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Impact of Ahmadi Continuing Nursing Model on self-care ability, stoma complications and quality of life of colostomy patients

Huiming Yan^{1†}, Ying Su^{1†} and Lina Wang^{1*}

Abstract

Objective To analyze the effects of Ahmadi Continuing Nursing Model (ACNM) on the self-care ability, stoma complications and life quality in colostomy patients.

Methods The clinical data of 120 patients who underwent postoperative colostomy in our hospital from June 2020 to June 2023 were retrospectively analyzed. The patients were divided into control group ($n=60$, treated with routine nursing) and observation group ($n=60$, treated with the ACNM on the basis of routine nursing) according to different nursing methods. Postoperative recovery of gastrointestinal function, ostomy adaptability, self-care ability, and life quality before and after nursing were compared. The probability of complications before and after nursing was recorded between the two groups.

Results The time of first exhaust was 3.65 ± 0.82 d, the time of first meal was 1.83 ± 0.65 d, and the first bowel sound recovery was 1.47 ± 0.53 d in the observation group, which were shorter than those in the control group (4.38 ± 1.20 d, 3.12 ± 1.15 d, 2.39 ± 1.06 d, $P < 0.001$). After intervention, the positive emotions in the ostomy adaptation score were 32.09 ± 5.03 points, negative emotions were 31.41 ± 5.70 points, social life adaptation were 27.12 ± 4.98 points, and the total score was 90.78 ± 5.98 points in the observation group, which were significantly higher than those in the control group (26.32 ± 4.52 points, 24.25 ± 6.02 points, 20.25 ± 4.02 points, 67.25 ± 6.09 points, $P < 0.001$). The self-willingness was 34.18 ± 4.02 points, self-care skill was 10.57 ± 2.23 points, self-care knowledge was 18.59 ± 3.10 points, and the total score was 63.18 ± 4.98 points in the observation group, which were significantly higher than those in the control group (25.25 ± 3.08 points, 8.72 ± 2.13 points, 15.26 ± 2.70 points, 45.69 ± 4.09 points, $P < 0.001$). The physical function was 79.74 ± 2.81 points, psychological function was 76.71 ± 3.05 points, social function was 78.11 ± 3.50 points, and material life status was 60.06 ± 2.98 points in the quality of life in the observation group, which were significantly higher than those in the control group (75.36 ± 2.68 points, 69.72 ± 2.93 points, 72.33 ± 3.42 points, 51.23 ± 3.08 points, $P < 0.001$).

[†]Huiming Yan and Ying Su contributed equally to this work.

*Correspondence:

Lina Wang
wanglinasjdoc@21cn.com

Full list of author information is available at the end of the article



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Conclusion ACNM effectively promoted the recovery of gastrointestinal function after surgery in colostomy patients by improving patients' stoma adaptability, self-care ability and life quality and reducing the occurrence of complications, which was worthy of promotion.

Keywords Ahmadi continuing nursing model, Colostomy, Complications, Quality of life, Self-care ability

Introduction

Colorectal cancer (CRC) is a common malignant tumor of the digestive tract, and the incidence has increased significantly in recent years. The latest global cancer data released by the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) in 2020 show that [1] CRC has become the third most common cancer in the world after breast cancer and lung cancer. CRC refers to malignant lesions of the colonic mucosal epithelium, mostly occurring in the cecum, ascending colon, transverse colon, descending colon, and sigmoid colon. CRC is more common in people aged 40 to 50 years, with a male-to-female ratio of 2:1 [2]. At present, the etiology of CRC is not yet well-defined, and the onset of CRC may be related to genetic factors, social environment, dietary habits, and other factors. Clinical studies [3, 4] have shown that colon polyps are extremely closely related to CRC, and the incidence of CRC is five times higher in patients with colon polyps than in those without colon polyps.

The main treatment for CRC is abdominoperineal resection, which has led to more than 100,000 CRC patients undergoing permanent colostomy in China every year [5]. Enterostomy is the removal of a diseased section of the intestine during surgery, and a section of the intestine is pulled out of an opening connected to the surface of the body to be used to excrete stool, which can be caused by tumors, inflammatory bowel disease, intestinal obstruction, infection, fecal incontinence, or diverticulitis. Self-care ability is a complex ability that individuals acquire in order to promote health, prevent disease, and maintain physical and mental balance. It covers the monitoring, maintenance, and management of self-health in daily life, and is an important basis for long-term management of chronic diseases and maintaining a healthy lifestyle [6]. In clinical applications, improving patients' self-care ability can reduce the consumption of medical and health resources and enhance health-promoting behaviors, disease prevention, and chronic disease management capabilities [7]. Colostomy severely alters the patient's image, personal hygiene, and excretory function, impairs the patient's dignity and lowers self-esteem, reduces the patient's ability to control daily life, and has a certain impact on the patient's quality of life. Quality of life is a multi-dimensional, comprehensive concept that covers multiple aspects from physiological to psychological, social to economic, and aims to comprehensively assess an individual's satisfaction and adaptability to their

living conditions, which is defined by the World Health Organization (WHO) as the experience of individuals in different cultures and value systems about their goals, expectations, standards, concerns, and living conditions [8].

