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ORIGINAL ARTICLE

Ambulatory colectomy: a pathway for advancing the enhanced recovery protocol

Karleigh R. Curfman[1] · Ashwini S. Poola[1] · Gabrielle E. Blair[2] · Callan L. Kosnik[1] · Sunshine A. Pille[1] · Melinda E. Hawkins[3] · Laila Rashidi[1]

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Abstract

Enhanced recovery after surgery (ERAS) protocols employ multiple factors to decrease surgical stress and improve recovery (Lyon et al., World J Gastroenterol 18(40):5661–5663, 2012). These protocols use multimodal approaches to improve outcomes, including length of stay and morbidities (Lyon et al., World J Gastroenterol 18(40):5661–5663, 2012; Carmichael et al., Dis Colon Rectum 60:761–784, 2017). The ERAS guidelines have evolved since development; however, the question is posed of how to improve next (Lyon et al., World J Gastroenterol 18(40):5661–5663, 2012). With the success of ERAS, in combination with milestones made by minimally invasive surgery (MIS), it is our aim to describe the next step of same day discharge colectomy. Retrospective review was performed on all colectomies from February 2019 to January 2022. Same day discharge (SDD) was defined as admission less than 23 h and no overnight stay. Procedures were nonemergent and MIS. Patients were candidates SDD based on comorbidities, communication means, and social support. SDD candidacy continued if surgery was uncomplicated. Next, patients were required to achieve strict Post Anesthesia Care Unit (PACU) criteria for discharge. SDD patients were monitored via calls or messages until their first appointment. After analysis, 326 total colectomies were identified; based on inclusion and exclusion criteria, 115 patients underwent SDD, 35.3%. Of the 115 SDD, 5 patients returned to the emergency department, only 1 required readmission (0.9%). The most performed procedures were low anterior resection, 61 (53.0%), and right hemicolectomy, 25 (21.7%). Using ERAS protocols as a groundwork to improve upon, we identified several ways to advance select patients into SDD. Using strict patient selection, intraoperative regulations, and rigorous postoperative criteria, we found that SDD as an advancement of ERAS is a relatively safe procedure with minimal complications.

Keywords Ambulatory colectomy · Same day discharge · Enhanced recovery after surgery · Colon resection

✉ Karleigh R. Curfman
karleigh.curfman@multicare.org;
karleighcurfman@gmail.com

Ashwini S. Poola
poolashwini@gmail.com

Gabrielle E. Blair
gabrielle.e.blair@gmail.com

Callan L. Kosnik
callan.kosnik@multicare.org

Sunshine A. Pille
pillesu@multicare.org

Melinda E. Hawkins
melinda.hawkins@swedish.org

Laila Rashidi
laila.rashidi@multicare.org

[1] Multicare Health Network, Tacoma, WA 98405, USA

[2] University of Portland, Portland, OR 97203, USA

[3] Swedish Medical Center, Seattle, WA 98104, USA

Introduction

Throughout the course of the past several decades, we have seen the progression of colon surgery improvements from inpatient admission of weeks now to a few days with decreased complication rates [1–11]. This course has been affected by both improvements in minimally invasive surgery (MIS) and the development of, and improvement upon, colorectal enhanced recovery after surgery (ERAS) programs [1–12]. Following MIS and ERAS approaches, the colorectal community has witnessed decreased hospital length of stay, intensive care admissions, and postoperative comorbidities as well as improved return of bowel function, normal daily function, and patient satisfaction [1–13]. Using a minimally invasive approach, and expanding upon already well-established ERAS guidelines from The American Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons, our institution became interested in adapting our nearly decade old ERAS protocol into a same day discharge (SDD), colectomy program [2].

Nearly 20 years after the first colorectal ERAS protocols were published, our institution began a meticulous development and implementation of an SDD protocol [1]. Intrigued by the success of ERAS protocols and exponential growth of MIS, our institution had begun to practice ambulatory colectomy in select patients in February 2019 as an expansion of our already established colorectal ERAS program. At that time, we were performing minimally invasive colorectal surgeries regularly, with the majority performed robotically. As our institution began to perfect its SDD protocol, the global Coronavirus Disease 2019 pandemic impacted several hospital system admissions and resources [14]. Because of these constraints, our developing SDD program transformed into a routinely practiced system protocol.

