

# Preoperative assessment for thoracic surgery

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## Abstract

Preoperative assessment of thoracic surgical patients is a multidisciplinary process designed to offer appropriate surgical treatment with acceptable risk.

UK guidelines for pulmonary resection associated with malignant disease have reviewed available evidence concerning operative risk. Patients displaying cardiopulmonary physiological parameters above previously recommended threshold values remain classified as good risk. Less certainty exists about the utility of predicted postoperative pulmonary function values and preoperative performance status to confer unacceptable risk. Guidelines suggest a tri-partite risk assessment combining risks of operative mortality, perioperative adverse cardiac events and postoperative dyspnoea – to be discussed by the multidisciplinary team and with the patient.

**Keywords** BTS guidelines; enhanced recovery; preoperative assessment; thoracic surgery

**Royal College of Anaesthetists CPD matrix:** 2A03; 3G00

UK thoracic surgical outcomes are subject to rigorous audit. Latest annual mortality data – Society for Cardiothoracic Surgery in Great Britain & Ireland (SCTS) 2011–12<sup>1</sup> – reveal a further reduction in overall mortality to 1.4% in 27,000 procedures: pneumonectomy 5%, lobectomy 2%, pleural procedures (eg decortications) 1–3%.

The SCTS 2nd National Thoracic Surgical Report 2011<sup>2</sup> reveals 60% increase in lung cancer surgery with reduction in mortality from 3.8 to 2.1% for the decade to 2010.

The National Lung Cancer Audit (NLCA) 2013<sup>3</sup> examined care of 40,216 new lung cancer cases in 2012 (approx 70% were non-small cell lung cancers (NSCLC)). Recognizing that lung cancers present late, approximately 50% when curative treatment is not possible, NLCA observes England has low lung cancer survival and low use of surgical resection compared to some European countries – with data suggesting low surgical resection rates are strongly associated with overall mortality. NLCA reveals marked variations in lung cancer surgery rates across UK regions – highest overall at 15.2% in England & Wales (2008–11.5%). Resection rate for NSCLC was 21.9% (2008–14%) but with

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## Learning objectives

After reading this article, you should understand the:

- concept of global risk assessment in patients undergoing thoracic surgery
- principles of cardiovascular risk assessment and the approach to co-existing coronary artery or valve disease
- quantitative approaches to predicting post-operative lung function and the uncertainty of threshold values used to assess operability
- principles of the Enhanced Recovery Programme applied to thoracic surgery and anaesthesia

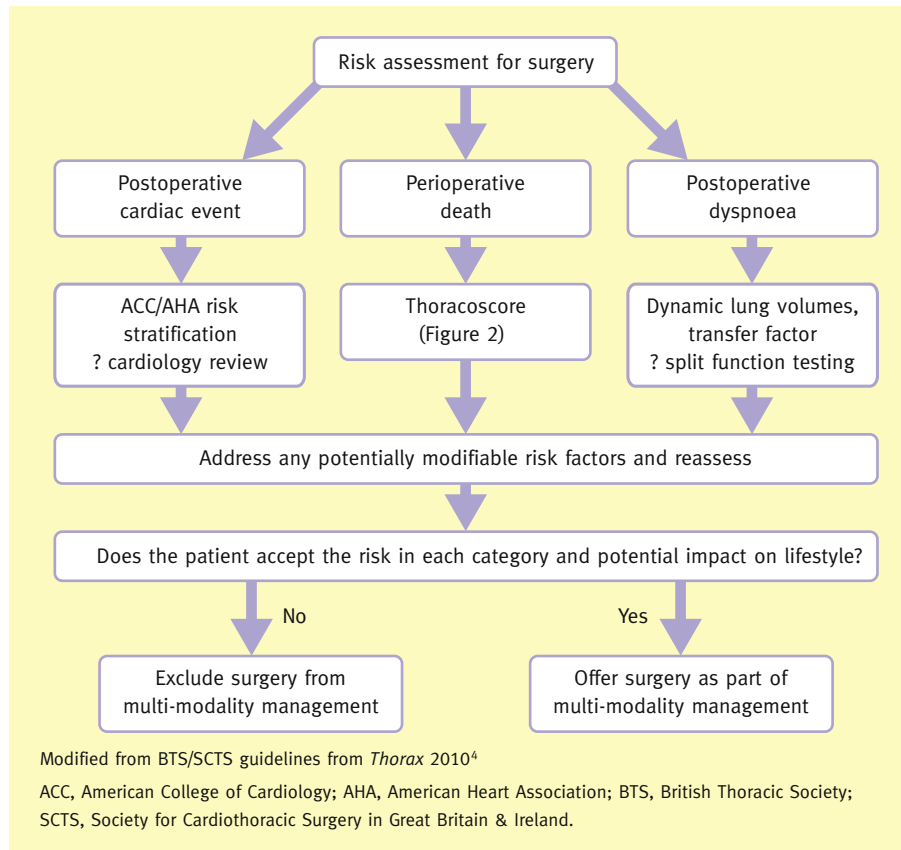
variation from 15 to 31% across networks. NLCA recommends trusts and networks with surgical resection rates below England & Wales average should review practice. In NSCLC Stage I–II, in which surgery offers the best chance of cure, NLCA recommends resection rates lower than 52% should be reviewed to ensure patients of borderline operability/resectability have access to specialist thoracic surgical expertise.<sup>3</sup>

