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REVIEW

Controversies in the emergency management of colorectal cancer and strategies for improved outcomes: a systematic review

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Background: Colorectal cancer (CRC) is the third most commonly diagnosed cancer worldwide, with approximately 1.8 million new cases diagnosed annually and over 860 000 deaths per year. Despite established screening programmes, between 15% and 45% of patients present as emergencies due to obstruction or perforation, conditions associated with significantly increased morbidity and mortality compared with elective presentations. The objective was to evaluate the management of emergency CRC patients with obstruction or perforation and assess existing controversies.
Methods: A systematic search was conducted across PubMed, Cochrane Library, Embase, Scopus, and Google Scholar, focusing mainly on studies published between 2000 and 2024, including randomised controlled trials, meta-analyses, cohort studies, and clinical guidelines for managing adult emergency CRC cases.
Results: Emergency CRC is associated with significantly worse outcomes than elective surgery, with 30-day mortality ranging from 15–33% for obstruction and 26–77% for perforation. Management of obstruction and perforation differs substantially. Diverting stoma remains a standard and widely accepted intervention for left-sided and rectal obstruction, particularly in settings where self-expanding metal stents (SEMS) expertise or availability is limited. Although early trials raised concerns about SEMS-related perforation and tumour dissemination, large European randomised trials (ESCO and CReST) demonstrated comparable long-term oncologic outcomes between SEMS as a bridge to surgery and emergency resection when appropriately selected.
Conclusions: To improve outcomes in patients with obstructed and perforated colorectal cancer, a multidisciplinary, evidence-based approach is critical. Strategies include reducing the incidence of advanced CRC through screening and early diagnostic pathways, optimising emergency surgical management protocols, increasing access to colorectal units, centralising care to specialised colorectal units, refining the use of SEMS, adapting enhanced recovery after surgery (ERAS) protocols for emergency settings, and refining bridge-to-surgery strategies.
Keywords: colorectal cancer, emergency, obstructed, outcomes, perforated

Introduction

Colorectal cancer (CRC) remains a major global health burden, and it is the third most commonly diagnosed cancer worldwide, with approximately 1.8 million new cases diagnosed annually and over 860 000 deaths per year.[1] Despite established screening programmes, 15–45% of patients present as emergencies due to bowel obstruction or perforation.[2] Emergency presentation is associated with poorer outcomes than elective cases, with perioperative morbidity rates reaching 70% and 30-day mortality rates as high as 50%, particularly in patients with perforation.[3] The definition of "obstructing colorectal cancer" varies significantly across studies. Some trials define obstruction endoscopically, whereas others require radiologic or clinical features of large bowel obstruction. This heterogeneity complicates the comparison of outcomes and the interpretation of management strategies.[4] Reported rates of emergency presentation, obstruction, and perforation across included studies are summarised in Table I, demonstrating substantial inter-study variability in definitions and incidence.

Several factors contribute to the poor outcomes in emergency CRC patients, including advanced-stage tumours, sepsis, and the poor physiological status associated with obstruction and perforation. Patient-related factors, such as age, high American Society of Anaesthesiologists (ASA) score, body mass index (BMI), and comorbidities, contribute to the risk.[1,5,6] Low socioeconomic status and limited access to healthcare and screening programmes lead to late diagnoses and higher rates of emergency presentations.[7] Furthermore, limited access to specialised colorectal services in emergency settings reduces the likelihood of achieving optimal oncological resections and favourable outcomes.[2,8]

Bowel obstruction and perforation in CRC patients are associated with severe complications, including peritonitis and septic shock, which significantly impact survival rates.[9] Timely and accurate diagnosis is essential, with computed tomography (CT) scan as the gold standard imaging modality

Table I: Incidence of emergency presentation, obstruction, and perforation in colorectal cancer across included studies

Study (country, year)	Study focus	Emergency CRC presentation (%)	Obstruction at presentation (%)	Perforation at presentation (%)
Kaewubon (Thailand, 2024)	Emergency colon cancer	37.3	NR	5.5
Esswein (Austria, 2023)	Emergency CRC outcomes	30.0	NR	2–9
Storli (Norway, 2023)	CRC recurrence patterns	11.0	NR	NR
Bin Traiki (KSA, 2023)	Emergency CRC surgery	32.5	8.4	12.9
Nahar (KSA, 2022)	Emergency CRC	33.0	NR	NR
Maertens (UK, 2022)	Emergency robotic CRC	25.0	NR	NR
Golder (UK, 2022)	Emergency CRC presentation	20.0	14.4	NR
Ocak (Turkey, 2021)	Emergency oncologic CRC	18.0	NR	NR
Acar (Turkey, 2020)	Emergency CRC surgery	18.4	NR	NR
Pisano (UK, 2018)	WSES CRC emergencies	13.2	3.4	NR
Chen (Taiwan, 2017)	Obstruction vs perforation	NR	4.6	4.3
Moura (Brazil, 2014)	Emergency CRC outcomes	19.6	63.6	NR
Ansaloni (Italy, 2010)	WSES guidelines	NR	20.0	NR
Kim (Korea, 2010)	Emergency CRC	NR	NR	2.6
Anwar (UK, 2006)	Perforated CRC	NR	NR	5.5

- Percentages refer to the proportion reported within each individual study population.
- Definitions of "emergency presentation," "obstruction," and "perforation" varied across studies and were based on authors' criteria (e.g., clinical presentation vs operative findings).
- NR – not reported in the original publication.

for evaluating tumour-related obstruction and perforation.[10] Emergency CRC management remains a challenge due to the complexity of surgical decision-making and the need to weigh the acute management and stabilisation of septic patients with long-term oncologic control.

For patients presenting with colonic obstruction or perforation, the possible surgical options are a diverting loop colostomy, Hartmann's procedure, or resection with primary anastomosis. The appropriate procedure is dictated by the patients' clinical status, physiological reserve, tumour location, and the surgeon's preference and level of experience.[11] Self-expanding metal stents (SEMS) provide an established option for patients presenting with an obstructing colonic tumour as a bridge to surgery (BTS), allowing for clinical optimisation and preoperative work-up.[12-14] Although they hold promise in emergency colorectal cases, their use is still limited by the physiological instability of patients requiring urgent personalised intervention.[15]

Obstruction and perforation represent distinct pathophysiological processes with different clinical priorities, surgical strategies, and prognostic implications. These entities should therefore be evaluated separately within management discussions.

This systematic review aims to evaluate the current management strategies for obstructed and perforated CRC, address controversies, and propose a roadmap for improving patient outcomes based on the latest evidence.

Objectives

The general objective of this systematic review is to assess the management strategies and challenges encountered in treating emergency CRC cases that present with colonic obstruction or perforation. Additionally, the review aims to evaluate opportunities to improve clinical outcomes in these patients.

The specific objectives of the study are as follows: first, to evaluate how presentations involving colonic obstruction or perforation influence final patient outcomes; second, to identify the key risk factors contributing to poor clinical outcomes in emergency CRC cases; third, to examine and analyse the ongoing debates and controversial issues in the management of CRC patients presenting with obstruction or perforation; and, finally, the study seeks to identify effective management protocols and strategies that could enhance clinical outcomes in this high-risk patient population.

Methodology

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to evaluate existing articles. The review was not prospectively registered due to its narrative-synthesis design; however, PRISMA methodology and predefined eligibility criteria were strictly followed. The following protocol was used to avoid bias and ensure reproducibility.

Search strategy

The literature search included the electronic databases such as PubMed, Embase, Scopus, Google Scholar, and Cochrane Library. The target of the research was studies on the management of perforated and obstructed CRC patients, including meta-analyses, randomised controlled trials (RCTs), clinical guidelines, and cohort studies. The keywords used for the search included: emergency colorectal cancer, colonic obstruction, perforated colorectal cancer, emergency presentation, self-expanding metal stents, Hartmann's procedure, colostomy, primary anastomosis, clinical outcomes, postoperative morbidity, mortality, quality of life, and survival in emergency colorectal cancer. To reflect contemporary management practices, particularly following the introduction of SEMS around 2008, studies published between 2000 and 2025 were included. The treatment era (pre-SEMS vs. SEMS) was considered during synthesis.

