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EBPOM
Evidence Based Peri-Operative Medicine

Congress REVIEW

Enhanced Recovery Programs:

Perioperative Care Pathways To Improve Outcomes and Value

This monograph is based on the Annual Congress of the American Society for Enhanced Recovery held on April 20-22, 2016, in Washington, DC.

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The congress was cohosted by the American Society for Enhanced Recovery (ASER) in conjunction with Evidenced Based Perioperative Medicine (EBPOM). Over 400 attendees, both domestic and international, participated in this 3-day conference, featuring 45 speakers, 11 Q&A panel discussions, and 24 poster presentations. It began with an initial overview of the concept of enhanced recovery, followed by individual sessions focusing on multiple topics, including economics of health care and implementation of an enhanced recovery strategy, fluid and hemodynamic management, pain management, utility of regional anesthesia and analgesia, and the future of perioperative medicine. Presenters included various experts of the health care team, such as surgeons, anesthesiologists, nurses, enhanced recovery coordinators, and hospital executives. This allowed the attendees to gain a unique and insightful perspective of the different aspects and roles involved in successfully implementing an enhanced recovery program.

Enhanced recovery programs (ERPs) are multimodal pathways focused on minimizing the adverse effects of the surgical stress response.[1-3] The implementation of these evidence-based practices is a paradigm shift in the perioperative management of patients.[3] With a multidisciplinary approach, ERPs modify and mitigate factors that lead to surgical stress (eg, physical, physiologic, and psychological) thereby accelerating postoperative surgical recovery.[4] The different elements of ERPs include preoperative patient counseling and education; minimal preoperative fasting; prehabilitation and medical optimization; modified mechanical bowel preparation; individualized fluid management; early postoperative oral intake and mobilization; and standardized multimodal analgesic protocols during recovery.[2,4-7]

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Health Care Economics and Implementation Of Enhanced Recovery

Health care economics are rapidly changing. Costs are rising and unsustainable. An increasing demand for medical services is being placed on our health care system by an aging population with significant comorbidities.[8] Simultaneously, as a result of the Affordable Care Act, multiple reimbursement changes are being implemented by the Department of Health and Human Services and Center for Medicare & Medicaid Services.[9] Furthermore, the Medicare Access and CHIP Reauthorization Act of 2015 has been implemented, creating a new framework in which reimbursement would no longer be associated with volume but value.[10] These changes are shifting Medicare from a fee-for-service model to a value-based payment model.[9] Such actions have created urgency for hospitals and the health care system in this country to reassess and implement a new perioperative care model.

The majority of expenses related to hospital admissions are currently attributed to perioperative care, and this percentage is projected to rise as the population ages.[8] However, the bulk of these expenses is often associated with postoperative morbidity, which has an average cost of about $12,000 per event (Table 1).[11] This enormous expenditure warrants our immediate attention. Health care value is defined as positive patient outcomes (quality) per dollar spent.[12] To maximize this value, effective leaders and members of health care teams must meet and exceed various quality metrics (improving outcomes) while reducing costs.

The enhanced recovery strategy can only be successful when there is a team-based approach. This begins with the identification of key champions within each institution constituting the multidisciplinary team.[4] Together, these individuals assemble a task force, with a predefined protocol for their respective surgical pathways (eg, colorectal, major urologic, hepatobiliary, and major gynecologic). With the appropriate team in place, the next critical step is to educate everyone involved and continually track and follow up to ensure that adherence to the various elements is consistent. Through this approach, the task force will be able to assess and improve on the process, reducing variability and producing better outcomes. This strategy is a prerequisite to a systemwide adoption to realize the economic benefits of an ERP. Successful implementation and execution of an ERP requires synchronous teams of multiple disciplines,

Table 1. Hospital Costs and Length of Stay for Patients With and Without Postoperative Complications

Complication	Complication Present (95% CI)	Complication Absent (95% CI)	*P* Value
Median total hospital costs, $			
Infectious	13,083 (6,499-20,234)	5,044 (4,490-5,767)	<0.001
Cardiovascular	18,496 (8,262-56,857)	5,236 (4,631-5,916)	0.001
Respiratory	62,704 (27,959-135,463)	5,015 (4,498-5,686)	<0.001
Thromboembolic	33,589 (21,985-61,789)	5,233 (4,611-5,851)	<0.001
Median length of stay, d			
Infectious	9 (7-13)	5 (4-5)	<0.001
Cardiovascular	4 (2-35)	5 (1-9)	0.17
Respiratory	19 (9-36)	5 (1-9)	<0.001
Thromboembolic	20 (9-22)	5 (1-9)	<0.001

Based on reference 11.

