Enhanced Recovery After Surgery and the Perioperative Surgical Home

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Key Learning Objectives

- Understand the purpose of Enhanced Recovery After Surgery (ERAS) pathways
- Define the Perioperative Surgical Home (PSH)
- Highlight the goals of the ERAS guidelines and PSH in each phase of perioperative care
- Recognize the anesthesiologist's role in addressing the national opioid crisis

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Enhanced Recovery After Surgery

The Enhanced Recovery After Surgery (ERAS) Society was established in 2001 by a group of European surgeons who desired to standardize the perioperative care of patients in an effort to decrease morbidity and mortality and improve recovery after surgery [1]. The mission of the ERAS Society is to develop evidence-based perioperative guidelines for the management of surgical patients with intention to reduce perioperative stress and accelerate recovery after surgery. ERAS protocols have been published across all different surgical subspecialties including thoracic, cardiac, colorectal, bariatric, gynecologic, urologic, head and neck and orthopaedic surgery. These guidelines are unique to the surgical procedure and are recommendations based on the best available evidence as determined by good quality meta-analyses, randomized controlled trials and large cohort studies [2]. Although each surgical specialty has specific ERAS protocols, many of the ERAS pathways highlight similar goals and recommendations. These interventions are aimed at preoperative optimization, intraoperative pain management and maintenance of homeostasis, and postoperative early mobility with continued focus on pain control.

The Perioperative Surgical Home

The Perioperative Surgical Home (PSH) is a multidisciplinary, collaborative and patient-centered model of care for surgical patients. The anesthesiologist is the primary physician in the PSH model and is responsible for coordinating the care of the patient throughout his or her perioperative experience. As the leader of the PSH, the anesthesiologist assumes care of the patient from the time a surgical diagnosis is recognized and focuses on positive outcomes and high patient satisfaction. The PSH is patient-centric, physician-led and team based [3]. Surgical care is frequently episodic and fraught with gaps in communication between the various members of the care team. It often represents a lengthy and confusing journey for a patient through diagnosis, surgery and

rehabilitation [4]. The ERAS pathways were developed with the goal of improving surgical outcomes and patient experience, but are often difficult to implement without a clearly defined perioperative leader. The PSH shares many of the same values and goals of the ERAS guidelines, but also seeks to improve the patient experience by prioritizing continuity of care and communication throughout the preoperative, intraoperative and postoperative journey (Fig. 33.1).

The Perioperative Surgical Home starts with the decision to have surgery. The patient is then sent for preoperative evaluation by an anesthesiologist in an effort to identify and optimize any coexisting medical problems. A comprehensive review of medical history at this time provides the patient and surgeon with a formal risk assessment based on the patient's medical conditions and the inherent risk of the specific surgical procedure. Assessment of comorbidities and the patient's functional status identifies the need for any additional testing or consults that may impact the management of the patient perioperatively. There is also an opportunity for preoperative conditioning, disposition planning and patient education at the time of the preoperative evaluation. The

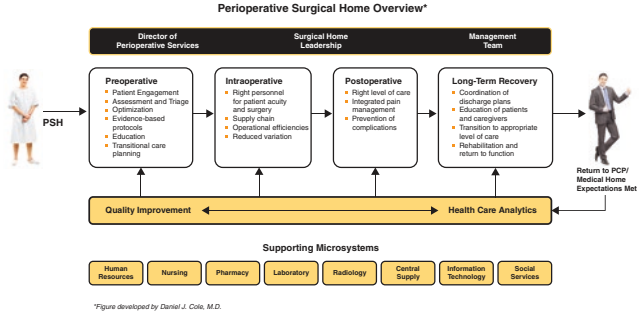

Fig. 33.1 Perioperative surgical home overview. (Public access? Also printed by Springer Publishing)

emphasis intraoperatively is on patient safety and evidence-based anesthetic techniques to optimize patient outcomes. Postoperatively, goals shift to pain control, early mobility, rehabilitation and prevention of postoperative complications such as postoperative nausea and vomiting, myocardial infarction, stroke, pulmonary embolus, and infection. Ultimately, care is transferred back to the primary care physician with an overall decrease in complications, morbidity and mortality resulting in a better patient outcomes [3].

