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REVIEW

An Evidence-Based Medical Review on Promoting Gastrointestinal Function Recovery After Colorectal Cancer Surgery

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Objective: The objective of this study was to search for, evaluate, and summarize data related to a faster postoperative recovery in patients with colorectal cancer (CRC) based on literature from China as well as internationally. This will serve as an evidence-based foundation for the clinical implementation of enhanced postoperative recovery of gastrointestinal function in patients with CRC.

Methods: Based on the hierarchical "6S" evidence model, we conducted a systematic search of computerized decision-support systems, guideline websites, as well as domestic and international databases for evidence, guidelines, expert consensus statements, clinical decision-making, best practices, evidence summaries, and systematic reviews of interventions focusing on accelerating gastrointestinal function rehabilitation after CRC surgery. The time limit for the search was from the date of creation of the database to January 2023. Two researchers evaluated the quality of the literature that was included, and we extracted data and summarized the evidence from those publications that fulfilled the quality criteria.

Results: The review included a total of 21 publications, comprising 6 guidelines, 6 systematic reviews, 3 expert consensus statements, 4 randomized controlled trials, and 2 evidence summaries. We summarized 51 best evidence findings across five areas: organizational management, preoperative risk assessment, education, intraoperative monitoring, and postoperative management.

Conclusion: There is a wide variety and wealth of information available on interventions to promote enhanced postoperative recovery of gastrointestinal function in patients with CRC. The use of evidence is discussed, keeping in mind the practical situation in China.

Keywords: colorectal cancer, evidence-based nursing, evidence summary, gastrointestinal function recovery, postoperative

Introduction

Colorectal cancer (CRC) is a common malignant tumor of the digestive system that is associated with high mortality and morbidity.[1] Globally, CRC is the third most common malignant tumor and the second deadliest cancer. In 2020, about 1.9 million cases of morbidity and 900,000 deaths globally were attributed to CRC. The prevalence of CRC is higher in developed countries and on the rise in low- and middle-income countries and regions.[2] It is projected that by 2035, the prevalence of CRC will increase to 2.5 million people, posing a serious healthcare challenge.[3] In China, the number of new cases of CRC was approximately 608,000 in 2019.[4] The total economic burden on patients was estimated to be RMB 202,990, with a per capita hospitalization cost of RMB 56,714.[5]

Therefore, laparoscopic colorectal cancer surgery is currently the most important operation in the treatment of CRC patients. However, as an invasive operation, the incidence of postoperative immune and gastrointestinal disorders in patients reached 12.5%.[6] The clinical manifestations of patients were stoppage of anal exhaust and defecation, abdominal

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pain, abdominal distension, continuous nausea and vomiting, and reduction or disappearance of intestinal sounds.[7–9] At the same time, studies have shown that the recovery of gastrointestinal function after colorectal cancer resection is slow and prone to mucosal barrier damage, intestinal flora imbalance and postoperative malnutrition, which affect the postoperative recovery of patients.[10–14] In addition, gastrointestinal dysfunction will also increase the occurrence of postoperative intestinal obstruction, anastomotic fistula and other serious complications, and lead to an infection rate of 9.38%,[6] seriously threatening the life of patients.[7] Existing guidelines on postoperative measures to accelerate the recovery of gastrointestinal function in patients are uneven, and patient compliance is low. Moreover, these guidelines do not have clear instructions on the specific surgical procedures, and the interpretation and execution are also vague, and the clinical nursing situation is not optimistic, resulting in a long postoperative bed time for patients, and it is difficult to recover to the preoperative level of function. The incidence of postoperative complications was 19.4%.[7,8,11–14] Therefore, in this study, we sought to summarize the best evidence for accelerating the postoperative recovery of gastrointestinal function in patients with CRC to offer a scientific, standardized, and reliable evidence basis for clinical practice.

Materials and Methods

Formulation of the Research Question

Based on the question development tool of the Center for Evidence-Based Nursing at Fudan University,[15] we formulated the research question using the PIPOST model. PIPOST is used for constructing a specific problem. Here, "P" (population) refers to the target population of evidence use, ie, in our case, patients with CRC identified as needing surgical treatment; "I" (intervention) refers to measures that can promote the enhanced recovery of gastrointestinal function of postoperative patients, and includes the five facets, namely, organizational management, preoperative risk assessment, preoperative education, intraoperative monitoring, and postoperative management; "P" (professional) denotes the personnel using the evidence, including nurses, doctors, patients, and family members; "O" (outcome) refers to the outcome indicators, including bowel sounds, the first postoperative exhaust, the first bowel movement, anxiety, nausea and vomiting, pain, and so on; "S" (setting) refers to the place where the evidence is used, including general surgery, gastrointestinal surgery, and surgical oncology settings, among others; and "T" (type of evidence) refers to the type of evidence, such as clinical decision-making, best practices, guidelines, evidence summaries, systematic reviews, expert consensus statements, and randomized controlled trials. This study was registered at the Fudan University Evidence-Based Nursing Center, China (registration number: ES20231504).

Literature Search Strategy

We performed a computerized search of the following using the top-down approach, following the "6S" pyramid model of evidence: (1) BMJ Best Practice, a computerized clinical decision support system; (2) guideline websites, including the US National Guideline Clearinghouse (NGC), the National Institute for Health and Care Excellence (NICE), the Guidelines International Network (GIN), the New Zealand Guidelines Group (NZGG), the Registered Nurses' Association of Ontario (RNAO), the Australian Clinical Practice Guidelines (ACPG), the Scottish Intercollegiate Guidelines Network (SIGN), the Ding Xiang Yuan (DXY), the Medlive, and other guideline networks; (3) databases included the following: PubMed, Cochrane library, OVID, Web of Science, Embase, CINAHL, and other foreign databases. We also performed a search in Chinese databases such as the China Biology Medicine disc, China National Knowledge Infrastructure, Wanfang Data, and the VIP Database.

We used the following English search terms: Colorectal Neoplasms/Ne-oplasm, Colorectal/Neoplasms, Colorectal/Colorectal Tumors/Colorectal Tumor/Tumor, Colorectal/T-umors, Colorectal/Colorectal Cancer/Cancer, Colorectal/Cancers, Colorectal/Colorectal Cancers/Color-ectal Carcinoma/Carcinoma, Colorectal/Carcinomas, Colorectal/Colorectal Carcinomas/Colonic Neopla-sms/Rectal Neoplasms GeneralSurgery/Postoperative, surgery /operative treatment /operation/p-ostoperation/after operation/radical resection/Radical surgery/radical operation/Modified radical correction Gastrointestinal Motility/Gastrointestinal Motilities/Motilities, Gastrointestina/Motility, Gast-rointestinal/Intestinal Motility/Intestinal Motilities/Motilities, Intestinal/Motility, Intestinal/Gastroint-estinal Motilities/Motilities,

Gastrointestinal/Motility, Gastrointestinal/Intestinal Motility/Intestinal Mot-ilities/Motilities, Intestinal/Motility, Intestinal/Gastrointestinal Tracts "Nursing Care/nurse/nursing/care".

The Chinese search terms we used were as follows: "Colorectal Tumor/Colon Tumor/Colorectal Cancer/Colon Cancer/Rectal Cancer/Rectal Tumor" "Post-Operative Period/Post-Operative/Surgery/Radical Surgery/Rectomy" "Gastrointestinal Activity/Gastrointestinal Function/Gastrointestinal Tracts/Gastrointestinal activity/intestinal peristalsis" and "Nursing/Nursing Management".