Enterostomy patients have limited time to receive treatment and care in the hospital, and most of the rehabilitation needs to be carried out outside the hospital, and patients with ostomy after discharge face a variety of nursing problems, both physically and psychologically. Due to the highly specialized nature of colostomy care, colostomy patients or their families cannot complete it and need to receive guidance and help from professionals [9]. However, at present, the community nursing force is relatively weak, and its responsibilities and functions cannot meet the needs of ostomy patients. The Ahmadi Continuation of Care Model (ACNM) is a home follow-up care plan designed by Iran scholar Ahmadi in 2002 for patients with cardiovascular disease, the core of which is to establish a continuous care environment through four steps, including orientation, sensitivity, control and assessment [10, 11]. Nowadays, patients and their families can acquire colostomy-related nursing knowledge and skills through various forms of continuous care service models, so as to effectively improve self-management ability, reduce the occurrence of complications, and fully meet the nursing needs of patients from in-hospital to out-of-hospital. Based on this, this study aimed to explore the effects of the ACNM on the self-care ability, colostomy complications and quality of life of CRC colostomy patients.

The research ideas and plans of this paper were as follows: Through strict experimental design and scientific evaluation methods, this study plans to comprehensively explore the effects of ACNM on self-care ability, colostomy complications and quality of life of CRC patients with colostomy, aiming to provide a valuable reference for clinical nursing practice.

Materials and methods

General materials

A total of 150 colostomy patients who underwent post-operative colostomy treatment for CRC in our hospital during June 2020 to June 2023 were selected as the observation objects. The clinical data of the patients were retrospectively analyzed. 30 patients who did not meet the criteria were eliminated according to the exclusion criteria, and a total of 120 patients were included in the study.

All patients were divided into control group ($n=60$) and observation group ($n=60$) according to different care methods.

Patient participation was based on the following premises: Ethical principles: Conflict of interest resolution, statistical analysis methods and patient participation in accordance with the Declaration of Helsinki. By involving patients and the public in the research process, ensure that the study was more relevant to the real needs and improve the acceptability and validity of the study. The power analysis in this paper involved the selection and application of statistical methods, as well as a detailed analysis of sample size and statistical power. The power analysis process was $\alpha=0.05$ (one-sided) and $\beta=0.1$, and the ratio between groups was 1:1. PASS11 was used to estimate the sample size. It was found that at least 55 patients and 55 controls needed to be included. Considering a 10% loss to follow-up, 60 patients and 60 controls were included in this study. The process of general data selection was shown in Fig. 1.

Inclusion and exclusion criteria

Inclusion criteria: (1) All patients were diagnosed with CRC by colonoscopy, the lesion resection surgery was successfully performed, and he postoperative pathological examination was re-diagnosed with CRC; (2) Patients who underwent postoperative colostomy; (3) Patients did not receive anti-tumor treatment such as chemotherapy and radiotherapy before surgery; (4) Patients and the families were informed and all signed the informed consent forms; (5) The patient had good compliance and could cooperate with examination and treatment. Exclusion criteria: (1) Patients with severe dysfunction in organs such as the heart, liver, lungs, and kidneys; (2) Patients with immune dysfunction or undergoing pre-operative immunotherapy; (3) Patients accompanied by other malignant tumors; (4) Patients accompanied by other endocrine and metabolic diseases; (5) Patients were allergic to anesthetic drugs and other surgical drugs; (6) Patients with local or systemic infections; (7) Patients refused this experiment or terminated due to other reasons.

Nursing methods

The study sites were all in the Department of Proctology of our hospital, the recruitment time was from June 2020 to June 2023, and the nursing intervention cycle was from the patient's admission to three months after discharge.

