Development and Evaluation for the Preoperative Nursing Practice Guidelines in Patients with Colorectal Cancer

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Abstract: Colorectal cancer is the third most common cancer worldwide, and surgery is the primary treatment. Developing and implementing clinical nursing practice guidelines for preoperative care is essential to enhance patient outcomes. Evidence supports the effectiveness of clinical nursing practice guidelines in Thailand for colorectal surgery, particularly in reducing hospital stays and enhancing quality of life. However, preoperative components such as individualized education, comprehensive nutritional support, and psychological readiness remain insufficiently addressed in existing studies. This study aimed to 1) develop and implement a preoperative clinical nursing practice guideline, 2) evaluate its impact on patients' knowledge, anxiety, behavioral adherence, and satisfaction among both nurses and patients, and 3) assess its feasibility and nurses' and patients' satisfaction. Using Soukup's evidence-based model, the clinical nursing practice guidelines were designed and evaluated through evidence-triggered, evidence-supported, and evidence-observed approaches. The study included 12 nurses and 24 patients with colorectal cancer scheduled for surgery at a university hospital in Bangkok, Thailand. Patients' knowledge and anxiety were measured before and after the initial visit, one week later, and on the day of admission. Behavioral adherence was assessed at one week and admission. The satisfaction of nurses and patients with the guidelines was evaluated. Data were analyzed using descriptive statistics and Friedman and Wilcoxon signed-rank tests.

The Preoperative Nursing Practice Guidelines for people with colorectal cancer included four components of recommendations: 1) preadmission information, education, and counseling; 2) preoperative optimization; 3) nutritional assessment; and 4) prehabilitation. The results revealed that patients demonstrated significantly increased knowledge and showed a trend of anxiety reduction, with good behavioral adherence. Both patients and nurses reported high compliance and satisfaction with the guidelines. Nurses can apply these guidelines in practice to care for patients with colorectal cancer. However, further study should include postoperative follow-up of the outcomes with a larger sample size, multicenter studies, and a randomized controlled trial before it can be widely used.

Keywords: Colorectal cancer, Feasibility study, Implementation research, Nursing practice guidelines, Preoperative care

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     WS: Conceptualization, methodology, data collection and analysis, project administration, resources, and writing and editing

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Introduction

Colorectal cancer (CRC) is the third most common cancer globally, following lung and breast cancers.[1] Thailand ranks third in newly diagnosed cases for males and second for females.[2] Surgery is the primary treatment for colorectal cancer, but it carries a high risk of complications, such as pain,[3] bowel ileus,[4] surgical site infections, anastomotic leaks, intra-abdominal infections, pneumonia, and thromboembolism.[5,6] Complications can adversely affect the postoperative recovery of patients.[7,8]

Studies have identified factors associated with the severity of postoperative complications in patients with various gastrointestinal cancers, including gastric, hepatic, and colorectal cancers. These factors include intraoperative blood loss, nutritional status, preoperative anxiety, and depressive symptoms.[9] Preoperative anxiety in surgical patients is associated with postoperative complications, including insomnia, pain, nausea, vomiting, and neurocognitive dysfunction.[10] Therefore, it is essential for patients undergoing colorectal cancer surgery to receive comprehensive preoperative care to increase knowledge and reduce anxiety so that they can participate in postoperative rehabilitation and rapidly recover after surgery.

One widely adopted approach for patients with surgery is the Enhanced Recovery After Surgery (ERAS) guidelines.[11] These guidelines outline evidence-based practices to promote a rapid return to normal function for the cardiovascular, respiratory, and gastrointestinal systems. There is some evidence to support the effectiveness of ERAS in Thailand, including the incorporation of preoperative physical and nutritional assessments, stoma planning, and structured postoperative care into ERAS-based practice for colorectal surgery. This approach can reduce hospital stays without increasing complications[14] and improve quality of life, although clinical outcomes remained unchanged.[15] However, the specific preoperative needs of colorectal cancer patients, particularly regarding individualized education, nutritional support, and psychological readiness to reduce anxiety, remain underdeveloped within the ERAS framework. Addressing these gaps is essential to optimize ERAS protocols and ensure equitable patient-centered care in Thailand. Therefore, developing the Preoperative Nursing Practice Guidelines (PNPG) in patients with CRC using evidence-based implementation strategies is critical to increase the quality of preoperative care in outpatient surgical departments (SURGOPD).

Review Literature and Conceptual Framework

The diagnosis of CRC initially induces anxiety before surgery regarding the disease itself and its treatment.[12] Furthermore, surgery, the primary treatment for CRC, is perceived as a life-threatening event, leading some patients to experience fears of death, postoperative complications, unexpected surgical side effects, and the possibility of not fully recovering to their previous state.[13] The physiological impact of this anxiety includes an increased secretion of glucocorticoid hormones, which inhibit collagen synthesis, a crucial component in tissue repair, resulting in prolonged wound healing. Additionally, the suppression of antibody production increases susceptibility to infections.[14]

Malnutrition before surgery significantly increases the risk of postoperative complications and mortality, making it crucial to assess nutritional status and address deficiencies prior to surgery.[15] At the implementation setting, nutritional status is evaluated upon admission using the Nutrition Alert Form (NAF). This form categorizes patients into three levels based on their scores. NAF A (scores 0-5) indicates normal nutritional status or minimal risk of malnutrition, with nurses reevaluating these patients within seven days. NAF B (scores 6-10) reflects a moderate risk of malnutrition, warranting a nutritional assessment by a dietitian and medical care within three days. NAF C