Many institutions routinely utilize colorectal ERAS protocols in the perioperative setting, for which the data have been well established and verified by many sources [1–13]. However, there are few published literature sources relaying information on the practice of SDD after colorectal surgery [15–19]. With our experience and guided by reporting criteria, we include our patient data on selection, inclusion, exclusion, complications, and outcomes for SDD, as well as present the first step-by-step report on how to advance our routine colorectal ERAS protocol into a developed SDD program [20].

Objectives

The intent of this study is to report our institution's findings for SDD colectomy, regarding patient selection criteria, postoperative and discharge protocol, patient data on inclusion, exclusion, and complications, and methods of improving upon established ERAS protocols to transform and upgrade them into SDD programs.

Methods

After obtaining approval from The MultiCare Health System Institutional Review Board (IRB), a retrospective review was performed assessing all colectomies performed at a single tertiary community center by one surgeon between February 2019 and January 2022. This population was determined by procedure codes extracted from electronic medical records (EMR), for which the analysis yielded a potential population of 326 patients. From that point, we reviewed the candidate EMR data by both operative procedure code and timing of discharge in relation to case start times, to retrospectively identify patients who underwent SDD. For this study, SDD (or ambulatory colectomy) patients were those who had hospital stays of less than 23 h and did not stay overnight. Once the EMR data established a baseline population of all colectomies during the study period, manual review was performed of the patient EMR and excluded any patients who did not meet strict preoperative inclusion criteria, and thus were not defined as SDD candidates in the preoperative setting to ensure congruency with the reported protocol. These preoperative inclusion criteria consisted of: a means for physician contact, stable outpatient support system, and an understanding of the procedure and perioperative course by the patient and their support team. An adequate support team consists of someone who will be with the patient after discharge and be able to care of them postoperatively. The understanding of the process is confirmed by both the support staff and the patient via teach back method at the time of the preoperative visit. Hard copy education is also provided to the patient and support team at that time. Exclusion criteria from SDD candidacy include factors, such as emergent surgery, total abdominal colectomy, ostomy creation, major prior abdominal surgeries, major uncontrolled comorbidities (such as diabetes mellitus or cardiopulmonary disease), history of anticoagulation or antiplatelet use, malnutrition, or American Society of Anesthesiologists (ASA) Class 4. Furthermore, the protocol stated that intraoperatively patients were removed from the SDD candidacy pool if they had any major aberration from the proposed case, instability, complications, or were converted to an open procedure. Open communication was ensured with the Anesthesia team during the case as the patients received a combination of motility agents and antiemetics at the Anesthesiologist's or Certified Registered Nurse Anesthetist's (CRNA) discretion. Finally, to continue with the SDD protocol, patients had several strict

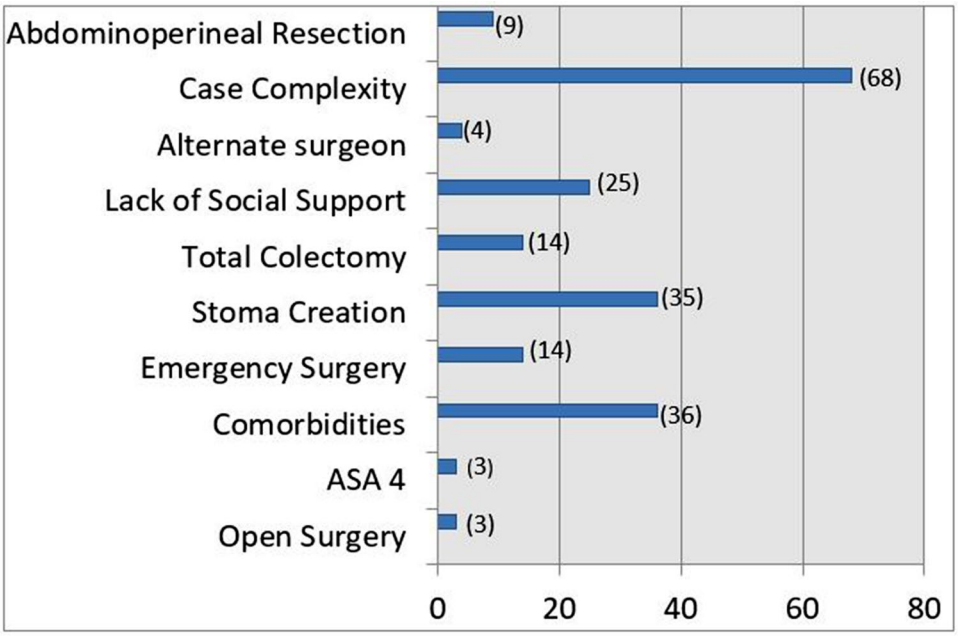

Fig. 1 Cause for same day discharge exclusion in potential candidates. Figure 1 is a representation of the different causes for patient exclusion from the SDD protocol. The most commonly described reasons were due to preexisting comorbidities, need for stoma creation, and complexities incurred during the surgery