Control group: Routine nursing was used to provide targeted care for the colostomy site. Basic nursing was provided for diet, colostomy skin, prevention and treatment of complications, and psychological changes. Patients were provided with health education and

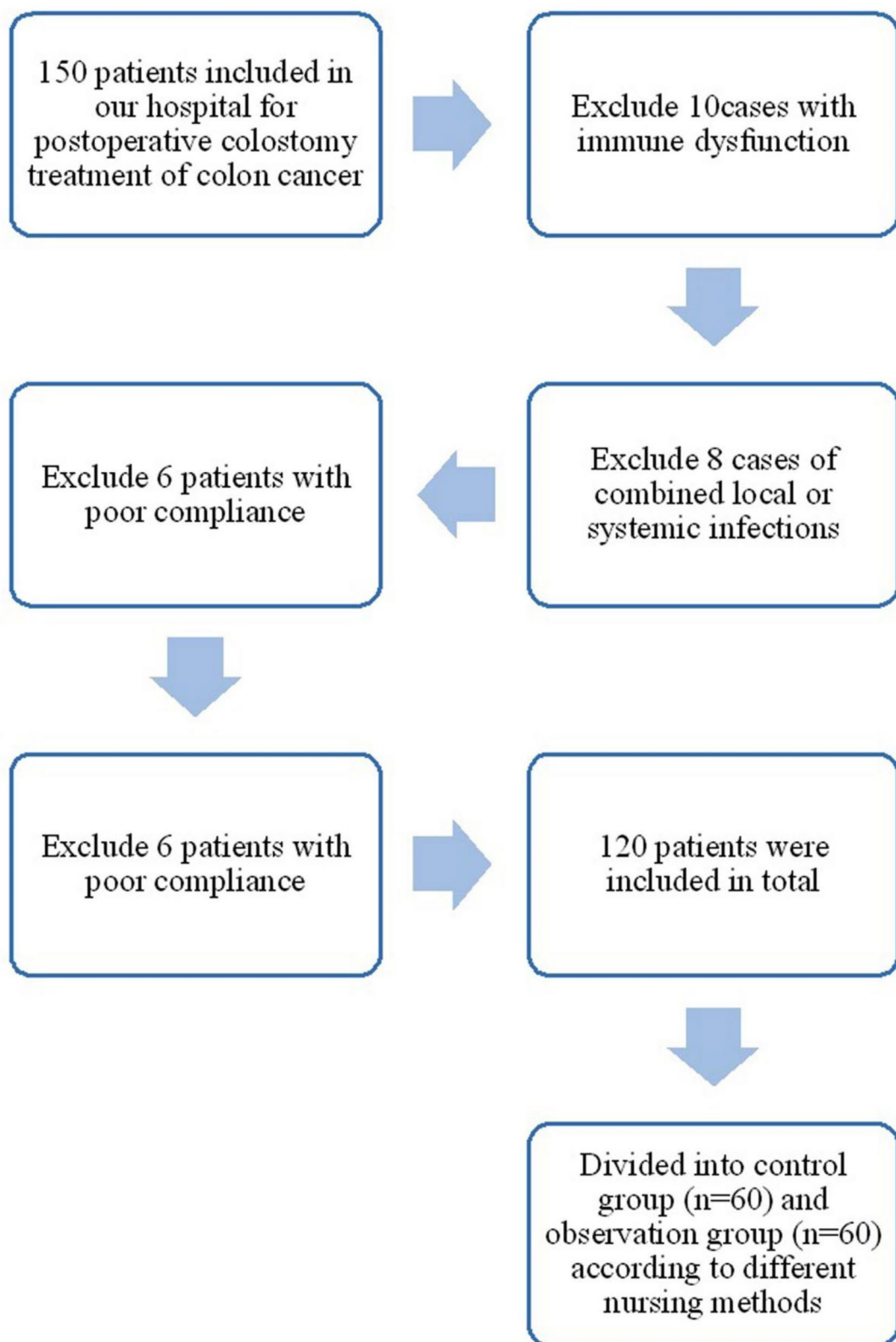
guidance on their self-care abilities. Regular telephone follow-up was conducted after discharge.

Observation group: The ACNM was used on the basis of routine nursing. An ACNM intervention group was set up, with a head nurse as the group leader, 4 nursing staff, and 1 doctor as members. The team members jointly developed and implemented the ACNM plan, and the team leader was responsible for regular inspections and quality monitoring. Firstly, the group members used various methods such as interviews, literature reviews, and analysis to comprehensively understand the family health knowledge needs, psychological status, and the most urgent family nursing skills currently needed for patients and nursing staff with colostomy. The group members worked together to provide a continuous nursing intervention plan for patients and nursing staff through four stages, including orientation, sensitivity, control and evaluation, aiming to change the situation of immediate interruption of nursing services after discharge in the past and establish a continuous nursing environment.