(score 11 or higher) signifies a high risk of malnutrition, necessitating immediate dietary evaluation and medical care within 24 hours.[16] Identifying the underlying causes of anemia and administering appropriate treatment is essential. Anemia increases the risk of postoperative complications and mortality, making it essential to identify its underlying causes and provide appropriate treatment.[17]

The ERAS guidelines focus on preparing patients for surgery, optimizing care during the procedure, and promoting a recovery. The goal is to accelerate recovery, reduce complications, shorten hospital stays, and help patients return to everyday life as soon as possible. The guidelines encompass the entire perioperative period—preoperative, intraoperative, and postoperative phases—with 25 recommendations, 11 for preoperative care and five for pre-admission care.[11] This study specifically focuses on the preoperative phase in the implementation setting. The preparation in this phase involves preoperative counseling, assessment, and management of risk factors. This counseling is designed to inform patients about their upcoming surgery, address their concerns, educate them on postoperative care, and assist in pain management, all of which contribute to reduced anxiety. To facilitate a deeper understanding, multimedia resources, such as videos and pamphlets, may allow patients to review and reinforce the information in a home setting. Furthermore, the assessment and management of multiple risk factors, including chronic conditions such as diabetes, cardiovascular disease, and hypertension, prior to surgical intervention are critical components of a comprehensive approach to optimize patient outcomes.[18] Implementing prehabilitation programs—comprising exercise, protein supplementation, and adequate rest—six weeks before surgery can reduce the risk of complications, especially in patients undergoing abdominal procedures.[19]

ERAS guidelines recommend against preoperative bowel preparation for major colorectal surgery due to risks like dehydration and discomfort, although it may benefit minor bowel surgery.[11] Rollins et al.[20] found no significant differences in complications, hospital stay, or mortality between patients who did and did not undergo bowel preparation. Despite this, most surgeons in the setting do not adhere to ERAS practices in this regard; therefore nurses advise all patients with colorectal surgery to follow a low-fiber diet for two days before admission and perform bowel preparation. A recent study by Zhang et al.[21] found that integrating the ERAS guidelines with multidisciplinary collaboration in CRC surgeries could reduce hospital stays, facilitate faster catheter removal, increase earlier mobilization, decrease postoperative inflammatory responses (as indicated by lower interleukin-6 levels), improve quality of life, and result in lower total hospitalization expenses. These findings underscore the benefits of combining ERAS protocols with multidisciplinary approaches to enhance postoperative recovery and optimize patient outcomes in CRC surgeries.

This implementation study utilized Soukup's[22] evidence-based model. The process includes 1) an evidence-triggered phase, received from practice trigger and knowledge trigger; 2) an evidence-support phase, which involves searching for empirical evidence, during which relevant research and data are gathered to inform potential solutions; 3) an evidence-observed phase entailing piloting the practice guidelines, allowing for a trial implementation to assess their effectiveness and feasibility in a controlled setting; and 4) an evidence-based phase focusing on the full implementation of these guidelines within the organization, coupled with efforts to disseminate the practices more broadly to encourage widespread adoption and sustained improvement in practice. This framework thus ensures a rigorous, evidence-informed approach to developing and integrating new practices in clinical settings. In this study, the researchers categorized it into two phases: Phase 1 focuses on identifying clinical problems (evidence-triggered) and gathering relevant empirical evidence related to the clinical issues (evidence-support phase), while Phase 2 involves developing and implementing the PNPG in

an organization (evidence-observed phase). The study followed the Cochrane Effective Practice and Organization of Care (EPOC) Group taxonomy for implementation strategies. This approach aligns with the work of Cassidy et al.,[23] which involves multi-component implementation strategies, including educational meetings, educational materials, and audit and feedback approaches. For outcome measures, Proctor et al.[24] distinguish between implementation outcomes (e.g., acceptability, feasibility, fidelity) and service outcomes (e.g., efficiency, safety, effectiveness), as well as client outcomes (e.g., satisfaction, function, symptomatology), which serve as preconditions for achieving service and client outcomes. Thus, this study encompassed implementation outcomes and client outcomes to determine the efficacy of implementing a PNPG for patients with CRC.

Study Aim

This study aimed to 1) develop and implement a preoperative PNPG for patients with CRC, 2) compare patients' knowledge, anxiety levels, behavioral adherence to guidelines, and satisfaction at four time points (before and after receiving preoperative information, one week later, and on admission day), and 3) assess the feasibility and satisfaction among nurses in utilizing this guideline.

Methods

Design: This study developed the PNPG for patients with CRC by synthesizing and integrating evidence-based information and evaluating the feasibility of implementing it in practice using a pretest-posttest one-group design. The writing of this report was guided by the AGREE Reporting Checklist for clinical practice guidelines.[25]

Sample and Setting: It has been argued that feasibility studies do not require formal sample size justification,[26] while a pilot study recommends 12 per group.[27] This study assessed the feasibility of the PNPG, inviting 12 nurses from the SURGOPD, responsible for preoperative preparation across various surgeries. For patients, a sample size of 24 was calculated using G*Power 3.1.9.4,[28] based on a 0.05 significance level, 0.80 power, and an effect size of 0.25 derived from a prior study.[29] The inclusion criteria were as follows: 1) for the patient sample, participants had to be over 18 years old, able to communicate in Thai, and, if over 60, have no cognitive impairment as assessed by the 6-item Cognitive Impairment Test (6CIT),[30] 2) for the nurse sample, 12 nurses with more than one year of experience from SURGOPD were included, while nurses on leave or vacation for two or more consecutive weeks were excluded. The SURGOPD at a university hospital in Bangkok provided preoperative advice to 7,620 patients, including 315 undergoing CRC surgery in 2023. Nurses deliver preoperative care across various surgeries, covering medication management, financial guidance, contact details, and physical preparation, including diet, exercise, lung training, and postoperative self-care. The advice varies based on patient needs and nurse experience, with some nurses having limited knowledge of CRC. High patient volume and case complexity limit the time available for in-depth guidance.

