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Adoption of enhanced recovery after surgery (ERAS) strategies for colorectal surgery at academic teaching hospitals and impact on total length of hospital stay

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Abstract

Objective The objective of enhanced recovery after surgery (ERAS) programs is to incorporate strategies into the perioperative care plan to decrease complications, hasten recovery, and shorten hospital stay. This study was designed to determine which ERAS strategies contribute to overall shortened length of hospital stay in patients undergoing elective colorectal surgery in hospitals.

Methods A retrospective cohort study of 336 consecutive patients at seven hospitals was performed. Demographic and data on 18 ERAS components identified from a systematic review of the literature were collected. A multiregression analysis was performed to assess for factors independently associated with a total length of hospital stay of 5 days or less.

Results Fifty-five percent were male (mean age, 62 years), 57.5% had an ASA III or IV, 76.9% had cancer, and 28.6% had low rectal procedures; 46.3% were completed laparoscopically. The median length of stay was 6.5 days with a mean of 8.6 days. On bivariate analysis, strategies associated with a stay $\leq$5 days were preoperative counseling, avoidance of oral bowel preparation, use of a laparoscopic approach, use of a transverse incision, introduction of clear fluids on day of surgery, and early discontinuation of the Foley catheter (all $P < 0.05$). On multivariate analysis, factors that remained significantly associated with a stay $\leq$5 days included use of a laparoscopic approach (odds ratio (OR), 1.24; 95% confidence interval (CI), 1.12–1.38), preoperative counseling (OR, 1.26; 95% CI, 1.15–1.38), intraoperative fluid restriction (OR, 1.26; 95% CI, 1.15–1.37), clear fluids on day of surgery (OR, 1.09; 95% CI, 1.00–1.2), and Foley urinal catheter discontinued within 24 h of colon surgery and 72 h of rectal surgery (OR, 1.13; 95% CI, 1.01–1.27).

Conclusions In hospitals with variable uptake of ERAS strategies, preoperative counseling, intraoperative fluid restriction, use of a laparoscopic approach, immediate

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initiation of clear fluids after surgery, and early discontinuation of the Foley catheter are all independently associated with shortened length of stay.

Keywords Enhanced recovery after surgery · Colorectal surgery · Fast-track surgery

During the past decade, there has been a paradigm shift in the perioperative care of patients who undergo elective colorectal surgery. The traditional components of care, including use of an oral bowel preparation, preoperative fasting, use of NG tubes and intra-abdominal drains, and postoperative bowel rest, have been challenged by increasing evidence that less trauma and emphasis on earlier return to normal function enhance recovery. Enhanced recovery after surgery (ERAS) programs are multimodal programs developed to decrease postoperative complications, speed recovery, and promote early discharge [1]. Using the best evidence available, ERAS programs adopt novel strategies to decrease perioperative stress, pain, and dysfunction. The key concepts of ERAS programs in colorectal surgery include patient education and preparation, preservation of gut function, minimization of organ dysfunction, minimization of pain and discomfort, and promotion of patient autonomy [2].

In patients who undergo colorectal surgery, five randomized controlled trials to date have found that utilization of an ERAS program leads to fewer complications and shortened length of stay compared with traditional perioperative care plans [3–7]. The components of these programs can be classified into preoperative, intraoperative, and postoperative interventions. Interestingly varying strategies or components of ERAS programs have been evaluated within each of these trials (Table 1). This makes it confusing to understand which components of an ERAS program are most responsible for the positive outcomes that have been observed and which strategies clinicians and policy makers should adopt to optimize recovery.

During the past decade, two guidelines have been published that detail strategies to enhance recovery after colorectal surgery [8, 9]. The dissemination and uptake of these guidelines are unknown. The purpose of this study was to determine the utilization of individual ERAS strategies across seven teaching hospitals within the same university and to determine which ERAS strategies contribute most significantly to overall shortened length of hospital stay in patients who undergo elective colorectal surgery.