(1) Orientation stage: The nursing staff understood the patient's operation situation, the position and size of stoma and the surrounding skin condition in detail, and evaluated the patient's pain degree, eating habits and psychological state. Based on this information, a personalized continuous care plan was formulated for patients, including stoma care skills training, diet guidance, psychological support and regular follow-up arrangements.

(2) Sensitive stage: After the orientation stage was clear, the sensitive stage content was confirmed. An intervention plan was designed by the study team members to improve the patient's physiological state and behavior from the day of discharge to 4 weeks after discharge (since patients with prophylactic enterostomy needed to go to the ostomy clinic for follow-up examination within 6 months after surgery, i.e., within the first 12 weeks, the study team members were transferred to the outpatient clinic to have face-to-face contact with the patient and follow up on the patient's condition). This mainly included the following content:

Physiological state: A: Pain: After surgery, a medical abdominal belt was used to protect the wound, reduce pain caused by turning over and coughing, and prevent complications of wound hernia. B: Complications around the stoma: The stoma skin was cleaned with a neutral solution, and the fungal infection was cleaned with a sodium hydroxide solution. C: Defecation function training: According to the patient's defecation habits, regularly apply pressure to the abdomen during defecation, massage along the ascending colon, transverse colon and descending colon from the umbilicus for 30 min each time. Pay attention to the uniform force, and develop the habit of regular bowel movements, 1 ~ 2 times/day.

**Fig. 1** The process of general data selection

Health related behavior field: This course introduced the concept of enterostomy, the types of enterostomy, and instructs patients on how to distinguish between normal and abnormal stomastomy. By displaying high-definition videos or audio of stoma therapists wearing and removing stoma bags for patients, guide patients on how to avoid problems during the use of stoma products. Indicate the applicability and advantages and disadvantages of each product on the drawings, so that patients could choose the most suitable product for themselves. Provide dietary guidance and psychological care to patients.

(3) **Control stage:** On the basis of the sensitive stage of the patient, enter the corresponding control stage to deepen the relevant knowledge and skills learned by the patient in the above stages. Nursing staff should maintain sufficient interaction with patients, adjust their intervention time, and actively and effectively intervene for patients. **Home care methods:** Clean and dry: Clean the stoma and surrounding skin daily with warm water and mild cleanness (avoid alkaline soaps or disinfectants) to ensure that the skin is clean and dry. After cleaning, gently dry with a soft paper towel or cloth to avoid rubbing the ostomy mucosa. Choose the right stoma bag: According to the specific conditions of patients, the appropriate stoma bag, such as adhesive artificial anal bag with the good adhesive performance and less skin irritation, was chosen. Different types of colostomy bags, such as bathing type, swimming type, and lavage type, were selected according to needs. **skin sparing:** Protective agents such as vaseline gauze or zinc oxide ointment should be applied to the skin around the stoma to prevent skin damage. If you have symptoms such as skin redness, swelling, pain or ulcers, you should seek medical treatment in time.

(4) **Evaluation stage:** During the assessment phase of the ACNM for patients, it was important to assist patients in evaluating the quality of care and treatment during the nursing stage, in order to identify targeted issues and provide effective solutions. After the patient was discharged, relevant nursing quality evaluation forms should be used for evaluation and corresponding intervention measures should be taken.

Outcome measures

Gastrointestinal function recovery: Postoperative gastrointestinal function recovery is an important part of postoperative rehabilitation, which can help patients resume eating early, prevent water, electrolyte, acid-base balance disorders, and reduce the occurrence of complications such as postoperative intestinal adhesions, intestinal flatulence, and intestinal obstruction. The time of first postoperative exhaust, first meal, and first bowel sound recovery between the two groups were recorded and compared.

Stoma Adaptation Scale [12]: The Ostomy Adjustment Inventory-20 (OAI-20) is a tool used to assess the level of psychosocial adjustment in patients with permanent colostomy to investigate and analyze the adjustment of patients with an ostomy and its associated factors. OAI-20 was used to evaluate the positive emotion, negative emotion, and social life adaptation, with a total of 20 items and a total score of 20–100 points (each item was assigned with 1–5 points). Higher score indicated better adaptability to stoma. One patient was missing from the survey. The scale was revised on the basis of translating Kingsley's psychosocial adjustment questionnaire for patients with colostomy. After expert review and clinical practice verification, its content can accurately reflect the psychosocial adjustment of patients with colostomy. The Cronbach's α coefficient of the total scale was 0.8686, indicating that the scale had a high internal consistency. The test-retest reliability was 0.68, indicating that the scale results had good stability when measuring the same group of subjects at different time points.

