# Enhanced recovery programmes in colorectal surgery: clinical implications

Since the first successful colorectal resection in 1833 by Reybard of Lyons, surgeons have sought to improve technical and perioperative strategies to minimize morbidity and mortality in colorectal surgery. In the last 10 years, evidence-based medicine has questioned the routine use of mechanical bowel preparation, abdominal drains, nasogastric tubes and prolonged perioperative fasting. A greater understanding of the metabolic response to surgery has led to strategies to minimize the complex cytokine cascades and other neurohumoral factors. These concepts, with attention to social and medical factors within a multidisciplinary framework, are the foundations of enhanced recovery programmes.

Despite variation in name (ERAS, ERP, ESTREP, Fast-Track), the main goal of all enhanced recovery programmes is the same – to mentally and physically prepare a patient to minimize the stress response to surgery and so the time an individual requires to recover. While this does result in a reduced length of stay (with resultant cost savings and increased bed availability allowing more patients to be treated), the focus of enhanced recovery is the patient. Kehlet, the forerunner of enhanced recovery, identified 20 factors which could be modified to enhance recovery following surgery. These can be considered in pre-, intra- and postoperative phases.

## Preoperative

The preoperative phase begins with the primary care physician. When a diagnosis is made, attention should be directed to stopping smoking, reducing alcohol use and optimization of medical conditions and physical function. A primary care physician is in a unique role to initiate this process and start mentally preparing an individual for surgery.

Contact with the surgical and enhanced recovery team reinforces this foundation. Mental and physical preparation for a short hospital stay, early mobilization and oral intake with a focus on activity and discharge, not debility, is continued. Social factors which could predictably delay recovery or discharge are addressed. Preoperative nutritional supplementation with high carbohydrate content drinks up until 2 hours preoperatively and no longer using mechanical bowel preparation are key elements in preventing a dehydrated, catabolic patient presenting for surgery. Assessment of cardiopulmonary risk by cardiopulmonary exercise testing allows clear risk stratification.

## Intraoperative

Intraoperative anaesthetic techniques include thoracic epidurals dominated by local anaesthetic, minimal opioid use, aggressive anti-emetics and active maintenance of normothermia with warmed intravenous fluids and body warming devices. Intraoperative cardiac output monitoring using non-invasive oesophageal Doppler or invasive dilutional techniques allows volume administration to be minimized and early use of inotropes to optimize cardiopulmonary function.

From a surgical perspective, minimally invasive surgery and transverse as opposed to longitudinal incisions minimize surgical stress. Gentle and accurate surgical technique with limited incisions and technical excellence may be as effective as laparoscopic surgery in the context of excellent perioperative care.

The routine use of high dependency units or intensive care do not routinely add value, but may be required in high-risk patients.

## Postoperative

This is perhaps the most difficult area of an enhanced recovery programme to control, as a result of preconceptions of staff and patients alike. Reduction of staffing ratios and lack of nursing and junior staff continuity delays progress of an enhanced recovery programme. Patients should be mobilized out of bed on the day of surgery and encouraged to eat and drink. By the second postoperative day, intravenous fluids should be stopped, catheters, drains and epidurals should be out, and patients should be mobilizing around the ward and eating normal food. Maessen et al (2007), reporting on five European centres introducing enhanced recovery programmes, showed this occurred in less than 50% of cases. They concluded ongoing and repeated education and organization were paramount. Dedicated ward areas and nursing staff were supported.

In clinical experience, patients are often medically cleared for discharge but unable to go home because they do not want to or because social or other factors intervene. Maessen et al (2007) suggested hospital stay could be reduced by 2 days with more effective preoperative evaluation and prescheduled discharge planning. Psychological preparation allows patients to be ready for early discharge. Stoma education may hold up discharge but can be mitigated by preoperative preparation and intensive postoperative training.

## Controversies

As with any change, questions about the appropriateness and effectiveness of enhanced recovery programmes continue to be raised. Early feeding is not detrimental and may be beneficial (Lewis et al, 2001; Hans-Geurts et al, 2007). Early mobilization prevents deconditioning following surgery. Enhanced recovery programmes are safe (Wind et al, 2006), with no increase in surgical complications and trends towards not only reduced cardiopulmonary complications but significantly improved physiological function (Basse et al, 2002; Anderson et al, 2003).

Meta-analyses have shown reduced length of stay and reduced costs (Basse et al, 2004). More importantly, costs have not been passed onto the community. Surgical complications are not missed although there is a slight increase in re-admission rates. Patient satisfaction is high. Initial protocols restricted enhanced recovery to right or left resections above the peritoneal reflection, but Delaney et al

(2001) and the authors' own experience has shown other major cases including pelvic exenterations can benefit from enhanced recovery.

The role of enhanced recovery programmes with the advent of laparoscopic surgery has been questioned. Most laparoscopic series have compared costs and lengths of stays with colorectal patients managed with conventional care after open surgery. The single trial comparing laparoscopic and open surgery with enhanced recovery programmes for both suggested an additional benefit in short-term outcomes (King et al, 2006a,b).

## Enhancing recovery for elderly patients

The elderly experience significant deconditioning from hospitalization and surgery and many will not return to their previous level of independence because of this. Basse et al (2002) showed a clear advantage of enhanced recovery programmes for the elderly and, in association with medical optimization, nutrition and 'prehabilitation', reduced morbidity and mortality (Killewich, 2006).

Harrari et al (2007) highlighted the importance of focussed groups such as proactive care of older people undergoing surgery (POPS). Preoperative consultation with elderly patients undergoing elective orthopaedic surgery identified high levels of non-optimally treated comorbidity and multiple potentially preventable issues which would delay discharge. Subsequently, involvement of the POPS team from a preoperative stage showed fewer postoperative medical complications (20 *vs* 4%), reduced length of stay by 4.5 days and fewer delayed discharges for medical complications (37 *vs* 13%) or waiting for occupational therapy assessment or equipment (20 *vs* 4%).

## Conclusions

Without doubt, many of the positive factors mentioned are part of routine management of colorectal patients. However, the value of the enhanced recovery programme lies in a protocolized team approach to each patient with coordinated perioperative care and reduced variability in management (Kehlet and Wilmore, 2002). Similar approaches are likely to become the standard of care in the future. Those who undertake to implement a programme deserve the support of their colleagues in the quest for improved outcomes for colorectal patients. BJHM

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## KEY POINTS

- Enhanced recovery relies on preoperative, intraoperative and postoperative organization.
- The primary aims are to speed postoperative recovery and improve patient outcome.
- Early discharge may be achieved but is not a primary goal – discharge criteria remain the same for all patients.
- Implementation of individual aspects of care rather than a programme of care will fail to achieve the benefits seen in published series.