ERAS guidelines complement the concept of a perioperative surgical home. Similar to the perioperative surgical home, ERAS protocols are multimodal and multidisciplinary in nature. Preoperative emphasis on patient education, nutrition, optimization of general medical conditions such as correcting anemia, prewarming and preemptive oral analgesia mirror many of the goals of the preoperative assessment within the PSH (Fig. 33.2). An intraoperative focus on regional anesthesia whenever possible, normothermia, normovolemia, blood conservation and antibiotic prophylaxis highlights the emphasis on patient safety and evidence-based anesthetic techniques that improve patient outcomes. ERAS guidelines recommend postoperative use of multimodal opioid-sparing techniques, postoperative nausea and vomiting (PONV) prophylaxis, early mobilization and early oral intake [5].

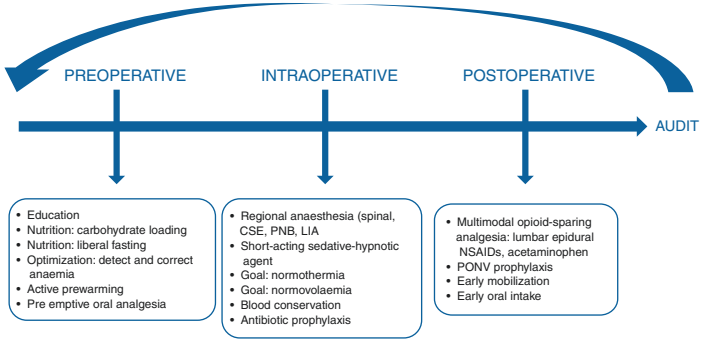

Fig. 33.2 An example ERAS protocol for total joint arthroplasty. (With permissions from BJA)

The PSH model is a coordinated system of perioperative care that requires institutional support and multidisciplinary engagement in order to be successful. The anesthesiologist leads the team with endorsement from surgical and hospital management [3]. The expected metrics of the PSH are to improve operational efficiencies, improve allocation of resources, decrease hospital length of stay and readmission, and reduce morbidity and mortality resulting in overall enhancement of patient care. The concept of a PSH essentially expands the role of an anesthesiologist from a consultant in the treatment of acute pain into a more comprehensive physician leader in the overall perioperative management of surgical patients. The PSH emphasizes continuity, coordination, and integration of perioperative care with a greater focus on patient-centeredness and shared decision making, ultimately aiming to reduce healthcare costs and maximize the quality of patient care [4]. The PSH enhances the visibility and value of the anesthesiology department within the hospital, and affords anesthesiologists the opportunity to expand their clinical practice and depth of expertise.

Preoperative Assessment

The first phase of the Perioperative Surgical Home, the preoperative assessment, begins after the decision has been made by the patient and the surgeon to proceed with surgery. The preoperative visit empowers the patient to participate in his or her perioperative care by engaging in conversations about past medical history, assessment of risk and optimization prior to surgery. The primary goals of preoperative assessment include:

- Documentation of the condition(s) for which surgery is indicated
- Assessment of patient's overall health status
- Perioperative risk determination
- Optimization of the patient's medical conditions in order to reduce surgical and anesthetic perioperative morbidity and mortality

- Perioperative medication management
- Patient education about surgery, anesthesia, intraoperative and postoperative pain control in hopes of reducing anxiety and facilitating recovery
- Reduction of costs, shortening hospital stay, reduction of cancellations and increase of patient satisfaction [6]

The assessment of a patient's overall health status may include preoperative labs such as complete blood count to evaluate for anemia or thrombocytopenia, basic metabolic panel to identify any electrolyte abnormalities or reduced renal function, and albumin as an indicator of overall nutritional status. Preoperative tests may include an electrocardiogram to look for arrhythmias or signs of ischemia, pulmonary function studies in patients with obstructive or restrictive lung disease, sleep study if concern for obstructive sleep apnea, echocardiogram to assess for valvular abnormalities or congestive heart failure, and stress testing if concern for inducible ischemia. The primary goal of the preoperative risk assessment is to prevent major adverse cardiac events such as myocardial infarction and malignant dysrhythmias that may lead to significant morbidity or even perioperative death. Determination of a patient's functional status helps guide need for additional testing.