Table II: Definition harmonisation, reporting variability, and recommended standardisation for emergency colorectal cancer research

Domain	Operational definition used in this review	Common variations across included studies	Impact on synthesis	How addressed in this review	Preferred standardised definition for future research
Emergency presentation	CRC presenting as an emergency requiring urgent admission and/or urgent operative intervention due to obstruction or perforation.	Emergency defined by admission route, urgency of surgery, or mixed/unclear criteria.	Alters reported incidence of emergency CRC and limits comparability.	Incidence reported study-by-study; no pooled estimates across differing definitions.	Emergency CRC defined as *unplanned admission requiring urgent intervention within 24–72 hours for obstruction or perforation*.
Obstruction	Clinical and/or radiologic large bowel obstruction attributable to CRC at presentation.	Complete vs partial obstruction; clinical vs CT vs intraoperative diagnosis; inclusion of ileus.	Influences management choice (SEMS, diversion, resection) and outcomes.	Rates reported as published; interpretation contextualised in narrative.	CT-confirmed mechanical large bowel obstruction secondary to CRC, stratified as *complete vs partial*.
Perforation	CRC-associated perforation at presentation or surgery.	Free perforation vs contained abscess; tumour perforation vs diastatic/caecal perforation; some combine with sepsis/peritonitis.	Major determinant of morbidity, mortality, and operative strategy.	Perforation interpreted primarily as a marker of septic physiology.	Perforation classified as: (1) tumour perforation, (2) diastatic perforation, (3) free vs contained, with sepsis status recorded.
Mortality	Short-term postoperative mortality as reported by each study.	In-hospital, 30-day, 90-day, or unspecified postoperative mortality.	Prevents valid pooling and exaggerates apparent inter-study differences.	Mortality retained as reported; variability explicitly stated in tables.	Mandatory reporting of **30-day mortality**, with optional 90-day mortality.
Morbidity/ complications	Postoperative complications following emergency CRC surgery.	Overall complications vs major (Clavien–Dindo ≥III); complication-specific reporting.	Limits direct comparison and risk stratification.	Morbidity interpreted qualitatively; not pooled.	Complications reported using **Clavien–Dindo classification**, with major morbidity (≥ III) specified.
Stoma formation	Any stoma created during index emergency admission.	Temporary vs permanent stoma not distinguished; some studies report only "stoma rate".	Overestimates long-term stoma burden when not stratified.	Stoma rates reported as given; limitations acknowledged.	Mandatory distinction between **temporary diverting stoma** and **permanent end stoma**.
Recurrence	Any reported oncologic recurrence after emergency CRC surgery.	Local vs distant recurrence; variable follow-up duration; stage-restricted cohorts.	Susceptible to survival bias and follow-up heterogeneity.	Recurrence reported only when explicitly stated; interpreted cautiously.	Recurrence reported as **local vs distant**, with minimum follow-up of **3–5 years**.
Survival	Overall survival as reported in individual studies.	OS vs DFS vs cancer-specific survival; variable follow-up length and reporting format.	Cannot be pooled without harmonised endpoints.	Survival outcomes presented descriptively.	Primary endpoint: **overall survival (OS)**; secondary: DFS, with defined follow-up intervals.
Denominators/ populations	Emergency CRC cohorts presenting with obstruction and/or perforation.	Colon-only vs colon + rectum; resected-only vs all admissions; guideline vs clinical cohorts.	Denominator shifts distort incidence and outcome rates.	Study populations clearly labelled; NR used where data not extractable.	Explicit reporting of **population denominator**, cancer site (colon vs rectum), and inclusion criteria.

- CRC – Colorectal cancer, NR – not reported.
- Substantial heterogeneity in definitions and outcome reporting justified a structured narrative synthesis rather than quantitative pooling.
- The proposed standardised definitions are intended to inform future observational studies, registries, and guideline development.

Eligibility criteria

This systematic review analysed studies focusing on perforated or obstructed CRC cases. The types of studies included were meta-analyses, RCTs, cohort studies, and clinical guidelines on the management and outcomes of emergency CRC.

For the purposes of this review, studies were included if obstruction was defined clinically, radiologically, or endoscopically as reported by the original authors. Where possible, outcomes were interpreted according to the obstruction definition used in each study. Considerable heterogeneity was identified in the definitions of emergency presentation, obstruction, perforation, and the reported outcome measures across the included studies. To enhance transparency and interpretability, operational definitions used in this review and proposed standardisations for future research are summarised in Table II.

Inclusion criteria

In this systematic review, we included studies that reported the incidence of emergency CRC and assessed outcomes of CRC cases, including morbidity, mortality, quality of life, and survival. Additionally, the review included studies on treatment options for CRC cases presenting with obstruction

Table III: Characteristics of studies included in the systematic review

Study (author, year)	Country	Study design	Study population	Emergency presentation type	Sample size (if reported)	Key outcomes reported
Pisano et al., 2018	Italy	International guidelines	CRC with obstruction/ perforation	Obstruction and perforation	NR	Mortality, morbidity, surgical strategies
Ansaloni et al., 2010	Italy	Consensus guidelines	Left-sided obstructing CRC	Obstruction	NR	Operative options, outcomes
Golder et al., 2022	UK	Systematic review and meta-analysis	CRC emergency presentation	Emergency CRC	NR	Incidence, mortality
Ma W et al., 2023	China	Systematic review and meta-analysis	Obstructive CRC	Obstruction	NR	Mortality, complications, SEMS
Esswein et al., 2023	Austria	Retrospective cohort	Emergency CRC resection	Emergency CRC	NR	Survival, morbidity
Arnarson et al., 2023	Sweden	Retrospective cohort	Emergency colon cancer	Emergency CRC	NR	Mortality, survival
Kaewubon et al., 2024	Thailand	Retrospective cohort	Stage II emergency colon cancer	Emergency CRC	NR	Recurrence, prognostic factors
Chen et al., 2017	Taiwan	Retrospective cohort	CRC with obstruction/ perforation	Obstruction and perforation	NR	Mortality, outcomes
Moura et al., 2014	Brazil	Retrospective cohort	Emergency CRC surgery	Emergency CRC	NR	Stoma, mortality
Ocak et al., 2021	Turkey	Retrospective cohort	Emergency oncologic CRC	Emergency CRC	NR	Morbidity, mortality
Bin Traiki et al., 2023	Saudi Arabia	Retrospective cohort	Emergency CRC surgery	Emergency CRC	NR	Outcomes, survival
Öistämö et al., 2016	Sweden	Retrospective cohort	Emergency CRC	Emergency CRC	NR	Mortality
Krutsri et al., 2021	Thailand	Retrospective cohort	Elderly emergency CRC	Emergency CRC	NR	Morbidity, mortality
Kobayashi et al., 2023	Japan	Retrospective cohort	Obstructed/perforated CRC	Obstruction and perforation	NR	Mortality
Norman et al., 2023	South Africa	Retrospective cohort	Emergency CRC	Emergency CRC	NR	Mortality, survival

- CRC – Colorectal cancer.
- NR – Not reported or not extractable from published data.
- Study populations varied in inclusion of colon-only versus combined colon and rectal cancers.

