

# Enhanced Recovery after Thoracic Surgery

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Enhanced recovery after surgery (ERAS) protocols place an emphasis on the quality of a patient's recovery with the aim of improving postoperative outcomes. The focus is on the entire patient pathway. Evidence-based interventions are promoted while dogmatic practices, and specifically perioperative care elements that are unnecessary or delay recovery, are eliminated. The subsequent blunting of the harmful stress response to surgery reduces complications and hastens a return to normal function. Reduced costs and length of stay are by-products of this process. ERAS protocols also aim to remove variation and standardise practice, creating person-independent systems of care.

The thoracic surgery unit at Bristol Royal Infirmary was one of the first in the world to develop and integrate ERAS into its patient pathway. Two of the consultants went on to form part of the core authorship group for the international ERAS Society guidelines for perioperative care in lung surgery, along with Babu Naidu from Birmingham and Olle Ljungqvist from Oresbro in Sweden.

Bristol's success was possible due to the earlier development of an integrated Preoperative Department. Unknowingly, some key elements of ERAS were already in place. The ERAS pathway can be divided into 4 phases (Preoperative, Admission, Intraoperative and Postoperative), and the first 2 of these phases were already well-embedded at the time of the formal launch of ERAS in thoracic surgery in 2010.

Development of an ERAS pathway requires a multi-disciplinary team, improved communication, patient empowerment and the flattening of any hierarchies. There also needs to be acknowledgement that the perioperative care of a patient can be as important as the operation itself. Below is a summary of the pathway.

## **PREOPERATIVE PHASE**

1. Preadmission information, education and counselling to manage patient expectations. Education also reduces anxiety, pain and nausea.
2. Perioperative nutrition:
  - Patients are screened preoperatively for nutritional status and weight loss
  - Oral nutritional supplements are given to malnourished patients
3. Smoking should be stopped at least 4 weeks before surgery
4. Alcohol consumption (in alcohol abusers) should be avoided for at least four weeks before surgery
5. Anaemia is identified, investigated, and corrected preoperatively with IV iron
6. Prehabilitation is considered for patients with borderline lung function or exercise capacity, based on clinical assessment and/or a cardiopulmonary exercise test

## ADMISSION PHASE

1. Patients are admitted at 7.15am on the day of surgery to a dedicated preoperative admissions unit
2. Preoperative fasting:
  - Clear fluids are allowed until 2 hours (and solids until 6 hours) before induction of anaesthesia
  - Oral carbohydrate loading (400ml of a commercially available complex carbohydrate drink) is taken at home at 6am. If surgery is not until later in the day, it is re-administered 2 hours prior to induction of anaesthesia
3. No routine administration of pre-anaesthetic medications/sedatives to reduce anxiety is necessary

## INTRAOPERATIVE PHASE

1. Venous thromboembolism (VTE) prophylaxis:
  - Mechanical (compression stockings and surgical compression devices)
  - Pharmacological (subcutaneous low molecular weight heparin started 6 hours after surgery)
2. Routine IV antibiotics given within 60 minutes of, but prior to, the skin incision
3. Skin preparation:
  - Hair clipping if hair removal is required
  - Chlorhexidine-alcohol rather than povidone-iodine solution
4. Preventing intraoperative hypothermia:
  - Maintenance of normothermia with convective active warming devices
  - Continuous measurement of core temperature for efficacy and compliance
5. Standard anaesthetic protocol:
  - Lung protective strategies during one-lung ventilation
  - Combination of regional and general anaesthetic techniques
  - Short-acting volatile or IV anaesthetics (equivalent choices)
6. Postoperative nausea and vomiting (PONV) control
  - Non-pharmacological measures for all patients (*e.g.* carbohydrate loading, avoidance of fasting and dehydration, avoidance of opioids)
  - Multimodal pharmacological approach for patients at moderate or high risk using at least 2 different drug classes (*e.g.* Dexamethasone + Ondansetron + one other)
7. Regional anaesthesia and pain relief:
  - Aim to avoid or reduce opioid use
  - Paravertebral blockade and/or intercostal blocks with Bupivacaine
  - No routine epidural anaesthesia to avoid its deleterious side effects
  - Combination of regular Paracetamol and NSAIDs for all patients (unless contraindications exist)
  - Ketamine can be considered for patients with pre-existing chronic pain
  - Dexamethasone to prevent PONV and reduce pain

8. Perioperative fluid management
  - Aim for euvolaemia (very restrictive or liberal fluid regimes should be avoided)
  - Balanced crystalloids are the IV fluid of choice
  - IV fluids discontinued in recovery and replaced by oral fluids and diet
9. Atrial fibrillation prevention
  - Patients taking  $\beta$ -blockers preoperatively should continue them into the postoperative period
  - IV magnesium supplementation for all patients (although evidence for AF prevention is only seen in magnesium-deplete patients)
10. Surgical technique:
  - VATS approach for the majority of patients (including 80% of lung cancer operations)
  - If a thoracotomy is required, a muscle-sparing technique is performed, also sparing the intercostal muscle and nerve

## POSTOPERATIVE PHASE

1. Chest drain management:
  - No routine suction (drains usually set at -0.8kPa)
  - Digital drainage systems to reduce variability in decision-making
  - Chest drains removed even if the daily serous fluid output is high volume (up to 450 ml/24 hours)
  - Single drain for almost all cases
  - Drain removed in recovery for straightforward cases (*e.g.* wedge resection, lung biopsy, thymectomy) to promote 24-hour discharge
2. No urinary catheter unless eGFR <45
3. Patients should be mobilised on the day of surgery if possible
4. Patients aim to mobilise 10 times/day from day 1 to prevent deconditioning, pulmonary complications and VTE
5. Prophylactic minitracheostomy in high-risk patients (*e.g.* current smokers) along with “lung protection package” of nebulisers, Carbocisteine and aggressive mobilisation
6. Regular combination of aperients to prevent opioid-induced constipation
7. Nurse-led telephone follow up several days after discharge to assure patients, assess for issues arising, and either prevent or facilitate readmission as required

## Links

Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, Brunelli A, Cerfolio RJ, Gonzalez M, Ljungqvist O, Petersen RH, Popescu WM, Slinger PD, Naidu B. Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS). *Eur J Cardiothorac Surg.* 2019;55(1):91-115. [Link](#)

[ERAS Society](#)