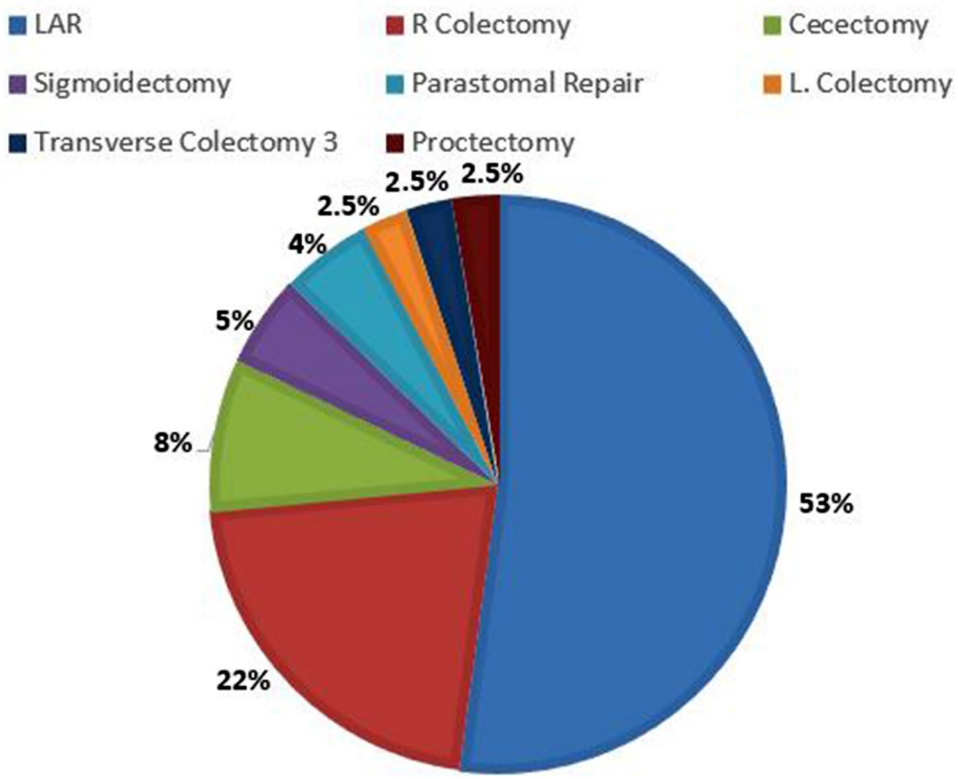

Fig. 2 Distribution of same day discharge colectomies by procedure type. Figure 2 demonstrates the case breakdown by procedure type of the SDD operations performed. Approximately half of the SDD surgeries were Low Anterior Resections (LAR), while approximately one-fifth were right colectomies

postoperative milestones to achieve in the Postoperative Anesthesia Care Unit (PACU) to reach before undergoing safe discharge. Patients were discharged on multimodal antinausea and pain control regimens that included scheduled gabapentin and naproxen, as well as ondansetron and hydromorphone on an as needed only basis. Patients were required to meet all previously established ERAS metrics as well as any newly employed SDD advancements to continue in the SDD protocol and undergo safe discharge home on Postoperative Day (POD) zero. Following their discharge, patients were contacted by the operative physician via phone on POD1, and by a colorectal specific

Table 1 Distribution of same day discharge patient and operative demographics

Surgery	Amount	% of total SDD	Avg. age	Sex (M:F)	Avg. operative time (min)	Avg. console time (min)	% of case on console	30-day emergency room visit	30-day readmission rate
LAR	61	53.0%	57.4	1:1.4	163	121	74.0%	1	0.0%
R. colectomy	25	21.7%	66.7	1.4:1	161	108	67.1%	1	0.0%
Cecectomy	9	7.8%	49.3	1:1.5	53	34	64.2%	1	0.0%
Sigmoidectomy	6	5.2%	65.5	1:1	103	77	74.8%	2	0.9%
Parastomal hernia	5	4.3%	49	1:0	122	90	73.7%	0	0.0%
Transverse Colectomy	3	2.6%	58	1.5:1	135	98	72.6%	0	0.0%
Proctectomy	3	2.6%	45.6	1.5:1	216	126	58.3%	0	0.0%
L. colectomy	3	2.6%	70.5	1:1	135	99	73.3%	0	0.0%

