

What is the role of post-operative physiotherapy in general surgical Enhanced Recovery after Surgery pathways?

Abstract

Purpose

Enhanced Recovery after Surgery (ERAS[®]) has improved outcomes following elective surgery. This narrative review aimed to assess current evidence for post-operative physiotherapy interventions in general surgical procedures which adopt ERAS[®] principles.

Materials and Methods

A systematic review of the literature between 2000 and 2017 was conducted. Randomised controlled trials (RCTs) that compared physiotherapy interventions for patients after the following elective ERAS[®] procedures were included: gynaecologic, gastrectomy, gastrointestinal, pancreatic, bariatric, head and neck, breast, cystectomy, colorectal, colonic and liver.

Results

One study (two publications) was found to compare post-operative physiotherapy interventions in radical cystectomy patients on an ERAS[®] pathway. The addition of a progressive exercise-based intervention improved aspects of health-related quality of life (dyspnea ($p < 0.05$), constipation ($p < 0.02$) and abdominal flatulence ($p \leq 0.05$)). Enhanced mobilisation was achieved, but no differences were observed in length of stay or severity of complications.

Conclusions

It is essential that the paucity of research to assess post-operative physiotherapy interventions within ERAS[®] cohorts is highlighted. The results of our literature search

highlight that there is a role for post-operative physiotherapy in ERAS[®] pathways. However, without well-conducted RCTs to evaluate procedure-specific interventions, the optimal type, timing, and dose will not be found and the potential for improving patient functional recovery will be limited.

Keywords: ERAS, Rehabilitation, Evidence based physiotherapy/medicine, Education, Recovery, Patient outcomes.

Introduction

Enhanced Recovery after Surgery (ERAS[®]) is a multimodal, multidisciplinary approach towards patient care that was originally applied to colorectal surgery and is now well established across a variety of surgical sub-specialities [1]. This paradigm shift in perioperative care has led to improvements in clinical outcomes and provided cost savings for the healthcare service [2]. There is evidence to support the efficiency of ERAS[®] pathways in comparison to traditional care [3-5], and the potential for reducing length of stay with no increase to post-operative complications or re-admission rates [6,7]. ERAS[®] has steered a change in traditional best-practice and organisational improvement and each profession within the surgical team has reconsidered their roles and interventions. Advances such as the move to minimally invasive surgical approaches, regional anaesthetic techniques, multi-modal opioid sparing analgesia and early feeding and nutrition have contributed to improved patient care.

Physiotherapy plays an important role within the surgical journey by encouraging early ambulation and promoting the return to function for patients. It plays an important part of the prophylaxis of respiratory complications [8] and thromboprophylaxis [9] within ERAS[®] pathways. Despite this, evidence for post-operative physiotherapy is largely limited to studies on early mobilisation and prehabilitation. Debate remains regarding the clinical and economic benefit of other post-operative physiotherapy interventions (such as strengthening exercises) for accelerating achievement of discharge criteria and return to function in general surgical procedures. This evidence is better established within cohorts of orthopaedic patients, with studies supporting the use of early mobilisation [10], progressive strength training [11], and higher intensity rehabilitation programmes [12] following total hip or knee replacement.

The future focus of ERAS[®] pathways is not only to accelerate the achievement of discharge criteria, but to also consider how a patient can return to normal function and physical activity

quicker following general surgery. Therefore, it is important to consider which modalities of physiotherapy and rehabilitation can be effective within the post-operative stage (during hospital admission and after discharge) of ERAS[®] pathways. Within this study, we aim to evaluate the current evidence and scope for post-operative physiotherapy in cohorts of general surgical ERAS[®] patients.

Methodology

A systematic approach was taken to review all available literature on post-operative physiotherapy interventions within cohorts of general surgical ERAS[®] patients. Orthopaedic studies were not included due to the specific nature of procedures and already published literature in this area. Studies that assessed prehabilitation were not included as we aimed to assess post-operative physiotherapy interventions only. The surgeries that were included in the search were: gynaecologic, gastrectomy, gastrointestinal, pancreatic, bariatric, head and neck, breast, cystectomy, colorectal, colonic, and liver [13-23].

