



Prevention of Surgical Site Infection Complicating Colorectal Surgery

Statewide guidance for Victoria

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About this document

This document outlines the Victorian best practice approach/recommendations for preventing surgical site infection (SSI) and enhancing outcomes following colorectal surgery. It will help perioperative colorectal teams to employ evidence-based best practice in colorectal surgery to optimise patient outcomes.

The development of this clinical guideline was a collaboration between Safer Care Victoria, Victorian Healthcareassociated infection surveillance (VICNISS), and other subject matter experts including colorectal surgeons, anaesthetists, enhanced recovery after surgery (ERAS) co-ordinators and infection preventionists.

What Does this Guidance Cover?

Aim:

The aim of this clinical guideline is the standardisation of practice and subsequent reduction in SSIs complications following colorectal surgery across health services delivering major colorectal surgery in Victoria.

This document details:

A bundle of care to be delivered before, during and after surgery aimed at reducing surgical site infection. The elements of the bundle which are evidence-based to reduce SSI have been graded as core (Table 1) and conditional (Table 2).

Essential ERAS items that promote enhanced recovery after surgery but are not targeted at reducing surgical site infection are listed in Table 3 for reference.

These recommendations are based on consensus achieved in a modified Delphi process / Nominal Group Technique involving an Expert Advisory Group (Appendix A). Although the process did not involve a systematic formal review of the evidence, international recommendations (e.g. WHO) were reviewed as part of guideline development and the evidence has been accordingly cited.

It does not include:

Detailed recommendations for risk mitigation practices pre-admission and prehabilitation.

This guideline is intended for adult patients.





BACKGROUND

Colorectal surgery has one of the highest rates of postoperative surgical site infection (SSI), with published rates ranging from 15% to over 30%. [1-4] Surgical Site Infection includes superficial and deep wound infections, and deeper organ space infection within the pelvis, peritoneal cavity and retroperitoneum. Left-sided colonic resections and rectal resections in particular have a higher incidence of postoperative SSI compared with right-sided colonic resections. The consequence of SSIs is increased discomfort for patients in terms of wound discharge and breakdown, readmission to hospital often with a requirement for interventional radiology to drain infections or reoperation. [5,6] Recovery from surgery is prolonged and may involve complex wound dressings and drainage bags. The literature reports that 60% of these SSI outcomes can be prevented through the increased use of evidence-based measures.[7]

The need for standardised bundles of care

The enhanced recovery after surgery (ERAS) study group collaboration was established in 2000 in response to a lack of congruence in perioperative care across sites, unsatisfactory recovery rates, and diverse quality in terms of reporting outcomes. The first ERAS guideline in colorectal surgery was published in 2005, and more recent iterations present a consensus for optimal perioperative care in colorectal surgery and providing graded recommendations for each ERAS item within the ERAS protocol according to the GRADE-system. [8,9]

When comparing ERAS protocols with traditional care in colorectal surgery, ERAS significantly reduces the risk for postoperative morbidity by 48% and median length of stay in hospital by 2.5 days. [9,10] Importantly, current evidence in support of the ERAS protocol applies to the whole protocol and not for every single item within it as the evidence base behind each item within the protocol is constantly changing depending on newly published evidence. [9]

Similarly, there is mounting evidence that implementation of prevention bundles of care is associated with a reduced rate of SSI, particularly deep and organ space SSI after elective colorectal surgery. Implementation of colorectal SSI bundles increases standardisation among surgical teams and decreases operative variance that then leads to reductions in SSIs and an improvement in surgical quality of care. [11]

The earliest SSI prevention bundle, the Surgical Care Improvement Project (SCIP) bundle, [5] was responsible for an 18% decrease in the odds of developing an SSI and a 4% cumulative decrease in SSI rates. [12] The SCIP bundle consisted of elements including intravenous (IV) antimicrobial prophylaxis consistent with published guidelines, hair removal with clippers instead of razors, blood glucose control, and maintenance of preoperative normothermia. [5] More contemporary bundles consist of additional pre-admission, pre-operative, intra and postoperative elements, several of which are specific to colorectal procedures. These include the use of wound protectors, glove changes, and a clean instrument tray for wound closure. [13,14]

A meta-analysis of 23 studies with pre- and post-implementation data published in 2017 evaluated colorectal surgery SSI prevention bundles. They identified an SSI risk reduction of 44% for superficial SSI, and 34% for organ space SSI with the use of bundles. Bundles with sterile closure trays, mechanical bowel preparation (MBP) with oral antibiotics, and pre-closure glove changes had significantly greater SSI risk reduction. [15] A supplementary analysis focusing on bundle size found that bundles with more than 11 components were responsible for a risk reduction of 63.3%, and these optimal bundles included at least 1 of sterile closure trays, MBP with oral