Table 1 displays the frequency different patient demographics, case distribution, operative times, and complication rates associated with each procedure as seen in the same day discharge patient population

physician's assistant on POD3 to assess for any issues and answer questions. They then were seen in the clinic between POD5 and POD7 and scheduled for further routine postoperative follow up from that point, completing their SDD protocol. These criteria were used to develop our retrospective cohort, all patients who completed the SDD protocol were compliant with these metrics, had any patient fallen out from these criteria they would have been excluded from the SDD population of this study.

Results

Over the 35-month study period, 326 nonemergent colectomies were performed. After extensive review of the patients who were able to complete the SDD protocol successfully, 115 patients were identified (35.3%). Most patients who were excluded from the SDD protocol were defined preoperatively based comorbidities or need for stoma creation, or at the time of surgery due to complexities experienced during the case. (Fig. 1) Patient sex, age, anticipated operative time, and robotic console times were not factors in establishing preoperative SDD candidacy. The end distribution of the population by sex found that forty-eight males (41.7%) and sixty-seven females (58.3%) completed SDD protocol. The ages of patients involved in the final SDD population ranged from 21 years old to 89 years old. The most performed surgeries in our patient population were low anterior resection, 61 (53.0%), and right hemicolectomy, 25 (21.7%), all via a minimally invasive approach (Fig. 2). Within 30 days of their procedure, five patients were evaluated in the emergency department (4.3%). These complaints included: abdominal pain following low anterior resection or sigmoidectomy (2 patients, 1.7%), urinary retention after sigmoidectomy (1 patient, 0.9%), leg pain status post ileocecectomy (1 patient, 0.9%), and diarrhea after right hemicolectomy (1 patient, 0.9%). Of the five patients who returned to the ED, only one required admission (postoperative urinary retention), posing a 30-day readmission rate of 0.9%. There were no identified surgical site infections, ileus, obstructions, anastomotic leaks, intensive care unit admissions, or mortalities in our study population. (Table 1).

Discussion

Advancements in colorectal surgery due to the implementation of ERAS protocols over the past 20 years have been remarkable [1, 2, 7–13]. The development of this dynamic protocol led to improvements throughout all phases of colorectal surgery care [1, 2, 7–12]. Some of the well-established advancements include: decreases in length of stay, complication rates, and opiate pain medication use, with faster return of oral intake and bowel function, and an increase in patient satisfaction [1, 2, 7–13]. With recognition of the progress the protocols have made, our institution elected to further augment the protocols and adopt them into an SDD colorectal surgery platform [21]. When building our SDD protocol, we recognized that many important factors from previously reported ERAS protocols were essential to patient success and would remain stable, while others could be expanded upon for further benefit [2, 11, 12]. Additionally, prior to embarking on such a significant endeavor, our institution realized two key factors that would be essential to the success of SDD. First, we recognized that upgrades to our institutional ERAS protocol would be required throughout all perioperative phases of care [21]. Compared to previously published literature, this paper details a phase by phase analysis of ERAS components and how to expand upon them to create a SDD protocol [21]. Second, we acknowledged that the success of our SDD protocol would be limited without significant patient and family education, cooperation, and understanding [21].

Similar to ERAS, the success of our SDD protocol also begins in the preoperative phase of care [2, 11, 12]. ERAS protocols have elaborated upon multiple factors to discuss

Table 2 Comparison of factors between preoperative Enhanced Recovery After Surgery (ERAS) recommendations and Same Day Discharge (SDD) advancements

	ERAS	SDD (advanced ERAS)
Preoperative		
Patient education	Recommended	*Advanced from ERAS*
Family/support system education	No specific recommendation	*Advanced from ERAS*
2-h preoperative clear liquid diet	Recommended	Unchanged from ERAS
Carbohydrate loading	Recommended	Unchanged from ERAS
Mechanical bowel preparation	Recommended	Unchanged from ERAS
Oral Antibiotic bowel preparation	Recommended	Unchanged from ERAS
Use of regular orderset	Recommended	Unchanged from ERAS
Prehabilitation	Recommended	Unchanged from ERAS
Specific criteria for patient selection	No specific recommendation	*Advanced from ERAS*