The search keywords were modified for each database. The search strategy for PubMed, as an example, is shown in Supplementary Materials. The search time frame for clinical decision-making, guidelines, best practices, evidence summaries, systematic reviews, and expert consensus statements was from the inception of the database until January 2023.

Inclusion and Exclusion Criteria

Literature Inclusion Criteria

(1) The study population was patients after surgery for CRC, involving enhanced recovery of gastrointestinal function; (2) The type of literature was Chinese and international clinical practice guidelines, evidence summaries, systematic reviews, original studies, and so on; (3) The languages were Chinese and English.

Literature Exclusion Criteria

(1) Research that pertained to patients with postoperative enterostomy after CRC; (2) literature with limited information in the text that could not be utilized; (3) literature where the full text could not be obtained through various channels but only abstracts were available; (4) conference reports and conference papers; (5) guidelines published by individual treatises; and (6) non-evidence-based guidelines.

Criteria for Evaluating the Quality of Literature

We evaluated the guidelines quantitatively using the 2012 version of the Appraisal of Guidelines for Research and Evaluation II (AGREE II).[16] The scale consists of 23 items, each of which is rated on a scale of 1 to 7, with 7 being "strongly agree" and 1 being "strongly disagree". Recommendations are made for the guidelines based on the number of standardized percentages for each domain and the appraiser's judgment. We evaluated expert consensus statements using the 2016 version of the Australian Joanna Briggs Institute (JBI) Evidence-Based Health Care Centre criteria,[17] which consists of six items with the evaluation options "not applicable", "unclear", "no", and "yes" for each item. For evaluating randomized controlled trials, we utilized the 2016 version of the Australian JBI evaluation tool, which consists of 13 items with the choices "not applicable", "unclear", "no", and "yes" for each item. We evaluated systematic reviews using AMSTAR (A MeaSurement Tool to Assess systematic Reviews),[18] which consists of 11 items with the options of "not applicable", "unclear", "no", and "yes" for each item. For evaluating evidence summaries, recommended practices, and best practice information booklets, we traced the original literature on which the evidence was based and selected the appropriate evaluation criteria for quality assessment depending on the type of literature.[19]

Process of Literature Quality Evaluation

Two appraisers with a research background in evidence-based nursing independently conducted the quality evaluation of the selected literature. In cases where the two raters came to different conclusions about a piece of literature, a third professional was invited to rate the piece and collaboratively decide on its inclusion or exclusion. When there were conflicting conclusions from different sources of evidence, the appraisers followed the rule of prioritizing evidence-based evidence, prioritizing high-quality evidence, and prioritizing the most recent published evidence. Guidelines were evaluated by at least four professionals, and other literature was evaluated independently by two researchers with evidence-based training, and in case of disagreements, a third researcher with a background in evidence-based medicine made the decision.[20]

Criteria for Extracting Evidence, Summarizing Findings, and Determining Recommendation Levels

In this study, we evaluated the extracted evidence using the JBI system for evidence pre-grading and evidence recommendation level[21] and the evidence was classified from levels 1 to 5 according to the type of study design: level 1 for randomized controlled trials/experimental studies, level 2 for quasi-randomized controlled trials, level 3 for observational-analytical studies, level 4 for observational-descriptive studies, and level 5 for expert opinion/basic studies.

We organized an expert meeting in March 2023 to evaluate the feasibility, appropriateness, clinical significance, and effectiveness of each item in the intervention program. The discussion included six experts (two specialists in evidence-based nursing methodology, one chief physician of general surgery, one deputy chief physician, one head nurse of general surgery, and one charge nurse), two staff members at the senior level, three at the deputy senior level, and one at the intermediate level. All of them had been working in their related field for more than 10 years and had rich work experience. Thus, the opinions discussed by the experts in this meeting had a certain degree of reliability and representativeness.

Results

General Overview of the Included Literature

We identified 1,454 articles in the preliminary literature search. There were 1,179 articles after removing duplicates. We excluded articles whose content was not relevant to the topic, reviews, 939 case reports, publications where we could not access the full text, those with incomplete data, and 55 articles in languages other than Chinese or English. After this re-screening, we had 185 articles. Additionally, we excluded articles with low-quality literature, literature that was not relevant to the practical work of nursing staff, and those with inconsistencies in outcome indicators. Finally, we included a total of 21 articles in the review, comprising 6 guidelines,[22–27] 6 systematic reviews,[28–33] 3 expert consensus,[34–36] 4 randomized controlled trials,[37–40] and 2 evidence summaries.[7,41] The flowchart of literature screening is shown in Figure 1.

Basic Details of the Included Literature

Literature extraction and evidence grading results: We extracted the following details from the included literature: title of the article, year of publication, country, source, type, and topic. These details are shown in Table 1.

Results of Literature Quality Evaluation

Results of Quality Evaluation of Guidelines

We included six guidelines[22–27] in this review, and their methodological quality evaluation results are shown in Table 2.

Quality Evaluation Results of Systematic Reviews

There were a total of six systematic reviews[28–33] in the final review, and the results of their methodological quality evaluations are shown in Table 3.

Quality Evaluation Results of Expert Consensus Statements

Three articles pertaining to expert consensus statements[34–36] were included in this study, and the results of their methodological quality evaluation are shown in Table 4.

Quality Evaluation Results of Randomized Controlled Trials

The review consisted of six randomized controlled trials,[37–42] and their methodological quality evaluation results are shown in Table 5.

Results of Quality Evaluation of Evidence Summaries

Two evidence summaries[7,41] were included in our review, and the results of their methodological quality evaluation are shown in Table 6.