Self-care ability [13]: Self-care ability refers to the ability of an individual to perform self-care activities in order to maintain life, health, and comfort, and a comprehensive understanding of a patient's self-care ability can be obtained through patient self-assessment and healthcare provider assessment. The scale included self-willingness (12 items, each assigned 1–4 points, with a total score of 12–48 points), self-care skills (12 items, each assigned 0–1 points, with a total score of 0–12 points), and self-care knowledge (21 items, each assigned 0–1 points, with a total score of 0–21 points). The total score was the sum of three-dimensional scores. Two patients were missing from the survey. The self-care Agency scale comprehensively assesses the self-care agency of individuals through multiple dimensions to ensure that the content of the scale can comprehensively reflect the self-care status of the subjects. The Cronbach's α coefficient of the scale was 0.88, indicating that the internal consistency of each item in the scale was high, that is, the scale had good stability when measuring the same concept. The test-retest reliability of the scale was 0.62, indicating that the measurement results of the scale at different time points had good consistency.

Complications: Complications refer to the problems and symptoms associated with surgery and treatment, including various diseases and comorbidities, that occur in patients during surgical treatment. The probability of complications occurring before and after nursing in two groups was recorded, including postoperative infection, bleeding, stoma stenosis, stoma hernia, stoma prolapse, and irritating dermatitis.

Quality of life [14]: The concept of a patient's quality of life during hospitalization relates to the comprehensive status of the patient's physical, psychological, and

social functioning during hospitalization. A comprehensive quality of life assessment questionnaire was used to evaluate physical function, psychological function, social function, and material life status. Each score ranged from 1 to 5 points, and higher score indicated better life quality. One patient was missing from the survey. The dimensions and factors of the scale comprehensively covered the main aspects of quality of life, ensuring the comprehensiveness and pertinence of the scale content. The item of the scale has been reviewed by experts and verified by clinical practice, which ensures the accuracy and scientific nature of its content. The Cronbach's α coefficient of the scale was 0.82, and the test-retest reliability was good.

In order to address selection bias, the inclusion and exclusion criteria of study subjects have been clarified to ensure that the sample is representative. A detailed description of the study subjects is provided in order to assess the representativeness of the sample. In order to address information bias, this study uses standardized survey tools and operational procedures to ensure consistent information collection. Collect information from multiple sources and perspectives to improve the integrity of information. In order to address observer bias, nursing staff were trained in this study to improve the objectivity of observation. A standardized scoring system [15] is used to reduce differences between observers.

Statistical analysis

SPSS 20.0 software was used for data analysis in the study. The analysis was conducted as a whole. Measurement data were expressed in terms of ($\bar{x} \pm s$). All data were normally distributed test. The independent samples *t*-test or rank-sum test were used for data comparison between groups for quantitative data conforming to normal distribution, and the paired samples *t*-test was used for data comparison within groups. For those who did not conform to the normal distribution, the Mann-Whitney rank sum test was performed. The enumeration data were described and analyzed as frequency and percentage. Qualitative data were compared between groups using chi-square or rank-sum tests. When the results of bilateral test and statistics were $P < 0.05$, it was statistically significant. The determination of the research scale in this paper comprehensively considered the process of sample selection, sample size calculation, control, replication and equilibrium, and ensured the reliability and scientificity of the research results through reasonable research design and rigorous statistical methods. Due to the small amount of missing data in this study and the limited impact on the overall data, the direct deletion method was used for the missing data.

Table 1 Comparison of the general data between the two groups

General Information		The control group (n=60)	The observation group (n=60)	χ^2/t	P
Gender	Male	26 (43.33)	24 (40.00)	0.137	0.711
	Female	34 (56.67)	36 (60.00)		
Age (Year)		71.15 $\pm$ 7.10	70.89 $\pm$ 8.42	0.183	0.855
BMI (kg/m ²)		22.12 $\pm$ 1.45	21.95 $\pm$ 1.22	0.695	0.489
Lesion location	Sigmoid colon	25 (41.67)	26 (43.33)	0.412	0.938
	Transverse colon	11 (18.33)	13 (21.67)		
	Descending colon	12 (20.00)	10 (16.67)		
	Ascending colon	12 (20.00)	11 (18.33)		

Table 2 The gastrointestinal function recovery ($\bar{x} \pm s$)

Indicators	The control group (n=60)	The observation group (n=60)	t	P
First exhaust time (d)	4.38 $\pm$ 1.20	3.65 $\pm$ 0.82	3.891	< 0.001
First meal time (d)	3.12 $\pm$ 1.15	1.83 $\pm$ 0.65	7.564	< 0.001
First bowel sound recovery time (d)	2.39 $\pm$ 1.06	1.47 $\pm$ 0.53	6.013	< 0.001

Results

Comparison of the general data between the two groups

There were no significant differences in general data such as age, gender, lesion location and BMI between the two groups ($P > 0.05$, Table 1).