Table IV: Short- and long-term outcomes of emergency colorectal cancer surgery across studies

Author (Country, Year)	Emergency cohort focus	Stoma formation (%)	Postoperative morbidity (%)	Mortality (%)	Recurrence (%)	Survival (%)
Moura (Brazil, 2014)	Emergency CRC	85.0	33.4	50.0	NR	NR
Ma W (China, 2023)	Obstructive CRC	NR	53.4	50.0	NR	77.8
Elmessiry (Egypt, 2023)	Emergency curative CRC	NR	11.1	28.9	25.2	71.1
Arnarson (Sweden, 2023)	Subspecialist vs generalist	42.5	35.4	33.4	28.3	47.0
Boeding (Netherlands, 2023)	Emergency CRC	29.0	10.0	NR	NR	60.9
Zamaray (Netherlands, 2023)	Emergency CRC	NR	29.0	NR	NR	NR
Pisano (UK, 2018)	CRC emergencies	NR	NR	25.2	NR	NR
Öistämö (Sweden, 2016)	Emergency CRC	6.5	26.0	12.0	NR	NR
Esswein (Austria, 2023)	Emergency resection	39.0	47.4	47.5	35.6	NR
Krutsri (Thailand, 2021)	Elderly emergency CRC	NR	41.3	26.3	NR	NR
Kobayashi (Japan, 2023)	Obstruction/perforation	8.3	18.5	53.3	NR	NR
Norman (South Africa, 2023)	Emergency CRC	4.3	31.0	2.2	5.4	55.4
Bin Traiki (KSA, 2023)	Emergency CRC	28.6	NR	NR	NR	60.9
Ocak (Turkey, 2021)	Emergency CRC	NR	31.0	NR	NR	NR
Kim (Korea, 2010)	Emergency CRC	NR	NR	45.9	NR	NR

- Mortality endpoints varied across studies (in-hospital, 30-day, or short-term postoperative mortality).
- Morbidity definitions were heterogeneous and included overall complications or major complications as defined by individual authors.
- Survival outcomes represent overall survival where reported; follow-up duration varied between studies.
- NR – Not reported.

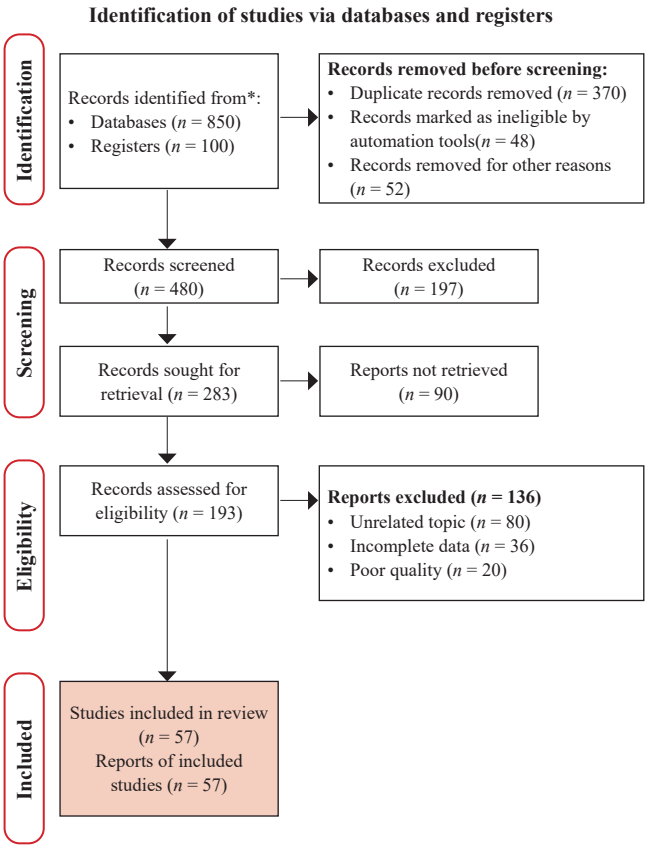

Figure 1: PRISMA 2020 flow diagram of study selection

PRISMA 2020 flow diagram illustrating the study identification, screening, eligibility assessment, and inclusion process for this systematic review of emergency colorectal cancer presenting with obstruction or perforation.

or perforation, including colostomies and SEMS, studies on controversies in CRC emergency management, and studies comparing outcomes between elective and emergency cases. Studies discussing the importance of multidisciplinary care, studies on the role of enhanced recovery after surgery (ERAS) in managing cases with perforated or obstructed CRC were included in the study for the adult population.

Exclusion criteria

We excluded studies that included letters to the editor, case reports, personal opinions, studies of elective CRC cases, studies of benign colonic conditions, studies of paediatric cohorts, and studies published in non-English languages. The methodological characteristics, geographic distribution, and design of the included studies are summarised in Table III.

A PRISMA flow-chart diagram was used to illustrate the study selection process. A total of 950 records were identified (850 from database searches and 100 from other sources). After removal of duplicates, 480 records remained for title and abstract screening. Of these, 197 were excluded for irrelevance or language, leaving 283 articles for full-text review. After excluding 226 studies (case reports, paediatric studies, elective-only cohorts, and non-eligible designs), 57 studies were included in the final qualitative synthesis, as illustrated in Figure 1.

Data extraction

The extracted data included study information, patient demographics, presentation of emergency CRC, various management strategies, and clinical outcomes, including morbidity, mortality, and survival.

Quality assessment and risk of bias

The included studies were evaluated using design-specific quality appraisal tools: AMSTAR 2 for meta-analyses and systematic reviews, the Cochrane Risk of Bias tool for RCTs, the Newcastle-Ottawa Scale for cohort studies, AGREE II for clinical guidelines, and SANRA for narrative and scoping reviews. To reduce risk of selection bias (Appendix 1), two reviewers independently and in duplicate screened titles and abstracts against predefined eligibility criteria. Full-text articles were then reviewed in the same manner. Discrepancies were resolved through discussion or, if needed, by consulting a third reviewer. The use of explicit inclusion and exclusion criteria, along with the PRISMA flow diagram, ensured methodological rigor and minimised selection bias. Duplicate reports were excluded, and only peer-reviewed, English-language articles reporting clear outcome data were considered.

Data synthesis and analysis

A qualitative synthesis was conducted, and the relevant findings were summarised in a narrative and presented in tables. Descriptive statistics were used for pooled data whenever possible. Meta-analysis was not done due to heterogeneity of the articles, their methods, and their outcomes. The qualitative analysis included evaluation of surgical procedures (colostomy, primary anastomosis, and SEMS), the impact of centre volume, and the impact of emergency surgery for CRC cases.

Results

Where comparative data were available, outcomes of emergency CRC surgery were interpreted in relation to elective surgery cohorts to contextualise differences in morbidity, mortality, and long-term survival.

Outcomes in obstructed and perforated CRC cases

Emergency CRC cases involving obstruction and perforation are associated with significantly worse outcomes, as summarised in Table IV, which presents reported ranges for mortality, morbidity, stoma formation, recurrence, and survival across included cohorts. The primary outcome measures reviewed in this study include mortality, postoperative complications, length of hospital stay, stoma formation, quality of life, and long-term survival.

