SOUTHERN SURGICAL ASSOCIATION ARTICLE

Enhanced Recovery after Colorectal Surgery: Can We Afford Not to Use It?

Andrew D Jung, MD, Vikrom K Dhar, MD, Richard S Hoehn, MD, Sarah J Atkinson, MD, Bobby L Johnson, MD, Teresa Rice, MD, Jonathan R Snyder, MD, FACS, Janice F Rafferty, MD, FACS, Michael J Edwards, MD, FACS, Ian M Paquette, MD, FACS

BACKGROUND: Enhanced recovery pathways (ERPs) aim to reduce length of stay without adversely affecting short-term outcomes. High pharmaceutical costs associated with ERP regimens, however, remain a significant barrier to widespread implementation. We hypothesized that ERP would reduce hospital costs after elective colorectal resections, despite the use of more expensive pharmaceutical agents.

STUDY DESIGN: An ERP was implemented in January 2016 at our institution. We collected data on consecutive colorectal resections for 1 year before adoption of ERP (traditional, n = 160) and compared them with consecutive resections after universal adoption of ERP (n = 146). Short-term surgical outcomes, total direct costs, and direct hospital pharmacy costs were compared between patients who received the ERP and those who did not.

RESULTS: After implementation of the ERP, median length of stay decreased from 5.0 to 3.0 days ($p < 0.01$). There were no differences in 30-day complications (8.1% vs 8.9%) or hospital readmission (11.9% vs 11.0%). The ERP patients required significantly less narcotics during their index hospitalization (211.7 vs 720.2 morphine equivalence units; $p < 0.01$) and tolerated a regular diet 1 day sooner ($p < 0.01$). Despite a higher daily pharmacy cost ($477 per day vs $318 per day in the traditional cohort), the total direct pharmacy cost for the hospitalization was reduced in ERP patients ($1,534 vs $1,859; $p = 0.016$). Total direct cost was also lower in ERP patients ($9,791 vs $11,508; $p = 0.004$).

CONCLUSIONS: Implementation of an ERP for patients undergoing elective colorectal resection substantially reduced length of stay, total hospital cost, and direct pharmacy cost without increasing complications or readmission rates. Enhanced recovery pathway after colorectal resection has both clinical and financial benefits. Widespread implementation has the potential for a dramatic impact on healthcare costs. (J Am Coll Surg 2018;■:1−8. © 2018 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Enhanced recovery pathways (ERPs) are gaining acceptance and being implemented in multiple surgical specialties, particularly in colorectal surgery. In 2001, academic surgeons in Europe published the first standardized ERP for elective colorectal surgery after preliminary data suggested multimodal pain control and early enteral nutrition improved postoperative recovery. Both early studies and more recent studies have demonstrated benefits in reducing length of stay.[1-4] Similar results have been seen with postoperative complication rates, with some studies reporting up to a 50% reduction in adverse outcomes after the implementation of an ERP.[5-12]

With benefits to ERPs repeatedly demonstrated in the literature, many societies have proposed its routine use in elective colorectal resection.[13] The American Society of Colon and Rectal Surgeons and Society of Gastrointestinal and Endoscopic Surgeons recently released guidelines on the use of ERPs in colorectal surgery.[14] These guidelines challenge certain historical surgical dogma;

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From the Department of Surgery, University of Cincinnati College of Medicine (Jung, Dhar, Hoehn, Atkinson, Johnson, Rice, Snyder, Rafferty, Edwards, Paquette) and Cincinnati Research in Outcomes and Safety in Surgery (Jung, Dhar, Hoehn, Atkinson, Johnson, Rice, Paquette), Cincinnati, OH.

Correspondence address: Ian M Paquette, MD, FACS, Department of Surgery, University of Cincinnati College of Medicine, 2123 Auburn Ave #524, Cincinnati, OH 45219. email: ian.paquette@uc.edu

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they emphasize minimization of narcotic medications, fluid restriction, and early resumption of diet.[15] Despite this, widespread clinical application of these pathways has been slow, likely due to the persistence of historical surgical dogma, as well as healthcare system resistance to perceived higher costs. Surgeons might be uncomfortable embracing an idea that contradicts historical teaching about appropriate length of stay, diet advancement, and narcotic usage.

