Appendix 1 Statistical methods of sensitivity analysis 2: comparison of risk prediction of the SRC model and single risk factors:

The risk score calculated by the ACS NSQIP SRC model on the basis of patient and procedure characteristics for a specific outcome is intended to be the probability that this individual patient will experience the outcome multiplied by 100. Hence the logit of this probability, e.g., ln(P/(1-P)) represents the best approximation of the outcome conditional on the characteristics the model can provide. We challenged the model by adding variables to this "best" approximation and tested whether prediction improved. In more detail, we selected variables that differed between patients with and without outcome at significance level P<0.01 according to Fisher's exact test. We chose this low alpha to select only few variables. We added each of these variables one by one as covariates to a logistic model with ln(P/(1-P)) as only independent variable and outcome as dependent variable. We used the likelihood ratio test for nested models to test whether the added single risk factor significantly improved the model fit of the model with ln(P/(1-P)) alone.

Table S1 Thoracic procedures groups with associated Current Procedural Terminology (CPT) codes

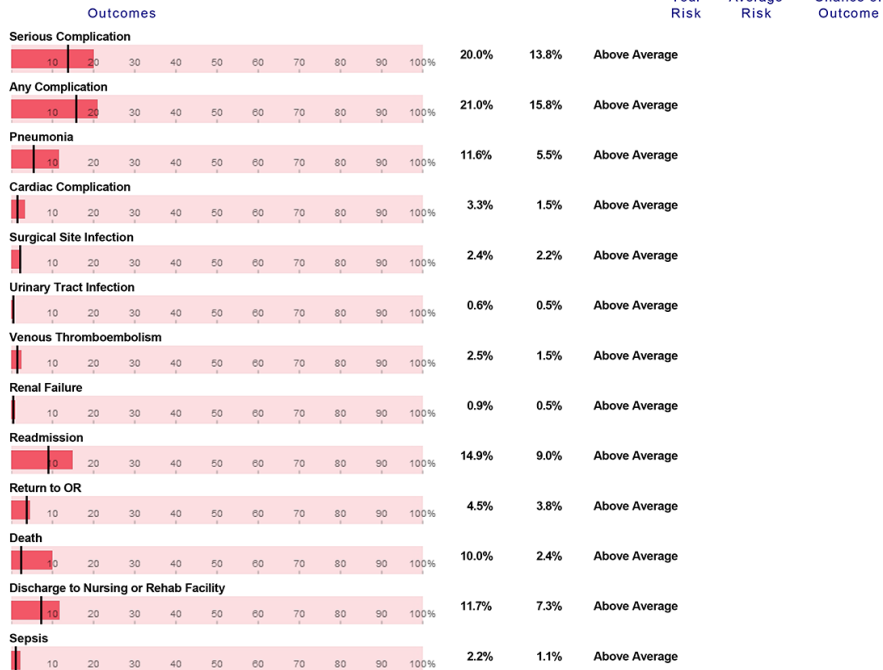| Thoracic procedure groups	CPT code
Lung resections performed by thoracotomy or VATS, which included wedge, segmentectomy, lobectomy, bilobectomy, sleeve resection, and pneumonectomy)	32096, 320967, 32140, 32141, 32215, 32440, 32480, 32482, 32484, 32486, 32503, 32505-32507, 32607/8, 32650, 32655, 32663, 32666-32672
Pleural Empyema - thoracotomy or VATS	32320, 32651-3, 32656
Chest-wall interventions - rib and sternal osteosynthesis, Nuss procedure, and chest-wall resection	19260, 20999, 21600, 21620, 21740, 21743, 21811, 21825, 24000, 32900
Other thoracic surgeries - diaphragm plication, primary intrathoracic hemorrhage, fiberotic pleural tumor, biopsy interventions such as mediastinoscopy or thoracoscopy, and mediastinal tumors of any kind, etc.	11008, 11011, 11012, 11042, 21501, 22010, 32150, 32654, 32999, 39545, 49419, 49422, 38746, 38724, 39400, 39000, 32609, 60270, 32662, 39220, 60521

VATS, video-assisted thoracic surgery.