Mortality and morbidity in emergency CRC cases

Emergency CRC surgeries are associated with significantly higher mortality and morbidity compared to elective procedures. Thirty-day mortality ranges from 15–33% in obstruction and 26–77% in perforation, whereas in elective surgery it typically remains below 5%.[2,6] The mortality rate increases further at 90 days, reaching up to 37%, particularly in patients presenting with complications such as sepsis and multi-organ failure.[16-19] Among emergency presentations, patients with perforated CRC face the highest mortality risks, with reported rates ranging from 26–77%. This is primarily

due to the presence of peritonitis, systemic infection, and resulting organ dysfunction.[2,6] In contrast, patients with obstructed CRC have somewhat lower but still concerning mortality rates, reported between 15% and 30%, which is often attributed to delayed presentation and the inherent risks of emergency surgical intervention.[15] A recent study from Japan emphasised that patients undergoing emergency surgery for CRC had significantly lower overall survival than those treated electively, underscoring the negative impact of emergency presentation on long-term prognosis.[20]

Postoperative complications

Postoperative complications are also markedly higher in emergency CRC surgeries compared to elective procedures. Anastomotic leakage occurs in approximately 13–27% of emergency primary anastomoses. Primary anastomosis should be performed only in hemodynamically stable patients with adequate physiological reserve. In unstable patients, staged procedures or diversion are preferred. Leak rates differ by tumour location: emergency right-sided anastomoses have leak rates comparable to those of elective surgery, whereas left-sided emergency anastomoses carry a higher risk.[15] Sepsis and septic shock are present in 25–50% of patients with perforated CRC, and these complications are strongly correlated with increased mortality.[5] Wound infections are reported in 20–45% of emergency CRC surgeries, consistently higher than the rates observed in elective surgeries, which are typically under 10%.[5,21] Pulmonary complications, such as pneumonia and acute respiratory distress syndrome (ARDS), develop in 18–35% of emergency CRC patients, largely due to prolonged hospital stays and sepsis-related complications.[21] A study conducted in South Africa further confirmed that patients with colonic perforation experience significantly higher rates of postoperative infections and poorer outcomes.[16]

Length of hospital stay and ICU admissions

The length of hospital stay and the rate of ICU admission are also significantly higher in emergency CRC cases. The mean hospital stay ranges from 10–21 days, whereas for elective cases it is typically 5–9 days.[15] ICU admission rates range from 45–67%, primarily due to sepsis, organ failure, and perioperative instability.[21] Readmission rates following emergency CRC surgery are also high, reported at up to 30%, with stoma-related complications, infections, and delayed recovery being the most common causes.[21] A registry-based study also showed that patients with right-sided obstructing colon tumours experienced longer hospitalisations and had worse overall survival outcomes than those with left-sided tumours.[22]

Stoma formation and long-term functional outcomes

Stoma formation should not be considered inferior management in emergency CRC. In left-sided and rectal obstruction, diversion is standard practice in many healthcare systems and may significantly improve short- and long-term outcomes by allowing stabilisation before definitive resection. Stoma formation in emergency CRC cases significantly impacts both short- and long-term patient outcomes. Temporary or permanent stomas are created in 50–80% of cases, especially in unstable patients and those presenting with perforated tumours.[15] Permanent stomas are required in approximately 30–55% of patients who undergo Hartmann's procedure, often due to poor postoperative functional recovery or patient frailty.[15] Complications related to stomas, including prolapse, stenosis, and peristomal infections, occur in 20–35% of cases and contribute to higher hospital readmission rates.[15,23,24] Recent research indicates that emergency CRC patients who undergo stoma formation report significantly lower quality of life compared to those who undergo primary anastomosis.[17]

Quality of life and long-term survival

In terms of long-term survival and quality of life, emergency CRC patients fare considerably worse than their elective counterparts. Reported five-year survival for emergency CRC ranges approximately from 20–45%, whereas elective cases generally demonstrate substantially higher survival rates, often exceeding 60–70% depending on stage and population characteristics.[15,24] Stoma formation in emergency CRC cases may impact health-related quality of life, particularly in the early postoperative period. However, diversion remains a safe and widely accepted standard strategy in unstable patients or in left-sided obstruction and should not be considered inferior management. In many emergency scenarios, stoma formation represents the safest approach to achieve source control and reduce anastomotic risk.[15] Specialist care can offer survival benefits; high-volume, specialised colorectal centres have reported five-year survival rates of up to 55%, compared to 20–30% in general surgical units.[25,26] A multicentre study further confirmed that elderly patients experience significantly higher recurrence rates and lower survival following emergency resection of CRC than those who undergo elective surgery.[27]

Factors contributing to poor outcomes in emergency CRC

The poor outcomes observed in emergency CRC cases are multifactorial. One major factor is the advanced stage of disease at presentation. More than 70% of emergency CRC cases present at stage III or IV, which significantly limits the potential for curative surgical intervention.[1,2,6] A study in Saudi Arabia found that advanced-stage presentation notably increases 30-day mortality, particularly in low-resource healthcare settings.[28] Sepsis and multi-organ dysfunction are also common and associated with increased mortality. Approximately 50% of patients with perforated CRC develop severe sepsis or septic shock, which significantly increases perioperative mortality.[5] Large-scale registry data indicate that CRC associated with perforation has the poorest oncologic outcomes due to the systemic inflammatory response.[29]

Patient demographics and comorbidities also contribute to unfavourable outcomes. Patients aged 70 years or older with cardiovascular or pulmonary conditions have a 2.5-fold increased risk of mortality and postoperative complications.[21] Socioeconomic status and healthcare access further influence emergency CRC rates. Populations with lower incomes and those in rural areas experience a 40% higher incidence of emergency CRC presentation, largely due to disparities in screening and limited access to healthcare services.[30] The availability of specialised colorectal care also plays a significant role. High-volume centres report a 30% reduction in mortality and 15% shorter hospital stays compared to non-specialised hospitals, highlighting the importance of expert surgical teams.[8,26,29,30]

Table V: Emergency management strategies and key controversies in colorectal cancer presenting with obstruction or perforation

Clinical scenario	Strategy/approach	Evidence source(s) in this review	Key message/controversy	Practical implication for roadmap
Obstructing CRC (general)	Immediate emergency resection (various procedures)	Esswein 2023; Ocak 2021; Moura 2014; Norman 2023	Emergency surgery is associated with substantial morbidity/mortality in multiple cohorts; outcomes vary widely by setting and case-mix.	Where feasible, optimise physiology (resuscitation, sepsis control) and centralise to experienced units; standardise perioperative pathway.
Obstructing CRC (left-sided)	SEMS as bridge-to-surgery (BTS)	Ma W 2023 (meta-analysis); Yoo 2021 (review); Binetti 2022 (review)	Ongoing controversy: BTS may reduce emergency surgery burden and allow optimisation, but concerns persist about perforation and potential oncologic compromise.	Use SEMS selectively (appropriate expertise, tumour location, and absence of peritonitis/perforation) and document indications/contraindications.
Obstructing CRC (left-sided)	Diverting stoma / staged surgery	Pisano 2018 (guideline); Ansaloni 2010 (consensus)	Staged approaches may be safer in unstable/high-risk patients; choice depends on physiology, contamination, and expertise.	Recommended for unstable patients or where definitive resection is unsafe; integrate into local protocol.
Obstructing CRC	Primary resection + anastomosis (± diversion)	Pisano 2018; Ansaloni 2010; Yang 2017 (reviewing feasibility); Sato 2025 (observational)	Controversy: oncologic adequacy vs leak risk under emergency conditions; patient selection is critical.	Restrict to hemodynamically stable patients with good physiological reserve, controlled contamination, and experienced colorectal teams.
Perforated CRC (localised or free perforation)	Damage control principles/ source control first	Pisano 2018 (guideline); Anwar 2006 (perforated CRC outcomes)	Septic physiology drives outcomes; the immediate priority is source control and resuscitation over one-stage reconstruction.	Use structured sepsis pathways; consider staged reconstruction; emphasise early broad-spectrum antibiotics and ICU support when needed.
Perforated CRC	Hartmann's procedure/resection without anastomosis	Pisano 2018; Anwar 2006; cohort outcomes indirectly reflected in high stoma rates (Moura 2014)	Common in high-risk or gross contamination; reduces leak risk but increases permanent stoma burden.	Define local criteria for Hartmann (shock, faecal peritonitis, high ASA, severe contamination).
Perforated CRC (stage II subgroup)	Oncologic recurrence risk stratification	Asano 2023; Kaewubon 2024	Perforation is a recurrence-risk modifier even in stage II; controversy around intensity of adjuvant decisions and surveillance.	Incorporate perforation status into postoperative oncology referral and surveillance pathways.
Who should operate?	Specialist colorectal vs general surgeon	Arnarson 2023	Consistent theme: subspecialisation/volume influences outcomes; supports centralisation.	Roadmap should include referral networks, on-call colorectal cover, or regional pathways.
Approach (open vs minimally invasive)	Emergency laparoscopy/ robotics	Alselaim 2022 (laparoscopy review); Maertens 2022 (robotic emergency series)	Promising in selected patients, but limited by resources, expertise, hemodynamic instability, and contamination.	Use minimally invasive only with expertise and stable physiology; do not compromise source control or oncologic resection.
Perioperative care pathway	ERAS adaptation for emergency CRC	Lohsiriwat 2019 (review); manuscript conclusion emphasises ERAS adaptation	ERAS in emergencies is feasible but requires modification (sepsis, obstruction physiology, urgent surgery).	Include a pragmatic emergency-ERAS bundle (early mobilisation, multimodal analgesia, glycaemic control, goal-directed fluids).