Search Strategy

A computer-based search was completed in September 2017, and the electronic databases sourced included: PubMed, Cochrane Library, CINAHL Complete and Medline Complete. The search reviewed all available peer-reviewed abstracts, published in English language (or those where a translation was available), since 2000. The search date was chosen to reflect the time period when ERAS[®] was first implemented into hospitals. Studies were only included in the synthesis where full-text details were available from either the original publication or the corresponding author. As we aimed to compare an intervention group to standard care, only randomised controlled trials (RCTs) were selected for analysis, as they offer the gold standard methodology for a clinical trial [24]. Studies were excluded if they were not completed within a cohort of ERAS[®] or “fast-track” patients, defined as anyone receiving treatment that follows guidelines from the ERAS[®] Society, which was stated within the methodology of the paper.

The search strategy was repeated for each surgery, using procedure specific terminology for each search, which is listed within table 1. Once records were identified through database searching, duplicates were removed and then assessed for eligibility by two independent reviewers (LB and TW). TW is internationally recognised for his work on ERAS[®] pathways and has published widely in this area. LB's background is within exercise science and currently holds a research assistant position focused on ERAS[®] research.

<<<<INSERT TABLE 1 HERE>>>>

<<<INSERT FIGURE 1 HERE>>>

Results

The search found one study (two publications) that compared standard ERAS[®] care to ERAS[®] care with the addition of an exercise-based intervention [25] (table 2). The search did not reveal any relevant RCTs which had compared post-operative physiotherapy interventions following gynaecologic, gastrointestinal, gastrectomy, pancreatic, bariatric, colorectal, colon, liver, head or neck or breast surgery within ERAS[®] cohorts. The search strategy generated studies within these cohorts of patients however the outcomes of the studies focused on early mobilisation [26], prehabilitation [27], intraoperative techniques [28], the feasibility of ERAS[®] within elderly cohorts [29] and the outcomes between conventional care and ERAS[®] pathways [30,31].

<<<INSERT TABLE 2 HERE>>>

A prospective RCT completed by Jensen and colleagues [25] was the only study to compare standard fast-track surgery ($n=57$) to fast-track surgery with the addition of an exercise-based intervention ($n=50$), following radical cystectomy. The post-operative intervention included early mobilisation, set goals for mobilisation and walking, an exercise-based intervention, physical therapy twice a day for the first 7 post-operative days, followed by a

standardised supervised progressive muscle strength and endurance training programme. The progressive exercise programme was performed for 2 x 30 minute sessions a day, supervised by a specialist physiotherapist and was documented by patients in diaries. The authors found that post-operative mobilisation was significantly improved by walking distance ($p \leq 0.001$), and the ability to perform functional activities was improved by one day ($p \leq 0.05$). The median length of stay was 8 days in both groups ($p = 0.68$) and there were no significant differences between treatment groups in severity of complications.

The search also found a secondary analysis by the same authors on their previously completed RCT [32]. The authors aimed to determine the impact of a multidisciplinary rehabilitation programme on health-related quality of life (HRQoL) following radical cystectomy. They found no overall impact on global HRQoL but significant and positive impacts of HRQoL aspects related to bowel management and respiratory function (improvement to dyspnea ($p < 0.05$), constipation ($p < 0.02$) and abdominal flatulence ($p \leq 0.05$) scores), highlighting the benefits of multimodal rehabilitation, including physical exercises in fast-track radical cystectomy. In contrast, the standard care group reported reduced symptoms in sleeping patterns ($p \leq 0.04$) and clinically relevant differences in fatigue, body function and role function.

Discussion

ERAS[®] pathways have been adopted within the United Kingdom for a variety of surgical procedures, and physiotherapists are nearly always involved in the post-operative phase of recovery. They facilitate early mobilisation, but prior to this review it has not been clear if any other physiotherapy interventions had been looked at within ERAS[®] cohorts. This review highlights the paucity of evidence for post-operative rehabilitation interventions in ERAS[®] specific cohorts. As the focus of ERAS[®] moves from simply accelerating achievement of discharge criteria, to accelerating achievement of functional recovery post-discharge, it seems essential that we understand which traditional post-operative physiotherapy

interventions are successful or less effective. For example, now that patients can be mobilised on the day of surgery [33], are traditional physiotherapy interventions such as deep breathing exercises and circulation exercises routinely required?