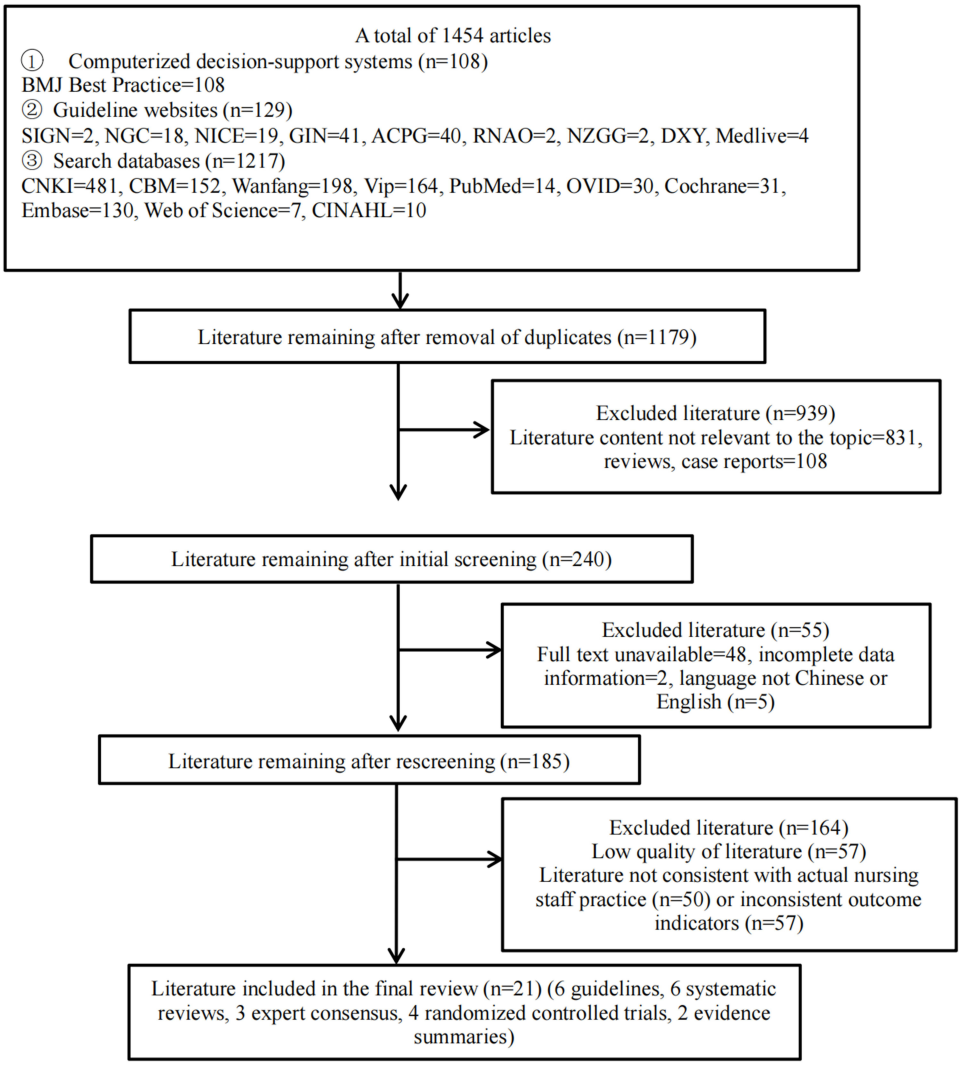

Figure 1 The flowchart of literature screening.

Best Evidence Summaries

After extracting and summarizing the evidence of enhanced postoperative recovery of gastrointestinal function in patients with CRC, we identified 58 best evidence practices in five areas: organizational management of postoperative CRC patients, preoperative risk assessment, preoperative teaching, intraoperative monitoring, and postoperative management, as shown in Table 7.[43,44]

Discussion

Organizational Management

Evidence 1 emphasizes a multidisciplinary collaborative approach. Currently, a multidisciplinary team consisting of personnel from nursing, surgery, traditional Chinese medicine, anesthesia, nutrition, rehabilitation, and other disciplines is involved in promoting enhanced postoperative recovery in patients. Relying solely on nursing staff is inadequate to comprehensively promote the enhanced postoperative recovery of gastrointestinal function in patients. As emphasized in the *Clinical Practice Guidelines for Enhanced Recovery after Surgery in China (2021)*,[22] a multidisciplinary collaboration can enhance the safety of patients during the perioperative period, reduce postoperative complications, shorten hospitalization time, and improve patient satisfaction. The negative impact on patients is mainly an increase in costs.

Table 1 Basic Details of the Literature Included in the Review (n = 21)

Authors	Time of Publication (year)	Country	Source of Literature	Type of Literature	Title
Chinese Medical Association of Surgery[22]	2021	China	CNKI	Guidelines	Clinical practice guidelines for enhanced recovery after surgery in China (2021)
Nygren et al[23]	2013	Europe	PubMed	Guidelines	Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations
Brendan et al[24]	2017	United Kingdom	Wiley	Guidelines	Association of coloproctology of Great Britain & Ireland (ACPGBI): Guidelines for the Management of Cancer of the Colon, Rectum and Anus (2017) – Surgical Management
Joseph et al[25]	2017	USA	SpringerLink	Guidelines	Clinical practice guideline for enhanced recovery after colonand rectal surgery from the American Society of Colon and Rectal Surgeons (ASCRS) and Society of American Gastrointestinaland Endoscopic Surgeons (SAGES)
Jennifer L et al[26]	2022	USA	SpringerLink	Guidelines	Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the American Society of Colon and Rectal Surgeons and the Society of American Gastrointestinal and Endoscopic Surgeons
Alfonsi et al[27]	2014	France	ELSEVIER	Guidelines	French guidelines for enhanced recovery after elective colorectal surgery
Traci et al[34]	2018	USA	PubMed	Expert consensus	American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Postoperative Gastrointestinal Dysfunction Within an Enhanced Recovery Pathway for Elective Colorectal Surgery
Zhejiang Provincial Working Group on Enhanced Recovery after Surgery for Colorectal Cancer Research[35]	2016	China	CNKI	Expert consensus	Enhanced Recovery after Surgery for CRC based on Clinical Multicenter Study Zhejiang Consensus on Comprehensive Treatment Model
Expert Committee of Shanghai Pharmaceutical Profession Association on Enhanced Recovery after Surgery of Chinese and Western Integrative Medicine[36]	2021	China	CNKI	Expert consensus	Shanghai Expert Consensus on Enhanced Recovery after Surgery of Chinese and Western Integrative Medicine (2021 Version)
Yang et al[28]	2018	China	PubMed	Systematic review and Meta-analysis	Effects of early postoperative enteral nutrition versus usual care on serum albumin, prealbumin, transferrin, time to first flatus and postoperative hospital stay for patients with colorectal cancer: A systematic review and meta-analysis
Herbert et al[29]	2018	United Kingdom	Cochrane Database of Systematic Reviews	Systematic review	Early enteral nutrition within 24 hours of lower gastrointestinal surgery versus later commencement for length of hospital stay and postoperative complications

Efrat et al[30]	2020	German	PubMed	Systematic review and Meta-analysis	Probiotic/Synbiotic Treatment and Postoperative Complications in Colorectal Cancer Patients: Systematic Review and Meta-analysis of Randomized Controlled Trials
Federica et al[31]	2022	Italy	Embase	Systematic review and Meta-analysis	The effect of early oral postoperative feeding on the recovery of intestinal motility after gastrointestinal surgery: Protocol for a systematic review and meta-analysis
Jean et al[32]	2021	France	PubMed	Systematic review and Meta-analysis	Comparison of treatment to improve gastrointestinal functions after colorectal surgery within enhanced recovery programmes: a systematic review and meta-analysis
Farah et al[33]	2020	France	PubMed	Meta-analysis	The Impact of Sham Feeding with Chewing Gum on Postoperative Ileus Following Colorectal Surgery: a Meta-Analysis of Randomised Controlled Trials
Chao et al[37]	2013	Taiwan area	PubMed	RCT	The Beneficial Effect of ST-36 (Zusanli) Acupressure on Postoperative Gastrointestinal Function in Patients With Colorectal Cancer
Stefanus et al[38]	2019	Netherlands	PubMed	RCT	Multimodal prehabilitation in colorectal cancer patients to improve functional capacity and reduce postoperative complications: the first international randomized controlled trial for multimodal prehabilitation
Zhang et al[39]	2021	China	PubMed	RCT	Combination of Epidural Blockade and Parecoxib in Enhanced Recovery After Gastrointestinal Surgery
Jin et al[40]	2021	China	CNKI	RCT	Effects of Three-step Time-Gradual Early Rehabilitation Exercise on Gastrointestinal Function following Colorectal Cancer Surgery
Liu et al[7]	2022	China	Vip database	Summary of evidence	Summary of the Best Evidence for Promoting Perioperative Gastrointestinal Recovery in CRC Patients
Gao et al[41]	2022	China	Vip database	Summary of evidence	Summary of the Best Evidence for Nonpharmacological Interventions to Promote Postoperative Functional Recovery in Patients with Gastrointestinal Malignancies