- This table summarises *management-relevant contributions* of included sources; effect sizes and direct head-to-head comparisons were not consistently extractable across studies.
- "NR" indicates details were not reported in the extracted dataset or were not comparable across studies.
- CRC – Colorectal cancer, SEMS – Self-expanding metal stent, BTS – Bridge to surgery, ERAS – enhanced recovery after surgery.

Controversies in emergency CRC management

While many aspects of emergency CRC management are now guided by established principles, nuanced decision-making remains necessary regarding surgical timing, patient selection, and bridge-to-surgery strategies. Hartmann's procedure is the most commonly performed, reported in up to 60% of emergency resections in observational series, but it has a high permanent stoma rate – approximately 50% – which significantly affects patients' long-term quality of life.[6,14,16,23,24] While resection and primary anastomosis offer better functional outcomes, they are associated with a higher anastomotic leakage rate (13–27%), requiring careful patient selection.[11] Key emergency management strategies and areas of ongoing debate are summarised in Table V, including diversion strategies, SEMS use, Hartmann's procedure, and the role of specialist units.

The use of SEMS as a bridge to surgery in obstructed CRC cases shows a 70% success rate in delaying surgical intervention. This approach allows time for patient optimisation and facilitates elective resection, thereby reducing the complications associated with emergency surgery.[12-14] SEMS use is not without complications. Perforation rates ranging between 5% and 15% have been reported in earlier series and remain an important technical consideration.[31] Historically, concerns have been raised about potential oncologic compromise, particularly in cases complicated by perforation. Some observational multicentre studies have suggested possible associations between stent-related perforation and recurrence; however, these findings are inconsistent and must be interpreted cautiously.[32] Contemporary randomised evidence supports oncologic non-inferiority when SEMS is appropriately selected and performed in experienced settings. Neoadjuvant therapy in emergency CRC is rarely utilised due to the urgency of presentation, but it may benefit select patients, especially those with rectal cancer who are hemodynamically stable. In such cases, diversion of colonic contents is often required as a preliminary step.[33]

Opportunities to improve outcomes

Improving outcomes in emergency CRC requires a multifaceted approach targeting early detection, optimised surgical care, institutional specialisation, and patient-centred strategies. One of the most impactful opportunities lies in early diagnosis. Expanding CRC screening programmes may reduce the incidence of advanced-stage colorectal cancer and potentially decrease the proportion of emergency presentations; however, screening does not improve outcomes once obstruction or perforation has occurred.[15,24] Early detection through systematic screening facilitates elective intervention and reduces the likelihood of advanced-stage presentation; however, its population-level survival benefit varies across trials.

Another critical area is preoperative stabilisation and optimised perioperative care. The use of fluid resuscitation, prompt antibiotic administration, and comprehensive patient assessment plays a vital role in reducing perioperative mortality and enhancing surgical success.[12] Optimising patient condition prior to surgery may significantly improve perioperative outcomes.

Minimally invasive approaches, when feasible and performed in experienced centres, may be associated with reduced short-term postoperative morbidity and faster recovery in carefully selected emergency CRC patients; however, high-quality comparative data remain limited.[28,34,35] The centralisation of care in high-volume, specialised colorectal centres is another key strategy. Studies have shown that patients managed in specialised units have 30% lower mortality rates and shorter hospital stays than those treated in general surgical units.[26] Furthermore, patients treated in high-volume referral hospitals demonstrate better functional recovery and higher stoma reversal rates, suggesting superior long-term outcomes.[17]

Although originally developed for elective surgery, ERAS principles have been adapted for emergency colorectal surgery and have been associated with reduced postoperative morbidity and shorter hospital stays in pooled analyses, though the evidence remains largely observational.[36] These protocols improve recovery by optimising analgesia, promoting early mobilisation, and implementing structured perioperative care pathways, which are associated with shorter hospital stays and reduced postoperative morbidity in emergency settings.[36,37]

A multidisciplinary approach and long-term follow-up are also essential for successful emergency CRC care. Involving specialists from multiple fields improves postoperative recovery, facilitates comprehensive care planning, and increases long-term survival.[38] This collaborative approach ensures that treatment decisions are patient-specific and evidence-based.

Lastly, improving public awareness and strengthening screening strategies can have a transformative effect. Increasing awareness of CRC symptoms and encouraging participation in screening programmes can significantly reduce the incidence of emergency presentations due to obstruction or perforation. Better-informed populations are more likely to seek care early, resulting in improved outcomes.[38]

Collectively, these opportunities represent actionable strategies that can significantly reduce the burden of emergency CRC and enhance both short- and long-term outcomes.

Discussion

Emergency presentation of CRC is linked to poor outcomes such as high morbidity and mortality rates, rendering its management a clinical challenge. This systematic review highlights the difficulties, controversies, and factors contributing to poor outcomes and suggests a roadmap for better outcomes.

Determinants of poor outcomes in emergency CRC

Emergency CRC presentations, including obstruction and perforation, are associated with significantly worse outcomes than elective cases. Several factors contribute to these poor outcomes, such as advanced disease at presentation, sepsis, delayed intervention, and limited access to specialised colorectal surgical teams. Retrospective analyses have demonstrated that, although emergency oncologic colorectal resections carry higher morbidity than elective surgery, acceptable oncologic outcomes can be achieved in appropriately selected patients.[39]

Advanced disease at presentation

Patients from low socioeconomic status usually present late as emergencies with locally advanced disease due to limited

access to early screening programmes.[1,2,6] Presentation with obstruction or perforation is associated with a poor prognosis, as patients have a lower chance of curative resection and optimal management, due to an increased incidence of peritoneal seedlings.[18] Expectedly, elective cases have higher 5-year survival rates reaching 60–80% compared to approximately 30% for emergency CRC cases.[3,5] Manual decompression techniques have been described in small retrospective series; however, the evidence is limited and insufficient to recommend routine use.[40]

CRC presenting with colonic obstruction is associated with unfavourable tumour biology and poor response to adjuvant treatment, rendering obstruction an independent poor prognostic factor.[41]

Importantly, perforation represents a distinct biological and clinical state compared with obstruction because it is frequently accompanied by peritoneal contamination, systemic inflammation, and septic physiology, which further worsens prognosis.[2,6,18]

Influence of comorbidities and age

Several patient factors contribute to poor outcomes in emergency CRC, including renal impairment, diabetes mellitus (DM), ischemic heart disease (IHD), and advanced age.[21] Additionally, a higher ASA score (III or IV) is associated with adverse outcomes.[1,2,5,6,21] In emergency settings, elderly patients have a higher recurrence rate compared to younger cohorts, which highlights the need for a tailored approach for this age group when presented with obstruction or perforation of CRC.[42]

While operative principles are broadly similar, older patients often require stricter physiological selection, enhanced preoperative optimisation, and careful balancing of definitive resection versus damage-control/staged strategies.[21,42]

Healthcare disparities and access to specialised care

Access to high-volume colorectal centres has been linked to improved patient outcomes, driven by specialised surgical expertise and multidisciplinary care.[1-3,6,10] However, many emergency CRC patients are treated in non-specialist settings, where the lack of standardised protocols and colorectal surgical experience contributes to suboptimal postoperative outcomes.[25] Studies have found that higher hospital volumes are associated with lower operative mortality rates in cancer cases, underscoring the importance of centralising care.[43] National trends in CRC mortality suggest that improved access to specialised services and early detection programmes contribute to declining mortality rates, underscoring the importance of structured healthcare policies.[19]

Management of obstructing colorectal cancer

Management of obstructing CRC has evolved substantially and is no longer uniformly "highly controversial." Contemporary management is guided by tumour location, patient physiology, and local expertise, with several pathways considered standard of care.