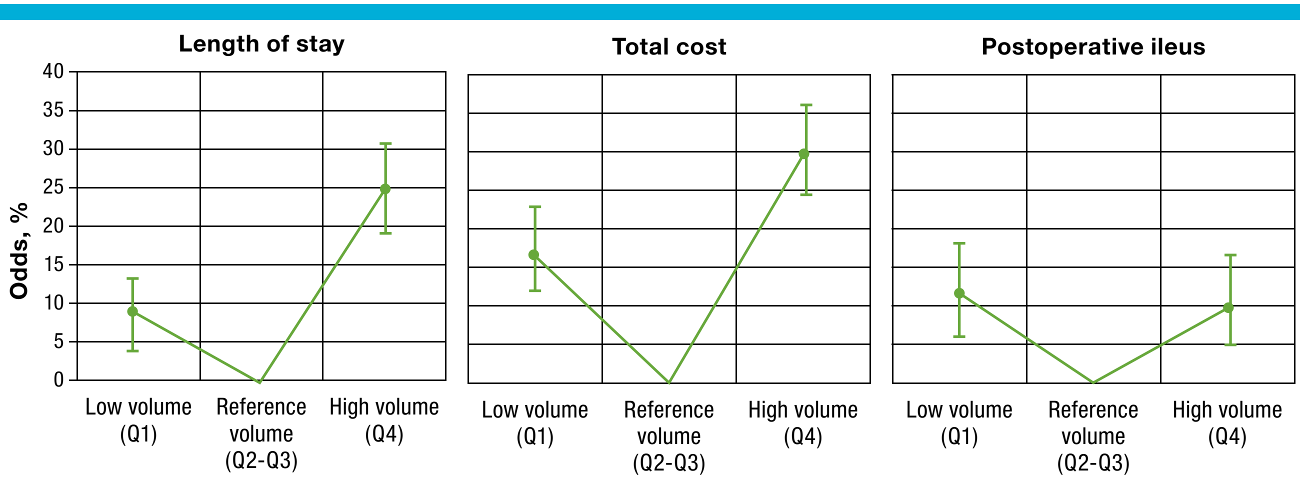

Figure 1. Odds assessment of patient outcomes based on fluid volume for colorectal surgery.

Based on reference 19.

including surgery, anesthesiology, nursing, nutrition, physical therapy, and other dedicated hospital team members.[1] Working together will allow them to effectively integrate and manage the perioperative care of patients within a highly evidenced-based context. There may be some variations among institutions with the implementation process; however, the primary goals of an ERP are to improve care and reduce health care costs.[1]

Fluid and Hemodynamic Management

Patients undergoing any major surgery are exposed to potentially significant morbidity and mortality. These risks often are associated with the perioperative variability in fluid administration. Individualized goal-directed fluid therapy (GDFT) is a key element in an ERP by which hemodynamic and fluid management are targeted using various monitoring parameters, such as stroke volume and cardiac output.[13]

Focusing on intraoperative fluid management, the challenge is to find the optimal balance while achieving 2 primary goals: Establish and maintain central euvolemia, and avoid administering inadequate or excessive fluid with a high salt content. Hypovolemia may lead to hypoperfusion, bowel ischemia, organ dysfunction, and increased adverse outcomes. Conversely, if we allow patients to become overloaded with fluid, edema, organ dysfunction, postoperative ileus, and increased adverse outcomes may result.[14]

GDFT aims to assess fluid responsiveness based on the Frank-Starling curve.[15] A meta-analysis of 29 studies showed that GDFT significantly reduced mortality and surgical complications.[16] To best assess a patient's hemodynamic changes in an individualized approach, a minimally invasive, or noninvasive, cardiac output monitor should be considered in major surgery.[6] Additionally, ERP patients who routinely are allowed to drink liquids up to 2 hours before surgery have an increased likelihood of arriving to the operating room without significant fluid deficit, consequently aiding the management of their fluids. To decrease variability and improve outcomes, GDFT protocols need to be individualized for each patient based on their unique surgical and patient risk factors.[17]