Methods

This was a retrospective study of consecutive patients who underwent an elective colorectal surgical procedure between July 1, 2008 and June 30, 2009 at one of seven teaching hospitals affiliated with the University of Toronto Department of Surgery (St. Joseph's Health Centre, Toronto General Hospital, Toronto Western Hospital, Mount Sinai Hospital, St. Michael's Hospital, Sunnybrook Health Science Centre, Toronto East General Hospital). Surgeons from all the hospitals belong to the Division of General Surgery, participate in university-wide rounds, and are responsible for teaching residents. All of the hospitals are members of the Best Practices in General Surgery program, which develops and disseminates guidelines to support standardized evidence-based perioperative care. Before undertaking this study, university-wide guidelines for ERAS had not been developed; however, many of the hospitals had made local attempts to adopt an ERAS program with the use of preprinted postoperative order sets and care plans. This study acted as audit to evaluate the current uptake of ERAS strategies proposed in the published guidelines [8, 9]. Research ethics board approval was obtained at each hospital before beginning the study.

Fifty patient charts were retrieved from the medical records of each hospital using the Canadian Classification of Interventions (CCI) coding system. All patients who were aged 18 years or older and who underwent an elective procedure captured by the following codes were included: excision total, partial, or radical large intestine; excision total or partial rectum; reattachment of large intestine; closure of fistulas small or large intestine. Patients were excluded if they were deemed palliative or underwent pelvic pouch procedures, pelvic exenteration, or any other multivisceral resection. These complex procedures were excluded, because they are only completed at specific hospital sites and are associated with higher complication rates and longer hospital stays.

After piloting the data extraction forms for five patient charts at each site by two study members (one investigator and one data extractor), anonymized data were extracted from the patient's paper and computerized medical chart and entered into a Microsoft Access database. Independent variables collected: gender, age, BMI, comorbidities, ASA score, hospital, procedure, technique utilized (laparoscopic vs. open), etiology, and ERAS interventions employed.

The ERAS interventions examined were those that had been included in ERAS protocols and assessed in previous randomized, controlled trials. The 18 ERAS interventions evaluated are described in Table 1 as preoperative, intraoperative, and postoperative interventions [10]. Some of the ERAS variables could not be found within the hospital chart, specifically preoperative interventions such as preoperative counseling regarding "early discharge," use of probiotics, and carbohydrate loading before surgery. To understand whether we were missing these interventions due to the retrospective nature of the study, because this

Table 1 Strategies included in randomized trials of ERAS programs for patients undergoing elective colorectal surgery

	Anderson et al. 2003 [3]	Delaney et al. 2003 [17]	Gatt et al. 2005 [4]	Khoo et al. 2007 [5]	Muller et al. 2009 [6]	Serclova et al. 2009 [7]
Preoperative						
Preoperative counseling	X	X	X	X	X	X
Preassessment by anesthetist	X		X			X
Probiotics	X		X			
Oral bowel preparation omitted	X		X	Standard MBP (Fleet)	X	Only if rectal surgery
Carbohydrate loading	X		X			X
Length of fast before surgery	3 h		3 h	3 h	4 h	2-4 h
Intraoperative						
Fluid restriction				X	X	X
Hyperoxia	X		X			
Transverse incision	X		X			
No NG tubes or drains	X	X	X	X	X	
Postoperative						
Clear fluids day of surgery		X	Early fluids	X	X	X
Regular diet	Early diet	Day 1	Early diet	OR day	Day 1	OR day
Epidural	X			X	X	X
Standing NSAIDS	X	X		X		X
Aggressive ambulation	Structured physiotherapist plan	Evening of surgery POD 1, mobility targets	Structured physiotherapist plan	Evening of surgery with mobility targets	Early mobilization	Exercise in bed Encouraged to mobilize
Discontinue Foley 24 h after colon and 72 h after rectal surgery				X		
Domperidone (Motilium)				X		
Magnesium hydroxide (Milk of Magnesia)				X		
Liquid calorie supplements				X	X	

data had not been captured in the charts, surgeons with patients enrolled in the study were asked directly about their practice patterns and whether they routinely included these strategies for their elective colorectal patients.

The primary outcome variable was total length of stay for the first 30 days following initial elective procedure, including days stayed during any readmissions within the first 30 days. Because there is concern that early discharge may lead to readmission, this would be captured in this composite outcome. A short hospital stay was considered a priori to be 5 days or less. Previous patients enrolled in randomized, controlled trials that evaluated ERAS programs have had a median hospital length of stay of 3–5 days for open surgery and 2–5 days for laparoscopic surgery [10, 13]. This cutoff also was thought to be sensitive enough to detect the impact of the adoption of an ERAS intervention. Other outcomes measured included length of primary hospital stay, readmissions, complications, and mortality.