Left-sided and rectal obstruction should be explicitly distinguished from right-sided obstruction because management options, anastomotic risk, and feasibility of BTS strategies differ.

Surgical options in obstruction

For left-sided and rectal obstruction, a diverting stoma remains a standard and widely accepted management strategy. In many healthcare systems, particularly where endoscopic expertise is limited, diverting patients and delaying resection improves both short- and long-term outcomes.

Resection with primary anastomosis may be considered in carefully selected hemodynamically stable patients with adequate physiological reserve.[11] However, the risk of anastomotic leakage is higher in emergency settings, particularly in left-sided resections.

Right-sided obstructing tumours may be managed with right hemicolectomy and primary anastomosis in stable patients. Leak rates in emergency right-sided anastomoses are generally comparable to those in elective settings, whereas left-sided emergency anastomoses carry a higher risk and often require diversion or staged approaches.[11]

Self-expandable metal stents

SEMS are increasingly used for malignant large bowel obstruction as a BTS, allowing preoperative optimisation and staging.[12-14] Early concerns regarding perforation (5–10%) and potential tumour dissemination were raised.[31] ESGE guidelines endorse selective use of SEMS in non-perforated left-sided obstruction,[14] and meta-analyses demonstrate reduced stoma rates when SEMS are appropriately applied.[12,14]

Consensus guidelines recommend avoiding SEMS in patients with signs of impending perforation, with careful consideration of tumour location and technical expertise.[44] Observational studies have reported worse oncologic outcomes in patients presenting with perforation, including those with stent-related perforation; however, these findings are heterogeneous and should be interpreted cautiously.[45] Perforation remains a recognised technical complication of SEMS placement. Early Dutch Stent-In trials raised concerns regarding oncologic safety.[46,47] However, subsequent randomised trials, including ESCO and CReST, demonstrated comparable long-term oncologic outcomes between SEMS and emergency surgery when used in appropriately selected patients.[48,49]

Minimally invasive surgery for obstruction

Evidence regarding minimally invasive surgery in emergency CRC remains limited and largely observational. Selected series suggest that laparoscopic approaches are technically feasible in hemodynamically stable patients when performed by experienced teams, particularly in high-volume centres.[28,34,35] However, the need for advanced expertise, careful patient selection, and the potential for longer operative times limit widespread adoption in acute settings. Robust comparative data demonstrating long-term oncologic or survival benefit over open surgery are currently lacking.

Management of perforated colorectal cancer

Perforated CRC represents a distinct, more severe clinical entity characterised by peritonitis and septic physiology and may present along a spectrum ranging from localised contamination to feculent peritonitis 50; therefore, it requires a different management emphasis than obstruction.

Mortality in perforated CRC is significantly higher than obstruction alone due to sepsis and systemic inflammatory response 2,6.

Surgical priorities in perforation

The primary objective in perforated CRC is urgent source control. Hartmann's procedure remains widely used for left-sided perforation in unstable patients.[5,6,23] While associated with a high permanent stoma rate, it provides safe control of contamination and avoids a high-risk anastomosis in septic physiology.[5,6,23]

Right-sided perforations are typically managed with right hemicolectomy. Primary anastomosis in perforated CRC should be considered only in carefully selected, stable patients with minimal contamination and adequate physiological reserve; otherwise, staged approaches or diversion are preferred.[5,6,11,23]

Because perforation exists along a clinical spectrum (localised/contained vs diffuse feculent peritonitis), outcomes and operative decisions vary accordingly, and this heterogeneity should be acknowledged when interpreting the literature.[50]

Adjunctive and emerging therapies in emergency CRC

The role of neoadjuvant therapy in emergency settings

Neoadjuvant chemoradiotherapy is standard for locally advanced rectal cancer to reduce local recurrence but is not routinely used in colon cancer. In emergency obstructing or perforated presentations, oncologic sequencing is typically precluded by urgent surgical requirements, and neoadjuvant therapy is rarely feasible.[33] Future research may explore the selective use of neoadjuvant therapy in stable obstruction cases or in cases where SEMS can facilitate optimisation without compromising oncologic outcomes. It is essential to evaluate neoadjuvant strategies for obstructed, locally advanced tumours that can be relieved, potentially enhancing resectability by downstaging and downsizing the tumour.[51]

Where neoadjuvant therapy is considered, the discussion should explicitly differentiate rectal cancer (where chemoradiotherapy impacts local control) from colon cancer (where radiotherapy is not routine) and recognise that emergency physiology often precludes oncologic sequencing.[33,51]

Enhanced Recovery After Surgery in emergency CRC

Enhanced recovery after surgery (ERAS) protocols, originally developed for elective colorectal procedures, have increasingly been adapted to emergency colorectal surgery. A systematic review and meta-analysis demonstrated that the application of ERAS principles in emergency settings is associated with reduced postoperative morbidity and a shorter length of hospital stay compared with conventional care, although the available evidence remains largely observational.[36] Prospective cohort data further support the feasibility and potential benefit of ERAS implementation in emergency colorectal surgery when applied in carefully selected patients.[37] Pragmatic adaptation – such as individualised fluid management, optimised analgesia, early mobilisation, and cautious advancement of enteral feeding – is recommended in emergency physiology and appears feasible when implemented within experienced multidisciplinary services.[52]

Strategies to improve outcomes in emergency CRC

Reducing incidence of advanced CRC and emergency presentations

Strengthening CRC screening programmes, particularly in underserved populations with limited access to healthcare, may reduce the burden of emergency presentations by reducing the number of advanced-stage diagnoses.[15,24] However, screening does not directly improve outcomes once obstruction or perforation has already occurred; its role is primarily in reducing the incidence of advanced disease and emergency presentation.[53] Improving diagnostic pathways in symptomatic patients may also shorten time to diagnosis and reduce late-stage emergency presentations.[54]

Standardising emergency CRC management protocols

Developing evidence-based guidelines for emergency CRC – particularly regarding SEMS use, diversion strategies, surgical decision-making, and perioperative optimisation – is critical to reducing care variability and improving patient outcomes.[20,22,43]

Centralisation of care and multidisciplinary approach

High-volume colorectal centres and specialised units consistently report better surgical and oncologic outcomes.[25,26] Establishing referral pathways and centralising complex cases to specialised centres could significantly enhance patient survival.[25,26] High-volume, tertiary, specialised colorectal units achieve better outcomes for emergency CRC cases, encouraging greater service centralisation. This improvement is demonstrated in improved overall survival and lower morbidity rates.[1,2,6]

Training general surgeons in emergency CRC care

Given the limited availability of colorectal specialists in many regions, training general surgeons in emergency CRC management is essential. Implementing structured surgical training programmes and standardised treatment algorithms will help bridge the expertise gap.[55] Simulation-based workshops and structured training enhance surgical decision-making and technical proficiency in managing emergency CRC cases, particularly in low-resource settings.[27]

Public awareness and digital outreach for early diagnosis

Digital platforms that reach all community levels can significantly increase CRC awareness, educate the public about symptoms, and promote early medical consultation.[7,10] Artificial intelligence and machine learning applications are increasingly being explored to enhance early CRC detection and guide clinical decision-making, potentially reducing advanced disease and emergency presentations.[17]