Our search accentuates and exposes the urgent need for physiotherapy specific research in ERAS[®] cohorts. The aim of this narrative review is to stimulate enquiry in this area by highlighting the lack of research, as whilst other professions move forward and develop practice in ERAS[®], physiotherapy implementation has remained unchanged. ERAS[®] is evidence-based, however the transition into clinical care can be lacking. Therefore, additional interdisciplinary involvement, education and regular re-evaluation are required to ensure that major improvements in quality patient care, outcomes and economic benefits occur.

The results of our literature search highlight that there is a role for post-operative physiotherapy in ERAS[®] pathways, however results of outcome measures are varied [25, 32]. The authors highlight that the intervention may not have impacted length of stay due to the already well implemented fast-track pathway within the hospital department. They also consider that some components of the intervention may have been incorporated into standard practice, such as enhanced mobilisation. Additionally, both treatment groups were on the same ward, and patients may have encouraged each other with different rehabilitation techniques.

It is not surprising that evidence for post-operative physiotherapy from across surgical specialities in non-ERAS[®] cohorts is better-established [34-36], and whilst this evidence is valid, it does not consider all of the ERAS[®] intraoperative procedures that are implemented to reduce surgical stress response and allow early mobilisation. The ability to mobilise patients early is markedly different than historical care and non-ERAS[®] cohorts. Therefore, we cannot be sure that the same physiotherapy interventions will be effective or required for both cohorts, as there will be physical and logistical differences between patients. An aim of

ERAS[®] is to reduce the surgical stress response for the patient and most studies do not consider the multimodal approach (including regional anaesthesia, minimally invasive surgical techniques, early feeding and multi-modal opioid sparing analgesia) that may impact post-operative outcomes.

Future Implications

ERAS[®] programmes strive to be patient centred, with interdisciplinary collaboration accountable for improved outcomes, and this ethos must remain present within the post-operative recovery period. Perhaps capturing feedback from patients about their rehabilitation experience could prompt a change in clinical practice. The use of patient and public involvement (PPI) to inform rehabilitation needs along with examining data on Patient Reported Outcome Measures (PROMs) and Patient Reported Experience Measures (PREMs) could accelerate the improvement of quality care by informing care planning and management [37]. Identifying which services are working well and which need improvement can lead to the evaluation of systems and create relevant and meaningful changes.

Related research has proposed the use of supervised physiotherapy to accelerate recovery from surgery, including complex rehabilitation programmes [38], aerobic training [39, 40], weight loss and diet interventions [41], stretching [42-44] and lymphatic drainage techniques [45]. The ingredients of a multifactorial physiotherapy programme should be trialled within cohorts of ERAS[®] patients so that intraoperative procedures and the individual pathophysiology of the procedure in which it is being tested can be considered. For physiotherapy practice to remain evidence based, prospective studies should be conducted using established guidelines such as the PREPARE trial guide for planning clinical research [46] and reported consistently in accordance to recommendations such as the TIDieR (Template for Intervention Description and Replication) [47] checklist. They should compare standardised measures such as pain, functionality, quality of life and oedema to accurately describe patient recovery. Reporting studies using the TIDieR checklist allows for

interventions to be described in sufficient detail to allow their replication [47] and can allow for quality improvement within clinical research.

The results of these trials may create ERAS[®] and procedure-specific evidence-based knowledge that can translate into practice so that physiotherapists can provide an optimal service to patients. Recovery of a patient's physical fitness and activity within the post-operative period is important to reduce the likelihood of poor functional outcomes and post-operative complications and should be a focus of future research. All patients could benefit from daily, personalised, physiotherapy care in the months following surgery; however, this may not be economically feasible. Therefore, it is not only important to ensure that the physiotherapy that is delivered post-operatively contains the optimal ingredients for recovery but also to analyse economic and clinical outcomes. There is also a need to identify high risk adults or those with a need to regain a certain level of function (those returning to work or sport), so that individualised, high intensity rehabilitation programmes can be created. The majority of patients recover well from ERAS[®] pathways; however, specialisation may be required for the individuals with specific needs.