Table 2 is a display of the comparisons made between ERAS recommendations and the implemented SDD factors. The table represents which factors were included in the ERAS guidelines and those that were not, as well as which of those factors are stable in SDD, or have been advanced or new from the ERAS protocol

Table 3 Comparison of factors between intraoperative Enhanced Recovery After Surgery (ERAS) recommendations and Same Day Discharge (SDD) advancements

	ERAS	SDD (Advanced ERAS)
Intraoperative		
Surgical site infection bundle use	Recommended	Unchanged from ERAS
Multimodal opioid sparing pain control	Recommended	Unchanged from ERAS
Thoracic epidural use in open surgery	Recommended	Open surgery not performed in SDD
Preoperative antiemetics guided by screening	Recommended	Unchanged from ERAS
Multimodal nausea prophylaxis	Recommended	Unchanged from ERAS
Tailor crystalloid to avoid excess	Recommended	Unchanged from ERAS
Use of balanced crystalloid solution	Recommended	Unchanged from ERAS
Goal directed fluid therapy	Recommended	Unchanged from ERAS
Minimally invasive approach	Recommended	*Advanced from ERAS*
Minimally invasive extraction	No specific recommendation	*Advanced from ERAS*
Avoidance of drains and tubes	Recommended	Unchanged from ERAS

Table 3 is a representation of the intraoperative factors described in the ERAS protocol and their implementation or advancement in the SDD program

with patients prior to their procedure, including ileostomy teaching, importance of dehydration avoidance, expected milestones, and discharge criteria [2, 11, 12]. Our SDD protocol adopted this concept and expanded it even further to ensure not only adequate patient understanding, but also the understanding of their home support system [21]. Both patients and their support systems were extensively educated by the physician at preoperative appointments on the aforementioned factors, as well as the procedure, the risks, the benefits, the potential SDD, and the aspects that would lead to overnight or prolonged admission. Furthermore, patients return to clinic prior to their surgical procedure to be educated even further on preoperative carbohydrate and nutritional supplementation, proper use of bowel preparation, and day of surgery arrangements. The authors of this paper recognize that one of the main tenets of ERAS success is an underlying patient understanding of the protocol and expectations. As we are practicing an expedited ERAS, we have also recognized the importance of this education, and furthermore that of the family and other support members [1, 2, 7–12]. Finally in the preoperative phase, the authors must report that we acknowledge a significant impact to the success of our SDD protocol relies on patient selection. The patient must have available means for physician contact as well as meet strict social and medical preoperative selection criteria to be considered for SDD candidacy, as previously described. The key preoperative components in advancing ERAS to SDD rest in proper patient selection and extensive communication. A comparison of preoperative ERAS elements to SDD preoperative advancements is seen in Table 2.

In the operative phase of care, ERAS protocols have a significant focus on methods to decrease complications and length of stay [2, 11, 12]. (Table 3) This has been achieved through surgical site bundles, decreased intravenous fluids, and avoidance of drains. We incorporated all these factors into our SDD platform. [2, 11, 12]. Additionally, we identified that one of our SDD key discharge criteria, toleration of oral intake, rests upon perioperative nausea control. To