Ethical Considerations: The study was approved by the Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University (COA.MURA2021/700). Participants were informed of the research objectives, procedures, and their right to withdraw at any time without affecting their medical or nursing care. Data were kept confidential and used solely for research purposes, with findings reported as group data. Informed consent was obtained from all participants.

Preoperative Nursing Practice Guidelines (PNPG) for Patients with Colorectal Cancer: This was developed based on two phases:

Phase 1: Identifying clinical problems (Evidence triggered) and gathering relevant empirical evidence related to the clinical issues (Evidence support). The

empirical evidence-based documents related to preoperative preparation for patients with CRC were sourced from electronic databases (CINAHL, PubMed, ScienceDirect, BMJ, OVID), research databases, institutional repositories (Online Public Access Catalog; OPAC), and non-electronic sources. The duplicate documents and full-text content not accessible were excluded. The search spanned the years 2007 to 2022, using search terms based on the PICO framework, including "CA Colorectal," "Colorectal cancer," "Enhanced Recovery After Surgery (ERAS)," "Clinical Practice Guideline for Colorectal Surgery," "Preoperative Nutrition Support," "Preoperative Deep Breathing Exercise," and "Anxiety." Abstracts were reviewed to select relevant scholarly articles and research papers obtained in full text.[11] The assessment of research quality adhered to the evaluation criteria established by the Royal College of Physicians of Thailand.[31] However, the primary recommendations were based on the Enhanced Recovery After Surgery (ERAS) guidelines,[11] which were evaluated using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) framework developed by the GRADE Working Group in 2004.[32] The search found evidence at various levels, including Level A (10), Level B (6), Level C (1), and Level D (3). The description of the evidence level is shown under **Table 1**.

Phase 2: Developing and implementing the PNPG in the organization (Evidence-observed phase). The PNPG was reviewed and validated by three experts: a nurse instructor, an advanced practice nurse, and a physician specializing in CRC care. It comprises four sets of recommendations: 1) preadmission information, education, and counseling (Recommendation Grade: Strong), 2) preoperative optimization (Recommendation Grade: Strong), 3) nutritional assessment (Recommendation Grade: Strong), and 4) prehabilitation (Recommendation Grade: Weak). The details of the recommendations for the preoperative PNPG sources of evidence are shown in **Table 1**.

Implementation Strategies: These targeted the nursing staff. They consisted of a two-hour educational meeting that included a training session, a lecture, and a discussion. A booklet covering CRC knowledge and CNPG was also provided. Following the educational session, the nursing staff applied the CNPG to patients with CRC, with audits, feedback, and facilitation provided to support implementation. The implementation is shown in **Table 1**.

Data collection instruments: The researchers developed eight instruments for evaluating the PNPG. The same group of three experts who validated the CNPG also validated these instruments for content validity, and reliability was reported for the actual study.

Table 1. Recommendations the preoperative clinical nursing practice guidelines for patients with CRC

Visit	Assessment	Recommendation

Visit 1
Date of appointment with the physician at SURGOPD
	Knowledge, anxiety before and after providing information	**1. Preadmission information, education, and counseling (ERAS 2018, Strong Recommendation)**
		  1.1 History taking of past and current illnesses and current medicine.[36] (level of evidence: B)
		  1.2 Advise on discontinuing antiplatelet drugs, anticoagulant drugs at least 3-7 days according to the treatment plan,[38] (level of evidence: D); vitamin supplements, and dietary supplements seven days before surgery.[39] (level of evidence: A); Recommend avoiding high-fiber foods two days before admission to the hospital.[2,36] (level of evidence: D, B)

Table 1. Recommendations the preoperative clinical nursing practice guidelines for patients with CRC (Cont.)

Visit	Assessment	Recommendation
		1.3 Assessment of mental, emotional, social, and economic aspects, anxiety levels before surgery, cost estimation for surgery, and the deposit for medical supplies to be paid on the day of admission. If there are issues, a social worker is consulted for assistance.[40,41] (level of evidence: A, D)
		1.4 Provide health education about the disease, the surgical procedure, and postoperative complications. Provide related documents, and a pamphlet on deep vein thrombosis prevention via QR code video clips.[11,36,37,42,43] (level of evidence: A, B, B, B, B)
		2. Preoperative optimization (ERAS 2018, Strong Recommendation)
		2.1 Risk assessment for patients with underlying disease and deviate laboratory[11,44] (level of evidence: A, A)
		2.2 Recommend immediate abstaining from alcohol.[11,44] (level of evidence: A, A), and refraining from smoking for 4−6 weeks before surgery.[11,45] (level of evidence: A, A)
		3. Nutritional assessment (ERAS 2018, Strong Recommendation) Using the Nutrition Alert Form (NAF).[46] (level of evidence: C) If the NAF score is ≥ 11 points (NAF = C: Severe malnutrition), the physician is informed to consider a consultation with a nutritionist.[11,47] (level of evidence: A, A)
		Providing dietary recommendations, including increasing protein intake by 40 grams per day.[47] (level of evidence: A) (e.g., adding two egg whites three times a day or consuming boiled or grilled chicken/beef two servings per day or fish 3 servings per day)
		4. Prehabilitation (ERAS 2018, Weak Recommendation)
		4.1 Teaching deep breathing exercises and advising on the correct way to cough, by slightly bending forward, taking a deep breath, holding the breath, and exhaling rapidly through the mouth. After surgery, use a pillow and hold the incision area firmly while coughing.[48−50] (level of evidence: B, B, A)
		4.2 Advising on early ambulation within 24 hours after surgery to help promote bowel movement and prevent abdominal distention.[11] (level of evidence: A)
		4.3 Recommending exercise, maintaining the usual exercise routine if available.[11,19,51] (level of evidence: A, A, A)
		For those who do not regularly exercise, advise arm swinging while standing with feet shoulder−width apart, bending knees slightly, allowing arms to swing naturally, without excessive force, and transferring weight to the toes and heels. This exercise should be done for at least 30 seconds.[52] (level of evidence: A)