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Table 2 Results of the Quality Evaluation of Guidelines

Included Guideline	Standardized Score for Each Domain (%)						Number of Domains ≥60% (number)	Number of Domains ≥30% (number)	Level of Recommendation
	Scope and purpose	Participants	Formulation Rigor	Expression Clarity	Applicability	Editorial Independence			
Chinese Medical Association of Surgery (2021)[22]	84.72%	63.54%	75.00%	86.46%	56.94%	81.25%	5	6	B
J. Nygren et al 2013[23]	95.83%	79.17%	86.90%	92.71%	66.67%	98.96%	6	6	A
Brendan Moran et al 2017[24]	97.92%	87.50%	85.71%	93.75%	77.78%	97.92%	6	6	A
Joseph C. Carmichael et al 2017[25]	97.22%	86.46%	95.24%	95.83%	81.94%	97.92%	6	6	A
Jennifer L. Irani et al 2022[26]	97.22%	94.79%	91.67%	98.96%	86.11%	97.92%	6	6	A
P. Alfonsi et al 2014[27]	97.22%	89.58%	81.55%	90.63%	83.33%	87.50%	6	6	A

Table 3 Results of the Quality Evaluation of Systematic Reviews

Systematic reviews	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	Overall assessment
Yang et al 2020[28]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Inclusion
Georgia et al 2018[29]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Inclusion
Efrat et al 2020[30]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Inclusion
Federica et al 2022[31]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Inclusion
Jean et al 2021[32]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Inclusion
Farah et al 2020[33]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Inclusion

Note: ① Did the research questions and inclusion criteria adequately address the PICO section? ② Did the study explicitly mention that the research methodology for the systematic review was established prior to its implementation? Are any inconsistencies with the research protocol adequately addressed and explained? ③ Did the authors of the systematic review specify the types of studies included in their literature search? ④ Did the authors of the systematic review employ a comprehensive search strategy? ⑤ Was a two-reviewer repetitive literature selection method employed? ⑥ Was a two-reviewer repetitive data extraction method employed? ⑦ Did the authors of the systematic review provide a comprehensive inventory of the literature that was excluded from their analysis, along with a clear rationale for its exclusion? ⑧ Did the authors of the systematic review provide a comprehensive description of the included studies? ⑨ Did the authors of the systematic review employ suitable tools to evaluate the risk of bias for each study included? ⑩ Did the authors of the systematic review disclose the funding sources for the inclusion of each study? ⑪ If a meta-analysis was performed, did the authors of the systematic review employ suitable statistical techniques to aggregate the findings from the included studies? ⑫ While conducting a meta-analysis, did the authors of the systematic review evaluate the potential influence of bias risk in each of the included studies on the outcomes of the meta-analysis or other forms of evidence synthesis? ⑬ Did the authors of the systematic review take into account the potential bias of the included studies when analyzing or discussing the findings of each study? ⑭ Did the authors of the systematic review reasonably explain and discuss any heterogeneity in the results of the studies? ⑮ If the authors of the systematic review employed quantitative synthesis, did they thoroughly investigate and discuss the potential impact of publication bias (specifically, bias arising from small sample studies) on the results? ⑯ Did the authors of the systematic review report all sources of potential conflicts of interest, including any grants received for conducting the systematic review?

Table 4 Quality Evaluation Results of Expert Consensus Statements

Expert Consensus Statements	Evaluation Indicators						Number of Items Evaluated as "Yes" (Number)	Overall Evaluation Results
	①	②	③	④	⑤	⑥		
Traci et al 2018[34]	Yes	Yes	Yes	Yes	Yes	Yes	6	Inclusion
Zhejiang Provincial Working Group on Enhanced Recovery after Surgery for Colorectal Cancer Research 2016[35]	Yes	Yes	Yes	Yes	Yes	No	5	Inclusion
Expert Committee of Shanghai Pharmaceutical Profession Association on Enhanced Recovery after Surgery of Chinese and Western Integrative Medicine (2021)[36]	Yes	Yes	Yes	Yes	Yes	No	5	Inclusion

Note: ① Whether the source of viewpoints is clearly labeled. ② Are they representative of the field. ③ Whether the viewpoints are centered on the population of interest to the study. ④ Are the conclusions based on the results of the analysis, and are the ideas expressed logically. ⑤ Are references to other existing literature accurately cited. ⑥ Are inconsistencies with other literature rationally explained.

Table 5 Quality Evaluation Results of Randomized Controlled Trials

Randomized Controlled Trials	Evaluation Item												
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬
Chao etal 2013[37]	Yes	Unclear	Yes	Unclear	Unclear	Yes	Yes	Unclear	Yes	Yes	Yes	Yes	Yes
Stefanus et al 2019[38]	Yes	Unclear	Yes	Unclear	Unclear	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes
Zhang et al 2021[39]	Yes	Yes	Yes	Unclear	Unclear	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes
Jin et al (2021)[40]	Yes	Unclear	Yes	Unclear	Unclear	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes

Notes: ① Whether true randomization was used for grouping; ② Whether allocation to treatment groups was concealed; ③ Whether the baseline was comparable between the groups; ④ Whether the study participants were blinded to treatment assignment; ⑤ Whether outcome assessors were blinded to treatment assignment; ⑥ Whether outcome measures were blinded to treatment assignment; ⑦ Whether groups were identical except for the intervention to be validated; ⑧ Whether follow-up was complete, and whether measures were taken to deal with participants lost to follow-up; ⑨ Whether participants were analyzed in the groups to which they were randomized in the outcome analysis; ⑩ Whether outcome indicators were assessed in the same way for all groups of study participants; ⑪ Whether the outcome indicators were measured in a reliable way; ⑫ Whether the method of data analysis was appropriate; ⑬ whether the study design was methodologically rigorous.

Table 6 Results of Quality Evaluation of Evidence Summaries

Evidence Summaries	Evaluation Criteria								
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
Liu Yinghong et al (2022)[7]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partially yes
Gao Honglian et al (2022)[41]	Yes	Yes	Yes	Yes	Partially yes	Yes	Yes	Yes	Yes

Note: ① Scope and objectives are specific. ② Authors are clear and transparent. ③ Reviews are clear and transparent. ④ Evidence grading is clear. ⑤ Recommendations are clear. ⑥ Recommendations are appropriately cited. ⑦ Recommendations are time-sensitive. ⑧ Have a conflict of interest statement. ⑨Applicable to this study population.