Data were compiled by hospital and for the entire cohort. Continuous variables were reported with means and standard deviations, and categorical variables with frequencies and proportions. Length of stay was reported as a median, because it can be heavily influenced by outliers. The impact of demographic factors (e.g., age and sex), clinical factors (e.g., diagnosis, type of procedure), and ERAS strategies on the primary outcome, and total length of stay ≤ 5 days, was first established in bivariate analyses. Variables with a $P < 0.1$ on bivariate analysis were entered into multiple logistic regression analysis. Due to the clustered nature of the data (i.e., patients were clustered within seven hospitals and would conceivably receive more similar care), generalized estimating equations (GEE) were used in place of standard logistic regression because these models account for the dependence in clustered data [11]. To get adequate representation per hospital, 50 patient charts were reviewed per hospital to give a complete data set of 350 patients.

Results

A total of 336 patients were included in the study. From the 350 patients charts reviewed, 14 patients were excluded before analysis because they were diagnosed with an unresectable tumor at the time of surgery and their care was deemed palliative. The average age of patients included in the study was 62 years, the majority were male (55.4%), and 57.5% had an ASA III or IV (Table 2). Most patients underwent surgery for malignant disease (76.9%), and 28.6% had low rectal procedures. Almost half of the procedures were completed laparoscopically (46.3%). A transverse incision was only done for laparoscopic cases.

Overall, the rate of complications was 23.8% ($n = 80$). There were 12.8% ($n = 43$) major complications; 26 (7.7%) anastamotic leaks, 13 (3.9%) cardiac or vascular events (myocardial infarction, cerebrovascular event), and 13 (3.9%) pulmonary events. Only one patient died (0.3%). Other complications included: wound infections ($n = 40$, 11.9%), and bleeds ($n = 8$, 2.4%).

There was variable uptake of the different ERAS strategies (Table 3). Only 2 of the 18 strategies evaluated occurred frequently (>75%); assessment by anesthesia and avoidance of NG tubes. A few of the strategies were employed approximately half of the time; counseling regarding early discharge (41.4%), clear fluids evening of surgery (41.7%), and early discontinuation of Foley catheter (51.8%). Most were not utilized at all, including use of probiotics, oral carbohydrate loading, prescription of postoperative motility agents, and liquid caloric supplements.

The median length of stay was 6.5 days with a mean of 8.6 days. One hundred and thirty-four patients (40.1%) had a total length of stay of 5 days or less. The readmissions rate was 17.6% ($n = 59$).

On bivariate analysis, ERAS strategies significantly associated with a length of stay of 5 days or less included preoperative counseling, omission of oral bowel preparation, intraoperative fluid restriction, use of a transverse incision, avoidance of NG tubes, initiation of clear fluids on operative day, and early discontinuation of Foley urinary catheter (all $P < 0.05$; Table 3). Use of laparoscopic approach and type of surgical procedure completed also were significantly associated with a shortened total length of stay (Table 2).

In creating the multivariable regression model variables with $P < 0.1$ were included in the model with the exception of two ERAS variables. The variable avoidance of "NG tubes" was excluded, because only four patients in the short length of stay group received an NG tube, and it was thought that this small number may erroneously impact the model. Incision type was excluded, because it was collinear with use of a laparoscopic approach. In addition, use of an "oral bowel preparation" was excluded, because the data were of poor quality and >25% of the data were undeterminable as this variable was inconsistently reported in the patient chart. When we performed a sensitivity analysis with oral bowel preparation left in the model, the relationship between use of an oral bowel preparation and length of stay was not significant ($P = 0.059$). In multivariate analysis, the factors significantly associated with a length of stay of 5 days or less included use of a laparoscopic approach (odds ratio (OR), 1.24; 95% confidence interval (CI), 1.12–1.38), preoperative counseling regarding expected length of stay (OR, 1.26; 95% CI, 1.15–1.38), intraoperative fluid restriction (<1500 cc unless greater than 500 cc of bleeding; OR, 1.26; 95% CI, 1.15–1.37), clear fluids on day of surgery (OR, 1.09; 95% CI, 1.00–1.2), and Foley catheter discontinued within 24 h of colon surgery and 72 h of rectal surgery (OR, 1.13; 95% CI, 1.01–1.27; Table 4).

