

Systematic review of the influence of enhanced recovery pathways in elective lung resection

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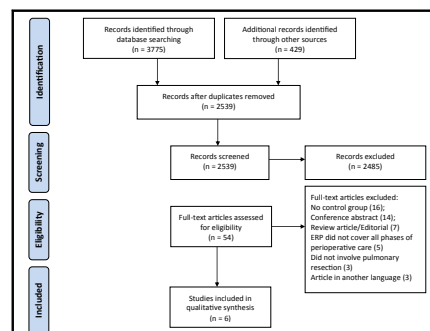
ABSTRACT

Objective: Enhanced-recovery pathways aim to accelerate postoperative recovery and facilitate early hospital discharge. The aim of this systematic review was to summarize the evidence regarding the influence of this intervention in patients undergoing lung resection.

Methods: The review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement. Eight bibliographic databases (Medline, Embase, BIOSIS, CINAHL, Web of Science, Scopus, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials) were searched for studies comparing postoperative outcomes in adult patients treated within an enhanced-recovery pathway or traditional care. Risk of bias was assessed using the Cochrane Collaboration risk of bias tool.

Results: Six studies fulfilled our selection criteria (1 randomized and 5 nonrandomized studies). All the nonrandomized studies reported shorter length of stay in the intervention group (difference, 1.2-9.1 days), but the randomized study reported no differences. There were no differences between groups in readmissions, overall complications, and mortality rates. Two nonrandomized studies reported reduction in hospital costs in the intervention group. Risk of bias favoring enhanced recovery pathways was high.

Conclusions: A small number of low-quality comparative studies have evaluated the influence of enhanced-recovery pathways in patients undergoing lung resection. Some studies suggest that this intervention may reduce length of stay and hospital costs, but they should be interpreted in light of several methodologic limitations. This review highlights the need for well-designed trials to provide conclusive evidence about the role of enhanced-recovery pathways in this patient population. (*J Thorac Cardiovasc Surg* 2016;151:708-15)



Six studies compared enhanced recovery pathways versus usual care in lung resection.

Central Message

There is no conclusive evidence about the role of ERPs in lung resection.

Perspective

A small number of low-quality comparative studies evaluated the influence of ERPs in patients undergoing lung resection. Some studies suggest that ERPs may reduce primary LOS and hospitalization costs, but risk of bias favoring the intervention was high. This review highlights the need for well-designed trials to provide conclusive evidence about the role of ERPs in lung resection.

See Editorial Commentary page 715.

See Editorials page 626 and 629.

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Postoperative morbidity is still common after lung resection despite advances in surgical and anesthetic techniques. Complications occur at a rate of 30% to 40%^{1,2} and often impair postoperative recovery, resulting in increased

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Abbreviations and Acronyms

ERP	= enhanced recovery pathway
LOS	= length of stay
PRO	= patient-reported outcome
RCT	= randomized controlled trial
SF-36	= Short Form 36
VATS	= video-assisted thoracic surgery

hospital length of stay (LOS),³ delayed return to regular activities, and poor postoperative quality of life.⁴ Prolonged postoperative recovery also increases health care costs, imposing a significant economic burden.⁵ Therefore, improving recovery is not only desirable for patients and clinicians, but also leads to more efficient use of health care resources.

In recent years, there has been increased interest in the use of multimodal care plans to hasten postoperative recovery, reduce morbidity, and facilitate early hospital discharge. This concept of care is often referred to as fast track, enhanced recovery after surgery, or enhanced recovery pathway (ERP).⁶ ERPs combine multiple care elements encompassing all phases of care: preoperative (eg, counseling and nutrition), intraoperative (eg, normothermia and epidural anesthesia), and postoperative (eg, early mobilization and early feeding).⁶ These care elements may have modest benefits when used alone, but are believed to have a synergistic effect to attenuate surgical stress and postoperative organ dysfunction, thereby facilitating recovery.⁶ Most of the evidence regarding the benefits of ERPs is derived from the colorectal surgery literature, where several meta-analyses reported a significant reduction in LOS and risk of complications without increasing readmission rates.⁷ Evidence also supports the cost-effectiveness of ERPs in this population.⁵ Although research in other surgical specialties is still limited, emerging evidence suggests similar benefits.^{7,8}

