

The in-hospital mortality of patients undergoing pulmonary resection on cardiopulmonary bypass

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Step 1: Specify the measure you have implemented

The in-hospital mortality of patients undergoing pulmonary resection on cardiopulmonary bypass.

Step 2: Background to your organisation

The National Inpatient Sample (NIS), a large US national database sampling approximately 20% of all inpatient hospitalizations in the United States, was accessed to determine outcomes. The NIS contains data on more than 8 million hospital stays each year from approximately 1,000 non-governmental institutions and when weighted, the NIS estimates roughly 40 million hospitalizations. Data contained within the NIS include patient and hospital demographics, admission and treating diagnoses, inpatient procedures, in-hospital mortality, length of stay, hospital charges, as well as discharge status. The NIS can be used to determine national trends and estimates for various procedures and conditions.

Step 3: Record what is already known about this outcome measure

The morbidity and mortality of pulmonary resections performed on cardiopulmonary bypass are not well described as they are infrequently performed. Pulmonary resections such as lobectomy or pneumonectomy may require cardiopulmonary bypass either electively due to invasion of the heart or great vessels or when performed with a cardiac procedure. Alternatively, cardiopulmonary bypass may be required emergently as a salvage procedure due to injury to vascular structures. The outcomes of these procedures are described in a few single-institution series with short-term mortality reported to range from 0% to 21% (Muralidaran A et al, Darwazah AK et al, Kauffmann M et al). In order to have a baseline measure of outcomes after such complex resections, we wanted to determine the mortality and morbidity of these procedures at a national level as a basis for comparison.

Step 4: Numerator

234 patients died while in the hospital after undergoing a lobectomy or pneumonectomy while on cardiopulmonary bypass during this ten year study period (2001-2011). 58 patients died during a planned resection, 61 died while having a pulmonary resection and a planned cardiac procedure, and 115 died when requiring cardiopulmonary bypass due to a vascular injury.

Step 5: Denominator

843 patients underwent lobectomy or pneumonectomy on cardiopulmonary during the 10-year study period. 265 were done on planned bypass, 376 had resection and a cardiac procedures, and 202 had an intraoperative injury requiring intraoperative injury (de Biasi AR et al).

Step 6: Implementation of the outcome

As a tertiary care centre, we often see patients referred for complex pulmonary resections that require cardiopulmonary bypass. Our cardiothoracic surgical outcomes unit sought to determine outcomes after pulmonary resection requiring cardiopulmonary bypass at a national level to better inform patients as well as provide a baseline for comparison at our institution. We examined the NIS over a 10 year period (2001 to 2011) as the frequency of such surgeries is low. We identified all patients 18 years and older who underwent pulmonary lobectomy or pneumonectomy on cardiopulmonary bypass. Lung transplantations were excluded. Patients were then further divided depending on which setting cardiopulmonary bypass was used: planned CPB; concomitant on-pump cardiac procedure; or secondary to injury. The main advantage of this approach was that significant sample could be obtained to characterize what is rare occurrence i.e. requiring cardiopulmonary bypass for pulmonary resection. (de Biasi AR et al).

Step 7: Changes made to improve this outcome

We now can compare our historical and future institutional outcomes to a national estimate. We can further refine our estimate by comparing to outcomes from other known national US registries and databases, such as SEER-Medicare, Society of Thoracic Surgeons (STS), or American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) or pooled analyses from single institutional series. As the NIS uses administrative data, it has inherent limitations in the granularity of the data available.

Step 8: Implications of this outcome measure

National estimates of the in-hospital mortality of patients undergoing pulmonary resection on cardiopulmonary bypass is useful to patients, providers, as well as payers alike in order to better inform them of potential outcomes for what is a infrequent procedure.

Step 9: Related outcomes

This outcome measure is related to the following outcome measures: in-hospital mortality after lobectomy, pneumonectomy, and cardiac procedures requiring cardiopulmonary bypass.

Step 10: Ratings

Please rate 1-5 (1 being the lowest and 5 being the highest) for the following measures of your outcome:

Ease of implementation (1, 2, 3, 4, 5): **5**

Ease of data collection (1, 2, 3, 4, 5): **5**

Sustainability of outcome (1, 2, 3, 4, 5): **5**

Evidence base for outcome (1, 2, 3, 4, 5): **2**

Reliability of outcome (1, 2, 3, 4, 5): **2**

References:

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