addition, a “dummy” observation for each hospital in the full sample was included, following the methodology provided by the Agency for Healthcare Research and Quality (AHRQ).<sup>8</sup> Thus, the 19,353 discharge records correspond to an SAS dataset with 23,559 records

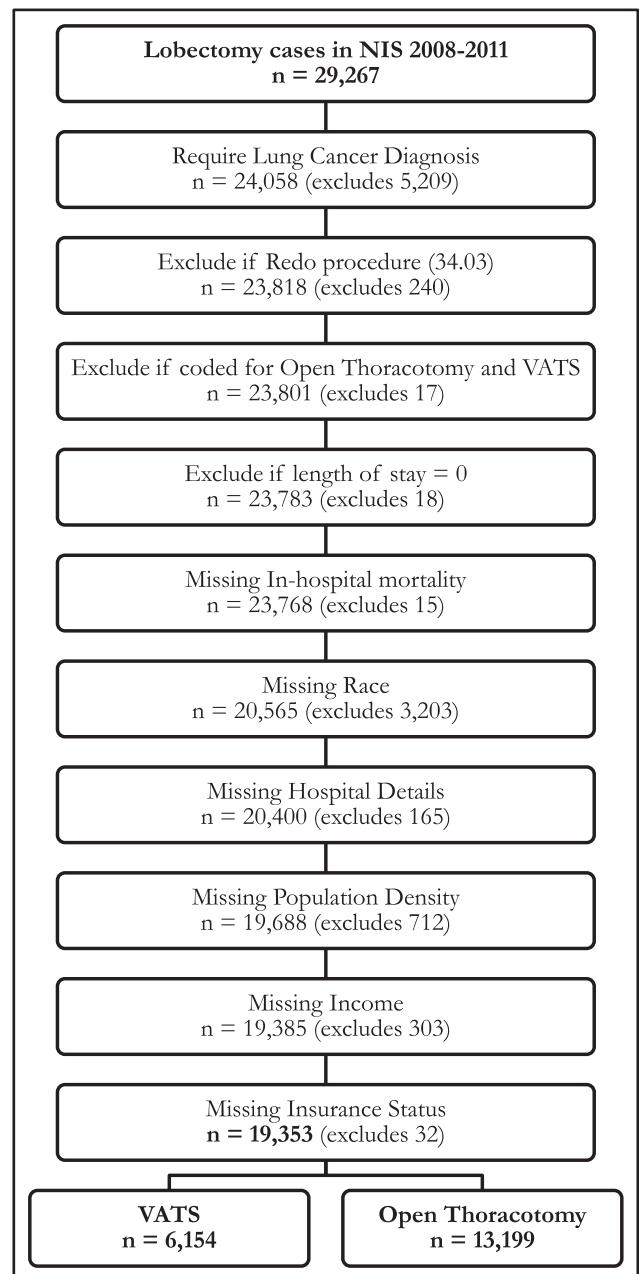


Figure 1 Cohort selection diagram.

(19,353 + 1,056 hospitals (2008) + 1,050 hospitals (2009) + 1,051 hospitals (2010) + 1,049 hospitals (2011)).

Baseline demographic, clinical, and regional differences among the lobectomy types were summarized with raw frequencies, weighted frequencies, and weighted percentages both overall and within procedure types (open thoracotomy or VATS). Differences in the distribution of these characteristics across procedure types were tested by Rao–Scott chi-square tests. Unadjusted comparisons of in-hospital mortality were also summarized by frequency and percentages, and differences in rates of in-hospital mortality were compared via Rao–Scott chi-square tests.

Multivariable logistic regression was used to model in-hospital mortality (yes/no) odds adjusted for the following characteristics: procedure type, discharge quarter, race

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