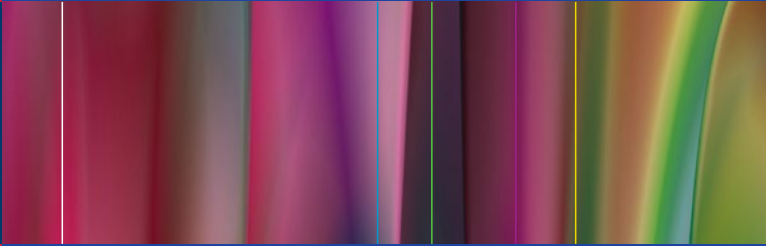


Liane S. Feldman · Conor P. Delaney  
Olle Ljungqvist · Francesco Carli  
*Editors*



**The SAGES/ERAS<sup>®</sup>  
Society Manual of  
Enhanced Recovery  
Programs for  
Gastrointestinal  
Surgery**

 Springer

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Manual of Enhanced Recovery  
Programs for Gastrointestinal  
Surgery



# The SAGES / ERAS<sup>®</sup> Society Manual of Enhanced Recovery Programs for Gastrointestinal Surgery

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# Foreword

Two major changes have improved outcomes in elective surgery: the introduction of minimally invasive surgery (MIS) revolutionized abdominal surgery, significantly lessening the impact of major surgery, reducing complications, and accelerating recovery. For many surgeons, interest in laparoscopic techniques was fueled by this desire to improve outcomes, especially recovery after surgery. There is a limit, however, to what can be accomplished using surgical techniques alone, and factors that keep people hospitalized and delay their return to normal functioning are multiple and complex. These include the surgical stress response, pain, postoperative nausea and vomiting, limited mobility, fluid overload, fatigue, and deconditioning, even in the absence of surgical complications. Enhanced Recovery After Surgery (ERAS) pathways are coordinated, multidisciplinary care plans incorporating evidence-based interventions along the entire perioperative trajectory and represent the second major step to improved outcomes after surgery. Traditionally, surgeons, anesthesiologists, and nurses have delivered care from individual silos. ERAS pathways represent a paradigm shift from traditional care, instead integrating multiple individual elements of perioperative care from these stakeholders, as well as empowering patients and caregivers to better understand the recovery process. By leveraging the gains achieved by MIS techniques with ERAS pathways, the goal is to further improve recovery, decrease complications, and decrease variability in practice, which in turn will be reflected in shorter hospital stay, lower costs, and improved patient satisfaction improving value for surgical procedures.

*The SAGES/ERAS Society Manual of Enhanced Recovery Programs for Gastrointestinal Surgery* represents a collaboration between two societies committed to improving surgical outcomes, from two unique but overlapping perspectives. SAGES has promoted the introduction and expansion of minimally invasive surgery, while the ERAS Society was created to promote implementation of evidence-based perioperative care. Both societies aim to improve patient recovery, decrease morbidity, and educate others in proven techniques and interventions.

While information is available in the scientific literature, there is no single source providing information on creating these programs across the wide array of procedures in GI and abdominal surgery. This book is designed to fill this gap and present a comprehensive, up to date and practical approach to creating an ERAS program for GI surgery. The first part, “The Science of Enhanced Recovery: Building Blocks for Your Program,” reviews the evidence underlying individual elements of ERAS, including evidence from laparoscopic procedures, when available, or pointing to evidence gaps where more research is required. These are written by experts in the field, including surgeons, anesthesiologists, nurses, and physiotherapists. The format of the chapters is a narrative evidence review, concluding with a table with “take home messages” and 3–5 key references for readers interested in more depth in each topic. Chapters also address management of common complications and patient selection or exceptions, when relevant. The second part, “Creation and Implementation of an Enhanced Recovery Program,” addresses practical concerns, including creation of a pathway team, addressing barriers, project management, and engaging administration. In the final part, experts will contribute real-world examples of their pathways for a variety of procedures, including colorectal surgery, bariatric surgery, upper GI and hepatobiliary surgery, enabling the user to have a starting point for creating their own programs.

