Preoperative instructions and postoperative care in the 21\textsuperscript{st} century

David E. Kearney, David Liska, Stefan D. Holubar

Department of Colorectal Surgery, Cleveland Clinic, Cleveland, Ohio, USA

Abstract: The preoperative and postoperative management of patients undergoing right hemicolectomy for colon cancer has undergone significant change in the 20\textsuperscript{th} century. From a time where a postoperative stay of 10 days was not uncommon, patients are now routinely discharged on postoperative day 2–3, and same day colectomy is also practiced in some centers. Enhanced recovery programs are standard practice and their guidelines are developed from a strong evidence base around perioperative management and recovery. The preoperative visit is increasingly important and is used to identify modifiable risk factors such as malnutrition, anemia, smoking, and alcohol abuse. Detailed counselling and preoperative education should also be undertaken so patients are psychologically prepared for their cancer surgery and have clear expectations and goals for their recovery. Nausea and vomiting postoperatively is a common cause of delayed discharge. Patients at risk should be identified preoperatively and treated prophylactically. Prehabilitation is an exciting field in colorectal surgery but its role in right hemicolectomy for colon cancer is limited due the necessary short interval between diagnosis and surgery. Patients should be fasting for the minimal amount of time preoperatively and should be allowed clear carbohydrate containing fluids up until 2 hours before surgery. The intraoperative use of opioids should be minimized and high risk patients should have goal-directed fluid therapy (GDFT). As the majority of right colectomies are performed laparoscopically, TAP blocks should be used instead of epidural analgesia for postoperative pain relief. The routine use of nasogastric tubes or abdominal drains should be avoided. Patients should be mobilized the evening after surgery and diet advanced early to prevent postoperative ileus. In modern colorectal practice, regular audits should be undertaken in the unit to ensure adherence to enhanced recovery programs and to identify areas for improvement.

Keywords: Enhanced recovery; colon cancer; right hemicolectomy

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Introduction

The perioperative management of patients undergoing right colectomy for colon cancer has undergone significant change in the past 20 years. From a historical standpoint, patients undergoing an open right colectomy would be admitted a day or two prior to surgery for inpatient bowel prepping and shaving, sometimes longer if they needed work-up, and a post-operative stay of a week to 10 days was standard, often with post-operative antibiotics for 48–72 hours and prolonged nasogastric tube decompression. In the modern era of enhanced recovery and same-day admission patients undergoing right colectomy can expect to be admitted the same day as their surgery and discharged day

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1–2 post-op with a 30-day mortality risk of 1–1.5% (1,2).

The idea of enhanced recovery was first introduced in Europe by Henrik Kehlet in the late 1990’s and early 2000’s as a series of interventions designed to reduce the sequelae of surgical injury and physiological stress (3,4). Now common in many surgical subspecialties, enhanced recovery in colorectal surgery has been proven over the last two decades to be safe and effective and is considered the standard of care. The ERAS® Society has produced evidence based guidelines designed to reduce and mitigate perioperative stress, maintain postoperative physiological function and accelerate recovery after surgery. First published in 2005 the society has recently published its fourth guideline in 2018 and many recommendations on perioperative care that are found in this article are derived from these guidelines (5). Further guidelines have been published on enhanced recovery after colorectal surgery by the American Society of Colon and Rectal Surgeons (ASCRS) in collaboration with the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), and the American Society for Enhanced Recovery (6-8). Enhanced recovery programs in colorectal surgery has been shown to reduce length of stay (LOS), reduce morbidity, decrease hospital cost, and improve patient satisfaction (5,9-15). In this review we will outline the perioperative management of patients undergoing a right hemicolectomy for colon cancer in the 21st century; we have divided our review into three sections: preoperative, intraoperative considerations and postoperative management. We will also address specific areas of controversy such as enhanced recovery in the elderly, the use of opioid receptor blockers, prehabilitation, goal-directed fluid therapy (GDFT), and prevention of surgical site infection (SSI) with care bundles.