Table 1. Recommendations the preoperative clinical nursing practice guidelines for patients with CRC (Cont.)

Visit	Assessment	Recommendation
<u>Visit 2</u> Phone follow-up after visit 1, approximately 1 week later	Knowledge, anxiety, compliance with instructions	Telephone follow-up to encourage patients to adhere to the recommendation and answer questions.
<u>Visit 3</u> Admission day	Knowledge, anxiety, compliance with instructions	Review preoperative information, provide support as needed, answer questions, and assist the patients in the patient unit.

Note. Level of evidence

A: Evidence obtained from a systematic review of randomized controlled clinical trials or from a properly conducted randomized controlled clinical trial

B: Evidence obtained from a systematic review of controlled clinical studies, from a controlled clinical study, from at least one systematic review of randomized controlled clinical trials, from an improperly conducted randomized controlled clinical trial, or from a quasi-experimental study

C: Evidence obtained from comparative or correlational studies or descriptive studies

D: Evidence obtained from expert opinions, consensus statements, textbooks, and other academic literature

The Personal Information Questionnaire for patients (PIQ-P) included gender, age, education, marital status, chronic illnesses, antiplatelet/anticoagulant medication used, smoking history, alcohol consumption history, body mass index (BMI), exercise for 30 minutes or more at least once a week, NAF, diagnosis, and type of surgery.

The Patient Knowledge Assessment Form (PKAF) consisted of 15 questions with two answer options (Yes/No). This instrument evaluated patients' knowledge about the disease and preoperative CRC surgery. Each correct answer earns 1 point. The total score ranges from 0 to 15 points. The interpretation is classified into three levels, as presented in the previous study on knowledge[32]: 12-15 points (80% and over) refer to a high level, 9-11 points (60-79%) to a moderate level, and 0-8 points (< 60%) to a low level of knowledge. The PKAF yielded a CVI score of 0.83 and an internal consistency reliability coefficient, as indicated by Kuder-Richardson-20 (KR-20), of 0.52.

The Patient Behavior Assessment Form (PBAF) focused on evaluating behavioral adherence to the preoperative CNPG recommendations to enhance patients' physical readiness for surgery. The questionnaire consists of five questions, each with four response options: 3 for consistent adherence, 2 for occasional adherence, 1 for rare adherence, and 0 for no adherence. The interpretation is based on the average scores of each item and categorized into three levels: 2.34-3.00 for good adherence, 1.67-2.33 for moderate adherence, and 1.00-1.66 for low adherence. The reliability of CVI and internal consistency was determined by Cronbach's alpha coefficient at 0.83 and 0.73, respectively.

The Patient Anxiety Assessment Form (PAAF) measures anxiety levels associated with the thought of undergoing surgery. A one-item numerical scale of 0-10 was applied to rate the anxiety level. Higher scores indicate higher levels of anxiety, while lower scores correspond to lower levels of anxiety. The PAAF yielded a CVI score of 1.

The Patient's Satisfaction Questionnaire (PSQ) assessed participants' satisfaction with preoperative CNPG. The five-item questionnaire uses a 5-point scale, ranging from 1 (lowest satisfaction) to 5 (highest satisfaction). The interpretation is based on the average score: 4.5-5.00 refers to very high satisfaction, 3.5-4.49 refers to high satisfaction, 2.5-3.49 refers to moderate satisfaction, 1.5-2.49 refers to low satisfaction, and 1.00-1.49 refers to very low satisfaction. The CVI and Cronbach's alpha coefficient in this study were 0.83 and 0.87, respectively.

*The Personal Information Questionnaire for Nurse*s (PIQ-N) includes information on gender, age, educational level, and work experience in the outpatient surgery unit. Based on the expert feedback, the form was adjusted.

The Feasibility Assessment Form for Applying CNPG (FAF) assessed the level of feasibility in the usage of the CNPG and comprises ten items with a 5-point scale ranging from "Strongly Disagree" (1 point) to "Strongly Agree" (5 points). The interpretation based on the average score of each item is as follows: 4.5-5.00 indicates very high feasibility, 3.5-4.49 indicates high feasibility, 2.5-3.49 indicates moderate to high feasibility, 1.5-2.49 indicates low to moderate feasibility, and 1.0-1.49 indicates very low feasibility. The CVI and Cronbach's alpha coefficients were 0.83 and 0.79, respectively.