Table 7 Summary of Evidence on Enhanced Recovery of Gastrointestinal Function After CRC Surgery

Number	Content of the Evidence	Evidence Level	Recommendation Level
1	Formation of a multi-disciplinary team (MDT), mainly consisting of personnel from nursing, surgery, traditional Chinese medicine, anesthesia, nutrition, and rehabilitation.[24,40]	5b	Strongly recommended
2	Screening patients for anxiety and depression using the Hospital Anxiety and Depression Scale (HAM-A).[45]	5b	Strongly recommended
3	Moderate to severe anxiety can increase postoperative pain, and elective medications or specialty treatments are recommended.[24]	5b	Strongly recommended
4	Patient's pain level is assessed using the visual analog scale (VAS).[24,42]	5b	Strongly recommended
5	It is recommended that preoperative nutritional risk screening be conducted as a routine practice, utilizing the Nutritional Risk Screening 2002 (NRS2002) scoring tool. Additionally, active implementation of nutritional support therapy is advised.[24]	5b	Strongly recommended
6	The 6-Minute Walk Test (6MWT) should be used to assess the patient's motor ability.[46]	5b	Weakly Recommended
7	Cards, manuals, multimedia, and display boards can be used.[24]	5b	Weakly Recommended
8	Prior to surgery, it is recommended to consume either 800 mL of liquid 10 hours before the procedure or 400 mL of carbohydrate drinks two hours before the surgery. Options for permissible liquids include water, sugar water, non-dregs fruit juice, carbonated beverages, clear tea, and black coffee (without milk). However, it is important to note that beverages containing ethanol should be avoided.[28]	5b	Strongly recommended
9	Prior to the operation, it is recommended to fast for a period of six hours. During this fasting period, it is advised to avoid consuming solid foods that are fried, high in fat, or contain meat.[28]	5b	Strongly recommended
10	Oral carbohydrate-rich isotonic fluids are not recommended for patients with diabetes mellitus or gastric emptying disorders. A deep vein catheter, such as the internal jugular vein or subclavian vein catheter, may be retained prior to surgery to provide intravenous energy supplementation.*	5b	Strongly recommended
11	For elective right hemicolectomy and combined abdominal perineal resection, routine preoperative mechanical bowel preparation is not recommended, while there are two scenarios: (1) for patients with preoperative colonoscopy suggestive of incomplete obstruction, oral lactulose, etc. combined with enemas for laxation may be given. (2) for patients whose colonoscopy suggests complete obstruction, only enema can be performed. In both of the above cases, oral antibiotics can be given three days before the operation, with intravenous antibiotics 30 minutes before the operation, and a supplementary group of antibiotics for two hours during the operation.[24]	5b	Strongly recommended
12	For the purpose of elective left hemicolectomy and anterior rectal resection, a combination of oral laxatives and a small quantity of sodium phosphate rectal solution can be considered a suitable option.[24]	5b	Strongly recommended

(*Continued*)

Table 7 (Continued).

Number	Content of the Evidence	Evidence Level	Recommendation Level
13	Adequate mechanical bowel preparation, in conjunction with oral antibiotics, is recommended as a preoperative measure for patients undergoing anus-preserving surgery for low to intermediate rectal cancer, those requiring intraoperative colonoscopic localization, or those experiencing severe constipation.[24]	5b	Strongly recommended
14	Preoperative administration of intravenous parecoxib at a dosage of 40 mg, along with either preoperative or postoperative epidural block using 2% lidocaine, is employed to alleviate postoperative pain in patients and facilitate their recovery.[27,43]	1C	Weakly Recommended
15	Preoperative exercise training has been shown to effectively mitigate the occurrence of postoperative complications. It is recommended that patients engage in aerobic and resistance exercises for a minimum of two weeks, with a frequency of ≥ 3 times per week and a duration of 40–60 minutes per session.[28]	5b	Strongly recommended
16	Aiming at multiple factors that tend to induce or aggravate organ insufficiency in the perioperative period, abdominal muscle strengthening training, fist exercises, breath and sputum expectoration exercises, chest expansion exercises, hip and anus lifting training, deep breathing, and ankle pumping exercises, etc., should be performed 1–2 times per day for 5–10 minutes per session, holding for 5–10 seconds each time.[27]	1c	Strongly recommended
17	Preoperative smoking and alcohol cessation ≥ 4 weeks.[27]	5b	Strongly recommended
18	Low-opioid multimodal analgesia facilitates rapid recovery of postoperative bowel function.[27]	5b	Weakly Recommended
19	Prior to the commencement of surgery, non-steroidal anti-inflammatory drugs (NSAIDs) should be administered with the intention of mitigating the occurrence of inflammatory pain.[27]	5b	Weakly Recommended
20	Strictly monitor the patient's body temperature throughout the procedure at no less than 36°C, and the operating room temperature should be ≥ 21°C for patients ≥ 18 years of age.[39,40]	5b	Strongly recommended
21	Use heated mattresses and warmers for body warmth; intravenous fluids must be heated for infusion; and warm saline or warm distilled water must be used for flushing the abdominal cavity.[39,40]	5b	Strongly recommended
22	Routine placement of abdominal drains is not recommended for patients undergoing elective abdominal surgery. Based on the clinical experience of gastrointestinal tumor surgery, it is advisable to maintain the presence of a gastric tube prior to the surgical procedure for: (1) reducing anastomotic pressure; (2) preventing postoperative symptoms such as nausea, vomiting, and aspiration; and (3) facilitating the administration of medications and enteral nutrient solutions through the gastric tube, if deemed necessary.[24]	5b	Weakly Recommended
23	It is recommended to place an abdominal drain in order to mitigate the risk of anastomotic leakage, considering the presence of risk factors.[24]	5b	Strongly recommended
24	Generally, the urinary catheter should be removed 24 hours postoperatively; patients undergoing transabdominal low anterior rectal resection may be left with an urinary catheter for about 2 days or have suprapubic cystocentesis drainage.[29]	5b	Strongly recommended
25	During tracheal intubation, if gas enters the stomach, it is necessary to apply pressure to the stomach in order to minimize gastrointestinal insufflation. Additionally, an intraoperative nasogastric tube can be utilized to expel the gas. However, it is important to remove the nasogastric tube before the patient regains consciousness from anesthesia.[39,40]	5b	Weakly Recommended
26	Postoperative pain relief can be effectively managed through the utilization of a portable thoracic segmental epidural pain pump or the regular administration of NSAIDs.[27]	2b	Strongly recommended
27	VAS < 3 points assists patients in early mobilization during the postoperative phase and serves as a preventive measure against postoperative falls.[24]	5b	Strongly recommended
28	Avemopan 12 mg can be administered to facilitate gastrointestinal motility. Natural laxative ventilation is a more preferable approach during the postoperative period, while early medication is not advised. If the recovery of gastrointestinal function is slow, medication may be used.[45]	5b	Weakly Recommended

(*Continued*)

Table 7 (Continued).

