

Enhanced recovery after surgery: the future of elective arthroplasty?

EDUCATION

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ABSTRACT

Summary

Enhanced recovery after surgery is a method of streamlining the patient journey pre-, intra- and post-operatively in order to account for foreseeable and unforeseeable barriers to recovery. Originally pioneered in general surgery, the technique has been adopted in other specialities, given its potential to minimise the duration of hospitalisation, hasten recovery and improve patient experience. Enhanced recovery programmes are of particular interest in orthopaedic surgery, where patients who often have multiple comorbidities could gain substantial benefits from more efficient management. This is particularly pertinent given the rising prevalence of age-related joint disease requiring arthroplasty: Enhanced Recovery is more economically and clinically efficient.

Relevance

Enhanced recovery is a relatively novel - heterogeneously implemented - method of managing the surgical patient journey. Intrinsic to the success of such programmes is a thorough understanding of its components and close communication within the multidisciplinary team. Medical students' understanding of what these protocols involve will significantly affect their management of foreseeable - and unforeseeable - barriers to success in elective surgical patients during clinical years and in their future practice. It is therefore essential that all medical students - whether they have an interest in a surgical career or not - have a grounding in the components of enhanced recovery, because such programmes will form part of their practice at some point in their careers.

Take-home message

Enhanced recovery is a proactive intervention, which has been shown to be extremely effective across a number of surgical disciplines in reducing length of stay, whilst maximising postoperative outcomes. Trainees would benefit from a detailed knowledge of enhanced recovery programmes in order to provide a higher standard of care during their encounters with patients at every stage of the surgical pathway.

Enhanced Recovery Programmes: An Introduction

Enhanced Recovery After Surgery (ERAS) is a proactive, multifaceted approach focused on reducing postoperative morbidity and convalescence. The approach standardises the entire surgical pathway – informed by advancing knowledge of the perioperative stress response – in order to minimise adverse events and hence, safely reduce length of hospital stay. (1, 2) These reductions in average length of stay are highly cost-effective, due to a reduction in post-operative delays and the need for additional interventions. (2) ERAS was pioneered in the late 1990s by Kehlet in colorectal surgery as a response to the inadequacy of “unimodal responses to multimodal perioperative morbidity”. (3, 4)

A General Overview

ERAS encompasses a set of approaches and values aimed at patients undergoing major surgery. Many of the principles revolve around two questions: “why are surgical patients at risk?” and “why is a surgical patient currently in hospital?”. (5) This prompts clinicians to attempt to identify and minimise known and unknown adverse events, ultimately improving the patient experience. (6) ERAS streamlines patients’ pre-, peri- and post-operative treatment and focuses on improving surgical techniques, employment of regional anaesthesia (where appropriate), early mobilisation, restoration of enteral nutrition and optimised postoperative pain management. (7) Consequently, limited evidence exists demonstrating that ERAS modestly increases quality of life equivalent to +0.086 QALYs compared to standard protocols (+0.006 QALYs) in hip and knee surgery. (8) However, the clinical significance of this remains to be corroborated in larger studies and is a key area for future investigation.

ERAS forms part of the modern “surgical revolution”, focused on reducing perioperative stress and maximising recovery, whilst also reducing the need for unnecessary additional interventions. (1, 6) This shortened recovery period in conjunction with optimised pain relief is advantageous in orthopaedic procedures, as it reduces the duration of convalescence prior to mobilisation. (1) The end goal is always to reduce length of stay and maximise rehabilitation that may be hindered by the hospital environment. (4, 9) However, a key question is whether striving for earlier patient discharge is a desirable or even a beneficial goal. There was concern that premature discharge could increase complication rates, resulting in a rise in readmission of up to 13% and reduced patient satisfaction. (2, 10) Yet, enhanced recovery has been shown to result in no change in orthopaedic readmission rates compared to patients on traditional surgical pathways (ERAS: 4.8%; traditional pathways: 4.7%). (10) Furthermore, enhanced recovery has been shown to reduce length of stay by up to 3.5 days in colorectal patients, whilst causing no significant difference in mortality. (2)

ERAS Programmes in the UK

Since the millennium, 14 NHS Enhanced Recovery innovation centres have been established. These have received widespread support from clinicians, management and patients. However, ERAS programs are inherently heterogeneous due to their patient- and specialty-centred nature. Therefore, a standard enhanced recovery programme acts as a blueprint on which to map and adapt to local needs. (2, 11) Uptake has been slow, often due to organisational inefficiency and multidisciplinary resistance to change. (3, 4)

The Components of ERAS

Enhanced Recovery is most effective as a pre-emptive protocol, optimising the entire surgical pathway (Figure 1). (9) This pathway can be applied to all patients with modifications to meet specific needs, empowering the patient to become an active participant in their recovery. (4)

1. *The Preoperative Phase*

At this stage, patients are actively educated about their condition and the surgery that they are to undergo and the expected day of discharge is recorded, ensuring that all team members are working towards a common goal. (4, 12) This sets discharge expectations, creating a “length of stay boundary”. Additionally, education aims to psychologically prepare patients by setting expectations of postoperative pain and discomfort. (7, 9) These steps ensure that patients “go ahead” and “stay ahead” of impediments to rehabilitation. (6) All patients undergo preoperative assessments to identify significant comorbidities, which can then be proactively optimised. (7) Physical or social impediments to rapid recovery are assessed and a plan for perioperative anaesthesia and postoperative analgesia is formulated (Figure 1). (4, 13)

2. *The Perioperative Phase*

Perioperative considerations are factors that inhibit prompt rehabilitation including: pain, stress response, nausea and vomiting, hypoxaemia, fatigue, immobilisation and drains (Figure 1).