The manual grew out of the first Enhanced recovery postgraduate course given by SAGES in April 2014 in Salt Lake City, UT, and involves international experts who draw on experiences from a myriad of practice settings. Many authors are contributors of original research in their fields. We hope the book will be of use to anyone involved in perioperative care, including surgeons or surgical trainees with various subspecialty interests, anesthesiologists and anesthesia technicians, perioperative physicians, nurses involved in all phases of perioperative care, and medical administrators. Whether you are beginning your own program, addressing barriers as you are implementing a program, or are expanding an existing program, we hope this manual will prove a useful and practical reference. Of course this is a constantly evolving field, and the ERAS Society and SAGES SMART Enhanced Recovery websites remain valuable resources, curating new knowledge towards improving the trajectory of recovery for patients.

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# 1. Introduction to Enhanced Recovery Programs: A Paradigm Shift in Perioperative Care

*Liane S. Feldman*

## What's the Issue?

Despite improvements in surgical and anesthetic techniques, a significant proportion of patients experience complications after major gastrointestinal surgery [1], there is significant variability in care processes and outcomes between practitioners [2–4], full patient functional recovery requires weeks or months, even after ambulatory surgery [5–7], and costs of care continue to rise without resulting in better population health [8]. Achieving higher value care for patients, defined as health outcomes *that matter to patients* achieved per dollar spent, must become the goal [8].

Recovery after surgery is an outcome that matters to all stakeholders involved in perioperative care [9]. Obstacles delaying recovery include preoperative organ dysfunction, surgical stress and catabolism, pain, post-operative nausea and vomiting, ileus, fluid excess, semistarvation, immobilization, and surgical traditions or culture [10]. For many surgeons training in the last 20 years, minimally invasive surgery was the answer to improving recovery. However, even after low-impact procedures such as laparoscopic cholecystectomy, full recovery of physical activities takes longer than most surgeons think [5]. Outside of the traditional purview of the surgeon, many other interventions have the potential to delay or accelerate recovery through their impact on the surgical stress response. These include afferent neural blockade, pharmacologic interventions, fluid and temperature management, nutrition, and exercise [11] (Fig. 1.1). There is abundant evidence to guide best practices in perioperative care [12–14].

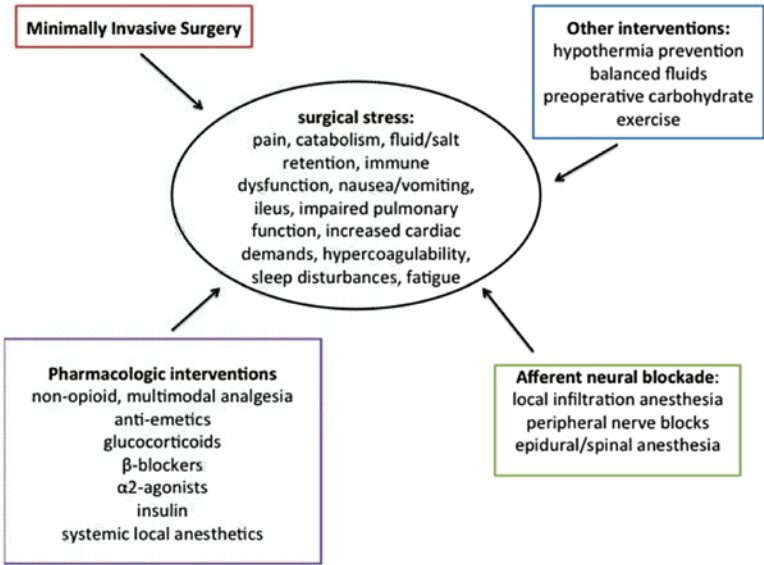


Fig. 1.1. Approaches to reduce surgical stress and improve surgical recovery: There are many developments in perioperative care that are outside the traditional purview of the surgeon that have significant potential to accelerate or delay recovery after surgery (adapted from Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg.* 2008;248:189–98, with permission).