Future directions and research priorities

Continuing research is essential to refine emergency CRC management strategies and establish widely accepted clinical guidelines. Key areas requiring investigation include evaluating long-term oncologic outcomes of SEMS as a BTS, assessing the feasibility and efficacy of

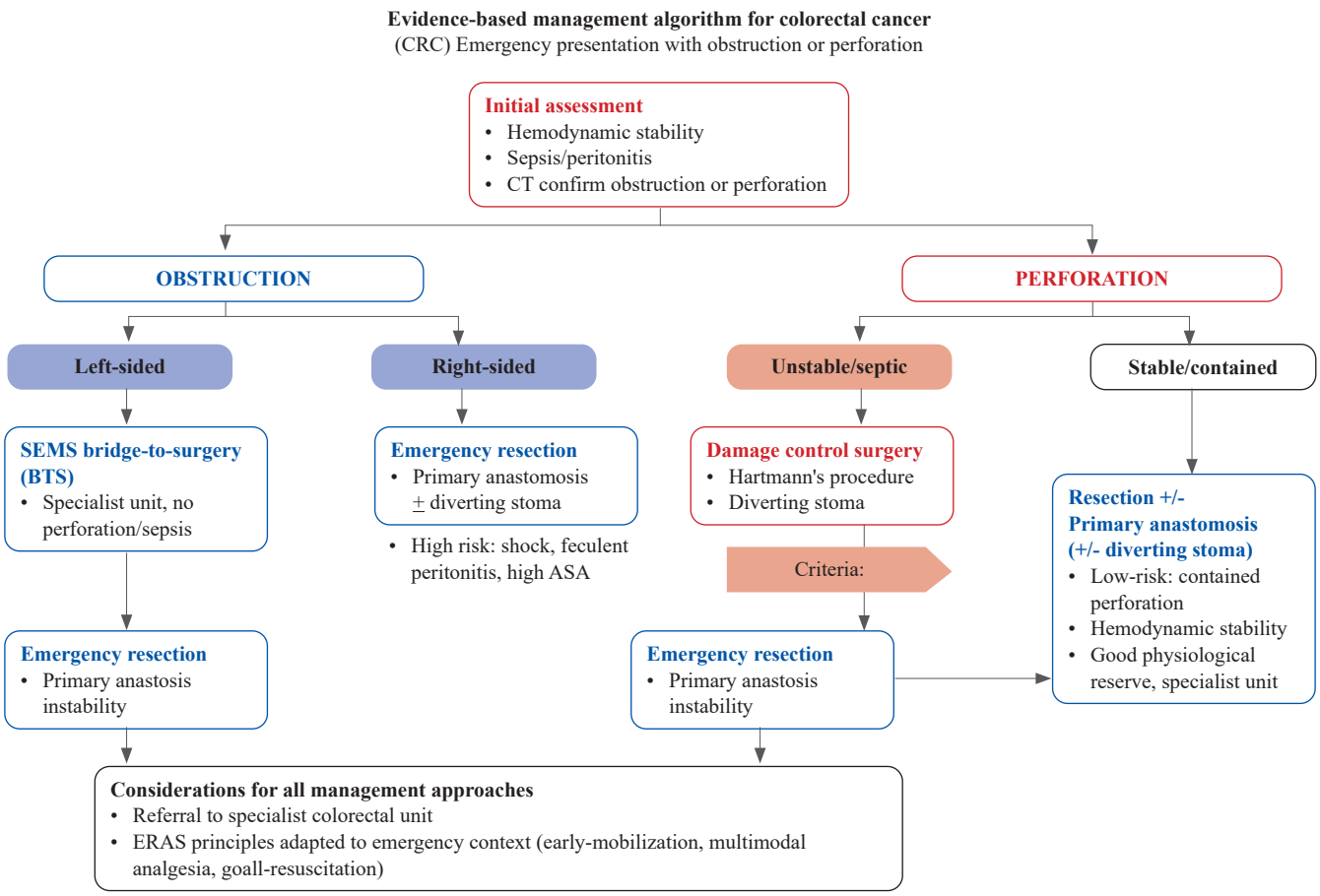

Figure 2: Evidence-based management algorithm for emergency colorectal cancer presenting with obstruction or perforation

CRC – Colorectal cancer, CT – Computed tomography, SEMS – Self-expanding metal stent, BTS – Bridge to surgery, ASA – American Society of Anaesthesiologists, ERAS – Enhanced recovery after surgery

neoadjuvant strategies in selected emergency CRC cases, and defining the role of robotic and laparoscopic procedures in acute CRC management. Emerging reports of robotic and minimally invasive approaches in emergency settings suggest technical feasibility, though evidence remains limited to small retrospective series.[56] Research should also focus on optimisation and adaptation of ERAS protocols specifically tailored to emergency situations. Another critical area is the development of predictive models integrating clinical, radiologic, and molecular markers to improve patient stratification and treatment planning in emergency CRC cases.[57]

Future research should also separate outcomes by obstruction vs perforation and right-sided vs left-sided disease, because these subgroups have different decision pathways and complication profiles.[22,26] An evidence-based management algorithm synthesising the reviewed literature is presented in Figure 2.

Recommendations

- Implement national strategies to reduce advanced colorectal cancer incidence through improved awareness and context-appropriate screening, recognising that screening reduces incidence rather than outcomes in established emergencies.
- Prioritise early diagnosis, rapid physiological optimisation, and timely access to specialised colorectal and multidisciplinary care.
- Adopt patient-tailored management based on physiological status, disease severity, and tumour location.
- In obstruction, guide resection strategy by hemodynamic stability, severity of obstruction, and surgical expertise; apply SEMS selectively in stable left-sided cases within experienced centres.
- In perforation, follow damage-control principles with diversion or anastomosis guided by sepsis severity and contamination.
- Centralise emergency CRC services to high-volume specialised centres with structured referral pathways.
- Implement pragmatic ERAS adaptations following resuscitation to optimise recovery.
- Develop standardised management protocols and definitions to enhance comparability and strengthen the evidence base for emergency CRC care.

Strengths

This systematic review included current articles from diverse health infrastructure with variable levels of specialised services for obstructed and perforated colorectal cancer patients. This review provides a global perspective by including different study designs, international guidelines, and studies from different geographical areas.

Limitations

Several limitations of this systematic review should be acknowledged, including the heterogeneity of the reviewed