Conclusion

ERAS[®] is well established in improving patient outcomes and reducing hospital costs following general surgical procedures, however the current evidence for post-operative physiotherapy interventions is poor and there is a pressing need to highlight and expose this. Early mobilisation is well established within cohorts of ERAS[®] patients, and there is high quality evidence that the implementation of individualised perioperative training is tolerable and worthwhile [48]. The effectiveness of post-operative physiotherapy is still under debate. The current evidence for post-operative physiotherapy within general ERAS[®] pathways is limited to one high-quality RCT specific to cystectomy. Well-conducted trials, reported using appropriate guidelines and objective outcome measures to evaluate procedure-specific interventions and standardise best-practice across ERAS[®] disciplines are required. These

interventions should be informed by PPI to ensure that quality improvement methods are relevant and effective for patients. Results from these studies have the potential to influence improvement to long-term patient rehabilitation and continue to advance multidisciplinary ERAS[®] pathways.

Funding:

No funding was received for this study.

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Surgery	Surgical search terms	ERAS® search terms	Physiotherapy search terms
Gynaecologic	"Gynaecolog* surgery" OR "gynecolog* surgery" OR (AB "Gynecology")	"enhanc* recover*" OR "fast track" OR	(AB "Physical Therapy
Gastrointestinal	(AB "Endoscopy, Gastrointestinal") OR "gastrointestinal surgery"	"fast-track" OR "ERAS" OR "rapid surgery" OR "rapid-	Modalities") OR (AB "Physical Therapy Specialty") OR
Gastrectomy	(AB "Gastrectomy") OR Gastric cancer surgery OR gastrectomy	surgery" OR "accelerated surgery" OR	"physical therapy" OR physiotherapy
Cystectomy	(AB "Cystectomy")	surgery" OR	OR (AB "Exercise
Pancreatic	(AB "Pancreaticoduodenectomy")	"accelerated-	Therapy") OR (AB
Colon	(AB "Colon") OR "colonic surgery"	surgery" OR "rapid recovery" OR "rapid-	"Rehabilitation") OR
Colorectal	(AB "Colorectal Surgery") OR "rectal surgery" OR "pelvic surgery"	recovery" OR "early mobilisation" OR	"strengthening training" OR
Bariatric	(AB "Bariatric Surgery") OR bariatric OR "gastric bypass" OR (AB "Gastric Bypass")	early mobilization"	"strengthening exercise*" OR
Liver	(AB "Hepatectomy") OR "liver surgery"	OR "multimodal pain" OR outpatient* OR ambulatory	"resistance training" OR "resistance exercise*" OR
Head or Neck	(AB "Pharyngectomy") OR (AB "Laryngectomy") OR (AB "Laryngoscopes") OR laryngopharyngectomy OR (AB "Laryngoplasty") OR (AB "Neck Dissection") OR (AB "Lymph Node Excision") OR (AB "Thyroidectomy") OR "oral cavity resection" OR (AB "Glossectomy") OR "head surgery" OR "neck surgery" OR "head and neck surgery"		"manual therapy" OR stretch* OR exercise OR "musculoskeletal manipulations"
Breast	(AB "Breast Surgery") OR (AB "mastectomy") OR (AB "Lumpectomy") OR (AB "Quadrantectomy") OR (AB "axillary dissection") OR (AB "breast cancer") OR (AB "breast carcinoma") OR (AB "axillary node dissection")		

Table 1: Search strategy for capturing relevant articles for review.