Although the use of care pathways in lung resection was introduced more than 15 years ago,⁹ evidence in this field is provided largely by case-series reports.¹⁰⁻¹² These reports show excellent results in favor of ERPs, but the absence of a control group raises questions about the degree to which improved outcomes can be attributed to the intervention as opposed to other factors such as differential selection of patients (ie, selection bias), lack of blinded outcome assessors (ie, detection bias), or changes in other aspects of patient care (ie, performance bias). The influence of ERPs on postoperative outcomes after lung resection has not been extensively studied in comparative studies involving a control group receiving traditional care. In our systematic review, we aimed to summarize and assess the quality of the evidence regarding the effects of ERPs in comparison to traditional care in adult patients undergoing lung resection.

METHODS

This systematic review was conducted according to the Preferred Reporting Items For Systematic Reviews and Meta-Analyses Statement guidelines¹³ and aimed to respond to the following research question: To what extent do ERPs influence postoperative outcomes after lung resection in comparison to traditional care? The review protocol was registered with the PROSPERO international prospective register of systematic reviews (CRD42013003789).

Search Strategy

Eight bibliography databases (Medline, Embase, BIOSIS, CINAHL, Web of Science, Scopus, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials) were searched by a medical librarian (TL) from their date of establishment until June 2014. Text words and relevant indexing were used to capture the concepts of lung resection procedures (eg, lung/pulmonary resection and lobectomy) and ERPs (eg, enhanced recovery and fast track). The complete search strategies used in each database are described in [Appendix E1](#). The reference lists of included studies and the Web sites Turning Research Into Practice (<http://www.tripdatabase.com/>) and International Network of Agencies for Health Technology Assessment (<http://www.inahta.net/>) were searched for additional relevant articles. To avoid publication bias, we searched ClinicalTrials.gov for unpublished studies. The Medline search was rerun before submission (May 21, 2015) and no additional relevant studies were found.

Inclusion and Exclusion Criteria

Studies were included if they involved adult patients undergoing elective lung resection (ie, wedge resection, lobectomy, or pneumonectomy), involved patients managed using an ERP, involved a control group receiving traditional care, reported at least 1 of the outcome measures of interest (see below), and were published in English or French. For the purpose of this review, we considered that patients were managed using an ERP if the authors documented the use of a bundle of at least 4 interventions aimed to enhance recovery, covering all phases of perioperative care (pre-, intra-, and postoperative). Because there are no standardized criteria to define what constitutes an ERP, this definition was based on previous reviews on ERPs in other surgical specialties.¹⁴ Studies were excluded if the care elements included in the ERP were not described, the ERP included fewer than 4 care elements, or the ERP did not cover all phases of perioperative care.

Outcome Measures

The main outcome of interest was primary LOS (ie, time from surgery until first discharge). Other outcomes of interest were postoperative complications, readmissions, mortality rates, and patient-reported outcomes (PROs) (ie, measures of health status collected directly from patients). Data on costs, total LOS (primary LOS plus LOS during readmission), time to functional recovery (eg, readiness for hospital discharge), and adherence to the protocol were also analyzed if available.

Study Selection and Data Extraction

Two investigators (JF, PN) independently screened the articles identified by the search. Articles that were clearly irrelevant were excluded after examination of titles and abstracts. Full-text versions of the articles potentially suitable for inclusion were retrieved and evaluated against the selection criteria. Disagreements regarding eligibility were resolved by consulting a third investigator (LSF).

Data were extracted independently by 2 investigators (JB, KC) and cross-checked. In addition to the outcome measures of interest, the following variables were obtained from the selected articles: study design, number of participants, age, gender, American Society of Anesthesiologists grade, body mass index, forced expiratory volume in 1 second, preoperative diagnosis, surgical approach (eg, video-assisted thoracic surgery [VATS] and thoracotomy), extent of resection, duration of follow-up and specific ERP elements included in the ERP.

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