Most instances of intraoperative crystalloid administration have been shown to be determined by providers rather than patient or procedural factors.[18] Additionally, this wide inter- and intraprovider variability in crystalloid infusions gives rise to adverse outcomes.[19] Therefore, the excessive or inadequate administration of crystalloid solution should be avoided using a zero-balance fluid strategy.[20] Furthermore, in a recent large study assessing the association between intraoperative IV fluid utilization and outcomes, significantly worse outcomes were associated with both restrictive and liberal fluid administration.[19] Both extremes resulted in increased total costs and hospital length of stay (LOS), as well as increased incidence of postoperative ileus in patients undergoing colorectal surgery (Figure 1).[19] Conversely, patients who received moderate fluid administration had better outcomes and lower costs.[19]

The international Fluid Optimization Group published a consensus statement focusing on multiple tenets of perioperative fluid therapy.[21] According to the statement, fluid should be comparable to an IV drug, so that their mindful use and titration of timing, duration, and quantity are essential.[21] Fluid responsiveness and the necessity for perfusion changes must be considered when establishing GDFT plans to avoid excessive fluid administration.[21] When considering short surgeries or low-risk surgical patients, balanced crystalloid solutions should be used. However, for more complex procedures, the combination of crystalloid and colloid fluids was found to be best.[21] Furthermore, GDFT plans should be designed using algorithms or detailed protocols, which are understood clearly and used universally by all anesthesiologists within a health care institution.[21]

Fluid management is generally still highly variable in practice ranging from too little to too much fluid administration. Liberal fluid use is associated with increased risk for complications, whereas individual patient-tailored fluid protocols have advantages (eg, reduce morbidity, hospital LOS, and health care costs; Figure 2).[13,16,21] Therefore, adopting GDFT allows anesthesiologists to choose the right amount and type of fluid at the appropriate time.[21,22]

Multimodal and Regional Anesthesia

Within the United States, postsurgical analgesia has remained challenging, as most patients continue to experience significant pain in the postoperative acute care setting.[23] The challenge is to achieve effective pain control with minimum adverse effects. This can be achieved using a multimodal approach.

Multimodal analgesia is defined as the combination of 2 or more analgesic agents or techniques that act by different mechanisms to provide pain control to the patient.[24] The American Society of Anesthesiologists Task Force recommends that, unless contraindicated, all patients should receive a consistent regimen of nonopioids, including nonsteroidal anti-inflammatory drugs, cyclooxygenase-2–specific analgesics, and acetaminophen (APAP).[24] Furthermore, other opioid adjuncts, such as gabapentin or pregabalin, are recommended preoperatively.[25] This is followed by a small intraoperative dose of dexamethasone (4-8 mg) to significantly decrease postoperative pain, nausea, and vomiting, as well as the addition of APAP and ketorolac, if not contraindicated.[26-29] Opioids remain the anchor for analgesia but its use should be minimized.[24,30] A nonopioid foundation using a multimodal analgesia technique should take a number of factors into consideration. First, it is important to consider the

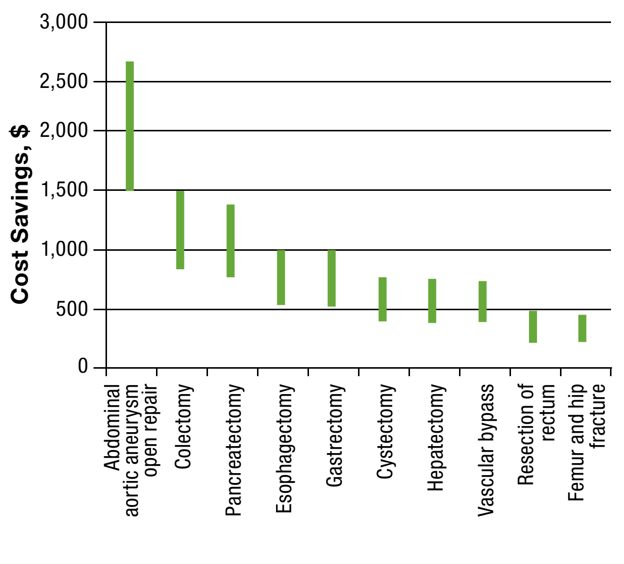

Figure 2. Projected cost savings per patient with perioperative goal-directed fluid therapy.