The gastrointestinal function recovery

The time of first exhaust was 3.65 ± 0.82 d, the time of first meal was 1.83 ± 0.65 d, and the first bowel sound recovery was 1.47 ± 0.53 d in the observation group, which were significantly shorter than those in the control group (4.38 ± 1.20 d, 3.12 ± 1.15 d, 2.39 ± 1.06 d, $P < 0.001$, Table 2).

The stoma adaptability scores

The stoma adaptability scores between two groups had no statistically significant difference before the intervention ($P > 0.05$). After intervention, the positive emotions in the ostomy adaptation score were 32.09 ± 5.03 points, negative emotions were 31.41 ± 5.70 points, social life adaptation was 27.12 ± 4.98 points, and the total score was 90.78 ± 5.98 points in the observation group, which were significantly higher than those in the control group (26.32 ± 4.52 points, 24.25 ± 6.02 points, 20.25 ± 4.02 points, 67.25 ± 6.09 points, $P < 0.001$, Table 3).

Table 3 Comparison of stoma adaptability scores ($\bar{x} \pm s$)

Stoma adaptability score	Time	The control group (n = 60)	The observation group (n = 60)	t	P
Positive emotions (points)	Before	21.25 ± 4.69	20.13 ± 4.52	1.332	0.186
	After	26.32 ± 4.52***	32.09 ± 5.03***	6.609	< 0.001
Negative emotions (points)	Before	18.22 ± 4.03	17.99 ± 3.02	0.354	0.724
	After	24.25 ± 6.02***	31.41 ± 5.70***	6.690	< 0.001
Social life adaptation (points)	Before	11.25 ± 4.28	10.99 ± 3.05	0.383	0.702
	After	20.25 ± 4.02***	27.12 ± 4.98***	8.315	< 0.001
Total score (points)	Before	48.26 ± 5.04	49.10 ± 6.12	0.821	0.414
	After	67.25 ± 6.09***	90.78 ± 5.98***	21.354	< 0.001

Note: *** $P < 0.001$ compared with the same group before intervention

Table 4 Self-care ability scoring ($\bar{x} \pm s$)

Self-care ability score	Time	The control group (n = 60)	The observation group (n = 60)	t	P
Self-willingness (score)	Before	21.23 ± 3.69	20.11 ± 3.26	1.762	0.081
	After	25.25 ± 3.08***	34.18 ± 4.02***	13.659	< 0.001
Self-skills (score)	Before	4.45 ± 1.09	4.69 ± 1.03	1.240	0.218
	After	8.72 ± 2.13***	10.57 ± 2.23***	4.647	< 0.001
Self-care knowledge (score)	Before	12.26 ± 2.82	12.69 ± 2.36	0.906	0.367
	After	15.26 ± 2.70***	18.59 ± 3.10***	6.275	< 0.001
Total score (score)	Before	38.02 ± 6.63	37.39 ± 5.98	0.547	0.586
	After	45.69 ± 4.09***	63.18 ± 4.98***	21.023	< 0.001

Note *** $P < 0.001$ compared with the same group before intervention

Table 5 The incidence of complications [n (%)]

Complications	The control group (n = 60)	The observation group (n = 60)	χ^2	P
Postoperative infection	2 (3.33)	1 (1.67)		
Bleeding	2 (3.33)	2 (3.33)		
Stoma stenosis	5 (8.33)	2 (3.33)		
Stoma hernia	4 (6.67)	1 (1.67)		
Stoma prolapse	2 (3.33)	0 (0.00)		
Irritating dermatitis	7 (11.67)	4 (6.67)		
Total incidence	22 (36.67)	10 (16.67)	6.136	0.013

Self-care ability scoring

The self-care ability scores of two groups had no statistically significant difference before the intervention ($P > 0.05$). After the intervention, the self-willingness was 34.18 ± 4.02 points, self-care skill was 10.57 ± 2.23 points, self-care knowledge was 18.59 ± 3.10 points, and the total score was 63.18 ± 4.98 points in the observation group, which were significantly higher than those in the control group (25.25 ± 3.08 points, 8.72 ± 2.13 points, 15.26 ± 2.70 points, 45.69 ± 4.09 points, $P < 0.001$, Table 4).

