

Postoperative Pulmonary Complications

Postoperative pulmonary complications develop in 5% to 10% of patients undergoing nonthoracic surgery and in 22% of high-risk patients. As many as one in four deaths occurring within a week of surgery are related to pulmonary complications, thus making it the second most common serious morbidity after cardiovascular adverse events.

Risk Factors:

Established risk factors for an increased risk for pulmonary complications include the following:

- History of cigarette use (current or >40 PY)
- ASA>2
- Age >70 years
- COPD
- Neck, thoracic, upper abdominal, aortic or neurologic surgery
- Prolonged procedure >2h
- Planned GA with endotracheal intubation
- Albumin <3g/dL
- BMI>30
- Exercise capacity <2 blocks or <1 flight of stairs

** NB: Asthma, ABG and PFT results are NOT on this list; ABG and PFT results are useful in predicting pulmonary function after lung resection surgery but are not predictive of postoperative pulmonary complications

Table 35-15 -- Preoperative Predictors of Postoperative Respiratory Failure

Variable	Odds Ratio (95% Confidence Interval)
Type of surgery	
Abdominal aortic aneurysm	14.3 (12.0-16.9)
Thoracic	8.14 (7.17-9.25)
Neurosurgery, upper abdominal, or peripheral vascular	4.21 (3.80-4.67)
Neck	3.10 (2.40-4.01)
Other surgery*	1.00 (reference)
Emergency surgery	3.12 (2.83-3.43)
Albumin <0.30 g/L	2.53 (2.28-2.80)
Blood urea nitrogen >0.30 mg/dL	2.29 (2.04-2.56)
Partially or fully dependent status	1.92 (1.74-2.11)
History of COPD	1.81 (1.66-1.98)
Age (yr)	
≥70	1.91 (1.71-2.13)
60-69	1.51 (1.36-1.69)
<60	1.00 (reference)

From Arozullah AM, Daley J, Henderson WG, et al: Multifactorial risk index for predicting postoperative respiratory failure in men after major noncardiac surgery. The National Veterans Administration Surgical Quality Improvement Program. *Ann Surg* 232:242-253, 2000, with permission.

COPD, chronic obstructive pulmonary disease.

* Other surgeries include ophthalmologic, ear, nose, mouth, lower abdominal, extremity, dermatologic, spine, and back surgery.

Table 35-14 -- Classification of Risk of Pulmonary Complications for Thoracic and Abdominal Procedures

Category	Points*
I. Expiratory spirogram	
A. Normal (% FVC + [% FEV ₁ /FVC] > 150)	0
B. % FVC + (% FEV ₁ /FVC) = 100-150	1
C. % FVC + (% FEV ₁ /FVC) < 100	2
D. Preoperative FVC > 20 mL/kg	3
E. Postbronchodilator FEV ₁ /FVC < 50%	3
II. Cardiovascular system	
A. Normal	0
B. Controlled hypertension, myocardial infarction without sequelae for more than 2 yr	0
C. Dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, dependent edema, congestive heart failure, angina	1
III. Nervous system	
A. Normal	0
B. Confusion, obtundation, agitation, spasticity, discoordination, bulbar malfunction	1
C. Significant muscular weakness	1
IV. Arterial blood gases	
A. Acceptable	0
B. PaCO ₂ >50 mm Hg or PaO ₂ <60 mm Hg on room air	1
C. Metabolic pH abnormality >7.50 or <7.30	1
V. Postoperative ambulation	
A. Expected ambulation (minimum, sitting at bedside) within 36 hr	0
B. Expected complete bed confinement for ≥36 hr	1

Modified from Wong DH, Weber EC, Schell MJ, et al: Factors associated with postoperative pulmonary complications in patients with severe COPD. *Anesth Analg* 80:276, 1995.

Table 35-16 -- Postoperative Pneumonia Risk Index

Preoperative Risk Factor	Point Value
Type of surgery	
Abdominal aortic aneurysm repair	15
Thoracic	14
Upper abdominal	10
Neck	8
Neurosurgery	8
Vascular	3
Age	
80 yr	17
70-79 yr	13
60-69 yr	9
50-59 yr	4
Functional status	
Totally dependent	10
Partially dependent	6
Weight loss >10% in past 6 mo	7
History of chronic obstructive pulmonary disease	5
General anesthesia	4
Impaired sensorium	4
History of cerebrovascular accident	4
Blood urea nitrogen level	
<2.86 mmol/L (0.8 mg/dL)	4
7.85-10.7 mmol/L (22-30 mg/dL)	2
≥10.7 mmol/L (≥30 mg/dL)	3
Transfusion >4 U	3
Emergency surgery	3
Steroid use for chronic condition	3
Current smoker within 1 yr	3
Alcohol intake >2 drinks/day in past 2 wk	2

From Arozullah AM, Khuri SF, Henderson WG, et al: Development and validation of a multifactorial risk index for predicting **postoperative** pneumonia after major noncardiac surgery. *Ann Intern Med* 135:847-857, 2001, with permission.