Number	Content of the Evidence	Evidence Level	Recommendation Level
29	Between 3 days before surgery and 12 weeks after surgery, probiotics are taken to promote accelerated recovery of intestinal function. Parenteral supplies are available for fasting patients.[34]	1b	Weakly Recommended
30	Acetylcholinesterase inhibitors, as well as cholinesterase agonists, have a positive effect on recovery from gastrointestinal paresthesia and may also be offered as an option for patients by healthcare professionals.[45]	1b	Weakly Recommended
31	A postoperative daily activity schedule is implemented and recorded.[24]	5b	Weakly Recommended
32	Patients who are awake after surgery can be adjusted from the supine position to the semi-recumbent position and can perform a moderate amount of bed activities.[45]	5b	Strongly recommended
33	On postoperative day 1, the patient should be out of bed for 1–2 hours, and from day 2 until discharge, 4–6 hours of activity per day is appropriate.[45]	5b	Strongly recommended
34	In the postoperative period of 6–12 hours, the patients can be instructed to chew gum 3 times a day for 5–10 minutes each time.[31,35–38,40]	1a	Weakly Recommended
35	The postoperative balloon blowing method is highly suitable for facilitating early rehabilitation training for patients who are bedridden. Procedure: The patient is instructed to start blowing the balloon after taking one deep breath. The objective is to expel the gas in the lungs into the balloon. Typically, the balloon is expected to reach a size of 5–30 cm; this can be done for 3–5 minutes each time and 3–5 times per day.[40]	5b	Strongly recommended
36	At 12–24 hours after the operation, the patient should start abdominal breathing. The patient should lie in a supine position with the body as relaxed as possible. The hands are crossed over the lower abdomen, and the individual inhales air slowly through the nose, causing the abdomen to bulge and stretch forward. After a 2-second pause, the individual exhales the air slowly, resembling the action of playing a flute, 4–6 times per minute.[44]	1c	Strongly recommended
37	At 12 hours after the operation, abdominal massage should be started. The patient should lie flat on the bed with their hands and feet together. The nursing staff teach family members to massage the abdomen in a circular clockwise movement, starting from the navel as the center. They should be instructed to avoid the incision and use gentle strokes along both sides of the incision, moving from top to bottom and bottom to top. The technique should vary in pressure, ensuring it does not exceed the patient's tolerance level and avoiding additional tension on the incision. It is advisable to avoid applying excessive vertical tension on the incision.[44]	1c	Strongly recommended
38	Lower limb movement exercises should begin 24 hours after surgery. These exercises involve placing the legs in an anterior spreading position, flexing and extending the dorsum of the feet as much as possible, and lifting the legs upward in an alternating fashion to form a 45° angle with the bed. This position should be maintained for 5 seconds. For patients with poor compliance, pneumatic compression can be used to prevent lower extremity venous thrombosis.[44]	1c	Strongly recommended
39	At 24 hours after the operation, hip-lifting exercise should be started. The patient takes the supine position with both knees bent and is asked to move both feet in a circular motion on the bed while lifting the hips, using the feet and elbows/shoulders as the fulcrum. Then, the patient has to tighten the perineal muscles and hold for 1–5 seconds, and then move the hips back to relax the perineal muscles. In the early postoperative period, the subsequent steps of the rehabilitation exercises should be added over time to the content of the previous step. Starting from the 24-hour postoperative period, the aforementioned rehabilitation exercise movements should be performed three times a day, with each training session lasting for 5–10 minutes. During the rehabilitation exercise training process, it is important to closely monitor changes in blood oxygen levels, blood pressure, and heart rate, as well as the amount, texture, and color of drainage fluid. These factors should be taken into consideration when adjusting the intensity of the rehabilitation exercise training based on the individual's actual condition.[44]	1c	Strongly recommended

(*Continued*)

Table 7 (Continued).

Number	Content of the Evidence	Evidence Level	Recommendation Level
40	Detailed dietary instructions should be provided to patients and their families, emphasizing the importance of resuming their regular diet as soon as possible after surgery. It is recommended that patients consume at least 200 mL of a 10% glucose solution orally within 24 hours post-surgery. They are encouraged to start with a small dose of liquid diet, typically around 50 mL, and consume small and frequent meals (2–3 hours between each meal), and gradually increase the duration and frequency based on individual tolerance.[32,33]	5b	Weakly Recommended
41	Neither early oral feeding (EOF) nor enteral nutrition within 24 hours after colorectal surgery can lead to infections. Additionally, a low-residue diet can reduce nausea and promote the recovery of bowel function without increasing the incidence of other complications.[32,33]	5b	Weakly Recommended
42	A liquid diet supplemented with oral enteral nutrition can be introduced on postoperative day 2. Patients have to avoid excessive intravenous nutrition, control total energy intake at 25–30 kcal/(kg·d), and maintain the patient's body weight similar to the preoperative level.[32,33]	1a	Strongly recommended
43	For postoperative patients who are unable to eat or have insufficient energy intake (less than 60% of essential calories) for more than 7 days and have an indication for tube-feeding, tube-feeding can be initiated within 24 hours postoperatively. It should be noted that the rate of tube-feeding should be slow, at 10–20 mL/h.[32,33]	1a	Weakly Recommended
44	For patients with severe postoperative malnutrition, nutritional support therapy should be initiated immediately. Parenteral nutrition should be followed by enteral nutrition.[32,33]	1a	Strongly recommended
45	When oral intake is less than 60% of the normal amount, oral nutritional supplementation should be added and can be continued after discharge.[32,33]	1a	Weakly Recommended
46	For patients of normal weight, the postoperative nutritional supply is 104.6 kJ (25 kcal)/(kg·d). To prevent metabolic disorders caused by overnutrition, particularly excessive sugar intake, it is important to monitor blood glucose levels dynamically. Generally, postoperative monitoring of blood glucose every 2 hours is recommended, with the target range being 8 mmol/L or (6–10 mmol/L).[32,33]	1a	Strongly recommended
47	Early removal of various catheters, such as the nasogastric tube, urinary catheter, and abdominal drainage tube, at days 3 and 7 postoperatively is considered high-risk as it may result in bleeding and leakage. Therefore, the removal of the drainage tube should be done cautiously and only when deemed appropriate.[45]	5b	Weakly Recommended
48	If the patient has preoperative pyloric obstruction, intraoperative gastric wall edema, or a risk of postoperative anastomotic fistula and bleeding, it is recommended not to remove the nasogastric tube prematurely and to continue gastrointestinal decompression.[24]	5b	Strongly recommended
49	If postoperative patients experience gastric retention, abdominal distension, or severe nausea or vomiting, a comprehensive evaluation should be conducted to determine whether gastrointestinal decompression should be performed.[24]	5b	Weakly Recommended
50	Prior to performing acupressure, a licensed practitioner of traditional Chinese medicine (TCM) should locate and mark the *Zusanli* (ST-36) acupoint. Acupressure should then be performed only by a trained nurse.[41]	1c	Weakly Recommended
51	Beginning on the first postoperative day, acupressure should be performed at 6:30 a.m., 3:30 p.m., and 11:30 p.m. for five consecutive days. The massage should be performed by pressing the ST36 acupoint once per second five consecutive times, then resting for 2 seconds, and repeating again for a total of 3 minutes. The depth of each pressing should be 1–1.5 cm. The process is repeated on the other leg. During each 2-second rest period, the patient is asked if they felt any soreness, fullness, or heat, which would indicate whether the ST-36 was being pressed correctly. If the patient responds "yes", the acupressure continues. If the patient responds "no", the acupressure position is readjusted until the patient responds. The advantages of ST-36 acupressure are that the technique can be easily taught and used to relieve bloating, increase the frequency of bowel sounds, and shorten the time it takes for postoperative elimination of gas.[40]	1c	Weakly Recommended

Notes: NO.1 belongs to organizational management. NO.2 to NO.6 belongs to preoperative risk assessment. NO.7 to NO.13 and NO.15 to NO.17 belongs to preoperative education. NO.20 to NO.25 belongs to intraoperative monitoring. NO.14, NO.18, NO.19 and NO.26 to NO.51 belongs to postoperative management. *:Revised after expert consultation.