Based on reference 13.

type of surgery, the expected severity of the postoperative pain, the risk–benefit ratio of the various nonopioid multimodal strategies, and patient preferences and previous experience with pain.[24] Next, it is prudent to integrate a regimen that optimizes the efficacy of the various analgesics, while being cognizant of the side effects of individual medications.[31] Lastly, the ease of use (ie, around-the-clock vs as-needed) and the acquisition cost versus the overall benefits should be evaluated.[24,32]

Pain management regimens in the ERP setting involve the use of multimodal techniques and regional anesthesia while focusing on decreased opioid administration.[33-36] However, it is important to recognize that with the incorporation of multiple aspects of ERPs, the significant benefits of these multimodal techniques may not be as apparent. The overall data suggest that epidural anesthesia results in decreased pain and pulmonary and cardiac morbidity, and earlier return of gastrointestinal function.[37,38] The role and benefits of these in ERPs also show decreased pain and postoperative ileus.[39] However, the limited data available on epidural anesthesia in the ERP setting do not always demonstrate a direct decrease in hospital LOS and complications.[40,41] Evidence on transversus abdominis plane (TAP) blocks shows overall analgesic efficacy, better outcomes when performed in the preoperative period, and reduced analgesic efficacy when intrathecal opioids are used.[42-44] There is a paucity of data investigating TAP blocks within an ERP setting. Meanwhile, the data on paravertebral blocks show a significant decrease in opioid use, pain, postoperative nausea and vomiting, and pulmonary complications.[45,46] More research is needed to further examine the various regional techniques in the context of an ERP.

Education is a key factor to being successful in improving pain experience and avoiding opioid-related adverse events. An open conversation with patients about their postoperative analgesic regimen can lead to a better understanding and result in decreased adverse effects, thereby enhancing recovery. In a study, when patients were asked to determine their analgesic preferences, they were almost twice as likely to choose avoidance of opioid-related side effects rather than better pain relief.[47] Despite the fact that patients in the United States use significantly more opioids postoperatively than their European counterparts, their pain scores are higher, demonstrating the discord between the need for opioids and successful acute pain control.[48]

Outlook

The future of perioperative medicine depends on the multidisciplinary integration and collaboration in patient care. Enhanced recovery strategies are being embraced and adopted more commonly in this new era of value-based care. Perioperative medicine is changing rapidly and with improved outcomes already demonstrated in many surgical procedures, these changes will likely become the standard of care for patients undergoing surgery. The various aspects in each ERP are designed to decrease variability, thereby increasing quality and adding value to patients' perioperative experience. The priority must always focus on value not volume.[49] The time has come for institutions to take the initiative and responsibility to transition to a value-based delivery of care model in managing the health of our patients. Perioperative medicine is evolving. Let us evolve with it.

The following are summaries of some of the key posters presented at the congress. The authors have selected these posters.

Institution of a Patient Blood Management Program To Decrease Blood Transfusions in Elective Knee and Hip Arthroplasty[50]

Popoola O, Reid T, Mullan L, Rafizadeh M, Pitera R

A patient blood management (PBM) program was instituted as a component of the perioperative surgical home with the goal of improving patient outcomes and reducing the incidence of perioperative anemia in patients undergoing joint arthroplasty. The goals of the PBM program were to:

1. identify and treat preoperative anemia;
2. reduce autologous blood transfusions;
3. reduce blood loss during surgery;
4. reduce allogeneic blood transfusions (ABTs); and
5. increase tolerance to anemia and adaptation of transfusion triggers.

Major orthopedic surgery is often associated with an anticipated level of high blood volume loss.[51,52] It has been shown that approximately 40% of patients evaluated before elective orthopedic surgeries are anemic (women hemoglobin [Hb] <12 g/dL, men Hb <13 g/dL).[51] Preoperative anemia is a major predictor of ABT and is also known as an independent prognostic factor of increased mortality and morbidity.[51,53] ABT has been associated with increased rate of infections, perioperative mortality, transfusion reactions, and increased hospital LOS during the perioperative period.[51-53]

PBM protocols were implemented for all patients undergoing elective joint arthroplasty. Preoperatively, patients were seen 30 days before surgery for clinical evaluation and assessment, which consisted of screening for bleeding and coagulation risk, as well as anemia. Patients were treated with 1 or more of the following: IV iron, erythropoietin-stimulating agents, or vitamin supplementation. Autologous blood donation was eliminated. Intraoperatively, cell salvage, antifibrinolytics, and hemostatic agents were instituted. Postoperatively, postsurgical anemia was assessed and treated with IV iron. Blood products were ordered for patients undergoing joint arthroplasty who required approval from anesthesia before receiving a transfusion. Transfusion Hb triggers dropped to 7 g/dL in noncardiac patients and 8 g/dL in cardiac patients.