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antibiotics, and pre-closure glove changes. [16] A multimodal bundle, enhanced and amended over years, including application of a stoma bag prior to dressing (if applied) and 5-day padded Tegaderm dressing, significantly reduced SSI in Scotland. [17] Most recently, a systematic review also found that bundles containing ≥11 elements, consisting of both standard of care and new interventions, demonstrated the greatest SSI reduction following colorectal surgery. [18]

Locally, a study of patients undergoing elective left-sided colorectal procedures at Western Health implemented a bundle including 12 components and demonstrated a reduction in organ space SSI from 12.9% to 3.4%. [19] Notably, all recent bundles include pre-operative oral antibiotics which are associated with a significant reduction in the risk of surgical site infections compared with no pre-operative oral antibiotics even without mechanical bowel preparation. [20-22] Importantly, combined pre-operative oral antibiotics and intravenous antibiotics for surgical antimicrobial prophylaxis are superior to either alone in preventing SSI, [23] and MBP with oral antibiotics is preferable to MBP alone when MBP is used.

Evidence for gender differences in patients undergoing ERAS programs associated with colorectal surgery are limited. There is no current evidence in support of providing different ERAS bundles for males and females, nor does gender influence adherence to the prescribed ERAS bundle of care. However, studies of colorectal outcomes suggest that men have a higher risk of SSI (20-45%), whilst women tend to experience a faster recovery and shorter length of hospital stay. One study has also found that female surgeons are more likely to consistently use all ERAS elements. Despite differences in SSI risk and speed of recovery, both genders benefit proportionately from colorectal ERAS programs. [24,25]





RECOMMENDED SSI PREVENTION BUNDLE FOR VICTORIAN COLORECTAL SURGERY PROGRAMS

Pre-Admission

All patients undergoing major colorectal surgery should be screened for modifiable risk factors.

Some of these modifiable risk factors will impact upon SSI risk, for example:

- Smoking cessation
- Cessation of high alcohol intake, ideally 4 weeks prior to surgery
- Enhancing diabetes control (HbA1C <7%)
- Correction of malnutrition
- Correction of anaemia and iron deficiency
- Infection control screening
- Obesity
- Comorbid disease management

The time available before surgery to optimise risk factors and offer prehabilitation will vary according to the clinical presentation, and the urgency of the planned management of colorectal pathology. The earlier a patient requiring major colorectal surgery, particularly the higher risk patient, is referred to a high-risk clinic for assessment, the longer the time available to modify risk factors and enable the patient to prepare for their surgery. Ideally, patients likely to require major colorectal surgery should be referred at diagnosis, rather than awaiting the decision of a multidisciplinary meeting or scheduling for surgery. The in-patient admission process should include relevant questions to identify patients at risk of colonisation with multidrug-resistant organisms who may require pre-emptive isolation and screening. [26]

Peri-operative Bundles of Care

The tables below outline the recommended bundle elements before, during and after surgery. Core elements for SSI prevention, defined as those where there is confidence that the benefits of the intervention outweigh the risks, are presented in table 1. Conditional elements for SSI prevention, those where the benefits of the intervention probably outweigh the risks, are displayed in table 2. [27] Table 3 includes ERAS elements for enhanced recovery.

Compliance of \geq 80% with bundle elements is recommended. [28]





At the individual health service level, assessment of compliance with individual bundle elements is strongly recommended.

Explanatory notes have been provided to assist with local implementation.





Table 1 Core elements for SSI prevention

Bundle Elements	Core elements for SSI prevention	Explanatory Notes & Considerations for implementation
Before Surgery	Oral antibiotics: neomycin & metronidazole If neomycin unavailable, use trimethoprim/sulfamethoxazole & metronidazole	Patients should be prescribed oral neomycin 1g & metronidazole 400mg at 4-hour intervals (for example, 2-3 p.m., 6-7 p.m. and 10-11 p.m.) on the day prior to surgery (total dose: neomycin 3g and metronidazole 1.2g) Trimethoprim/sulfamethoxazole 160mg/800mg should be prescribed at 6 a.m. on the day of surgery for morning cases and at 11 a.m. for afternoon cases.
	+/- Mechanical Bowel Preparation (MBP)	
	Pre-warming	
	Hair removal with clippers (single-use head)	
During Surgery and anaesthesia	Discussion of bundle during team time out (surgical safety checklist)	
	Skin preparation 2% chlorhexidine in 70% alcohol	
	Pre-incision intravenous surgical antimicrobial prophylaxis	Cephazolin 2g (3 g if >120kg) should be administered intravenously within 60 minutes before skin incision. Metronidazole 500mg should be administered intravenously within 120 minutes before skin incision.
		For prolonged surgery or significant blood loss IV antibiotic doses must be repeated during surgery: every 4 hours for cefazolin, every 12 hours for metronidazole. If severe penicillin allergy use
		gentamicin & metronidazole Routine postoperative antibiotics are not recommended.
	Use of or changing to a level 3 gown where the operation is partly or completely open	Level 3 gowns provide moderate fluid protection and water resistance. They are resistant to water spray and offer some resistance to water penetration under constant contact with increasing pressure.