Preoperative Risk Assessment

Evidences 2 to 6 refer to preoperative risk assessment. Preoperative risk assessment is an important link to promote the enhanced recovery of patients after surgery. At present, hospitals routinely use the Hamilton Anxiety Scale (HAM-A) to evaluate the psychological status of patients; medication or specialized treatment has been recommended for moderate to severe anxiety that can increase postoperative pain. The severity of pain is assessed preoperatively by scoring the visual analog scale (VAS). Nutritional risk is screened with the Nutrition Risk Screening (NRS) 2002 nutritional scoring tool, and nutritional support is actively implemented. The 6-Minute Walk Test (6MWT) is used to assess the patients' motor ability, while the Pittsburgh Sleep Quality Index (PSQI) is used to evaluate overall sleep quality.[22]

Preoperative Education

Evidence 7 Summarizes Preoperative Education

Evidence 7 highlights the significance of preoperative education in order to promote better patient mastery and performance of perioperative tasks and thus accelerate the recovery of postoperative gastrointestinal function. There are various methods employed for imparting preoperative education, and the guidelines[22] point out that clear and interesting preoperative education content disseminated through the use of cards, manuals, multimedia, display boards, and other forms can effectively elicit the active cooperation of patients as well as improve their mastery of such information.

Evidences 8 to 10 emphasize Preoperative Fluid Intake

At present, there is growing evidence in favor of preoperative energy supplementation. This, on the one hand, can reduce patients' preoperative hunger, thirst, and irritability and significantly attenuate postoperative insulin resistance. On the other hand, it can stabilize the patient's blood glucose and metabolism and significantly decrease complications. Guidelines in China and internationally, expert consensus statements, and evidence summaries[7,24,26,36] all recommend that patients should consume 800 mL of liquid 10 hours before the procedure and 400 mL of carbohydrate drinks 2 hours before the procedure, but not ethanol-based drinks 10 hours before surgery. Patients should also fast for six hours before surgery, during which they can consume light and easy-to-digest food. Oral carbohydrate-rich isotonic fluids are not recommended for patients with diabetes. Patients with gastric emptying disorders can be left with a deep vein catheter (internal jugular vein or subclavian vein) to receive intravenous supplementation before surgery.

Evidences 11 to 13 Summarize Preoperative Bowel Preparation Protocols

Preoperative bowel preparation is determined based on the type of surgical modality. The guidelines[22] clearly state that routine preoperative mechanical bowel preparation is not recommended for patients undergoing elective right hemicolectomy and combined abdominal perineal resection; for patients undergoing left hemicolectomy and anterior rectal resection, bowel preparation is based on an oral laxative combined with a small amount of sodium phosphate enema; and for patients undergoing anus-preserving surgery for low to intermediate rectal cancer who have severe constipation or require intraoperative colonoscopic localization, the following two protocols are recommended: (1) for patients with preoperative colonoscopy indicating incomplete obstruction, oral laxatives such as lactulose can be combined with enema laxatives; (2) for patients with colonoscopy indicating complete obstruction, enemas can be performed alone; for both of the above cases, oral antibiotics can be given three days before the operation. Additionally, antibiotics can be administered intravenously 30 minutes before the operation, followed by another dose for two hours during the intraoperative period.

Evidences 15 to 17 Highlight Preoperative Exercising

The Chinese and international guidelines[23] indicate preoperative exercise to help reduce the risk of postoperative complications. These guidelines recommend preoperative aerobic and resistance exercise for at least two weeks prior to surgery, with a frequency of $\geq$ 3 times per week, for 40–60 minutes per session, including exercises such as ankle pumps, fist exercises, training to strengthen abdominal muscles, breath and sputum expectoration exercises, chest expansion exercises, deep breathing, and hip and anus lifting training, 1–2 times per day, 5–10 minutes per session while holding for 5–10 seconds each time,

can improve organ function. In addition, guidelines and van Rooijen et al[23,38] found that preoperative cessation of smoking and alcohol for ≥ 4 weeks can increase tissue oxygenation and reduce complications such as incision and lung infection.

Intraoperative Monitoring

Evidences 20, 21 clarify the Importance of Maintaining a Constant Body Temperature in Intraoperative Patients

Maintaining a constant body temperature, one of the five vital signs, is necessary to ensure that the body can carry out metabolism and other essential functions. Unexpected inadvertent perioperative hypothermia (IPH) can lead to serious complications such as postoperative infections, an increased risk of transfusion therapy, and a lower rate of anesthetic drug metabolism in patients.[42] The incidence of IPH in all types of surgeries ranges from 7% to 90%.[45] It interferes with the rapid postoperative recovery of patients. Expert consensus statements[35,36] have highlighted strategies for preventing IPH that include increasing the ambient temperature, shortening the intraoperative temperature monitoring time, and pharmacological interventions. Temperature monitoring should be started one hour before induction of anesthesia and monitored every 15–30 minutes. Additionally, warm saline or warm distilled water should be used when rinsing the abdominal cavity during the operation. The temperature in the operating room should be maintained at ≥ 21°C for surgeries on adults and ≥ 24°C for surgeries on pediatric patients.[46]

Evidences 22–25 Summarize the Choice of Perioperative Indwelling Tubes

A randomized controlled clinical trial of 494 patients with rectal cancer[47] found that the use of pelvic drainage after rectal resection did not provide any benefit to patients. In another study,[48–50] there was no significant difference between postoperative indwelling and non-indwelling gastrostomy tubes on patients' recovery of bowel function or length of hospitalization. As per Chinese and international guidelines,[22,25] routine placement of abdominal drains is not recommended for patients undergoing elective abdominal surgery. However, when risk factors for anastomotic leakage are present, it is recommended that abdominal drains be left in place to facilitate the early detection of gastrointestinal fistulas and timely treatment. If a urinary catheter is left in place during surgery, it is recommended that it be removed 24 hours postoperatively and that catheters be left in place for about 2 days in patients who have undergone transabdominal low anterior rectal resections or who have had suprapubic cystocentesis. If gas enters the stomach during tracheal intubation, the stomach can be pressed to reduce gastrointestinal insufflation before tracheal intubation, and a nasogastric tube can be left in place during the operation to expel the gas, but it should be removed before the patient regains consciousness from anesthesia.

Postoperative Management

Evidences 14, 18, 19, and 26 to 30 Focus on Perioperative Medications

Postoperative recovery of gastrointestinal function is delayed by the patient's reluctance to get out of bed early due to pain and fear of wound dehiscence. Delayed gastrointestinal function recovery (GIFR)may increase patients' discomfort, length of hospital stay, and treatment costs. GIFR could lead to accumulation of gas and effusion in the gastrointestinal tract lumen and increases the likelihood of intestinal obstruction and dysregulation of the gastrointestinal flora. The main clinical manifestations of delayed GIFR are delayed flatus or defecation, abdominal pain, abdominal distension, nausea, vomiting, and postoperative intestinal obstruction which often require nasogastric tube intubation.[51–53] Delayed GIFR also affects the time for early oral nutrition, leading to insufficient nutritional supply and time for adjuvant treatment, thus, influencing treatment outcomes and patients' survival.[54] Therefore, medical personnel should take a series of positive measures to help patients recover early, shorten the length of hospital stay, reduce medical costs and save medical resources. Several studies[3,39] have shown that combining epidural block with parecoxib enhances recovery and reduces pain in patients with CRC. Additionally, assessing the degree of pain in patients using the VAS scale can be helpful. Also, guidelines[22] recommend the use of a multimodal analgesic regimen postoperatively, in which, while epidural analgesia (EA) or thoracic epidural analgesia (TEA) are not beneficial for patients undergoing laparoscopic colorectal surgery, these have a positive effect on open colorectal surgery. The guidelines[23] recommend that patients without contraindications should be advised to use non-steroidal anti-inflammatory drugs (NSAIDs) 30 minutes before

the commencement of surgery and in the early postoperative period to improve the recovery of intestinal function; however, NSAIDs should not be used for more than three days. Furthermore, intraoperative intravenous infusions of lidocaine and dexmedetomidine can also help to enhance the analgesic and anti-stress effects, and these modalities can reduce the postoperative pain of the patients to a certain extent.