The Nurse Satisfaction Questionnaire (NSQ) assessed nurses' satisfaction with using the preoperative CNPG and consists of eight items rated on a 5-point scale, ranging from "very low satisfaction" (1 point) to "very highly satisfied" (5 points). The interpretation criteria are the average score of those 5 points as follows: 4.5-5.00 refers to very high satisfaction, 3.5-4.49 refers to high satisfaction, 2.5-3.49 refers to moderate satisfaction, 1.5-2.49 refers to low satisfaction, and 1.00-1.49 refers to very low satisfaction. An open-ended question is also provided for describing problems, obstacles, and suggestions on using the CNPG. The CVI and Cronbach's alpha coefficients in this study were 0.83 and 0.91, respectively.

Data Collection: Data collection was conducted from December 2021 to October 2022. After gaining IRB approval and the hospital director's permission for the study, a meeting was organized to facilitate understanding and provide training on using PNPG within the unit. The researchers coordinated with the SURGOPD head nurse to arrange meetings, individually and with groups of nurse participants, to explain the application of PNPG in CRC patient care. The researchers selected eligible patients, assessed them during their scheduled doctor visits, introduced themselves, presented the research objectives and procedures, and requested participation, ensuring patients understood their right to accept or decline. Nurses in the SURGOPD assessed the nutritional status of the participants and guided how to follow the PNPG. The researchers facilitated weekly discussions with participating nurses to monitor adherence to the protocol and provide ongoing feedback. Follow-up phone calls to patients were performed within one week of the intervention to assess their knowledge and behavioral adherence to recommendations, address any concerns, and answer questions. On the day of hospital admission, the researchers met with the patients to assess their knowledge, behavioral adherence to the recommendations, anxiety levels, satisfaction, and to answer any questions they might have. Following the implementation of the CNPG with 24 patients, the feasibility of its application and nurse satisfaction were evaluated.

Data Analysis: The continuous variables were reported with min-max, mean, median, and standard deviation. The categorical variables were reported by frequency and percentage. The knowledge, anxiety, and behavioral adherence scores did not meet the normality assumption of repeated measures ANOVA. Therefore, the Friedman test was performed to identify the differences over time. The Wilcoxon signed-rank test was applied for post hoc comparison.

Results

Patients' characteristics

The sample consisted of 24 participants with a mean age of 57.9 years. Most were female, had completed undergraduate education, and were married. Almost half had co-morbidities, and approximately one-third took antiplatelet/anticoagulant medication.

The majority did not smoke or use alcohol. The average BMI was 24.03 kg/m,^{2} with two-thirds within the normal range. Half of the sample did not regularly engage in physical activity. Approximately 79.2% had normal to mild malnutrition, 16.7% had moderate malnutrition, and 4.2% had severe malnutrition. The majority were diagnosed with rectal cancer and received open surgery. The detail is shown in **Table 2.**

Table 2. Patients' characteristics (n = 24)

Variables	Number	Percentage（%）
Gender		
Male	8	33.3
Female	16	66.7
Age（years）Min-Max = 24-75, Mean = 57.88,		
Median = 60.00, SD = 13.70		
Education		
lower than bachelor's degree	12	50.0
Bachelor's degree	10	41.7
Higher degree	2	8.3
Marital status		
Single	4	16.7
Married	15	62.5
Widowed/Separated	5	20.8
Have chronic illnesses	13	54.2
Antiplatelet/anticoagulant medication used	7	29.2
Smoking history		
Non-smoker	18	75.0
Former smoker	6	25.0
Alcohol drink history		
Non-drinker	19	79.2
Former drinker	5	20.8
Body mass index（kg/m^2）		
Range 18.75-35.70, Mean = 24.03, SD = 4.03		
Exercised for 30 minutes or more at least once a week		
Did not exercise	12	50.0
1-3 days per week	3	12.5
More than three days per week	9	37.5
Nutritional assessment（NAF）		
NAF A normal to mild nutrition	19	79.2
NAF B moderate malnutrition	4	16.7
NAF C severe malnutrition	1	4.1

Table 2. Patients' characteristics (n = 24) (Cont.)

Variables	Number	Percentage (%)
Diagnosis		
Colon cancer	11	45.8
Rectal cancer	13	54.2
Type of surgery		
Laparoscopic surgery	8	33.3
Open surgery	16	66.7

Nurses' characteristics

The nurses' characteristics are summarized in **Table 3**. The entire sample was female, aged 26 to 59 years, with a mean age of 36.78. Half was in the age group of 30–39 years. Most held a bachelor's degree. Regarding work experience, 50% had more than 5–10 years of experience in the outpatient surgical unit, and 58.3% had received training for patients undergoing colorectal cancer surgery. A significant proportion, 66.7%, had more than five years of experience in caring for patients with colorectal cancer.

Table 3. Nurses' characteristics (n = 12)

General characteristics	Number (Individuals)	Percentage (%)
Gender		
Female	12	100
Age (years) Min–Max 26–59, Mean 36.78, SD = 9.23		
20–29	2	16.7
30–39	6	50.0
40–49	3	25.0
50–59	1	8.3
Education		
Bachelor's degree	9	75.0
Master's degree	3	25.0
Work experience in SURGOPD (years)		
Less than 3	2	16.7
3–5	1	8.3
More than 5–10	6	50.0
More than 10	3	25.0
Experience for patients with CRC (years)		
Less than 3	1	8.3
3–5	3	25.0
More than 5–10	6	50.0
More than 10	2	16.7
Received training in CRC patient care		
Yes	7	58.3
No	5	41.7

Outcomes

Outcomes of implementing the PNPG for patients with CRC included knowledge, anxiety, behavioral adherence, and feasibility of applying the PNPG.