	Wound protector	
	Intraoperative warming	Intraoperative warm normal saline peritoneal washout recommended in the Oxford bundle.
	2 separate linear staplers for side-to-side anastomoses	
	Glove change before wound closure	Glove change by the whole scrub team prior to incision/closure are recommended in the Oxford bundle.
	Quarantine of contaminated instruments on separate trolley	
	Provide new instruments for wound closure either by using a specific closing tray or by separating closing instruments to a protected area at the start of the case	
	Maintain euglycaemia (6-10)	A tighter range should be considered for Type 1 diabetics
After Surgery	Maintain euglycaemia (6-10)	A tighter range should be considered for Type 1 diabetics
	Remove IDC by Day 1 in colon surgery, by Day 2 in rectal surgery	





Table 2 – Conditional elements for SSI prevention

Bundle		
elements	Conditional elements for SSI prevention	Explanatory Notes
Before Surgery	Surgeons should consider the relative benefits of MBP in each case.	MBP may be utilised for reasons unrelated to prevention of SSI.
	MBP with oral antibiotics is preferable to MBP alone when MBP is used.	
	Hair removal should be conducted before entering the operating room.	
During Surgery	Laparoscopic/minimally invasive/robotic	
and anaesthesia	approaches should be used whenever feasible in	
	preference to an open approach	
	Re-draping before closure	
	Gown change before wound closure	
	Irrigation of the superficial layers of the incision with aqueous povidone iodine	
	Closure of the incision in layers, including	
	subcuticular closure (no staples to skin)	
	Wounds closed and dressings applied prior to	
	opening the bowel to create the stoma	
After Surgery	Occlusive dressing (5 days)	





Table 3 – ERAS elements for enhanced recovery

		Explanatory Notes &
Bundle		Considerations for
elements	ERAS elements	implementation
Before Surgery	Immunonutrition	Immunonutrition should be given for
		up to 5 days before surgery to reduce
		postoperative infectious complications
	Comorbidities should be optimised before	
	surgery and identified for postoperative planning	
	Preadmission education and information should	
	be provided to all patients prior to surgery	
	White (low residue) diet	
	Dex drinks pre-surgery	Preoperative carbohydrate loading
		(evening before and 2 hours before
		anaesthesia) may be used to improve
		insulin sensitivity
	Sip clear fluids until sent to operating theatre	Statewide Sip Til Send fluid fasting
	(SipTilSend)	guidance
	Short preoperative fasting (solids until 6 hours,	
	clear fluids until 2 hours before anaesthesia)	
During Surgery	Laparoscopic & minimally invasive approaches	
and anaesthesia	(when appropriate)	
	Opioid sparing strategies (lidocaine infusion)	
	Avoid epidurals in laparoscopic surgery	
	Goal-directed fluid therapy	To maintain a slightly positive fluid
		balance on the day of surgery
	CO2 humidification	
	Warmed IV fluids	
	Minimise use of NGT	Prophylactic NGT is not recommended
		after colorectal surgery
	VTE prophylaxis	Victorian Guideline for the Prevention
		of Venous Thromboembolism in Adult
		Hospitalised Patients
	Minimise use of drains	
After Surgery	Immunonutrition (5 days after)	Immunonutrition should be given for
		up to 5 days after surgery to reduce
		postoperative infectious complications
	Early oral nutrition	Early gut feeding, preferably with oral
		nutritional supplements within 24
		hours post-surgery to enhance
		nutrient intake, shorten hospital stay
		and restore gut function
	Avoid epidurals >48 hours for open surgery	





Minimise duration of PCAs	
Early mobilisation	

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Appendix A Expert Advisory Group Members

Professor N. Deborah Friedman	Infectious Diseases Physician, Victorian Infectious Diseases Service & Director of VICNISS
Professor David Watters	Director of Surgery, Safer Care Victoria
Mr Ian Faragher	Colorectal Surgeon, Western Health
Professor Bernhard Riedel	Anaesthetist, Director of Anaesthetics, VCCC
Ms Catherine Sinton	ERAS, Clinical Nurse Consultant, VCCC
Ms Yvette Console	ERAS Nurse Coordinator, Barwon Health
Ms Rowena Craig	ERAS Nurse Coordinator, Grampians Health, Ballarat
Mr Thomas Suhardja	Colorectal Surgeon, Monash Health
Mr William Teoh	Colorectal Surgeon, Director of Colorectal Surgery, Monash Health
Professor Glenn Guest	Colorectal Surgeon, Barwon Health & Epworth Geelong
Dr Rani Chahal	Anaesthetist, VCCC
Dr Traudi Almhofer	Anaesthetist, Barwon Health
Ms Liz Orr	Infection Prevention Manager, Royal Melbourne Hospital
A/Professor Leon Worth	Infectious Diseases Physician, VICNISS