Early experiences with ERPs have shown benefits in perioperative pain control and reduced length of stay. However, these pathways often use expensive medications, such as IV acetaminophen, IV ibuprofen, and alvimopan. Consequently, there remains concern that pharmacy costs are prohibitive to fully implementing an ERP. This concern is inappropriately exaggerated at institutions where pharmacy budgets are calculated without broader consideration for total hospital budget. Our hypothesis was that implementation of an ERP in colorectal surgery might increase daily pharmacy costs, but would reduce total hospital expenditure significantly.

METHODS

Enhanced recovery pathway

In January 2016, an ERP was universally implemented at our institution for all elective colorectal resections (Table 1). In both the traditional and ERP groups, all procedures were done by the same 3 board-certified colon and rectal surgeons. Before the operation, patients were counseled about appropriate expectations and details of the pathway. Patients were instructed to take oral gabapentin 3 days before the procedure, which was continued until hospital discharge. On the day before the operation, mechanical bowel preparation with oral neomycin and flagyl was initiated, along with consumption of 2 Glycemic Endothelial Drinks (SOF Health).[16,17] Additionally, a third Glycemic Endothelial Drink was consumed the morning of the operation. Alvimopan, a μ-receptor antagonist, was given 2 hours before the procedure and continued bid during index hospitalization for a maximum of 7 days. Intraoperatively, the protocol required that the anesthesiology team judiciously maintain a euvolemic fluid status. Postoperatively, a transversus abdominis plane block was performed as part of a multimodal pain control regimen. For the first 24 hours after the operation, scheduled IV ketorolac and acetaminophen were prescribed. After 24 hours, all IV analgesics were discontinued, and patients were started on a combination of oral acetaminophen, ibuprofen, and oxycodone, as needed. A soft diet was initiated on postoperative day 1 for laparoscopic procedures and day 2 for open procedures. The pathway emphasized early ambulation and required patients to remain out of bed 4 to 6 hours beginning on the day of the operation. These processes of care are similar to those proposed by Delaney and colleagues[18] and are consistent with what is recommended in the American Society of Colon and Rectal Surgeons and the Society of American Gastrointestinal and Endoscopic Surgeons guidelines.[14,19]

All consecutive patients undergoing elective colorectal resection from January 2015 to January 2017 at a single medical center, representing 1 year before and 1 year after implementation of our ERP were included. Patient demographics and clinical data on hospital stay were retrospectively collected. Exclusion criteria included emergency operation, procedures not requiring bowel resection, and procedures for enterostomy takedowns. Type of colectomy was divided into the following 4 groups: right colectomy, left colectomy, proctectomy (low anterior resection or abdominoperineal resection), and total abdominal colectomy. Patients were also categorized according to level of anastomosis; colon, rectum, coloanal, or no anastomosis (signifying that an end eterostomy was performed).

Perioperative quality measures and outcomes were analyzed for surgical site infection, anastomotic leak, duration of ileus, and requirement for blood transfusion. Surgical site infections were defined as superficial cellulitis, deep incisional infection requiring drainage and treatment with local wound care, or organ space infections requiring either surgical or nonsurgical interventions. Anastomotic leak was defined by breakdown of the surgical anastomosis and confirmed with clinical or radiographic findings consistent with air and fluid or contrast around the anastomosis. Prolonged ileus was defined as failure of return of bowel function 3 days after operation with clinical or radiographic findings consistent with reduced bowel motility. Placement of a nasogastric tube was not required for the diagnosis of prolonged ileus.

Individual cost data were collected and managed by the hospital billing department. Total cost of hospital stay was divided into supply, labor, and other costs.

Statistical methods

Patients were categorized into “Traditional” and “ERP” groups based on use of the ERP. Patient demographics and perioperative factors including operative approach, type of surgical resection, type of anastomosis, operative time, and estimated blood loss were compared. Primary outcomes included length of stay (LOS), total narcotic dosage, day diet was advanced, and 30-day complications. Total narcotic dosage was measured in morphine equivalent units. Hospitalization cost data were also collected