The preoperative assessment is an excellent opportunity to optimize a patient's medical conditions prior to surgery in order to mitigate intraoperative and postoperative morbidity and mortality. Through a comprehensive review of systems and focused history and physical exam, the anesthesiologist may uncover undiagnosed medical issues such as sleep apnea, congestive heart failure, poorly controlled hypertension or diabetes, chronic kidney disease and previously unidentified risk factors for acute coronary syndrome. Identification of new problems allows for further investigation, referral for additional testing and/or consults from other specialists, and medical management prior to surgery. Occasionally, surgery may be postponed or cancelled due to the discovery of acute cardiopulmonary issues that may need to be addressed prior to an elective surgery. The PSH anesthesiologist

helps follow up on test results and recommendations from consulting physicians and often serves as the liaison between the consulting services and the surgeon.

The patient's home medications are reviewed at the preoperative visit and instructions for each medication are discussed. The PSH anesthesiologist helps determine management of anticoagulants and antiplatelet medications based on anesthetic plan and surgical risk of bleeding. Anticoagulation is typically held perioperatively, but timing becomes significantly more important if there is a plan for neuraxial anesthesia. Additionally, higher risk patients such as those with recent drug eluting stents or mechanical heart valves may require bridging with enoxaparin. Many of the decisions on perioperative medication management are standardized and evidence-based, and failure to adhere to the medication instructions can result in case cancellations or intraoperative complications such as hypotension, bleeding and arrhythmias. Lastly, the preoperative assessment serves to explain the anesthetic plan to the patient, answer any questions, assuage any fears and help to mentally and emotionally prepare the patient for his or her surgery.

The ERAS protocols also begin in the preoperative period. Common preoperative goals in most ERAS pathways include preoperative smoking cessation, reduction of alcohol consumption, recognition and treatment of preoperative anemia, preoperative physical conditioning when appropriate, optimization of nutrition, PONV prophylaxis and preoperative fasting recommendations [2]. Preoperative anemia is associated with increased risk of transfusion, length of stay, infection, morbidity and readmission rates. Preoperative anemia should be identified, investigated and corrected when possible. Recent anesthetic guidelines recommend the intake of clear fluids until 2 hours prior to surgery to maintain normovolemia during the period of preoperative fasting. It is also important to address any preoperative opioid use and introduce the concept of perioperative multimodal analgesia as an opioid-sparing technique. Most non-steroidal anti-inflammatory drugs (NSAIDs) are usually held preoperatively to decrease risk of surgical bleeding, but often resumed in the immediate preoperative period and continued postoperatively [7]. The preoperative

use of acetaminophen is encouraged when appropriate. Optimal pain management is a prerequisite of ERAS and combined use of oral analgesics of different classes with different modes of action has been shown to yield additive pain relief.

Intraoperative Goals

The next phase of the PSH, intraoperative management, focuses on patient safety and evidence-based anesthetic techniques to optimize outcomes [3]. Monitoring vital signs, temperature and volume status, maintaining adequate depth of anesthesia, using regional and neuraxial anesthesia when appropriate, treating intraoperative pain and promptly addressing intraoperative complications are all standards of care for anesthesiologists. Adhering to these basic principles of anesthesia minimizes the stress response of surgery and promotes improved outcomes. ERAS pathways highlight the value of regional and neuraxial anesthesia and promote the use of infiltration of local anesthesia when peripheral nerve blocks, subarachnoid blocks and epidurals are not possible [7]. All ERAS guidelines encourage the use of multimodal analgesia perioperatively to treat pain and minimize opioid use.

Other intraoperative recommendations common in most ERAS pathways include continued emphasis on PONV prophylaxis, intraoperative active warming to maintain normothermia, prophylaxis against venous thromboembolism (VTE), antimicrobial prophylaxis and skin preparation, perioperative fluid management and blood conservation. Prevention of intraoperative hypothermia has been shown to reduce rates of wound infection, decrease cardiac morbidity and reduce intraoperative bleeding [2]. VTE prophylaxis is achieved with compression stockings, intermittent pneumatic compression devices or pharmacological prophylaxis. The use of intravenous antibiotics is imperative to reduce the risk of surgical-site infections. Antibiotic selection is case-specific, dosed 30–60 minutes prior to incision and repeated intraoperatively as necessary. When possible, cleansing the skin with chlorhexidine-gluconate prior to incision is preferred [2]. The dif-

ferent ERAS pathways provide case-specific guidelines for intraoperative fluid management, but generally promote goal-directed treatment with crystalloid and/or colloid, and highlight the importance of blood conservation when possible.