The issue is not lack of evidence or even lack of guidelines. The issue rather is how can care be organized to make it easier to get this evidence into practice and improve outcomes for our patients. To make progress, we have to introduce new interventions that are proven beneficial, and, perhaps as importantly, stop doing things that are not beneficial and may even be harmful. But there is an estimated time lag of 17 years between research and the time it takes to benefit society [15].

## What Is an Enhanced Recovery Pathway?

An enhanced recovery pathway (ERP) is an evidence-based, multi-modal, integrated consensus on perioperative care that reorganizes care around surgery. The goal is to combine multiple evidence-based interventions, each of which may have modest impact in isolation, into

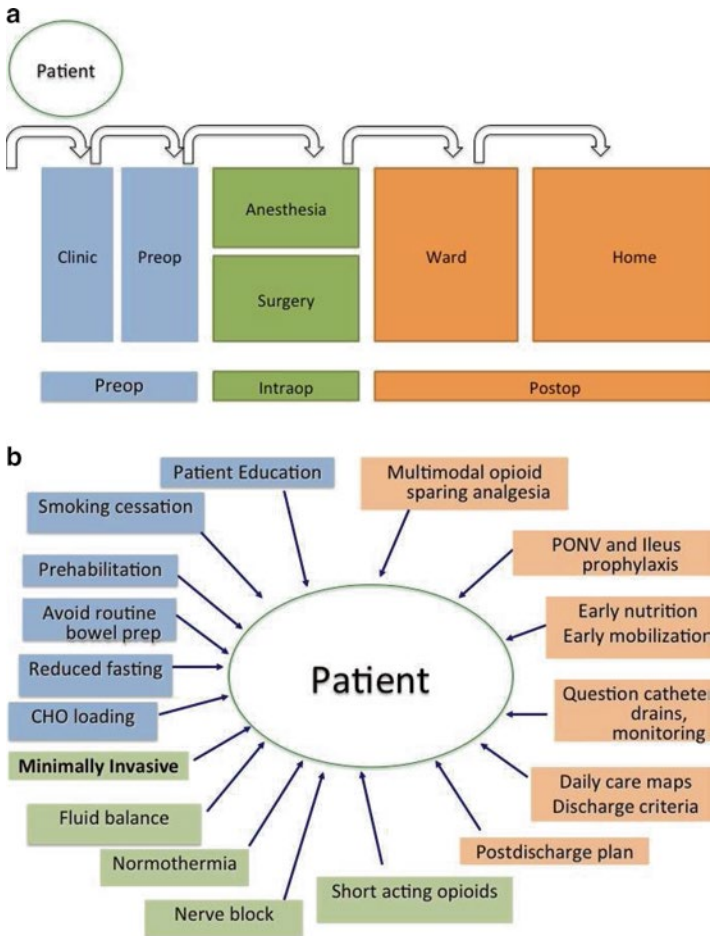


Fig. 1.2. In the conventional approach (**a**), providers work in expertise silos and the patient moves between these silos. ERPs instead look at the entire trajectory of perioperative care to standardize processes and integrate interventions into a cohesive package around the patient (**b**).

a coordinated, standardized package with synergistic beneficial effects on reducing physiologic stress and supporting early return of function. ERPs represent a paradigm shift from a clinician-focused system, where each stakeholder functions in an expertise silo with significant variability between providers, to a patient-centered system integrating each step along the perioperative trajectory into a single pathway (Fig. 1.2). It is

not simply a set of standard orders; in addition it should address patient preparation, intraoperative management, and audit. This approach helps introduce evidence into practice and results in less morbidity, less need to remain in hospital, less variability between practitioners, and lower resource use [16–19].