Blood utilization decreased significantly after incorporation of the program. In 2013, the rate of transfusion in total knee arthroplasty (TKA) was 8.5%. However, in 2014, there was a significant decrease to 5.1%, and in 2015 to 1.9% (P<0.001). In 2013, the average rate of transfusion for total hip arthroplasty (THA) was 12.8%; similar to TKA rates, in 2014, there was a significant decrease to 8.3%, and in 2015, an even further reduction to 6.1% (P<0.001).

Before initiation of the PBM program, the average rate of blood transfusions in this population was 19.45%. The institution's overall current average rate of transfusion is 6.5% (P<0.001). In 2013, the average hospital LOS for patients undergoing TKA was 3.3. In 2014, it was 3.2 days, and in 2015, it was 3.0 days (P<0.001). For patients undergoing THA, the average hospital LOS in 2013 was 3.4. In 2014, it was 3.2 days, and in 2015, it was 3.1 days (P<0.001), respectively.

Since the implementation of the PBM program, there was an increase in patients with an improved functional status upon discharge, and a significant increase in the percentage of patients discharged home: 30% in 2013, 32.5% in 2014, and 39.4% in 2015 for those who underwent TKA (P<0.001). Similarly, there was a significant increase in discharges—32.1% in 2013, 36% in 2014, and 43.5% in 2015—among patients undergoing THA (P<0.001).

The authors found that implementation of a PBM program is an effective way to address preoperative anemia, reduce ABTs, and improve patient outcomes while reducing patient risk, hospital LOS, and cost.

Cardiopulmonary Exercise Testing for Collaborative Decision-Making Prior to Major Hepatobiliary Surgery[54]

Edwards M, Sharp T, Jack S, Armstrong T, Primrose J, Grocott M, Levett D

Cardiopulmonary exercise testing (CPET) is being used more frequently for preoperative risk assessment. Recent data suggest results from CPET are predictive of postoperative morbidity and mortality for various surgical procedures.[55] It is frequently applied to triage postsurgical critical care patients,[56] as well as to facilitate discussion regarding preoperative risk. This study examined the use of CPET in preoperative shared decision-making within the institution's hepatopancreatobiliary surgical unit where postsurgical critical care admissions often occur.

In 2014 and 2015, 146 patients undergoing assessment for liver resection and pancreaticoduodenectomy underwent symptom-limited incremental exercise testing at the surgeon's discretion. Data were collected on CPET results, a clinical plan made on the basis of CPET, and intensive care and hospital LOS in operated patients. The physiologic risk was reported as "low risk" (anaerobic threshold [AT] >0 $mLO_2 \bullet min^{-1} \bullet kg^{-1}$), "high risk" (AT 8-10 $mLO_2 \bullet min^{-1} \bullet kg^{-1}$), or "very high risk" (AT <8 $mLO_2 \bullet min^{-1} \bullet kg^{-1}$). Median age was 69 years, with a mean (SD) AT of 9.6 (2.6) $mLO_2 \bullet min^{-1} \bullet kg^{-1}$. This age was lower than a previous case series of similar patients,[57] and hence may have reflected selective referral of patients where the surgeon had concern about the patients' baseline physiologies. Ultimately, 31 patients did not undergo surgery. Of these patients, 13 (8.9%) had disease deemed nonresectable, whereas 18 (12.3%) had a very high risk (mean AT 6.5 $mLO_2 \bullet min^{-1} \bullet kg^{-1}$). A collaborative decision was made between the patient, surgeon, anesthesiologist, and oncologist, regarding the pursuit of nonsurgical treatment in these patients. Various treatment options were explored to evaluate the risks and benefits. Additionally, the collaborators considered the individualized risk level of postoperative morbidity/mortality as determined by the CPET results. The different treatment options chosen included transarterial chemoembolization, chemotherapy, interval disease surveillance, and palliative care. By revealing cardiac and respiratory limitations to exercise, CPET also triggered significant modifications to perioperative care in 9 "high-/very high-risk" cases undergoing surgery (8% of operated group). This included 4 cases of cardiovascular medication optimizations for exercise-induced ischemia/arrhythmia and 2 cases of respiratory interventions with further treatment of obstructive airway conditions. This preoperative optimization group had their respective surgeries within a median time of 9 days after CPET. Their postoperative outcomes were in accordance with the lower-risk CPET group as follows: critical care LOS 1 day (range, 1-6 days) and hospital LOS 8 days (range, 2-9 days).