Preoperative

Patient education & counselling

Patient education and engagement are central tenets to modern integrated colorectal care pathways. Surgeons and nurses are involved in detailed patient education regarding what the patient should expect in the pre- and postoperative phases of their surgery. Setting patients’ expectations early, particularly in relation to expected date of discharge, has a significant impact on their postoperative course. Key postoperative targets that patients are expected to obtain are outlined as well as criteria that need to be met for discharge. It has been shown that taking time with patient education may reduce perioperative anxiety and post-operative pain (16-20). A randomized controlled trial and Cochrane review has demonstrated that psychological support and detailed preoperative education has a reduction in LOS and improved postoperative outcomes (21,22). Team members included in this discussion should include the surgeon, anesthesiologist, nurses and/or advanced practice providers (23).

Addressing modifiable risk factors

Optimization of certain preoperative risk factors has been shown to have a positive impact on patient outcome (24-27). There are numerous pre-operative risk assessment tools available online and in the literature that can aid physicians in patient risk stratification (28-31). While these tools can highlight specific identifiable risk there is little evidence that these scoring systems have an impact on postoperative outcomes (28). Addressing specific modifiable risk factors such as smoking, alcohol, anemia, and nutrition has been shown to improve patient outcomes and should be sought out at the pre-operative visit.

Smoking & alcohol

Smoking is a proven risk factor for post-operative complications, particularly wound related and respiratory complications, and should be addressed at the first consultation (32). As patients with right sided colon cancer do not have the luxury of postponing their surgery for longer than a few weeks the impact of smoking cessation is limited. The minimal level of smoking cessation needed to decreased complications appears to be 4–8 weeks, but notwithstanding this figure it is intuitive that smoking should be addressed at the pre-operative visits (24,25,33).

Alcohol abuse has been shown to increase post-operative morbidity, particularly infections, but not mortality (34). A systematic review of observational studies and RCTs demonstrated that consuming more than two units per day has an impact on post-operative morbidity. Although abstinence for at least four weeks is recommended, even abstaining for shorter periods will help in the perioperative phase, particularly for patients prone to alcohol withdrawal syndromes. Addressing nutritional deficiencies in heavy alcohol users (e.g., thiamine deficiency) should also be performed at this visit.

Anemia

Another specific modifiable risk factor that should be
addressed at the preoperative visit is anemia. This is of particular importance with right colon cancer as anemia is common and may be the only presenting sign (35). The WHO definition of anemia is a hemoglobin concentration less than 13 g/dL for men and 12 g/dL for women. The short time interval between diagnosis and surgery for right colon cancer limits the options available for normalization of hemoglobin as oral iron therapy can take weeks to take effect, and the modest increase seen with oral or IV iron therapy may be mitigated by ongoing losses. IV iron therapy may be considered in mild-moderate anemia as 1–1.5 g of iron is usually sufficient to replete iron stores and reticulocytosis occurs three to five days after infusion (5). Patients often report subjective feelings of improvement within 1–2 days. A single infusion of ferric carboxymaltose over 15 minutes was shown to increase mean hemoglobin by 0.8 g/dL over eight days (36). Severely anemic patients from an actively bleeding right colon cancer will benefit from packed RBC transfusion pre-op, although achieving a recommended pre-operative target of 13 g/dL may be unrealistic and unnecessary in this setting and a lower target should be identified to reduce the need for excessive transfusion. Autologous blood donation or acute normovolemic hemodilution is typically not used or recommended for this patient population.