The incidence of complications

The incidence of complications in the observation group was 16.67%, which was much lower than 36.67% of the control group ($P < 0.05$, Table 5).

The quality of life

The life quality scores of two groups had no statistically significant difference before the intervention ($P > 0.05$). After the intervention, the physical function was 79.74 ± 2.81 points, psychological function was 76.71 ± 3.05 points, social function was 78.11 ± 3.50 points, and material life status was 60.06 ± 2.98 points in the quality of life in the observation group, which were significantly higher than those in the control group (75.36 ± 2.68 points, 69.72 ± 2.93 points, 72.33 ± 3.42 points, 51.23 ± 3.08 points, $P < 0.001$, Table 6).

Discussion

As a common malignant tumor, CRC seriously affects the physical fitness and quality of life of the people. However, it is often necessary to perform colostomy to form an enterostomy during surgery, and the enterostomy changes the normal exit of feces and cannot be controlled at will, causing patients to bear psychological pressure and discomfort in life, which has become the main factor affecting the effect of colorectal cancer surgery and returning to society [16]. In addition, patients with enterostomy need to go home for treatment, due to the lack of knowledge about the disease and poor self-care ability, a variety of complications often occur after surgery, which affects life and is not conducive to prognosis. Self-management helps patients develop good living habits and healthy behaviors, so as to control risk factors, improve self-efficacy and coping ability, reduce the incidence and risk of diseases, and improve the quality of life of patients

Table 6 The quality of life ($\bar{x} \pm s$)

Life quality score	Time	The control group (n = 60)	The observation group (n = 60)	t	P
Physical function (points)	Before	58.26 ± 2.33	58.02 ± 2.16	0.585	0.560
	After	75.36 ± 2.68***	79.74 ± 2.81***	8.737	< 0.001
Psychological function (points)	Before	52.45 ± 2.41	52.33 ± 2.40	0.273	0.785
	After	69.72 ± 2.93***	76.71 ± 3.05***	12.802	< 0.001
Social function (points)	Before	56.81 ± 3.14	56.83 ± 3.21	0.035	0.973
	After	72.33 ± 3.42***	78.11 ± 3.50***	9.149	< 0.001
Material life (points)	Before	35.26 ± 4.19	35.36 ± 4.12	0.132	0.895
	After	51.23 ± 3.08***	60.06 ± 2.98***	15.96	< 0.001

Note***P < 0.001 compared with the same group before intervention

[17]. The results showed that the ACNM could promote the recovery of gastrointestinal function, improve the adaptability of the stoma, self-care ability and quality of life, and reduce the probability of complications, suggesting that the nursing model has certain clinical promotion value in the postoperative care of patients with early colorectal cancer.

Continuing nursing is widely recognized as an essential element of high-quality health services and is essential for patients and their families. The ACNM is a qualitative study conducted by Ahmadi in 2001 in Iran communities using triangulation in patients with chronic coronary artery disease and develops a continuation of care model called ACNM [18, 19]. The approach to this extended care model is dynamic and flexible, patient- or family-based, and expectation-oriented, identifying the patient's needs and problems that allow people to better embrace behaviors that restore and maintain health. The ACNM consists of four phases: Orientation, Sensitivity, Control, and Evaluation. The results of the present study showed that the observation group needed much shorter first exhaust time, first meal time, and first bowel sound recovery time than the control, indicating that ACNM could accelerate the recovery of gastrointestinal function. ACNM implements planned and targeted nursing interventions to comprehensively enhance the theoretical knowledge and clinical practice ability of patients after intervention. Patients can independently clean and care for the stoma and stoma pocket, undergo rehabilitation training, reduce infection rates, and enhance self-care abilities, thereby facilitating the recovery of

gastrointestinal function. Dai ZJ et al. [20] have found that the application of ACNM can significantly improve the life quality in patients with heart disease. Yao et al. [21] have found that continuous nursing intervention can promote the recovery of physical function, reduce psychological stress and negative emotions, and improve the quality of life of patients with severe adrenal tumors. Research by Rahim et al. [22] also suggested that ACNM could improve the life quality of patients. Combined with the previous literature and the results of this study, it can be seen that the ACNM can effectively promote the recovery of gastrointestinal function in CRC patients with stoma after operation through the comprehensive effect of directional assessment, sensitive monitoring, complication control, assessment feedback and psychological support.