Report Name: R. E. 11.09.1945
Procedure: 32097 - Thoracotomy, with diagnostic biopsy(ies) of lung nodule(s) or mass(es) (eg, wedge, incisional), unilateral
Risk Factors: 65-74 years, Male, ASA Severe systemic disease, Disseminated cancer, HTN, Dyspnea with moderate exertion, COPD

Note: Your Risk has been rounded to one decimal point.

Outcomes		Your Risk	Average Risk	Chance of Outcome
Serious Complication		20.0%	13.8%	Above Average
Any Complication		21.0%	15.8%	Above Average
Pneumonia		11.6%	5.5%	Above Average
Cardiac Complication		3.3%	1.5%	Above Average
Surgical Site Infection		2.4%	2.2%	Above Average
Urinary Tract Infection		0.6%	0.5%	Above Average
Venous Thromboembolism		2.5%	1.5%	Above Average
Renal Failure		0.9%	0.5%	Above Average
Readmission		14.9%	9.0%	Above Average
Return to OR		4.5%	3.8%	Above Average
Death		10.0%	2.4%	Above Average
Discharge to Nursing or Rehab Facility		11.7%	7.3%	Above Average
Sepsis		2.2%	1.1%	Above Average

Predicted Length of Hospital Stay: 6.5 days

How to Interpret the Graph Above:

Your Risk — Average Patient Risk — Your % Risk — X%

Disclaimer: The ACS Surgical Risk Calculator estimates the chance of an unfavorable outcome (such as a complication or death) after surgery. The risk is estimated based upon information the patient gives to the healthcare provider about prior health history. The estimates are calculated using data from a large number of patients who had a surgical procedure similar to the one the patient may have. Please note the risk percentages provided to you by the Surgical Risk Calculator are only estimates. The risk estimate only takes certain information into account. There may be other factors that are not included in the estimate which may increase or decrease the risk of a complication or death. These estimates are not a guarantee of results. A complication after surgery may happen even if the risk is low. This information is not intended to replace the advice of a doctor or healthcare provider about the diagnosis, treatment, or potential outcomes. ACS is not responsible for medical decisions that may be made based on the risk calculator estimates, since these estimates are provided for informational purposes. Patients should always consult their doctor or other health care provider before deciding on a treatment plan.

Definitions

Serious Complication includes important problems that occur after surgery including:
- Heart complication: Includes heart attack or sudden stopping of the heart
- Pneumonia: Infection in the lungs
- Kidney failure: Kidneys no longer function in making urine and/or clearing the blood of toxins
- Blood clot: Clot in the legs or lungs
- Return to the OR: The need to go back to the operating room due to a problem after the prior surgery
- Wound infection: An infection at or near the area where the surgery was performed
- Sepsis: Whole-body infection
- Intubation: The need to put the breathing tube back in after surgery to help breathing

Serious Complication (Continued):
- Urinary tract infection: Infection of the bladder and kidneys
- Wound disruption: Separation of the layers of a surgical wound

Any Complication also includes:
- Wound infection: An infection at or near the incision
- Extended time on the ventilator: Ventilator assistance for breathing longer than 48 hours
- Stroke: An interruption in blood flow to the brain

Discharge to Nursing or Rehab facility: Discharge to a facility other than home

Figure S1 ACS NSQIP risk calculator report. ACS NSQIP, American College of Surgeons National Surgical Quality Improvement Program.
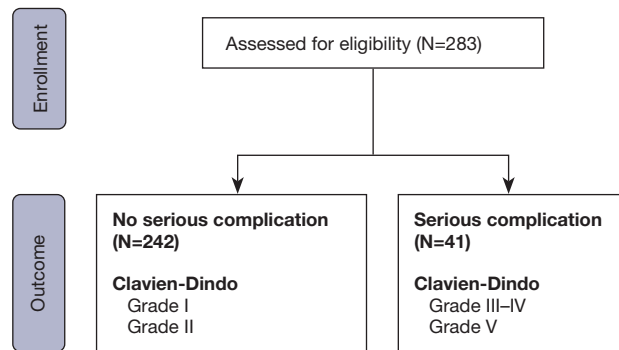
Figure S2 Flow diagram detailing the selection process for included patients.