Nutritional optimization

Cancer patients often present after significant weight loss and the preoperative visit should address nutritional status. It is well known that malnutrition increases postoperative morbidity and mortality and is associated with worse oncologic outcomes, particularly with unintentional weight loss of 5–10% or more (37-41). Although no singular nutritional risk assessment tool is agreed upon for patients having colorectal cancer resections, having a high Nutritional Risk Screening Score (NRS) is associated with increased risk of complications (5,42). Serum albumin levels are also associated with morbidity & mortality and can be used as a crude assessment of nutrition (43,44). Oral nutritional supplementation with high calorific drinks is usually sufficient to improve nutritional status in the short-term prior to surgery (29). The impact of immunonutrition in colorectal surgery has also been examined. Several specific nutrients such as arginine, glutamine, nucleotides and omega-3 fatty acids have been shown in laboratory and clinical studies to influence nutritional, immunological, and inflammatory parameters (45). Heyland et al. performed a systematic review of the evidence of immunonutrition in critically ill patients and found a reduction in infectious complication rates but no mortality advantage (45). Thornblade et al. examined the effect of preoperative immunonutrition on elective colorectal resection outcomes and found no difference in serious adverse events but a reduction in LOS (46). In a recent paper looking at the impact of immunonutrition on postoperative morbidity in digestive oncology surgery, Challine et al. found no difference in 90-day morbidity but a shorter LOS in the immunonutrition group (47). Identifying sarcopenia, visceral obesity and myosteatosis on pre-operative imaging may also be useful as they have been shown to be independent predictors of increased LOS and readmission in colorectal surgery (48).

Prevention of postoperative nausea & vomiting

One of the most debilitating symptoms for patients who undergo colonic resections is postoperative nausea and vomiting. It affects 30–50% of all surgical patients and is the leading cause of patient dissatisfaction (49). Risk factors for developing post-op nausea & vomiting include a past history of same, female gender, non-smokers, volatile anesthetic agents, nitrous oxide use, and high levels intraoperative of opioid administration (50,51). By minimizing or omitting modifiable risk factors listed above one can mitigate the severity of symptoms in those affected. There are several different classes of first line antiemetic drugs including D2 antagonists, 5HT3 antagonists, and corticosteroids. Using a multimodal treatment regimen for postoperative nausea and vomiting has a higher chance of success compared to single agent use (52). The DREAMS trial (Dexamethasone Reduces Emesis After Major Gastrointestinal Surgery) supported the use of dexamethasone for both open and laparoscopic GI surgery at a single dose of 8 mg without increased adverse events (53). According to recently published ERAS® Society guidelines patients with 1–2 risk factors for post-op nausea and vomiting should receive a two drug combination of first-line antiemetics, and patients with greater than two risk factors should receive 2–3 antiemetics from different classes (5). This observation was originally demonstrated by TJ Gan in a series of randomized controlled trials performed in the 1990’s (54-56).

Prophylactic antibiotics and skin preparation

Preoperative intravenous antibiotics given within 60 minutes
prior to incision have been clearly shown to reduce SSIs. A Cochrane review on prophylactic antibiotics in 2014 demonstrated a SSI reduction from 39% to 13% (57). Antibiotic prophylaxis should be guided by local hospital policy; the standard regimen used in our institution is metronidazole combined with a third generation cephalosporin for bowel cases; with metronidazole and ciprofloxacin for penicillin-allergic patients. Skin decontamination has traditionally been performed with iodine containing solutions. Recent level one evidence on the use of chlorhexidine-alcohol solutions in colorectal patients has shown a significant advantage of these agents over traditional iodine skin preparation (58). There is limited evidence to support pre-operative antiseptic showers in colorectal surgery but is considered a ‘best practice’ measure and is included as part of our SSI prevention bundle (59,60). Hair that will be in the surgical field should be clipped rather than shaved and this should be performed just prior to surgery.

**Mechanical bowel preparation**

The use of mechanical bowel preparation in colorectal surgery has been extensively investigated and updated Cochrane reviews have consistently shown no difference rates of SSI, anastomotic leak, organ space infection, mortality, LOS, or re-operation (61). Recent large database studies however have called this into question with NSQIP data showing that adding oral antibiotics to mechanical bowel preparation reduces SSI rate, anastomotic leak rate, ileus and major morbidity (62). It appears that adding oral antibiotics to mechanical bowel prep accounts for the reduction infectious complications. A meta-analysis in 2016 of RCTs that included colorectal patients that were given mechanical bowel prep as well as oral and IV antibiotics showed a reduction in incisional SSI rate but no difference in rates of organ space SSI rate (63). There are ongoing trials in right-sided colon resections to determine if enteral antibiotics, without the mechanical prep, are adequate.