The ERP approach is a philosophical shift from traditional management in several important ways. First, it provides a consistent approach to perioperative care for all patients undergoing a particular procedure, regardless of clinician. This standardizes processes and decreases unwanted variability between practitioners, facilitating decision making for nurses and for trainees. This requires that the team members arrive at a consensus for “how we do it” during creation of the pathway. Routine patients will progress along the predetermined trajectory without the need for the team to write daily diet, pain, catheter, mobilization, fluid, and monitoring orders. Patients who are informed of daily milestones beginning in the preoperative period are more engaged and empowered in their own care. Second, the pathway is geared towards accelerating recovery for patients without complications, which is the majority of patients. Rather than keeping all patients fasting because the minority of patients will not tolerate early oral intake, it allows more patients to benefit from early nutrition. Of course the team must continue to monitor and intervene for patients who develop complications. Although surgeons are very tuned to the “harms” sometimes resulting from surgery, pathways help us better care for the majority of patients without complications, and in many cases decrease the risk developing certain complication in the first place.

It is important for the program to address common contingencies or complications that may occur. For example, absence of voiding after removal of a urinary drain is best investigated and managed using a bladder scan-based protocol, in order to avoid automatic reinsertion of an indwelling catheter [20]. Similarly, intolerance of oral diet is relatively frequent with early feeding after abdominal surgery, and occurs in up to 35 % of patients to some degree [21]. However, NG tube insertion is required in less than 10 % of patients, so a stepwise approach should be outlined.

The ERP approach is applicable across a wide variety of procedures, in both the inpatient and outpatient settings. It should include key interventions in the preoperative, intraoperative, and postoperative phases of care (Table 1.1). Multiple elements of care are addressed in a procedure-specific manner and follow evidence when available. The expression of each element may differ between institutions depending on available resources, experience, and skill, but a standard consensus should be

Table 1.1. Key elements to address and include in development of enhanced recovery pathways. This approach is applicable across a variety of procedures, but the expression of each element may differ between procedures and between institutions.

Preoperative	Preoperative risk assessment and optimization of organ dysfunction Patient education Exercise/prehabilitation Smoking abstinence Examine use of routine bowel preparation Modern fasting guidelines Carbohydrate drinks (when evidence based)
Intraoperative	Avoid fluid excess Regional anesthesia (when evidence based) Minimally invasive surgery Short-acting opioids Maintain normothermia Glycemic control Antiemetic prophylaxis (evidence based)
Postoperative	Multimodal, opioid-sparing analgesia (evidence based and procedure specific) Anti-ileus prophylaxis Examine use of drains, tubes, catheters, and monitoring (evidence based) Early nutrition Early ambulation Daily care maps, predefined discharge criteria Postdischarge rehabilitation plan (evidence based)

From Kehlet H. Fast-track surgery-an update on physiological care principles to enhance recovery. *Langenbecks Arch Surg.* 2011;396:585–90; with kind permission of Springer Science + Business Media

reached within an institution. For example, there are multiple ways to deliver opioid-sparing multimodal analgesia with one institution relying on thoracic epidural, whereas others will integrate nerve blocks, while still others might use intravenous lidocaine with patient-controlled analgesia. The ERP team can also help change routine procedures for the entire operating room, like introducing modern fasting guidelines, not only for “pathway” patients.

It is not clear which elements of ERPs are most important, and many different approaches, ranging from relatively simple to more complex, can be successful [19]. Development and implementation of an ERP approach is best accomplished by a multidisciplinary team including surgeons, anesthesiologists, nurses involved in all phases of care, nutri-

tionists, physiotherapists, pain service personnel, and administrators. This team should meet routinely and have clear deliverables, following a time line and general principles of project management. Creation and implementation of a new ERP requires review of evidence or guidelines for each step in the perioperative trajectory for a specific procedure; reaching consensus between practitioners on how each care element will be delivered within the local context; creating patient education materials with daily milestones, standard order sets, nursing flow sheets, and discharge criteria linked to milestones with a target discharge date; and training of perioperative personnel. The team should audit selected processes and outcomes and revise the program as needed as well as re-scan the literature for new evidence every 2 years. Although there is nothing particularly complex about elements of ERPs, it is a change in approach and as with other quality improvement initiatives, enthusiastic surgical, anesthesia, and nursing champions, as well as appropriate administrative support, are critical to the success of the initiative.