The British Thoracic Society and SCTS published 2010 guidelines<sup>4</sup> on risk assessment for pulmonary resection for malignant disease (also relevant to surgery for non-malignant conditions). They suggest a tri-partite risk assessment combining risks of *operative mortality*, *peri-operative adverse events* and *post-operative dyspnoea* (Figure 1) – to be discussed by the multidisciplinary team and with the patient – and are less proscriptive than previous guidelines in considering ‘cut-off’ values for fitness for surgery indicators. Recent observational data suggest that applying thresholds as ‘cut-off’ values (e.g. postoperative predictive FEV<sub>1</sub> <40% or TLCO <40%) might overestimate respiratory dysfunction and deny surgery to patients with potential for acceptable outcomes. Patients exhibiting better than these previous cut-off threshold values are classified as low risk. The guidelines suggest that patients at moderate/high risk of postoperative dyspnoea might be offered surgery if they understand and accept the risks of dyspnoea and other complications, particularly in malignant disease in which surgery provides potential cure for early stage disease.

Patients presenting for thoracic surgery often have concomitant cardiac disease and smoking related conditions. The anaesthetist should ensure medical therapy is optimized. Any history of previous airway or anaesthetic difficulties (may influence the choice of lung isolation techniques) or recent intercurrent illness should be elicited.

## Risk of operative mortality

The 2010 guidelines<sup>4</sup> recommend using a global risk score to predict operative mortality, suggesting that of those available, the Thoracoscore, developed in France from more than 15,000 patients,<sup>5</sup> is currently the most discriminating. This logistic regression-derived model combines the odds-ratios of nine variables to allow a quantitative mortality risk assessment. Variables examined independently are not discriminatory – so features such as advanced age that score highly should not preclude surgery if considered in isolation. Other values that score highly are male, American Society of Anaesthesiologists (ASA) score



**Figure 1** Tri-partite risk assessment. Reproduced from *Thorax*, Lim E et al., volume 65, Supplement III, iii1–iii27, 2010 with permission from BMJ Publishing Group Ltd.

greater than 3, performance score more than 3, dyspnoea score more than 3, urgent/emergency surgery, pneumonectomy, malignant condition, and co-morbidity greater than 1. Thoracscore predicts mortality from below 1% to higher than 60% for worst score. Global risk scoring is now recommended when assessing and consenting patients for lung cancer surgery.

### Enhanced Recovery Programme (ERP)

Despite the 60% increase in UK thoracic surgical activity in the last decade<sup>2</sup> the NCLA<sup>3</sup> suggests a further substantial increase is required to reduce regional variation and ensure access to specialist expertise. There is a pressing need to increase treatment capacity and surgical throughput. One solution is to shorten the length of hospital stay – the cornerstone of enhanced recovery. The evidence base supporting elements of a proposed ERP in thoracic surgery have been reviewed<sup>6</sup> and numerous UK centres have recently introduced Thoracic ERP – although success of the programmes has yet to be confirmed.

Pre-optimization should begin as long before surgery as is practically possible and should address common issues such as: anaemia; cessation of smoking; control of co-morbid conditions and preoperative physiotherapy in selected patients.

At the preoperative visit, detailed assessment of co-morbidity, clinical condition and all applicable preoperative investigations should be undertaken by a suitably qualified anaesthetist with a view to facilitating day-of-surgery admission – when the patient should present appropriately starved (6 hours for solid food,

2 hours for clear fluids – some centres advocate administration of carbohydrate drink 2 hours preoperatively) and ‘surgery ready’. Standard, appropriate, intraoperative care is practised, with special attention to effective perioperative analgesia, early mobilization and physiotherapy. There is also a move towards early inter-costal chest drain removal, which would otherwise preclude a reduction in length of stay. If patients are pre-optimized; fasting time minimized; thromboembolism prevented; good analgesia provided and early mobilization and chest drain removal achieved, patients should leave hospital earlier – and capacity increased without compromising patient care.

### Cardiovascular risk assessment

Assessment is based on American College of Cardiology/American Heart Association (ACC/AHA) 2007 guidelines on perioperative cardiovascular evaluation for non-cardiac surgery.<sup>7</sup> Cardiac history with functional status, physical examination and ECG must be performed in all patients and active cardiac conditions identified. Patients with cardiac murmur or unexpected dyspnoea should undergo at least transthoracic echocardiography. In patients without active cardiac conditions, a revised cardiac index<sup>8</sup> may be applied (Table 1). Patients with good cardiac functional capacity and two or fewer risk factors may proceed to surgery without further cardiac assessment. Patients with poor cardiac functional capacity or  $\geq 3$  risk factors or with severe active cardiac conditions (Table 2) require further cardiology investigation and review. The ACC/AHA guidelines

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