**Pre-operative fasting & fluid management**

The goal of modern pre-surgical planning is to have the patient as close to a euvoletic state as possible with the safest minimal fasting time permitted prior to induction. Patients undergoing a right colectomy are allowed to drink clear fluids up to two hours before surgery with a light meal six hours before. This is recommended in the most recent ERAS® guidelines and has been shown to be safe in multiple RCTs (5,64-66). Carbohydrate loading with drinks the evening before surgery and two hours before induction has been shown to reduce to catabolic response to surgery and increase gastric emptying (67). In a large RCT of preoperative carbohydrate loading vs. placebo in major abdominal surgery Gianotti et al. showed carbohydrate loading lowered insulin requirements and patients had less episodes of hyperglycemia, however there was no difference in complications or LOS (68). A Cochrane review of 27 RCTs from multiple disciplines showed carbohydrate loading resulted in a small reduction in hospital stay (mean 0.3 days) (69). There are also some data from this review showing a reduced time to flatus. There is no evidence however showing a beneficial effect of carbohydrate loading on morbidity or mortality in elective colorectal surgery.

**Intraoperative considerations**

**Anesthesia**

The primary aims of anesthesia are threefold: to limit the stress response to surgery, optimize fluid balance, and provide adequate analgesia (70). Recommended principles in modern colorectal anesthetic practice include avoidance of benzodiazepines, use of short acting general anesthetic agents and minimal use of intra-operative opioids. Using propofol for induction of anesthesia combined with judicious use of short acting opioids such as fentanyl, alfentanil, sufentanil or remifentanil infusions minimizes the residual effect at the end of the procedure (5). Currently there is a trend towards opiate free anesthesia (71). Maintaining body temperature with the use of nasopharyngeal assessment or an esophageal probe checked every 5 minutes helps prevent the deleterious effects of hypothermia. Even mild perioperative hypothermia has been associated with adverse events such as increased blood loss, increased transfusion rate, increased afterload, myocardial ischemia and arrhythmias, and reduction in splanchnic blood flow, increased post-operative shivering and oxygen consumption, higher rates of infection and delayed discharge (72). Methods to increase body temperature intra-operatively include warming & humidifying anesthetic gasses, warming IV fluids and irrigation fluids, using warming devices, and pre-warmed blankets. Using warmed and humidified CO₂ was associated with improved intra-operative temperature control.
Analgesia

Thoracic epidural analgesia has consistently been shown in RCTs and meta-analyses to provide superior analgesia compared to systemic opioids in open colorectal surgery (73,74). This is usually administered between the lower thoracic vertebrae from T7-T10. For laparoscopic colorectal surgery however the same analgesic benefits have not been demonstrated and some research has shown an increased LOS (75). Transversus abdominis plane (TAP) blocks using a 4-point technique under direct laparoscopic visualization just after pneumoperitoneum is established is a useful analgesia adjunct in laparoscopic cases. This is easy to perform and eliminates the time delay associated with ultrasound administered TAP blocks performed before or after the procedure. Recent evidence has also suggested that intraoperative TAP blocks performed under direct vision may be superior to US guided TAP blocks (76). TAP blocks are associated with less opioid use and faster resumption of passage of flatus and bowel movements compared to controls (77,78). The use of longer acting liposomal bupivacaine in TAP blocks for colorectal surgery is a promising area but further research is needed before recommendation based on the much higher cost compared to standard local anesthetics. There also is recent evidence to suggest that a single intrathecal injection of opioids may be superior to a TAP block in colorectal surgery with less post-operative pain and less analgesia requirements (79). Local wound infiltration of the fascia and dermis in addition to the routine use of TAP blocks can also be used.