Centers and surgical specialties that routinely result in postsurgical critical care admissions may find utility in using preoperative CPET in a higher-risk patient group for guidance in patient care decision-making. This decision-making also includes very high-risk patients when surgery is not an option with regard to their postoperative morbidity and mortality, and timely optimization of cardiorespiratory limitations.

Hospitalization Costs for Patients Undergoing Orthopedic Surgery Treated With IV Acetaminophen + IV Opioids or IV Opioids Alone for Postoperative Pain[58]

Shah MV, Maiese BA, Eaddy MT, Lunacsek O, Pham A, Wan GJ

Using Truven Health's MarketScan Hospital Drug Database (HDD), Shah and colleagues assessed hospitalization costs (medical plus pharmacy) associated with patients undergoing elective TKA, THA, or surgical repair of hip fracture who received multimodal postoperative pain management with the combination of IV APAP and other IV analgesics compared with those who received only IV opioids starting on the day of surgery. The retrospective analysis, sponsored by Mallinckrodt, consisted of approximately 600 participating hospitals and more than 144,000 patients admitted and discharged for elective orthopedic surgery between January 1, 2011, and August 31, 2014. Patients in both groups could receive oral analgesics as part of their postoperative pain management regimen. Although treatment groups were significantly different on all baseline characteristics (all $P<0.001$), including mean age, sex, and whether the hospital was a teaching hospital, the numerical differences observed between groups may not be clinically meaningful.

The key findings associated with the use of multimodal analgesia, including IV APAP compared with IV opioids alone, in the orthopedic postsurgical pain management setting included the following (Table 2)[58]:

- Significantly lower mean total hospitalization costs for patients in the IV APAP group compared with patients in the IV opioid–only group ($12,540 vs $13,242; $P<0.0001$).
- After controlling for baseline differences in the multivariate analysis, differences in hospitalization costs were statistically significant with use of IV APAP as part of a multimodal analgesia approach being associated with $830 less in hospitalization costs ($P<0.0001$).

Because only patients admitted to hospitals providing cost data to the HDD were included, results seen in this analysis may not be generalizable outside of Truven Health's MarketScan.

Analyses were limited to data collected through hospital billing systems; data obtained outside the hospital setting are not included. Cost analyses were conducted at the hospital discharge level, so if a patient was admitted to 2 or more hospitals during the study period, each admission would be considered a unique discharge.

The use of opioids alone has been a mainstay for acute pain management. There is an overreliance on opioids as monotherapy to treat acute pain in US hospitals, with 7 of 10 hospital patients being treated with IV opioids alone.[59] These findings support a similar retrospective study in orthopedic patients that showed that multimodal analgesia with IV APAP was associated with improved patient outcomes and lower costs.[60] Taken together, this analysis may offer important insight on possible ways to help provide savings to the hospital system and improve patient outcomes in the orthopedic surgical setting.

Table 2. Total Costs for Patients Undergoing Orthopedic Surgery

	IV Acetaminophen (n=33,954)		IV Opioids (n=110,300)		*P* Value
	Mean	SD	Mean	SD	
Total costs	$12,540	$9,564	$13,242	$35,825	<0.0001
Medical costs	$12,053	$9,377	$12,754	$34,870	
Medical supplies	$2,795	$1,870	$2,889	$5,717	
Lab	$197	$301	$219	$1,019	
Imaging	$91	$129	$105	$238	
Other (eg, hospital administration, monitoring)	$8,970	$7,922	$9,541	$30,735	
Pharmacy	$486	$488	$488	$1,120	0.6786

Based on reference 58.