According to **Table 4,** the average knowledge score before applying PNPG was moderate but increased significantly afterward, peaking one week after application before admission. Anxiety scores showed a trend of decrease following PNPG implementation, but this was not statistically significant. Patients also exhibited good behavioral adherence, as assessed one week after PNPG implementation and before admission, although baseline data for behavior were unavailable. The details are shown in **Tables 4** and **5.**

Table 4. The mean score of knowledge, anxiety, and behavioral adherence of patients with CRC before and after receiving preoperative information, one week later, and on the admission day and comparison of the scores at time points (n = 24)

	Mean (SD)					
	Before applying PNPG M (SD)	**After applying PNPG M (SD)**	**One week after applying PNPG M (SD)**	**Before admission M (SD)**	**Friedman χ^2**	**p-value**
Knowledge	11.67 (1.34)	13.58 (1.21)	14.54 (0.88)	14.12 (1.08)	46.340	< 0.001
Anxiety	6.04 (2.68)	5.71 (2.31)	5.29 (2.64)	4.96 (2.96)	2.741	0.433
Behavioral adherence	–	–	2.85 (0.25)	2.83 (0.26)	0.067	0.796

Table 5. The pairwise comparisons of the knowledge scores (n = 24)

Pairwise comparison	Z	p-value
Before applying PNPG vs. After applying PNPG	−3.555	< 0.001
Before applying PNPG vs. one week after applying PNPG	−4.222	< 0.001
Before applying PNPG vs. before admission	−4.038	< 0.001
After applying PNPG vs. one week after applying PNPG	−3.372	0.001
After applying PNPG vs. before admission	−1.939	0.053
One week after applying PNPG vs. before admission	−1.510	0.131

The feasibility of applying the PNPG for patients with CRC

The feasibility results for nurses to utilize the preoperative PNPG for patients with CRC showed high potential for implementation. They could learn and work by following these guidelines and were well-prepared and capable of applying them immediately. This approach enhances the comprehensiveness and systemization of the preoperative PNPG for patients with CRC. Nurses trained according to the guidelines could perform preoperative assessments and management effectively. They rated a moderate level of guiding efficiency according to these guidelines, which was not a burden for nurses. However, this required additional working time and equipment procured by the healthcare facilities, with moderately complex operational procedures.

Patients' satisfaction with preoperative preparation was very high. All participants were satisfied with the explanation and information (mean = 4.58, SD = 0.65), advice for self-preparation (mean = 4.75, SD = 0.53), brochures, audiovisual media about the disease (mean = 4.50, SD = 0.59), self-preparation before surgery, continuous follow-up telephone calls, and knowledge reviews (mean = 4.54, SD = 0.88). The average satisfaction scores ranged from 4.5 to 4.75, with an overall satisfaction score of 4.75.

Nurse satisfaction with using the PNPG was found to be high. Nurses demonstrated a strong understanding of the CRC and the preoperative preparation process. They were confident in providing information about nursing roles and responsibilities following the PNPG.

Facilitators and areas for improvement in implementation

Nurses provided feedback on facilitators and barriers to implementing the CNPG. In terms of facilitators, training in preoperative patient preparation enabled nurses to guide patients efficiently based on the established practice recommendations. This guidance proved to be cost-effective, as it did not require additional equipment.

Regarding areas for improvement, nurses suggested the following: 1) regular updates on CRC knowledge, surgical procedures, complications, nutrition, and medication for nurses; 2) simplification and clarification of information using visual materials, such as brochures or video clips; and 3) creation of dedicated private spaces for patient education and group disease-specific sessions, and the provision of TVs for instructional videos to enhance patient understanding.

Discussion

The preoperative PNPG for patients with CRC was developed using an evidence-based nursing practice framework[22] to ensure its appropriateness and suitability within the organizational context and practical implementation by nurses. The PNPG itself was a synthesis of various evidence-based and ERAS guidelines.

The PNPGs provide quick, comprehensive, and efficient recommendations to guide in preparing the patients for CRC surgery, ensuring that nurses can deliver comprehensive, efficient, and effective pre-operative care. The practicality of this PNPG may be attributed to the rigorous development process, which was supported by the researchers' comprehensive understanding of the clinical setting and active collaboration with the nursing team. This collaboration was facilitated through scheduled meetings held during the PNPG's development, as well as ongoing weekly discussions and feedback sessions. Furthermore, the development of this PNPG was guided by the 2018 ERAS guidelines and an extensive literature review focusing on specific interventions. Notably, telephone follow-up was incorporated to enhance patient adherence to recommendations, reinforce preoperative information, offer necessary support, and address patient inquiries.

The average feasibility score revealed high feasibility in implementing the PNPG in clinical practice, whereas the high nurse satisfaction score indicated strong satisfaction among nurses, reflecting its acceptability.[24] The implementation involved multiple strategies, including educational meetings, materials, and audit and feedback. The researchers conducted audits of the nurse participants through direct observation and the use of checklists aligned with the PNPG to evaluate adherence to the established protocol. The findings indicated that the nurses were able to effectively implement care for preoperative patients with CRC in accordance with the PNPG. To support continuous improvement, the researchers provided weekly discussions and verbal feedback addressing the content of care and the nurses' performance. However, the nurses rated the efficiency of guidance provided by the PNPG as moderate, suggesting that its implementation was generally manageable and did not impose an excessive burden on clinical staff.