Discussion

Evidence supporting ERAS initiatives and ERAS guidelines were published more than 7 years ago, yet this study demonstrates the inconsistent uptake of these strategies in clinical practice. At a university center with a high volume of colorectal surgeries across seven hospitals, all with a desire to implement an ERAS program and variable attempts to do so, only 21% of patients received epidurals, 2% had fluid restriction for 3 h or less, 42% were allowed clear fluids the day of surgery, and 52% had early discontinuation of the Foley catheter. This demonstrates that guidelines alone often are not enough to influence change. In the case of ERAS strategies, obstacles to adoption may include the need for an engaged multidisciplinary team, confusion regarding the essential components of an ERAS program, ambiguity regarding how to implement the intervention, and the need for local and culturally appropriate guidelines [1, 12].

This study demonstrates that there are several simple strategies that are associated with a shortened hospital stay. With multiregression analysis, factors that remained significantly associated with a length of stay of 5 days or less

Table 2 Table of demographics and clinical characteristics by total length of hospital stay (means and proportions)

Variable	Overall	Total postop ≤5 days[a]	Total postop >5 days[a]	*P* value
Age, mean (SD)	62.1 (15.5)	60.6 (16.5)	62.2 (16.4)	0.38**
Sex, *n* (%)				
Male	185 (55.4)	67 (36.2)	118 (63.8)	0.117
Female	149 (44.6)	67 (45.0)	82 (55.0)	
ASA, *n* (%)				
1	12 (3.7)	5 (41.7)	7 (58.3)	0.732
2	126 (38.8)	55 (43.7)	71 (56.4)	
3	156 (48.0)	60 (38.5)	96 (61.5)	
4	31 (9.5)	14 (45.2)	17 (54.8)	
BMI, mean (SD)	27.7 (6.9)	27.4 (5.7)	27.8 (7.7)	0.620**
Current smoker, *n* (%)	52 (15.5)	22 (42.3)	30 (57.7)	0.371
Hypertension, *n* (%)	129 (38.4)	50 (38.8)	122 (58.9)	0.732
Diabetes, *n* (%)	51 (15.2)	21 (41.2)	30 (58.8)	0.878
CAD, *n* (%)	43 (12.8)	18 (41.9)	25 (58.1)	0.868
COPD/asthma, *n* (%)	27 (8.0)	11 (40.7)	16 (59.3)	1.000
Heart arrhythmia, *n* (%)	22 (6.6)	6 (27.3)	16 (72.7)	0.262
Previous DVT, *n* (%)	10 (3.0)	4 (40.0)	6 (6.0)	1.000†
Stroke/TIA, *n* (%)	14 (4.2)	5 (35.7)	9 (64.3)	0.788
Diagnosis				
Benign	7 (2.1)	2 (28.6)	5 (71.4)	0.637†
IBD	53 (15.9)	20 (37.7)	33 (62.3)	
Other inflammatory	17 (5.1)	6 (35.3)	11 (64.7)	
Neoplasm	257 (76.9)	107 (41.6)	150 (58.4)	
Procedure, *n* (%)				
Ileocolic resection	8 (2.4)	3 (37.5)	5 (62.5)	<0.001†
Right hemicolectomy	99 (29.5)	52 (52.5)	47 (47.5)	
STC with ileostomy	4 (1.2)	0 (0)	4 (100)	
STC with IRA	16 (4.8)	1 (6.3)	15 (93.8)	
Anterior resection/sigmoid resection/sigmoidectomy/left hemicolectomy	89 (26.5)	45 (50.6)	44 (49.4)	
Low anterior resection	61 (18.2)	20 (32.8)	41 (67.2)	
Abdominoperineal resection	23 (6.8)	3 (13)	20 (87)	
Hartmann reversal	26 (7.7)	8 (30.8)	18 (69.2)	
Proctocolectomy	13 (3.9)	4 (30.8)	9 (69.2)	
Major site of surgery[b], *n* (%)				
Colon procedure	240 (71.4)	108 (45)	132 (55)	0.005
Rectal procedure	96 (28.6)	27 (28.1)	69 (71.9)	
Approach				
Laparoscopic	155 (46.3)	93 (60)	62 (40)	<0.001
Open	146 (43.6)	32 (21.9)	114 (79.1)	
Converted	34 (10.2)	9 (26.5)	25 (73.5)	

[a] Percentages are calculated as percent of factor category that have a LOS of ≤5 days vs. >5 days (e.g., percent of females with ≤5 days LOS)

[b] Procedure was reclassified as colon surgery versus rectal surgery. Colon procedures: ileocolic resection, right hemicolectomy, subtotal colectomy, anterior resection, and Hartmann reversal. Rectal procedures: low anterior resection, abdominoperineal resection, proctocolectomy