Postoperative analgesia

A multimodal post-operative pain regimen is utilized for adequate pain relief post-op. This is based on the theory that acting on multiple analgesic receptors with a lower dose will provide adequate pain control while minimizing the side effects of each drug. Regular acetaminophen, non-steroidal anti-inflammatories (NSAIDS), gabapentinoids, and short acting opioid analgesia used only for breakthrough pain are the mainstay of pain control; opioids should be “last on, and first off” (7). According to the latest ERAS® guidelines there is insufficient evidence to prove that NSAIDS are associated with anastomotic leaks and are therefore included in the guidelines (5). Using minimal or no opioids post-operatively is associated with early mobilization, quicker return of bowel function, lower morbidity and a shorter LOS (6,84).

Drains/tubes

Orogastric tubes inserted after induction of anesthesia are used for open and laparoscopic cases at our institution and are removed before the patient wakes up. These aid in gastric decompression and are helpful in laparoscopic cases by increasing operative space and reducing the risk of gastric injury. The only indication for insertion of a nasogastric draining tube that will be left in post-operatively is if a patient presented with an obstructing right colon cancer with associated small bowel dilation. The routine use of abdominal drains for right colon cancer surgery is not recommended. Foley catheters are removed early on post-operative day one to facilitate early mobilization.

IV fluids and nutrition

As part of the enhanced recovery protocol patients are allowed liquids on the evening of their surgery; meals should be taken in the chair as well. Prolonged bed rest is associated with increased risk of deep venous thrombosis (DVT), atelectasis, and decreased muscle mass (80,81). Although the evidence for early mobilization in colorectal patients is mainly derived from other disciplines, some evidence from a recent systematic review suggests a shorter LOS in abdominal surgery (82). What is known is that prolonged bed rest after abdominal surgery is associated with a three-fold increase in pulmonary complications (83). As with the other elements of enhanced recovery programs discussed here, these interventions need to occur in tandem as inadequate pain control or failure to remove the Foley catheter will decrease the likelihood of early mobilization.

Early mobilization

Early mobilization is strongly encouraged as part of an enhanced recovery program and patients are encouraged to sit out of bed and walk on the ward on the evening of their surgery; meals should be taken in the chair as well. Prolonged bed rest is associated with increased risk of deep venous thrombosis (DVT), atelectasis, and decreased muscle mass (80,81). Although the evidence for early mobilization in colorectal patients is mainly derived from other disciplines, some evidence from a recent systematic review suggests a shorter LOS in abdominal surgery (82). What is known is that prolonged bed rest after abdominal surgery is associated with a three-fold increase in pulmonary complications (83). As with the other elements of enhanced recovery programs discussed here, these interventions need
required the use of excessive volumes of 0.9% saline should be avoided as this has been shown to cause hyperchloremic acidosis and interstitial fluid overload. Multiple studies have demonstrated the deleterious effects of overzealous use of 0.9% saline post-operatively (87-89).

**Avoiding post-operative ileus**

Postoperative ileus is the main reason for delayed discharge in patients who have undergone a right hemicolecetomy for colorectal cancer. Delayed passage of flatus and bowel movements leads to abdominal distention, nausea and vomiting and may necessitate nasogastric tube insertion. This setback coupled with the delay in resuming oral diet can lead to a delay in discharge of over a week or more. Specific measures that reduce the likelihood of ileus are therefore central to modern enhanced recovery protocols. Limiting perioperative opioid use through multimodal pain regimens, early mobilization, avoiding routine use of nasogastric tubes and abdominal drains, early removal of Foley catheter to encourage mobilization, and careful perioperative fluid and electrolyte managements are core tenets to modern perioperative care and have been shown to reduce the incidence of post-operative ileus (5,7). The use chewing gum in the post-operative period for colorectal patients has been extensively studied and is the subject of a Cochrane review (90). They have found that while it may be associated with a mild reduction of ileus the evidence is limited to poor quality studies. de Leede et al. recently found no benefit to gum chewing in a large RCT of patients undergoing GI surgery as part of an enhanced recovery protocol probably because the patients are already eating, and the literature supporting gum use when patients were kept NPO (91).