Nevertheless, the requirement for additional working time presents a potential barrier to long-term implementation, particularly in high-demand settings where nurses are already operating under significant time constraints. This suggests that, although the PNPG was positively received in principle, its sustained use may necessitate adjustments to staffing or workload distribution. Furthermore, the requirement for healthcare facilities to procure additional equipment introduces a degree of resource dependency. Therefore, healthcare administrators need to acknowledge and address the need for adequate time and resource allocation to

ensure the effective and sustainable implementation of the PNPG. However, nurses underwent training to enhance their capability and confidence in providing preoperative care for patients with CRC. They also perceived the benefits of this CNPG to enhance the quality of care.

The results are congruent with previous studies that developed and tested PNPGs in various surgical contexts, including total knee replacement surgery,[34] hip replacement,[35] and colorectal surgeries,[36] with ostomy creation.[37] These studies similarly found that nurses expressed high satisfaction and potential in implementing PNPGs in their regular care. They also found positive impacts on patient outcomes. One study suggested that the PNPG improved the quality of life for patients, had a positive impact on patient outcomes, and reduced the occurrence of complications.[37]

In this study, patient knowledge, as measured by the knowledge scores, significantly increased after receiving information following the PNPG—immediately after, one week later, and on the admission day—compared to before the information was given, indicating that patient knowledge improved and remained sustained until the admission day. Additionally, behavioral adherence scores indicated strong compliance with the preoperative PNPG. There was no significant difference between the scores one week after receiving PNPG-based information and on the day of admission, with consistently high mean scores of 2.85 and 2.83 out of 3, respectively, indicating strong fidelity of implementation. This finding supports the notion that effective implementation strategies lead to positive outcomes.[24] Previous studies also demonstrated that enhancing patient knowledge contributes to favorable clinical outcomes associated with patient adherence behaviors.[34,36,37] The anxiety levels decreased over time, even though the changes were not statistically significant, while patient satisfaction scores indicated high levels of satisfaction. These findings may be attributed to the continuous care provided by nurses from outpatient visits through to hospital admission. The PNPG framework guided nurses in delivering preoperative information, providing take-home materials, and conducting follow-up phone calls, which enhanced patient adherence behavior and readiness for surgery.

For areas of improvement, nurses identified training in preoperative care as a key facilitator, allowing them to implement the PNPG efficiently and cost-effectively without the need for additional equipment. To further enhance implementation, they recommended regular updates on knowledge related to colorectal cancer care, simplifying patient education, and creating private, dedicated spaces equipped with audiovisual tools to support more effective patient education. These recommendations highlight the importance of ongoing professional development and adequate educational infrastructure in optimizing PNPG implementation.

Limitations

This small-scale implementation research study provides valuable insight into the positive impacts of implementing the preoperative PNPG for patients with CRC. However, the findings should be interpreted with caution due to several limitations. First, the study was conducted in a single setting at a university hospital's outpatient surgical unit, which may limit the generalizability of the findings to other healthcare contexts. The applicability of these results to different institutions may require adaptations to align with local conditions, resources, patient populations, and organizational practices. Second, the relatively small sample size and lack of a control group may limit the ability to draw conclusions about causal relationships and introduce potential biases. Third, potential response biases could be present, as both nurses and patients were aware of their participation in the study. Fourth, as nursing research evolves, the guidelines should be regularly updated to reflect current evidence-based practices. Fifth, the level of evidence alone cannot warrant certainty without a formal appraisal of its quality. In this study, the researchers did not conduct

a concrete assessment of the quality of the included evidence, nor did they explicitly identify potential risks of bias. Future studies should incorporate systematic quality assessments to enhance the credibility and validity of the findings. Finally, the use of specific measurement instruments (such as the PKAF and PBAF), which have not been tested in other contexts, may further restrict the generalizability of the findings. Future studies should consider including multiple settings, a larger sample size, and more extended follow-up periods to assess the long-term impact of the PNPG on implementation and patient outcomes.

Conclusions

The development and implementation of the preoperative PNPG for patients with CRC were guided by Soukup's evidence-based model, utilizing evidence-triggered, evidence-supported, and evidence-observed approaches. Complemented by audit and feedback mechanisms, multi-component educational interventions were employed to enhance effectiveness. The PNPG for patients with CRC comprises four core components: preadmission information, education, and counselling; preoperative optimization; nutritional assessment; and prehabilitation. The study demonstrated that the PNPG is applicable in clinical practice, with both nurses and patients expressing satisfaction with the care provided through this approach. Further research should focus on the postoperative phase and continue to monitor patient outcomes to assess the long-term effectiveness of the PNPG.

Implications for Nursing Practice and Research

Comprehensive educational and ongoing training programs for nurses should be developed to cover topics such as colorectal cancer, surgical procedures, complications, nutrition, exercise, foot care, and breathing exercises. This training will enhance nurses' knowledge and confidence, facilitating the effective implementation of care protocols and improving patient outcomes.

Targeted strategies should be employed to promote nurse adherence within the organization, enabling the effective implementation of guidelines. These include educational interventions to enhance knowledge and skills, supported by ongoing audit and feedback mechanisms to reinforce compliance and facilitate continuous improvement.

Future experimental studies should compare outcomes between groups receiving standard preoperative recommendations and those adhering to the PNPG guidelines. This would provide valuable insight into the effectiveness of the guidelines in improving patient outcomes.

Continuous follow-up and longitudinal studies should be conducted to monitor postoperative outcomes over an extended period, including post-discharge, and to evaluate long-term patient recovery. This would help assess the sustained impact of the PNPG on patient recovery and the potential for improving long-term care quality.