Morphine is used for prolonging the analgesic effect to deal with bouts of postoperative pain; however, the expert consensus statement[35] points out that the amount of morphine should be controlled intraoperatively. Thoracic epidural anesthesia does not require the use of morphine, but there is a lack of evidence supporting its use in rectal surgery, and this needs to be clinically verified. Another meta-analysis[30] found that perioperative administration of probiotics is less expensive, has fewer side effects, and is beneficial to patients when compared to alternative medications in alleviating gastrointestinal symptoms and postoperative complications in CRC; additionally, acetylcholinesterase inhibitors, as well as cholinesterase agonists, have a positive effect on the recovery of gastrointestinal paresthesia and can be an option for patients.

Evidences 31–39 Emphasize Early Postoperative Functional Exercises and the Content of Such Exercise Regimens

The evidence includes maintaining activity diaries and detailed records after surgery, adjusting the patient's lying position to a semi-recumbent position when awake, and engaging in moderate activity while in bed. The guidelines[7] recommend that on postoperative day 1, the patient should be out of bed for 1–2 hours, and from day 2 until discharge, 4–6 hours of activity per day is appropriate. The expert consensus statement[36] recommends blowing exercises as they are simple and easy for patients to master. This postoperative functional exercise takes 3–5 minutes per session and is done 3–5 times per day.

Jin et al[40] conducted a randomized controlled trial to investigate the effects of a three-step gradual early rehabilitation exercise on patients' initial defecation time. They found that the intervention group experienced a significant reduction in initial defecation time, from 94.85 hours to 64.68.10 hours compared to the control group, leading to a significant reduction in both defecation and hospitalization time for the patients.

In addition, a meta-analysis and a randomized controlled trial[19,21,26] found that in the postoperative period of 6–12 hours, having the patients chew gum for 5–10 minutes three times per day when they were awake had the potential to effectively enhance the restoration of intestinal function. However, another meta-analysis[32] pointed out that chewing gum had no significant effect on intestinal obstruction. Therefore, it is imperative to consider these aspects in clinical practice.

Evidences 40–46 Summarize Dietary Guidance

A meta-analysis published by Yang et al,[28] which included a total of 2,307 patients, found that early enteral nutrition increased serum albumin and prealbumin, promoted recovery of gastrointestinal function, and reduced postoperative hospitalization. Another study[55] also found that early postoperative oral intake of water promotes the faster recovery of intestinal function, contributes to maintenance of the intestinal mucosal barrier, and reduces the incidence of post-operative infections. At the same time, the guidelines[22,29] clearly point out that detailed preoperative and perioperative dietary health education should be provided to patients. Patients can drink water within two hours after surgery if they do not experience any significant gastrointestinal reactions. Their liquid diet can be gradually increased based on their recovery. Blood glucose levels should be monitored every two hours in the postoperative period and should be maintained in the target range of 6–10 mmol/L.

Evidences –49 Summarize the Specific Retention Options for Drains

Currently, the use of nasogastric tubes is not a standard practice, and this helps to reduce postoperative pulmonary atelectasis and pneumonia. According to the guidelines,[22,26] in cases where gas enters the stomach during endotracheal intubation, it is recommended to keep a nasogastric tube in place intraoperatively to facilitate the expulsion of the gas. The tube should be removed prior to the patient's waking from anesthesia. Additionally, it is recommended to remove the urinary catheter within 24 hours after the surgical procedure.

Suprapubic vesicourethral drainage is a viable option for patients who have undergone transabdominal low anterior resection of the rectum or have had an indwelling urinary catheter for approximately two days. Postoperative

prophylactic abdominal drainage has been found to have no significant impact on the rate of anastomotic leakage and complications. Therefore, it is not recommended to routinely place abdominal drainage tubes for elective abdominal surgery. However, using indwelling abdominal drainage tubes is recommended for patients who have risk factors such as anastomotic leakage.[56]

Evidences 50–51 Refer to the Use of Acupressure

Acupressure is a noninvasive, safe, and easy-to-learn technique that can be performed by nurses, caregivers, family members, and even patients themselves under the guidance of a traditional Chinese medicine (TCM) practitioner. A randomized controlled trial[37] found that patients who were given *Zusanli* point acupressure within five days of surgery had a significantly shorter time to recovery of bowel function.

Limitations

First, only 21 literatures were included in the study, which was too small, which affected the credibility of the study. Second, literature in English and Chinese is only included in the study, and literature in other languages is not included, which further affects the scope of application of the study.

Conclusion

Using an evidence-based approach, we conducted a thorough and systematic review of Chinese and international literature in order to summarize a significant amount of high-quality evidence. The process of evidence-based method is rigorous, and the established protocol is of high quality, which can promote the recovery of postoperative gastrointestinal function in patients relatively perfect. Through "organizational management", "preoperative risk assessment", "preoperative education", "intraoperative monitoring" and "postoperative management" were analyzed in five aspects. Among them, acupressure, chewing gum, early imported eating, early exercise, and other measures are crucial to promote the recovery of postoperative gastrointestinal tract The function. Stop smoking and drinking, timely functional exercise, etc. before and after surgery will be beneficial to the rehabilitation of patients. The review provides healthcare professionals and other stakeholders with the most dependable evidence regarding enhanced recovery interventions for gastrointestinal function following surgery for CRC. It is essential for healthcare professionals to have a comprehensive understanding of the requirements for enhanced postoperative gastrointestinal recovery. They should also strive to increase the rate of implementing evidence-based practices and accurately utilize each piece of evidence in order to promote enhanced post-surgical gastrointestinal recovery for patients with CRC. In recent years, studies have shown that Chinese medicine acupuncture and moxibustion and other treatment methods have a good effect on promoting post-operative gastrointestinal function recovery.[57,58] However, there is no evidence based medical research on acupuncture and moxibustion treatment for gastrointestinal function recovery after CRC surgery, which can be further explored in future research.

Abbreviations

CRC, Colorectal Cancer; PIPOST, Population, intervention, professional, outcome, setting, type of evidence; NGC, National Guideline Clearing-house; NICE, National lnstitute for Health and Clinical Excellence; GIN, Guidelines International Network; NZGG, New Zealand Guidelines Group; RNAO, Registered Nurses'Association of Ontario; ACPG, Australian Clinical Practice Guidelines; SIGN, ScottishIntercollegiate Guidelines Network; AGREE III, appraisal of guidelines for research and evaluation instrument II; HAMA, Hamilton II Anxiety Scale; VAS, VisualAnalogueScale; NRS2002, nutritional risk screening 2002; 6MWT, 6-minute walking test; IPH, inadvertent perioperative hypothermia; EA, epidural analgesia; TEA, thoracic epidural analgesia; NSAIDs, Nonsteroidal Antiinflammatory Drugs.

Data Sharing Statement

The datasets used and analysed during the current study available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of Third People's Hospital of Yunnan Province(2023KY015).

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