minimize postoperative nausea and vomiting risk, a multimodal antinausea approach is practiced throughout all phases of SDD care, including the operative phase with anesthesia induction, as previously described. Furthermore, we have witnessed the importance of other described ERAS perioperative factors [2, 11, 12]. The use of minimally invasive surgery was employed in all procedures, with a majority performed robotically. None of the patients in our population required conversion to an open procedure, and if so, would have been excluded from SDD candidacy. Not described in ERAS, we employed a minimally invasive manipulation approach in our operations as well. We find that this is a key acknowledgement when upstaging ERAS protocols to SDD. Our program avoids regular tissue grabbing, and instead applies positional changes and sweeping methods for exposure and manipulation [21]. The authors acknowledge that some bowel grasping is required for surgical procedures, but attempt to minimize it and, if performed, attempt to manipulate only bowel that will be extracted in the specimen. As for the specimen, we perform all stapled anastomoses and employ a minimally invasive extraction method. When possible, our institution practices natural orifice extraction or extraction via ostomy take down sites. If neither of these methods is available, a mini Pfannenstiel incision is created for specimen removal. A hallmark of ERAS success is the use of a multimodal opioid sparing pain control regimen [2, 11, 12]. At the conclusion of SDD cases prior to extubation, the anesthesia team regularly performs ultrasound guided transversus abdominis plane (93.3%) or quadratus laborum (6.7%) local anesthetic blocks with either bupivacaine or ropivacaine. Additionally, this opioid minimizing concept is continued through all perioperative phases and these medications are used only on a strictly as needed basis when other pain relieving medications have failed. Finally, in contrast to ERAS protocols, our SDD program does not routinely encourage continued urinary catheters use. In right-sided SDD, the patient voids preprocedure and no urinary catheter is placed. In left-sided SDD, a urinary catheter is used for the duration of the procedure, backfilled with 200 cc of normal saline, and then withdrawn prior to extubation. No patients in our SDD protocol leave the operating room with a urinary catheter in place, unless for management of colovesicular fistula. With this protocol, only one out of 115 SDD patients returned postprocedure with urinary retention, 0.9% [21].

A significant emphasis must be placed on the advancements and differences created in the postoperative phase of care between standard ERAS protocols and our expedited SDD postoperative platform. Many ERAS factors are utilized over 24–48 postoperative hours, while our SDD platform practices these aspects over a 6-h PACU course [2, 11–13, 21] (Table 4). Because of the emphasis placed on PACU criteria, the PACU staff underwent verbal education sessions that were repeated every few months to ensure understanding, as well as physician instructions to the nursing staff where placed within the EMR. Our patients must meet several discharge metrics prior to PACU discharge, of which spontaneous voiding is one, hence intraoperative catheter removal. To decrease ileus risk, prior to PACU discharge, the patients must ambulate multiple times in the unit. Furthermore, in addition to minimal bowel manipulation techniques, minimally invasive surgical approaches, and early ambulation, we encourage minimizing ileus risk through early postoperative feedings. Although we do not routinely implement sham feedings as referenced by ERAS protocols, SDD patients must be able to tolerate at least eight

Table 4 Comparison of factors between postoperative Enhanced Recovery After Surgery (ERAS) recommendations and Same Day Discharge (SDD) advancements

	ERAS	SDD (advanced ERAS)
Postoperative		
Early mobilization	Recommended	Unchanged from ERAS
Immediate resumption of diet	Recommended	Unchanged from ERAS
Sham feeding	Recommended	Not used in SDD
Alvimopan use	Recommended	Not used in SDD
Early discontinuation of IV fluid	Recommended	Unchanged from ERAS
Urinary catheter	Recommended	*No postoperative use in SDD program*
Multimodal opioid sparing pain control	Recommended	Unchanged from ERAS
Multimodal antinausea regimen	Recommended	Unchanged from ERAS
Assessment of bowel function	No specific recommendation	*Not required in SDD program*
Postoperative education	No specific recommendation	*Advanced from ERAS*
Postoperative patient-physician communication	No specific recommendation	*Advanced from ERAS*

Table 4 describes the postoperative factors explained by the ERAS protocol and the inclusion, advancement, or elimination of each factor in the SDD program

ounces of liquids in addition to small solids in the PACU prior to discharge consideration [2, 11, 12]. In conjunction with ERAS guidelines, the SDD protocol practices a limited postoperative intravenous fluid regimen; no or minimal intravenous fluids are used in PACU once the patient is awake from anesthesia and oral intake is initiated [2, 11, 12]. The SDD protocol practices multiple different factors to minimize ileus occurrence, and as such, we do not wait postoperatively for bowel function to proceed with discharge if other metrics are met. SDD patients are contacted by a provider on POD1 and POD3, as well as are seen in the office between POD5 and POD7, for which bowel function is assessed during each of these communications. None of the patients in the SDD study population were diagnosed with postoperative ileus within the analyzed 30-day period. Our SDD program encourages incentive spirometer education and use in the PACU prior to discharge. The SDD protocol carries the perioperative ERAS hallmark of both multimodal antinausea and pain control regimens into the postoperative and postdischarge phases of care [2, 11, 12]. Immediately in PACU, patients begin an opioid sparing baseline regimen of alternating acetaminophen, naproxen, and gabapentin. PACU opiate use is minimized to a strictly as needed basis only when other employed methods are unable to control severe pain. In PACU, if the patient's pain is otherwise controlled on a nonopiate or minimally used low-dose opiate oral regimen, the patient meets discharge criteria. All patients are given a short term, strictly as needed only prescription for hydromorphone on discharge for severe pain. A multimodal antinausea regimen is used via a combination of as needed medications, primarily ondansetron, promethazine, and/or metoclopramide. The patient must have minimal nausea and be able to tolerate oral intake prior to PACU discharge, upon which all patients are discharged with at least one antinausea medication, typically oral ondansetron, for use on an as needed basis only.