** Design-adjusted *t* test used to account for clustered nature of data

† Fisher's exact test used due to small cell sizes

Table 3 Uptake of ERAS strategies by total length of hospital stay

	Overall		Postop stay					
			≤5 days		>5 days		χ^2	*P* value
	N	%	*N*	Row %	*N*	Row %		
Preop counseling							29.78	<0.001
Yes	139	41.4	80	57.6	59	42.4		
No	197	58.6	55	27.9	142	72.1		
Preassessment by anesthesia							0.01	0.926
Yes	260	77.4	105	40.4	155	59.6		
No	76	22.6	30	39.5	46	60.5		
Probiotics given							–	–
Yes	0		0		0			
No	336	100	135	40.2	201	59.8		
Mechanical oral bowel prep							6.67	0.042*
Yes	109	32.4	33	30.3	76	69.7		
No	129	38.4	54	41.9	75	58.1		
Undet	98	29.2	48	49.5	49	50.5		
Carbohydrate loading							–	–
Yes	0		0		0			
No	336	100	135	40.2	201	59.8		
Preop fasting protocol							0.04	0.848*
≤3 h	7	2.1	3	42.9	4	57.1		
>3 h	308	91.7	122	39.6	186	60.4		
Undet	21	6.3	10	47.6	11	52.4		
Intraoperative fluid restriction[a]							5.35	0.021*
Yes	24	7.1	14	58.3	10	41.7		
No	276	82.1	115	31.7	161	58.3		
Undet	36	10.7	6	16.7	30	83.3		
Perioperative hyperoxia O_2 >80%							0.43	0.514
Yes	8	2.4	4	50	4	50		
No	328	97.6	131	39.9	197	60.1		
Type of incision							8.33	0.003
Transverse	128	38.1	62	48.4	66	51.6		
Midline	208	61.9	73	35.1	135	64.9		
NG tube							9.48	0.022
Yes	25	7.4	4	16	21	84		
No	311	92.6	131	42.1	180	57.9		
Epidural analgesia							0.57	0.451*
Yes	71	21.1	24	33.8	47	66.2		
No	258	76.8	111	41.8	154	58.2		
Undet	7	2.1	4	57.1	3	42.9		
Standing NSAIDS							0.09	0.767
Yes	117	34.8	49	41.9	68	58.1		
No	219	65.2	86	39.3	133	60.7		
Clear fluids day of surgery							9.08	0.003
Yes	140	41.7	70	50	70	50		
No	196	58.3	65	33.2	131	66.8		
Ambulation encouraged day of surgery							0.66	0.417
Yes	33	9.8	11	33.3	22	66.7		
No	303	90.2	124	40.9	179	59.1		

Table 3 continued

	Overall		Postop stay				χ^2	*P* value
			≤5 days		>5 days			
	N	%	*N*	Row %	*N*	Row %		
Early D/C of Foley catheter[b]							17.73	<0.001*
Yes	174	51.8	86	49.4	88	50.6		
No	144	42.9	41	28.5	103	71.5		
Undet	18	5.4	8	44.4	10	55.6		
Regular domperidone							–	–
Yes	0		0		0			
No	336	100	135	40.2	201	59.8		
Regular magnesium hydroxide							0.57	0.451
Yes	4	1.2	1	25	3	75		
No	332	98.8	134	40.4	198	59.6		
Liquid calorie supplements							0.57	0.451
Yes	4	1.2	1	25	3	75		
No	332	98.8	134	40.4	198	59.6		

* Undetermined category excluded from calculation of *p* value for differences across postop length of stay groups

[a] Intraoperative fluid restriction = less than 1500 cc/case of fluid unless greater than 500 cc of bleeding

[b] Early D/C of Foley catheter = Urinary Foley catheter discontinued within 24 h post colon and 72 h post rectal surgery

included preoperative counseling regarding expected length of stay, intraoperative fluid restriction, clear fluids on day of surgery, and discontinuation of the Foley catheter within 24 h of colon surgery and 72 h of rectal surgery.