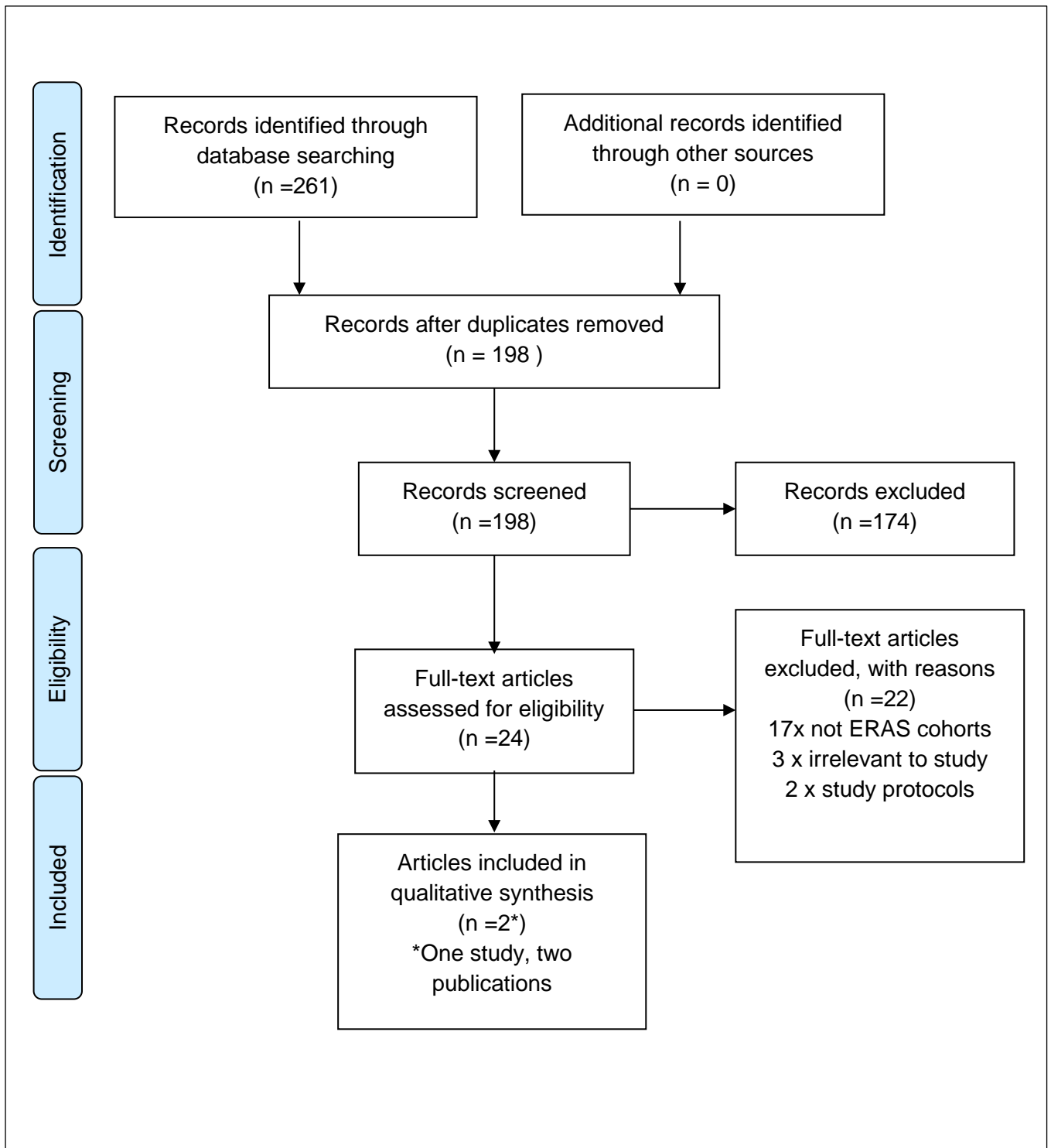


Figure 1: Flow diagram of included and excluded studies.

Study	Design and Sample Size	Patient, population or problem	Intervention, prognostic factor or exposure	Comparison or intervention	Outcomes	Main findings
Jensen et al. 2015	RCT n = 107	Radical cystectomy patients	Standardised pre-operative and post-operative strength and endurance exercises and progressive postoperative mobilisation.	Standard, fast-track surgery	Mobilisation (hours out of bed), length of stay (LOS), walking distance (m), the ability to perform personal activities of daily living (PADL), time to restored bowel function, pain and nausea (VAS).	Post-operative mobilisation was significantly improved with walking distance. PADL improved by a day for the intervention group. LOS did not change between groups. No significant difference for severity of complications.
Jensen et al. 2014	RCT n = 107	Radical cystectomy patients A secondary analysis	Standardised pre-operative and post-operative strength and endurance exercises and progressive postoperative mobilisation.	Standard, fast-track surgery	Health-related quality of life (HRQoL) (EORTC Quality of life questionnaire Core 30 (QLQ-C30) combined with the disease-specific EORTC BLS24 (baseline) and EORTC BLM30 (follow-up), inpatient satisfaction (PATSAT32)	The intervention group significantly improved HRQoL scores in dyspnea ($p \leq 0.05$), constipation ($p < 0.02$) and abdominal flatulence ($p \leq 0.05$) compare to the standard group. The standard group had reduced symptoms in sleeping pattern and clinically relevant differences in fatigue, body function and role function.

Table 2: Summary table of publications included within analysis.