Acknowledgments

Abbreviations

CRC	Colorectal cancer
PNPG	Preoperative Nursing Practice Guidelines
SURGOPD	Outpatient Surgical Department
NAF	Nutrition Alert Form
PIQ-P	Personal Information Questionnaire for Patients
PKAF	The Patient Knowledge Assessment Form

PBAF   The Patient Behavior Assessment Form
PAAF   The Patient Anxiety Assessment Form
PSQ   The Patient's Satisfaction Questionnaire
PIQ-N   The Personal Information Questionnaire for Nurses
FAF   The Feasibility Assessment Form for Applying CNPG
NSQ   The Nurse Satisfaction Questionnaire

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การพัฒนาและประเมินผลแนวปฏิบัติทางการพยาบาลก่อนการผ่าตัดสำหรับผู้ป่วยมะเร็งลำไส้ใหญ่และทวารหนัก

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บทคัดย่อ: มะเร็งลำไส้ใหญ่และไส้ตรงเป็นมะเร็งที่พบมากเป็นอันดับสามของโลก โดยมีการผ่าตัดเป็นวิธีการรักษาหลัก การพัฒนาและนำแนวปฏิบัติการพยาบาลในการดูแลผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงก่อนผ่าตัดไปใช้ เป็นสิ่งสำคัญในการพัฒนาผลลัพธ์การดูแลผู้ป่วย มีหลักฐานเชิงประจักษ์ยืนยันถึงประสิทธิผลของแนวปฏิบัติทางการพยาบาลทางคลินิกในประเทศไทยสำหรับผู้ป่วยที่ได้รับการผ่าตัดลำไส้ใหญ่และไส้ตรง ในด้านการลดระยะเวลาการนอนโรงพยาบาลและการส่งเสริมคุณภาพชีวิต แต่พบว่ายังมีประเด็นที่ควรพัฒนาเพิ่มเติมในระยะก่อนผ่าตัด เช่น การให้ความรู้เฉพาะราย การดูแลด้านโภชนาการอย่างครอบคลุม และการเตรียมความพร้อมทางจิตใจ การศึกษานี้มีวัตถุประสงค์เพื่อ 1) พัฒนาและนำแนวปฏิบัติการพยาบาลในการดูแลผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงก่อนผ่าตัดไปทดลองใช้ 2) ประเมินผลการใช้แนวปฏิบัติทางการพยาบาล ต่อความรู้ ความวิตกกังวล การปฏิบัติตามแนวทาง และความพึงพอใจของผู้ป่วย และ 3) ประเมินความเป็นไปได้ในการนำแนวปฏิบัติทางการพยาบาลไปใช้และความพึงพอใจของพยาบาล การศึกษาครั้งนี้ใช้รูปแบบการพัฒนาแนวปฏิบัติทางการพยาบาลตามหลักฐานเชิงประจักษ์ของซูคัพ ซึ่งประกอบด้วยการได้รับการกระตุ้นเพื่อการใช้หลักฐานอ้างอิง การใช้หลักฐานเชิงประจักษ์สนับสนุน และการนำหลักฐานลงสู่การทดลองใช้ โดยมีการใช้รูปแบบการให้ความรู้ที่หลากหลายร่วมกับการตรวจสอบและให้ข้อมูลย้อนกลับ การศึกษานี้ดำเนินการในโรงพยาบาลมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร ประเทศไทย โดยมีพยาบาลจำนวน 12 คน และผู้ป่วยที่มีกำหนดเข้ารับการผ่าตัดจำนวน 24 คน การวัดระดับความรู้และความวิตกกังวลของผู้ป่วยดำเนินการก่อนและหลังการเยี่ยมครั้งแรก หนึ่งสัปดาห์หลังจากนั้น และในวันที่เข้ารับการรักษาในโรงพยาบาล การปฏิบัติตามแนวทางได้รับการประเมินที่หนึ่งสัปดาห์และในวันเข้ารับการรักษา ร่วมกับความพึงพอใจของพยาบาลและความเป็นไปได้ในการนำแนวปฏิบัติไปใช้ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา การทดสอบ Friedman และ การทดสอบ Wilcoxon signed-rank

ในการศึกษาพบว่าแนวปฏิบัติการพยาบาลในการดูแลผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงก่อนผ่าตัด ประกอบด้วยข้อแนะนำ 4 ด้าน ได้แก่ 1) การให้ข้อมูล ความรู้ และคำปรึกษาก่อนการรับไว้รักษาในโรงพยาบาล 2) การเตรียมความพร้อมก่อนผ่าตัด 3) การประเมินภาวะโภชนาการ และ 4) การเตรียมร่างกายก่อนการผ่าตัด หลังนำแนวปฏิบัติการพยาบาลไปใช้ พบว่า ผู้ป่วยมีระดับความรู้เพิ่มขึ้นอย่างมีนัยสำคัญทางสถิติ และมีแนวโน้มของความวิตกกังวลลดลง มีการปฏิบัติตามคำแนะนำได้ดี ทั้งผู้ป่วยและพยาบาลรายงานระดับการปฏิบัติตามแนวทางและความพึงพอใจในระดับสูง ดังนั้น พยาบาลสามารถนำแนวปฏิบัติทางการพยาบาลนี้ไปใช้ในการดูแลผู้ป่วยมะเร็งลำไส้ใหญ่และไส้ตรงก่อนผ่าตัดได้ อย่างไรก็ตามควรมีการศึกษาติดตามผลลัพธ์เพิ่มเติมในกลุ่มตัวอย่างที่มีขนาดใหญ่ขึ้น มีการศึกษาหลายศูนย์ และมีการทดลองแบบสุ่มที่มีการควบคุมก่อนที่จะนำไปใช้ในวงกว้าง

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