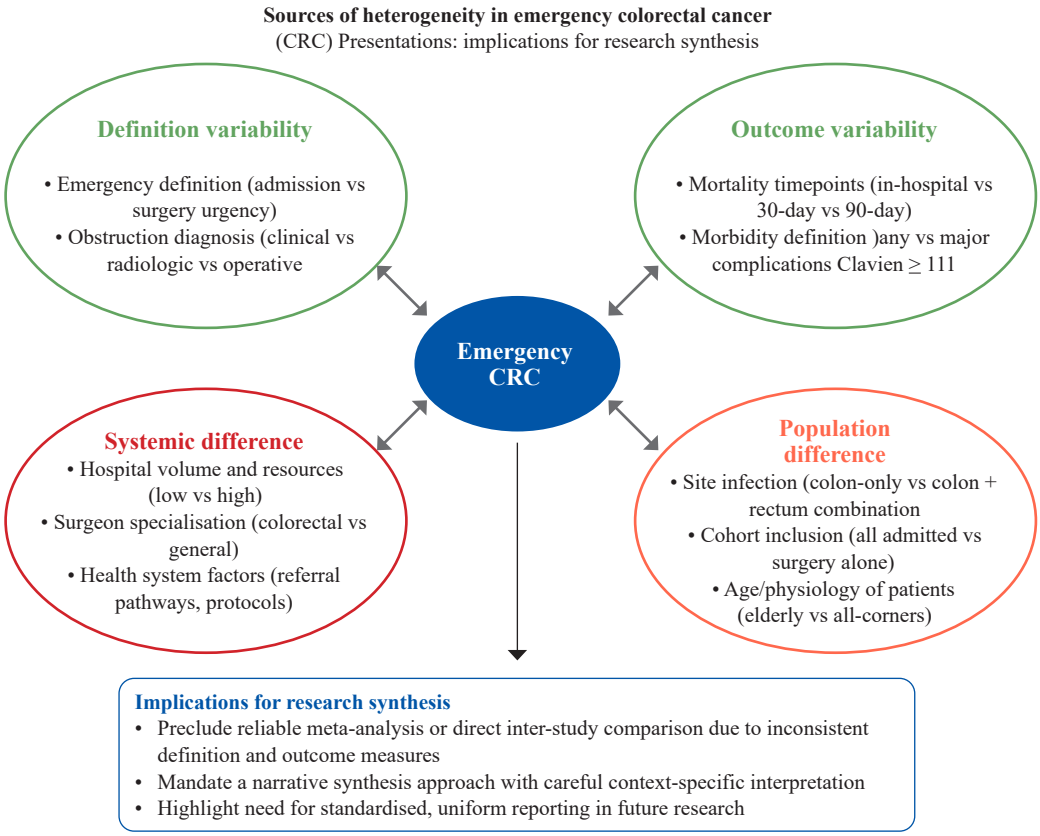

Figure 3: Sources of heterogeneity in emergency colorectal cancer and their implications for evidence synthesis

studies with respect to patient cohorts, definitions of emergency presentation, operative strategies, and reported endpoints (Figure 3). This precluded formal meta-analysis and limited the ability to conduct quantitative analyses between management strategies. Additionally, confounding and selection bias are possible as most reviewed evidence was observational in nature, with few randomised controlled trials specifically addressing emergency CRC. Moreover, the inconsistent reporting of long-term oncologic endpoints, quality of life, and stoma-related functional outcomes further limited the meta-analysis, highlighting the need for standardised reporting and prospective, multicentre research in this field.

Conclusion

Management of obstructing and perforated CRC cases is a significant clinical challenge due to the associated high morbidity and mortality rates. Better outcomes are observed in high-volume centres and specialised units, with early detection and clinical optimisation. Adoption and adaptation of ERAS protocols and multidisciplinary guidelines have shown promising results. Future research should focus on SEMS use, minimally invasive procedures, and enhancing ERAS adaptation to improve outcomes and survival.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Ethical approval is not required for this systematic review, as it reviews published articles that have undergone ethical clearance at the relevant institutes. However, this review conforms with the principles and guidelines of ethical considerations.

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REVIEW

Controversies in the emergency management of colorectal cancer and strategies for improved outcomes: a systematic review

Appendix 1: Risk of bias and quality appraisal tables (studies 1–57)

Table AI: Systematic reviews and meta-analyses (AMSTAR 2)

Ref	Study	Design	Critical domains met	Overall confidence
1	Golder et al., 2022	SR + MA	Most (minor non-critical flaws)	Moderate
3	Ma et al., 2023	SR + MA	Most (minor non-critical flaws)	Moderate
4	Veld et al., 2021	Systematic review	Most (no protocol registration)	Moderate
15	Mualla et al., 2021	SR + MA	All critical domains met	Moderate
21	Neal et al., 2015	Systematic review	Most (search heterogeneity)	Moderate
56	Harji et al., 2024	SR + MA	One critical flaw (RoB integration)	Low

Table AII: Randomised controlled trials (Cochrane RoB 2)

Ref	Study	Randomisation	Deviations	Missing data	Outcome measurement	Overall RoB
33	Sauer et al., 2012	Low	Low	Low	Low	Some concerns
45	Arezzo et al., 2017	Some concerns	Low	Low	Low	Some concerns
46	CReST Group, 2022	Low	Low	Low	Low	Low risk
47	van Hooft et al., 2011	Some concerns	Low	Low	Low	Some concerns
48	Sloothaak et al., 2014	Some concerns	Low	Low	Low	Some concerns
55	Bretthauer et al., 2022	Low	Low	Low	Low	Low risk

Table AIII: Observational studies (Newcastle–Ottawa Scale)

Ref	Study	Design	Selection (4)	Comparability (2)	Outcome (3)	NOS Score
2	Esswein et al., 2023	Matched cohort	4	2	1	7/9 (High)
6	Sato et al., 2025	Retrospective	3	1	2	6/9 (Moderate)
8	Arnarson et al., 2023	Registry cohort	3	1	2	6/9 (Moderate)
11	Turri et al., 2022	Observational	3	1	2	6/9 (Moderate)
16	Norman, Moodley, 2023	Observational	3	1	2	6/9 (Moderate)
17	Traiki et al., 2023	Retrospective	3	1	2	6/9 (Moderate)
18	Moura et al., 2020	Trend study	2	0	1	3/9 (Low)
19	Kim et al., 2022	Registry	3	1	2	6/9 (Moderate)
20	Kobayashi et al., 2024	Registry	4	2	3	9/9 (High)
22	Boeding et al., 2023	Nationwide	4	2	3	9/9 (High)
23	Sandén et al., 2023	Cohort	3	1	2	6/9 (Moderate)
26	El-Hussuna et al., 2023	Nationwide	4	2	3	9/9 (High)
27	Storli et al., 2023	Population-based	3	1	2	6/9 (Moderate)
28	Alselaim et al., 2022	Retrospective	3	1	2	6/9 (Moderate)
29	Yang et al., 2022	Retrospective	3	1	2	6/9 (Moderate)
35	Maertens et al., 2022	Case series	2	0	1	3/9 (Low)
37	Acar et al., 2020	Retrospective	3	1	2	6/9 (Moderate)
38	Bass et al., 2009	Observational	3	1	2	6/9 (Moderate)
39	Prasongdee, 2023	Single-center	2	0	1	3/9 (Low)
40	Yang et al., 2017	Comparative	2	0	1	3/9 (Low)
41	Asano et al., 2023	Retrospective	3	1	2	6/9 (Moderate)
42	Elmessiry et al, 2020	Case series	2	0	1	3/9 (Low)
44	Chen et al., 2017	Retrospective	3	1	2	6/9 (Moderate)
51	Otani et al., 2019	Observational	3	1	2	6/9 (Moderate)
52	Anwar et al., 2006	Observational	2	0	1	3/9 (Low)

54	Kaewubon et al., 2024	Retrospective	3	1	2	6/9 (Moderate)
57	Krutsri et al., 2021	Retrospective	3	1	2	6/9 (Moderate)

Table AIV: Clinical guidelines (AGREE II)

Ref	Guideline	Scope	Overall appraisal
5	Pisano et al., 2018	CRC obstruction & perforation	High
14	van Hooft et al., 2020	Colonic stenting	High
43	Ansaloni et al., 2010	Left colon obstruction	High
49	Mikalonis et al., 2024	Acute colonic obstruction	High

Table AV: Narrative and scoping reviews (SANRA)

Ref	Study	Type	Overall appraisal
7	Akimoto et al., 2021	Narrative review	Moderate
9	Hofseth et al., 2020	Narrative review	Moderate
10	Wu, Lui, 2022	Narrative review	Moderate
12	Kim, Lee, 2024	Narrative review	Moderate
24	Pavlidis et al., 2024	Narrative review	Moderate
25	Delamare Fauvel et al., 2023	Scoping review	Moderate
31	Yoo et al., 2021	Narrative review	Moderate
34	Hamilton, Bailey, 2023	Narrative review	Moderate
36	Binetti et al., 2022	Narrative review	Moderate
50	Grigorean et al., 2023	Narrative review	Moderate
53	Lohsiriwat, Jitmungngan, 2019	Narrative review	Moderate

Footnote: AMSTAR 2 overall confidence reflects presence of critical flaws. NOS scores are presented as Selection (4 stars), Comparability (2 stars), Outcome (3 stars). Risk of Bias (RoB) 2 judgments are based on domain-level assessments. AGREE II appraisals reflect overall guideline methodological rigor.