In addition to pain and nausea regimens employed post-hospital discharge, our SDD expands on ERAS protocols to include a postoperative communication regimen [2, 11, 12, 21]. The majority of the patient instruction in ERAS protocols is focused on preoperative education and communication [2, 11, 12]. While the authors of this study expanded upon preoperative education and communication for this protocol, we recognize that the element of postoperative communication assumed by ERAS with postprocedural hospital admission can be lost in SDD protocols. To prevent this, our SDD program communication is increased throughout all phases of care. Patient preference of communication method (phone or Internet medical portal) is confirmed and recorded in the EMR at the preoperative visit. The patients are encouraged to use this method both pre- and postoperatively to contact a provider with any questions or concerns. Furthermore, a provider routinely contacts the patient after discharge to assess their progress, address any questions, and analyze for any potential complications. The regimen proposed for communication per our SDD protocol includes contact via phone on POD1 by the surgeon and on POD3 by a colorectal specific physician's assistant, with the first inpatient clinic visit occurring between POD5 and POD7 [21].

Conclusions

Colorectal Enhanced Recovery After Surgery protocols have had an astonishing impact on the care and outcomes in colorectal procedures, as proven by many published sources [1–13]. However, ERAS is a dynamic system and evolutions have been made since its implementation over 20 years ago [1]. One of the most recent budding expansions is that of same day discharge colectomy. Using our established institutional ERAS program as a template to build upon for SDD, we have adopted advancements to ERAS throughout all phases of care. Our institutional SDD protocol is now witnessing successful growth as seen in the described large patient population with minimal complications, establishing a model for which other institutional ERAS programs can expand upon and develop into SDD.

Limitations

The data set has several limitations. It is a dataset produced by one surgeon at a single center, for which all data follow their perioperative approach and surgical methods. Second, the population reviewed was done in retrospective fashion and by use of EMR codes to define the initial potential population, which limits the study due to potential coding or documentation errors. Additionally, the data reflect carefully selected candidates for SDD and as such is not generalizable currently to the general population. Finally, we report a potential limitation of this study due to the absence of long-term data results. Thirty-day complication rates were reviewed, but as this protocol is in its infancy, approaching three years of practice, no further long-term data on outcomes and complications are available at this time.

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Author contributions Contributors to conception, design, acquisition of data, and interpretation of data: Dr. Karleigh Curfman, MD, Dr. Ashwini Poola, MD, and Dr. Laila Rashidi, MD. Manuscript writing and drafting: Dr. Karleigh Curfman, MD, Gabrielle Blair, and Dr. Laila Rashidi, MD. Revising it critically for important intellectual content: Dr. Karleigh Curfman, MD, Dr. Ashwini Poola, MD, Gabrielle Blair, Callan Kosnik PA-C, Sunshine Pille, PA-C, Dr. Melinda Hawkins, MD, and Dr. Laila Rashidi, MD. Final approval of the version to

be published: Dr. Karleigh Curfman, MD, Dr. Ashwini Poola, MD, Gabrielle Blair, Callan Kosnik PA-C, Sunshine Pille PA-C, Dr. Melinda Hawkins, MD, and Dr. Laila Rashidi, MD.

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Declarations

Competing interests The authors declare no competing interests.

Conflict of interest The authors of this article declare that they have no conflicts of interests regarding the publication of this paper. The authors received no funding or specific grant from any funding agency in the public, commercial, or not-for-profit sectors in the production of this study or the preparation of this manuscript.

Ethics approval Ethical approval for this study was obtained from MultiCare Health System Institutional Review Board (IRB).

Informed consent Informed consent was not sought for the present study, because this study was performed in a retrospective manner for which patients had already been treated and discharged from the hospital prior to review of information. No patient-specific information is included in the study. Only authors approved by IRB were able to access patient data to produce information pertinent to this study, and then, patient-specific information was immediately deleted without saving.