The current clinical medical model is gradually changing, and medical staff not only pay attention to the implementation of nursing interventions, but also pay attention to guiding patients to master self-care ability and carry out self-care. Thus, nursing staffs not only need to provide early examination and psychological care for patients with colostomy, but also guide them to master the relevant skills of colostomy care in order to perform self-care [23, 24]. The present study showed that the observation group had markedly higher scores for stoma adaptability and self-care ability than the control, indicating that ACNM could improve the self-care ability and stoma adaptability of colostomy patients. In consistent with the findings of ZHOU et al. [25], sufficient emotional support from medical staff in ACNM could help ameliorate the physical and mental condition of patients and accelerate their adaptability to stoma. The analysis of the relevant reasons may be that the ACNM uses remote methods such as WeChat to guide patients on specific care measures during the period at home. At the same time, it can help patients monitor their condition through video and other means, so as to implement effective nursing guidance for patients. In addition, the ACNM encourages patients to express their concerns during ostomy care, and the nurse in charge provides support and encouragement to alleviate the patient's negative emotions. Meanwhile, the patient's spouse, parents and children are mobilized to provide emotional support to the patient and improve the patient's ability to adapt to the ostomy.

The lack of nursing guidance for colonostomy patients after discharge from the hospital can easily affect the ability of ostomy care and increase stoma complications. In addition, the ostomy can lead to low self-esteem and shame, affecting the patient's social activities and reducing their quality of life. The present study showed that the incidence of complications in the observation group was 16.67%, which was sharply lower than that in the control

group with 36.67%. After intervention, the life quality score was much higher in the observation group than that in the control group, indicating that ACNM reduced the occurrence of colonostomy related complications and thereby improved their quality of life. The reason was that ACNM remotely monitored and supervised patients through the WeChat platform to focus on preventing stoma related complications, continuously monitored the patient's condition, and provided timely and professional encouragement and guidance for patients. In addition, ACNM inquired about the daily life, self-care skills, psychological and social status of stoma patients face-to-face to address existing and potential stoma related issues. By timely evaluating and treating complications, the incidence of complications related to stoma could be reduced, thereby improving the life quality of patients. The study [26] has found that a 45-minute preoperative video ostomy education can improve self-care knowledge and proficiency among patients undergoing ostomy surgery, and this intervention also reduces depression, anxiety and stoma-related complications. Thus, health education guidance for ostomy patients can significantly reduce the incidence of complications, which is similar to the results of this study.

In general, the ACNM could promote the recovery of gastrointestinal function in patients underwent colonostomy, enhance their adaptability and self-care ability, reduce the occurrence of complications, and improve the life quality, which was worthy of promotion. There were still certain limitations to this study. Some patients were retracted through the WeChat platform after the intervention, so questionable reliability may lead to bias in the results. In addition, no economic effect measures were collected, response rates were not discussed, and patients were not followed up for a long time to confirm the value of the ACNM. Besides, the influencing factors of clinical application of ACNM were not analyzed by multivariate analysis. In the future, a multicenter study can be tried to strengthen the follow-up time, extend the observation time, and evaluate the long-term effects of ACNM on patients' psychological and physical problems, costs, and readmission rates.

Clinical significance: The ACNM has significant advantages in the postoperative rehabilitation of CRC ostomy patients. This model focuses on the transition period from the hospital to the home, and provides personalized and continuous care interventions, which helps to improve the postoperative rehabilitation of patients. Compared with the traditional nursing model, the ACNM focuses on the comprehensive physical, psychological and social rehabilitation of patients, thereby reducing the incidence of postoperative complications and improving the quality of life of patients. In addition, the model encourages patients and family caregivers to

actively participate in the care process, enhances patients' self-management ability, and helps to reduce the burden of family caregivers.

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Author contributions

Ying Su and lina Wang confirmed the authenticity of all the raw data and edited the manuscript, Ying Su collected data and processed the data. Huiming Yan and lina Wang conducted the statistics. Ying Su and lina Wang reviewed and revised the article. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All procedures performed in studies were in accordance with the ethical standards of the ethics committee of Shengjing Hospital of China Medical University. Informed consent was obtained from all individual participants included in the study. The study was approved by the Ethics Committee of The Affiliated Yantai Yuhuangding Hospital of Qingdao University Shengjing Hospital of China Medical University (2025PS908K).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Nursing, Shengjing Hospital of China Medical University, 39 Huaxiang Road, Tiexi District, Shenyang City, Liaoning Province 110000, China

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