One of the factors independently associated with a shortened length of stay in this study was use of a laparoscopic technique. This is in contrast to randomized, controlled trials that have compared a laparoscopic to open approach for colorectal surgery within the setting of an ERAS program [13]. These studies have not detected any advantage to the laparoscopic approach; however, these small trials were underpowered to detect a clinically meaningful difference. Although it may be that laparoscopic surgery leads to decreased length of hospital stay even in the setting of an ERAS program other explanations for the association seen in this study include unmeasured differences in the perioperative care patients may have received from their surgeons and/or nurses if they underwent a laparoscopic versus open surgery. Secondly, there was a very low use of epidurals in this study and no use of a transverse incision when the open technique was employed. These factors may have had a significant impact on postoperative pain and extended length of stay for patients undergoing open surgery.

Good evidence for other interventions that could contribute to an accelerated recovery and shortened length of stay may have been missed in this study. Interventions for which there is sufficient evidence in the form of randomized, controlled trials that were not evaluated include gum chewing and use of IV lidocaine [14–16]. Gum chewing has been found to speed the return of gut function, and intraoperative lidocaine has been shown to decrease postoperative pain. Unfortunately, the ERAS strategies evaluated were only those that have been included in ERAS randomized, controlled trials before 2010 and that have been promoted in the published guidelines. The nature of this observational trial does not capture the impact of these interventions or others that are known or unknown.

Although total length of stay may not be the most important long-term outcome for patients and physicians, it is a good surrogate for postoperative complications and readmissions. The difficulty with using length of hospital stay as an outcome measure is that it may be impacted by such issues as willingness of patients to be discharged home and supports in place at home or placement organized for patient upon discharge. Although these factors may influence length of stay overall, in an effective ERAS program that gives adequate preoperative counseling and puts a plan in place for the patient to be discharge 2–4 days after surgery, these should be minimized. In this study, palliative patients and more extensive surgeries, such as pelvic exenterations, were excluded to minimize the effect of days spent in the hospital awaiting placement to an alternate level of care or rehabilitation.

This is an observational retrospective cohort study and as such suffers from the weaknesses inherent to this methodology. Due to the nonexperimental design, we can only conclude that there is an association between utilization of ERAS variables and length of stay as opposed to a causal relationship. There may be other unmeasured

Table 4 Multivariable logistic regression modeling total postop stay ≤5 days on demographic, clinical, and ERAS factors

	OR (95% CI)	*P* value
Procedure		
Rectal	0.97 (0.87, 1.09)	0.65
Colon	1.00 (Ref)	–
Approach		
Laparoscopic	1.24 (1.12, 1.38)	<0.001
Open	1.00 (Ref)	–
Converted	0.94 (0.83, 1.06)	0.313
Preop counseling		
No	1.00 (Ref)	–
Yes	1.26 (1.15, 1.38)	<0.001
Intraoperative fluid restriction[a]		
No	1.00 (Ref)	–
Yes	1.26 (1.15, 1.37)	<0.001
Clear fluids day of surgery		
No	1.00 (Ref)	–
Yes	1.09 (1.00, 1.20)	0.049
Early D/C of Foley catheter[b]		
No	1.00 (Ref)	–
Yes	1.13 (1.01, 1.27)	0.043

[a] Intraoperative fluid restriction = less than 1500 cc/case of fluid unless greater than 500 cc of bleeding

[b] Early D/C of Foley catheter = Urinary Foley catheter discontinued within 24 h post colon and 72 h post rectal surgery

variables that account for the associations. Second, some of the data were difficult to collect from the chart. This was the case for most preoperative interventions, including counseling regarding early discharge, use of probiotics, and carbohydrate loading. For these strategies, we relied on physician report of their usual practice for colorectal patients as opposed to observing what was really done. Although this may have introduced some bias, it should have occurred with equal frequency in patients in both groups. Third, strategies that were difficult to extract with accuracy from the charts included preoperative bowel routine and oxygenation strategy during surgery. Although these variables were recorded in the patient charts, the data were inconsistently reported. This is a clear limitation of retrospective series.

In conclusion, there is poor uptake of ERAS strategies for colorectal surgery. In this setting the use of a laparoscopic technique is associated with a shortened hospital stay. ERAS strategies significantly associated with a shortened hospital stay include preoperative counseling, intraoperative fluid restriction, clear fluids day of surgery, and early discontinuation of the Foley urinary catheter. None of these require additional costs or materials. Local multidisciplinary initiatives are required to help implement and promote ERAS guidelines. With the initiation of a local ERAS program, it will be essential for a successful program to have accurate documentation of the ERAS interventions undertaken within the patient chart for effective audit and feedback.

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