**Audit**

The importance of Audit in the modern management of colorectal patients’ needs to be emphasized. Many European countries perform national audits with yearly reports on crude outcomes to ensure quality control and adherence to protocol, and in the US the ACS NSQIP program collects and compares data from hundreds of hospitals. Individual hospitals or hospital groups should perform their own audits to ensure adherence to specific elements of perioperative care that are not included in national larger audits. Patients undergoing right hemicolecetomy for colon cancer are looked after by many healthcare professionals, and auditing patient outcomes should include all disciplines and the results fed back to the entire group. A Cochrane review showed that audit and feedback have a significant effect on healthcare professions adherence to specific protocol (92). It has also been shown that if audit is dropped from enhanced recovery programs compliance falls back and LOS increases (93).

**Controversial topics**

**Enhanced recovery in the elderly**

There was concern in the early period of enhanced recovery programs that specific measures were too aggressive for this population and may lead to unintended morbidity (94). It is now known that this is a patient population that derives specific benefits from the program due to the serious consequences that prolonged postoperative bed rest can have on these patients. Opioids and benzodiazepines are particularly hazardous in elderly populations and are a common cause of delirium (95). Gabapentinoids are relatively contraindicated as they can cause deep somnolence. Multiple studies have now demonstrated the safety of enhanced recovery in elderly populations, including a systematic review of 5,965 patients in 16 studies performed by Bagnall et al. (96). Elderly patients in this study who were part of enhanced recovery programs had a shorter hospital stay compared to standard care. While it has been shown that there is a lower adherence to the elements in the program in elderly patients (such as later Foley removal, less mobilization and slower advancement of diet) and that elderly patients had increased rates of readmission, the overall benefits of enhanced recovery programs in the elderly support its use in this specific population. Slight adjustments to the protocol in elderly patients may have to be made on an individual basis due to the increased co-morbidities and polypharmacy in this group.

**Opioid receptor antagonists**

Opioid receptor antagonists are used in colorectal surgery to reduce the effects of post-operative ileus. These μ-opioid receptor antagonists can ameliorate opioid-induced bowel dysfunction without reversing analgesia due to their limited ability to cross the blood-brain barrier. These agents include alvimopan, methylnaltrexone, naloxone and naloxegol (5). Alvimopan is the most extensively studied in colorectal surgery and is the only agent approved for use in GI surgery by the FDA. A meta-analysis of RCTs evaluating alvimopan...
showed a reduction in post-operative ileus in six of the eight RCTs with two showing no improvement (97). Alvimopan is restricted to patients who received a preoperative dose and only for open bowel resections (including laparoscopic procedures that were converted to open) with a primary anastomosis. Its use should be avoided in patients who have taken more than 7 consecutive days of therapeutic doses of opioids prior to surgery.

Prehabilitation

Poor physiological status is a known risk factor morbidity and mortality in major abdominal surgery (98). The concept of ‘prehabilitation’ has gained traction in recent years as a method of improving physiological reserve (99). Prehabilitation with specific aerobic targets has been shown to increase the physiological reserve in patients undergoing major surgery (100). Another study demonstrated a reduction by half in the number of post-operative complications by using a four week prehabilitation program (101). One limitation in prehabilitation programs in right colon surgery for colon cancer is the narrow window between diagnosis, staging and surgery. Nevertheless, adopting a program of smoking cessation, improved nutrition, increased aerobic capacity and resistance training are good medical practice and should be encouraged in all patients as well as those with upcoming major surgery. In the latest ERAS© guidelines prehabilitation programs are given a weak recommendation due to their lack of evidence and further research is required before considering this to be a mandatory item in an ERAS© protocol (5). There may be a role for targeting high-risk patients for customized prehabilitation programs that may result in a delay to surgery, if the benefits of prehabilitation in these individuals outweigh the delay to surgery.