Postoperative Management

The objectives of the PSH and ERAS guidelines in the postoperative phase of care are to optimize pain control, encourage early mobility and rehabilitation and prevent postoperative complications [3]. The use of multimodal opioid-sparing analgesia continues in an effort to treat acute postoperative pain effectively without the side effects and risk of addiction that come with heavy opioid use. Prolonged opioid use in and after surgery is a leading risk factor for longer term addiction and should be avoided. Epidural analgesia, peripheral nerve blocks and local infiltration of anesthesia all improve pain control and decrease need for opioids. Acetaminophen is a core component of multimodal analgesia in ERAS pathways as it reduces acute postoperative pain and has a favorable side-effect profile [7]. Multiple studies have also shown that NSAIDs decrease pain and reduce supplemental opioid use in patients with preserved renal function and no other contraindication to their use. There is conflicting evidence on the utility of gabapentanoids in addressing the neuropathic component of acute postoperative pain. Gabapentin or pregabalin may be considered as another option for opioid-sparing multimodal analgesia in patients with refractory pain. Adequate pain control through the use of multimodal analgesia and limited opioids allows for early ambulation, engagement in rehabilitation and improved outcomes.

The PSH also plays an important role after surgery in the management of chronic medical conditions. In addition to pain management, the goal of the anesthesiologist in the postoperative period is to prevent major adverse cardiac events such as myocardial infarction, stroke, flash pulmonary edema, malignant dysrhythmias and decompensated heart failure. Careful evaluation of perioperative medications, volume status, vital signs and concern-

ing signs or symptoms allows for prompt recognition and treatment of any major cardiopulmonary complications.

Both the PSH and ERAS protocols continue to emphasize PONV prophylaxis during the postoperative period. PONV affects 25–35% of all surgical patients and is a leading cause of patient dissatisfaction and delayed discharge from the hospital [2]. Consideration of risk for PONV preoperatively and intraoperative techniques to reduce PONV help mitigate the risk of PONV postoperatively. If nausea and vomiting persist, multimodal pharmacologic agents should continue to be dosed postoperatively to control symptoms.

Addressing the Opioid Epidemic

Through the use of multimodal analgesia and regional anesthesia, as well as the emphasis on early mobility, anesthesiologists have a unique perioperative opportunity to address concerns about opioid epidemic and empower patients with education and tools to prevent and address acute postoperative pain [8]. It is important for all physicians to understand the patient's opioid consumption during the pre-anesthetic evaluation, as well as his or her risk for substance use, misuse or abuse (Fig. 33.3). Preoperatively, it may be appropriate to maintain opioid therapy to avoid withdrawal, while being aware that these individuals may require significant doses of opioids during the postoperative phase. Some patients may be candidates to titrate down home opioid use in preparation for surgery. It is imperative to have discussions with patients and their families above the risks, benefits and alternatives to opioid therapy preoperatively. Awareness is key. Multimodal analgesia and opioid-sparing techniques are essential in the perioperative care of surgical patients. The use of acetaminophen, NSAIDs,

Fig. 33.3 The Perioperative Opioid Pathway. (Modified from ASA Monitor)

alpha-2 agonists, lidocaine infusions, magnesium infusions and regional anesthesia all help to decrease opioid use. Every decision in the hospital regarding pain management has an impact on the long-term management of pain. It is important to educate patients on how to safely use opioids in the postoperative period to treat acute pain, and empower them to stop using within 7–10 days. Encourage patients to dispose of opioids by returning to pharmacy or other "take back" programs. The PSH anesthesiologist guides patients through postoperative pain, and ensures reconnection with both the surgeon and the primary care physician to ensure no persistent pain or addiction. It is also important to understand the guidelines and regulations for prescribing opioids at the local, state and federal levels.

Summary

ERAS pathways are designed to standardize the perioperative care of patients by recommending evidence-based clinical practices that aim to reduce perioperative stress, decrease morbidity and mortality and improve recovery after surgery. The PSH is a multidisciplinary, team-based initiative led by anesthesiologists with similar goals of improving patient care and decreasing adverse perioperative outcomes. The PSH model integrates the ERAS guidelines into the perioperative care of surgical patients. Anesthesiologists are physician leaders in perioperative medicine as well as experts in risk assessment, optimization of medical comorbidities, pain management and prevention of postoperative complications. The PSH concept highlights the value of anesthesiologists as champions of patient-centered, collaborative, comprehensive perioperative care. The success of the anesthesiologist-led PSH depends on institutional support, strong interdisciplinary communication and a commitment to continuous quality improvement to ensure excellence in patient care.

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