Several specialty societies have developed an interest in educating their members about enhanced recovery. The ERAS Society has developed an implementation program including an interactive audit that has coached many centers through implementation. The American College of Surgeon's National Surgical Quality Improvement Program (NSQIP) has an ongoing pilot project to help centers adopt an ERP for colon surgery, including the ability to monitor care processes in addition to outcomes. Enhanced recovery courses and workshops are available through SAGES, the ACS, and others. We at McGill have an annual workshop addressing ERPs, bringing together over 100 multidisciplinary professionals annually. Many centres involved in ERPs are happy to mentor colleagues including through e-mail, phone calls, or site visits to facilitate implementation.

## Outcomes of the ERP Approach

In 2000, Kehlet published a seminal paper describing a multimodal rehabilitation program for 60 patients (average age 74, 20 patients ASA III–IV) undergoing elective open colon resection. The postoperative care program included thoracic epidural, enforced early nutrition, and mobilization, with a median 2-day hospital stay and 15 % readmissions [22]. This was the beginning of the “fast track” concept, with significant comparative research since then investigating the approach. A system-

atic review from 2014 identified 38 randomized trials in colorectal (18 studies), genitourinary (5 studies), joint (5 studies), thoracic (3 studies), and upper GI (6 studies) surgery. The review concluded that the use of an ERP was associated with reduced hospital stay (standard mean difference 1.14 days) without an increase in readmissions. ERPs were also associated with a 30 % reduction in complications at 30 days, with no increased risk of major complications or death. The effect was similar across different disciplines and for laparoscopic versus open colorectal surgery [19]. A separate meta-analysis of 13 randomized trials in colorectal surgery also found a shorter hospital stay by about 2 days, without increased readmissions. This is related to better organization of care [23], but also to fewer “general” complications and faster return of bowel function (by about 1 day) [16]. A systematic review of economic evaluations of colorectal ERPs found that eight of ten studies reported lower costs with ERPs [24]. When taking the full care trajectory into consideration, as well as implementation costs for the ERP, overall societal costs were lower when an ERP was used, with patients requiring less time off work and had less care-giver burden [25].

At the McGill University Health Centre, we created a multidisciplinary team to create and implement ERP-prevalent procedures across the department of surgery, building on previous institutional experience with pathways for laparoscopic foregut surgery [26] and laparoscopic colon surgery [27]. Working with clinical experts for each procedure, the team, led by a full-time nurse coordinator, has introduced 11 clinical pathways into practice, ranging from relatively simple ambulatory procedures to very complex in-patient procedures like esophagectomy. In our institution, all patients start the pathway in the preoperative clinic where standard educational information is reviewed by the preoperative nurses. Outcomes have been consistent in terms of reductions in hospital stay for prostatectomy [28], esophagectomy [29], colorectal surgery [25, 30] and lung resection [31], earlier time to achieve recovery milestones [25, 31], reduced infections [31], and lower costs [25, 32].

## Take-Home Messages

- ERPs facilitate introduction of evidence-based practice.
- ERPs foster interdisciplinary collaboration and culture.
- ERPs decrease unwanted variability between practitioners.

- ERPs decrease hospital stay by improving care organization, supporting function, and decreasing morbidity.
- ERPs reduce costs and improve the value of surgical care for patients.

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**Part I**  
**The Science of Enhanced Recovery:**  
**Building Blocks for Your Program**

## 2. Preoperative Education

*Deborah J. Watson and Elizabeth A. Davis*

Preoperative patient education is an essential element in an enhanced recovery program. It has been associated with lower levels of anxiety [1], less postoperative pain, improved wound healing, and shorter hospitalization [2]. Preoperative education provides patients with the tools they need to manage the stress of their surgical experience and become partners in their own recovery. Guidelines from the Enhanced Recovery After Surgery (ERAS<sup>®</sup>) Society consistently recommend “routine, dedicated preoperative counseling” [3, 4].