Introduction and Implementation of an Enhanced Recovery Program to a General Surgery Practice in a Community Hospital[61]

Shanahan P, Rohan J, Chappell D, Chesher C

In response to a hospital LOS greater than the National Surgical Quality Improvement Plan averages for diagnosis-related groups 329 through 331, a team of anesthesiologists incorporated evidence-based practice protocols and implemented an ERP into their institution.[62] A cohort of general surgeons from different groups were presented the ERP concepts with the goal of universal adoption from the surgery team. Initially, one surgeon adopted the program. However, after the pilot results were communicated with the other surgeons, further adoption developed. The positive results of this ERP displayed consistency with other published ERP literature. Within 3 months, the entire surgical team fully embraced and implemented the ERP while maintaining consistent positive results.

In just several months of implementation of an ERP, the institution and all of the participating general surgeons quickly accepted the adoption. Within the first 9 months, the ERP resulted in reduced hospital LOS of at least 50% and a variable reduction in direct cost of $4,357 per surgical case. Additionally, the program reduced various other hospital costs resulting in substantial savings for the institution.

During 2015, the institution's general surgeons implemented the ERP into their practice. Initially, there was disagreement by some surgeons of the well-established ERP principles. However, after observing similar programs and their significant benefits amongst their competitor surgeons, the adoption became widespread. Presenting evidence-based practices by a team of ERP champions can quickly achieve positive results through reductions in cost and hospital LOS. Several key elements in the ERP were found to be more important to the ongoing compliance and success of the program. Education of patients and their families is an essential component. The education theme extended to the professionals at all levels. Emphasis on multimodal pain management with narcotic use reduction was the second strong element in the program. Finally, engaging the nursing staff ensured continuity of the path after the surgical episode.

"Get Fit" for Surgery: Benefits of Prehabilitation Clinic for an Enhanced Recovery Program for Colorectal Surgical Patients[63]

Vanderbeek S, Kelly R, McEvoy P

Leadership at Beaumont Health System-Troy determined that a more consistent approach to screening surgical patients and preventing cancellations and delays was needed. Also, an ERP was implemented to engage the patients and improve their outcomes. The ERP included several established protocols: nutrition optimization; strength and conditioning; bowel preparation and optimization; appropriate use of premedication; GDFT; anesthetic optimization; nausea and vomiting control; multimodal analgesia; glycemic control; early feeding and bowel stimulation; early mobilization and conditioning; and education and expectation management.

A multidisciplinary team of experts (surgeons, anesthesiologists, a nurse educator, dietitians, the office manager, floor nurses and managers, pharmacists, a librarian, nurse anesthetists, administrative managers, and a project manager) was assembled to implement an ERP into the institution.

In July 2015, educating patients moved from the classroom to a clinic setting. Clinic space was created in the prescreening department, and the name STTAR (Surgical Testing and Teaching for an Accelerated Recovery) was given to the prescreening/prehabilitation clinic. The goal of the clinic was to create a "one-stop shop" and provide a pleasant experience for patients. Patients received a "goody bag" with the educational booklet, an incentive spirometer, and nutritional drinks.

A scheduling system was set up through the registration department. Cases were boarded as "ERAS" (Enhanced Recovery After Surgery) to identify them on the operating room schedule. An ERAS order set was developed in the electronic medical record. The STTAR clinic nurse provided the educational component and conducted tests. The physician assistant (PA) provided a history and physical examination. If needed the dietitian, ostomy nurse, and anesthesiologist were consulted to see the patient.

The ERAS committee continued to meet monthly and make adjustments to the program and order set as needed. By January 2016, the team had created educational videos that could be sent to patients via email or text. A request for a PA to run the clinic was approved. A grant was obtained to expand the program to other specialties, with orthopedics, spine, and bariatric surgery expected to launch over the next year.

Over 400 patients have been enrolled in the ERP protocol since the start of the program. Based on data of the first 150 ERAS cases in the clinic since July 2015, there has been a reduction in hospital LOS from 5.05 to 4.30 days with a decrease in direct cost from $8,171 to $7,245. There also has been a reduction in surgical site infections and emergency department admissions. Additionally, the patient surveys have been positive. Similar results are anticipated as the project continues to expand.

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