Broadly speaking, the use of regional rather than general anaesthesia is a crucial component of ERAS. (4, 6, 10) In addition, perioperative local anaesthetic infiltration around joints reduces pain and facilitates prompt ambulation. Hence, early discharge can be achieved without risking adverse outcomes. (4, 9–12) Opioid analgesics should be rationed at all stages of the pathway, due to their side-effect profile which can delay rehabilitation. (5) The gold standard for lower limb arthroplasty is a spinal block lasting up to 4 hours. (13) This ensures that mobilisation on the day of surgery is an achievable goal. This is essential because failure to mobilise on the day of surgery results in abandonment of ERAS in up to 80% of arthroplasties. (1, 4, 5, 14) Finally, adopting minimally

invasive techniques and reducing operation times can minimise the inflammatory response, resulting in reduced pain, morbidity and length of stay. (7, 9)

3. *The Postoperative Phase*

From postoperative day 2 onwards, recovery relies on resolving pain and fatigue. Therefore, postoperative hospital stays should be minimised as they are associated with fasting, sleep deprivation and immobilisation. (5) During the post-operative period, compliance can fall from near 100% to as low as 20%. (2)

Proactive postoperative mobilisation within 3–5 hours promotes early discharge in addition to reducing muscle wasting and venous stasis. (3–5, 10) However, only 33% of total knee arthroplasty patients mobilise on the day of surgery. Hence, round-the-clock physiotherapy should be available to facilitate mobilisation. (9) Additionally, prompt re-establishment of enteral nutrition correlates positively with swift post-operative recovery, through aiding recovery from the surgical stress response and maintaining muscle mass and strength, enabling early and sustained ambulation (Figure 1). (4, 7, 10)

Evidence Supporting ERAS

Enhanced recovery represents a shift towards a “well-patient” model in elective surgery. (1, 6) The largest observational study into ERAS showed a reduction in the mean length of stay from 8.5 to 4.8 days, with no significant change in readmission rates. (6, 9, 10, 12) Translating this to UK orthopaedic practice, this could potentially free up almost 5,500 bed days. If scaled up to the whole NHS, this could save over 430,000 bed days per year, enabling more procedures to be carried out without increasing capacity, and creating an annual saving of £118 million. (10) There is also evidence that ERAS results in reduced death rates postoperatively at 30-days (0.5%–0.1%) and 90-days (0.8%–0.2%). (10) However, as previously posited, the evidence base is limited with a lack of data focusing on quality of life outcomes, resource use and cost-effectiveness. (13) Furthermore, evaluation of whether accelerated discharge simply shifts the burden of postoperative care from the hospital to the rehabilitation-setting is an essential avenue for investigation. (4)

ERAS: An Orthopaedic Perspective

Osteoarthritis currently causes pain and disability in at least a third of the adult population and over 120,000 primary hip and knee replacements are performed annually in the UK. (9, 12) In the coming years, demand for joint replacements is likely to rise with a trend toward increasingly elderly patients with multiple comorbidities (a mere 12.7% of elective arthroplasty patients have

no comorbidities). (14) Currently, the average length of stay in Europe for elective arthroplasty is 6–11 days (11), hence, there is a real need for optimisation of current techniques to maximise patient outcomes and increase capacity. (14) Restructuring surgical pathways to reduce patient length of stay can be advantageous for both holistic and financial reasons. (9, 15)

Identifying and optimising high-risk patients preoperatively can safely reduce length of stay. (5, 11, 14) It is also worth noting that orthopaedic patients are generally considered more high-risk because of their age demographic. (15) However, a number of other factors can impede recovery following arthroplasty including: pre-existing mobility issues, post-operative loss of quadriceps function (by 30–80%), orthostatic intolerance and organisational issues. (3, 11, 15) A pre-emptive multimodal and multidisciplinary protocol can be effective in negating factors that hinder recovery. (1, 6) Therefore, ERAS is particularly applicable to orthopaedic surgery, where the multidisciplinary team (MDT) has been integral for many years. (3, 4, 12) This well-integrated multidisciplinary structure is highly advantageous, as ERAS depends upon a proactive – not reactive – response to potential hindrances at all stages of the patient journey. (6)

CONCLUSION

ERAS programmes streamline the surgical pathway, facilitating rapid rehabilitation. The preoperative period and attitude of the MDT are fundamental in providing patients with confidence to mobilise and psychologically cope with surgery. (9) Positive interaction with health professionals – including trainees – and pre-emptive medical interventions modify the patient’s adoption of the sick role. Hence, an MDT approach with full commitment to the programme is an absolute prerequisite for success. (6)

Evidence demonstrates that enhanced recovery almost halves the duration of hospitalisation, whilst having no impact upon readmission rates. (13) The evidence base is presently of low fidelity with a real need for high-quality studies. However, in an environment with increasing demand, ERAS has the potential to maximise efficiency and patient satisfaction. Hence, it is highly likely that its utility is yet to be fully realised.

FIGURES

Figure 1: A simplified enhanced recovery pathway highlighting key considerations throughout the surgical pathway. Also references standardised examples of interventions used in elective arthroplasty patients undergoing surgery via an enhanced recovery protocol.



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