Since the enhanced recovery approach may be different from what patients expect or have previously experienced, they need information about how to participate. This should be provided using clear written guidelines, including specific goals for each day of the perioperative period, the expected length of hospital stay, criteria for hospital discharge [5], and how to continue their recovery following discharge.

While print materials are frequently used to provide pre- and postoperative instructions, these materials are often written at a reading level beyond the ability of most patients and contribute to confusion and poor health outcomes for patients with low literacy skills [6]. Many people are unable to understand and act upon available health information, due to low health literacy [7].

In this chapter, we explore the concept of health literacy, discuss ways to improve patient understanding, identify strategies to create patient-friendly print materials, and describe the preoperative education model supporting the enhanced recovery program at the McGill University Health Centre (MUHC) in Montreal, Canada.

## Health Literacy

Health literacy refers to a set of abilities that allow people to read and evaluate information, fill out forms, understand and follow directions, navigate health care facilities, communicate with health professionals, and use information to make decisions about their health. Low health literacy has been linked with poor health outcomes [8]. Ratzan and Parker describe health literacy as “the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions” [7]. The Canadian Expert Panel on Health Literacy defines it as “the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course.” The panel recognizes the role of education, culture, language, the communication skills of professionals, the nature of the materials and messages, and the settings in which education is provided as important factors in the uptake of health information [9].

In the USA it has been estimated that nearly 50 % of the adult population, or 90 million people, have trouble reading and understanding health information [10]. Six out of ten Canadians do not have the skills to obtain, understand, and act upon health information and services, or to make appropriate health decisions on their own [11]. Canada’s Expert Panel on Health Literacy estimated that more than half of working-age adults in Canada (55 % or 11.7 million) have inadequate health literacy skills and seven out of eight adults over the age of 65 (88 % or 3.1 million) are in the same situation [12]. In 2011, the European Health literacy survey reported that among the eight participating European countries, nearly one of two individuals had inadequate or low health literacy [13]. Those most vulnerable are the elderly, minority groups, immigrants whose first language is not the language of the majority, the less educated, and the poor [7].

Health care professionals tend to underestimate the prevalence of low health literacy because it is not possible to identify this patient population by appearance. Most people with low literacy skills are of average intelligence and able to compensate for their lack of reading ability. People with low functional health literacy may have feelings of shame and inadequacy, so may not admit their lack of understanding or ask for help [14]. While it is not possible to predict low health literacy from a person’s behavior, certain clues may point to it. Patients may fill out

forms incompletely or inappropriately. They may be unable to name their medications or the indications for taking them. They may bring someone with them to do the reading or they may avoid having to read in front of others by saying, “I forgot my glasses” or “I’ll read this later” [10]. Although low levels of literacy predispose people to low health literacy, people who are good readers may also have low health literacy skills. In the context of health care, they may not be able to translate medical jargon and terminology into standard English that makes sense to them [15].

## Strategies to Improve Understanding

Communication between health care providers and patients can be improved. Weiss suggests that clinicians slow down, use plain, non-medical language, show or draw pictures, limit the amount of information, use the teach-back or show-me technique, and create a shame-free environment [6]. Other strategies include prioritizing clear communication within one’s organization and using a “universal precautions” approach to communication.

### *Universal Precautions*

Health literacy affects every patient interaction in every clinical situation. People of all ages, races, income levels, and educational backgrounds are affected by inadequate health literacy and many are unlikely to admit that they need clarification. If patients do not understand the information provided by health care professionals, they are at risk for poor health outcomes. The Canadian Council on Learning reported that without adequate health literacy skill “ill-informed decisions may be taken, health conditions may go unchecked or worsen, questions may go unasked or remain unanswered, accidents may happen, and people may get lost in the health-care system” [11]. Just as health care providers use universal precautions to protect against the spread of infectious organisms, we should use universal precautions to protect against inadequate communication with patients and families [16]. Most people, regardless of their reading or language skills, prefer medical information that is easy to understand.