Trial registration Not applicable as this study was performed in a retrospective manner.

References

1. Lyon A, Payne CJ, MacKay GJ (2012) Enhanced Recovery Programme in Colorectal Surgery: Does One Size Fit All? World J Gastroenterol 18(40):5661–5663
2. Carmichael JC, Keller DS, Baldini G et al (2017) Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the american society of colon and rectal surgeons and Society of American Gastrointestinal and endoscopic surgeons. Dis Colon Rectum 60:761–784
3. Al-Mazrou AM, Chiuzan C, Kiran RP (2017) The robotic approach significantly reduces length of stay after colectomy: a propensity score – matched analysis. Int J Colorectal Dis 32(10):1415–1421
4. Miller PE, Dao H, Paluvoi N et al (2016) Comparison of 30 – day postoperative outcomes after laparoscopic vs robotic colectomy. J Am Coll Surg 233(2):369–373
5. Nolan HR, Smith BE, Honaker MD (2018) Operative time and length of stay is similar between robotic assisted and laparoscopic colon and rectal resections. J Robot Surg 12(4):659–664
6. Papageorge CM, Zhao Q, Foley EF et al (2016) Short – term outcomes of minimally invasive versus open colectomy for colon cancer. J Surg Res 204(1):83–93
7. Miller TE, Thacker JK, White WD et al (2014) Reduced length of hospital stay in colorectal surgery after implementation of an enhanced recovery protocol. Anesth Analg 118(5):1052–1061
8. Cabellos Olivares M, Labalde Martinez M, Torralba M et al (2018) Satisfaction survey after an ERAS (Enhanced Recovery After Surgery) protocol in colorectal elective surgery in patients over 70 years of age. Colomb J Anesthesiol 46(3):187–195
9. Zychowicz A, Pisarska M, Laskawska A et al (2019) Patients' opinions on enhanced recovery after surgery perioperative care principles: a questionnaire study. Wideochir Inne Tech 14(1):27–37
10. Sanchez-Jimenez R, Blanco Alvarez A, Trebol Lopez J, et al. (2014) "ERAS (Enhanced Recovery After Surgery) in Colorectal Surgery". Colorectal Cancer – Surgery, Diagnostics, and Treatment. IntechOpen
11. Gustafsson UO, Scott MJ, Hubner M (2019) Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS) society recommendations: 2018. World J Surg 43(3):659–695
12. Cavallaro P, Bordeianou L (2019) Implementation of an ERAS pathway in colorectal surgery. Clin Colon Rectal Surg 32(2):102–108
13. Greer NL, Gunnar WP, Dahm P et al (2018) Enhanced recovery protocols for adults undergoing colorectal surgery: a systematic review and meta – analysis. Dis Colon Rectum 61(9):1108–1118
14. Al-Jabir A, Kerwan A, Nicola M et al (2020) Impact of the Coronavirus (COVID-19) pandemic on surgical practice – part 2 (Surgical Prioritisation). Int J Surg 79:233–248
15. Bourgouin S, Monchal T, Schlinenger G, et al. (2020) Eligibility Criteria for Ambulatory Colectomy. J Visc Surg.
16. McKenna NP, Bews KA, Shariq OA et al (2020) Is same – day and next – day discharge after laparoscopic colectomy reasonable in select patients? Dis Colon Rectum 63(10):1427–1435
17. Campbell S, Fichera A, Thomas S et al (2021) Outpatient Colectomy – A Dream or Reality. Baylor University Medical Center Proceedings 35:24–27
18. Gignoux B, Gosgnach M, Lanz T et al (2019) Short – term outcomes of ambulatory colectomy for 157 consecutive patients. Ann Surg 270(2):317–321
19. Gignoux B, Pasquer A, Vulliez A et al (2015) Outpatient colectomy within an enhanced recovery program. J Visc Surg 152(1):11–15
20. Elias KM, Stone AB, McGinigle K et al (2019) "The Reporting on ERAS Compliance, Outcomes, and Elements Research (RECOvER) checklist: a joint statement by the ERAS and ERAS USA societies. World J Surg 43(1):1–8
21. Curfman KR, Poola AS, Blair GE et al (2022) Ambulatory colectomy: a pilot protocol for same day discharge in minimally invasive colorectal surgery. Am J Surg 224(2):757–760