GDFT

GDFT is an intraoperative IV fluid approach where fluid boluses are given to reach a near-maximal stroke volume, usually measured with a Doppler in the esophagus. This brings the heart to work at the maximal point of the Starling curve and has the theoretical benefit of improving oxygen delivery to tissues (102). Early studies showed a benefit of GDFT over conventional fluid therapy in colorectal surgery with a reduction in infectious complications, postoperative ileus and a shorter LOS (103-105). More recent studies however have failed to show a benefit of GDFT in the setting of an enhanced recovery program (106,107). As a result society guidelines have recommended the use of GDFT for high-risk patients and in patients undergoing surgery with large intravascular fluid loss (5,6).

SSI bundles

The adoption of ‘bundled’ care to reduce post-operative infection in colorectal surgery has increased in popularity. SSIs are associated with increased morbidity, increased LOS, higher readmission rates and increased healthcare cost (59,108-114). The rates of SSI in colorectal surgery are higher than other surgical disciplines with rates ranging from 15–30% (115-117). Evidence based practices at reducing SSI rates are laid out by the Surgical Care Improvement Project of the Centers for Medicare and Medicaid Services and include administering prophylactic antibiotics, perioperative hair clipping, and maintaining intraoperative normothermia (118). Using systematic approaches, or bundles, have been shown to increase the compliance and adherence to these recommendations. Keenan et al. reported their experience of implementing a preventative SSI bundle for colorectal surgery after their institution was identified by the American College of Surgeons National Quality Improvement Program as having significantly higher rates of SSI compared to peer institutions (119). The absolute reduction in the rates of SSIs following introduction of the bundle was 19.3% in unadjusted analysis and 13.6% after propensity adjustment. Implementation of the bundle was also associated with a reduced rate of postoperative sepsis. Other large database reviews have shown a reduction in SSI’s when a bundled approach to SSI reduction was utilized (59,120). The core tenets of SSI reduction in bundles are also an integral part of ERAS recommendations so implementation of a bundled approach to these measures (e.g., with obligatory checks on electronic patient records) will improve compliance and is recommended.

Conclusions

The perioperative instructions for patients undergoing right hemicolectomy for colon cancer as outlined by these articles have significantly improved patient care in the 21st century. In the preoperative phase we have outlined evidenced based recommendations such as patient counselling and education, addressing modifiable risk factors such as anemia, nutrition, smoking and alcohol, pro-active prevention of postoperative
nausea and vomiting, the evidence based use of mechanical bowel preparation with oral antibiotics, careful preoperative fluid management and minimizing fasting time to reduce the physiological catabolic state. Intraoperative evidence-based recommendations include meticulous attention to normothermia, minimal use of opioids, avoiding routine use of nasogastric tubes and drains, routine use of laparoscopy and using TAP blocks for analgesia instead of epidural or PCA based opioid regimens. In the postoperative phase we have shown that early mobilization, early removal of Foley catheters, using a multimodal analgesia regimen with minimal opioid use, and minimizing the use of postoperative IV fluids contribute to optimum patient management in the era of enhanced recovery. We have also shown that enhanced recovery programs with modifications is safe in elderly populations, the use of SSI bundles should be encouraged, GDFR is useful for high-risk patients, and prehabilitation, although beneficial for elective benign colorectal surgery and rectal cancer patients who undergo chemoradiotherapy, has limited use in right colon surgery for colon cancer due to the short interval between diagnosis and surgery. The implementation of a comprehensive perioperative care plan for patients undergoing right hemicolecction for colon cancer requires buy-in from surgeons, anesthesiologist, nursing staff, allied healthcare professionals and the patients themselves. The rewards of such a pathway are clear however, and benefit the hospital, the healthcare professionals, and most importantly the patient.

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**Footnote**

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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