The Application Effect of a Three-Subject, Dual-Track Interactive Nursing Model Based on Smart Nursing in Patients with Intestinal Polyps

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Abstract: *Objective:* To explore the clinical value of a three-subject, dual-track interactive nursing model based on smart nursing in patients with intestinal polyps. *Methods:* From July 2024 to February 2025, 200 patients with intestinal polyps admitted to our hospital were selected and divided into a control group and an observation group, with 100 patients in each group, based on different nursing methods. The control group received routine nursing, while the observation group received a three-subject, dual-track interactive nursing model based on smart nursing. The nursing effects of the two groups were compared and analyzed. *Results:* The first defecation time in the observation group was shorter than that in the control group ($p < 0.05$). After nursing, the ESCA score, CSES score, scores for the right colon, transverse colon, left colon, total BBPS score, intestinal preparation qualification rate, and nursing satisfaction in the observation group were all higher than those in the control group ($p < 0.05$). *Conclusion:* The application of a three-subject, dual-track interactive nursing model based on smart nursing in patients with intestinal polyps can effectively alleviate gastrointestinal function, improve self-care ability, and enhance nursing satisfaction.

Keywords: Smart nursing; Three-subject, Dual-track interactive nursing; Intestinal polyps

1. Introduction

Intestinal polyps, as a common disease of the digestive system, although mostly benign, carry a certain risk of malignant transformation, seriously affecting patients' quality of life and long-term health [1]. Its treatment not only relies on precise surgical operations; postoperative care is equally crucial, directly affecting the patient's rehabilitation process and disease recurrence rate. However, for the treatment of intestinal polyps, apart from surgical methods, postoperative care also has a certain impact on patients' prognosis and recurrence. However, conventional care is limited to in-hospital aspects, and upon discharge, patients are entirely responsible for self-

management at home without professional nursing staff providing long-term care. Consequently, rehabilitation outcomes are not ideal. For those with poor knowledge of nursing care, complications are more likely to occur after surgery, affecting the patient's prognosis. Against this backdrop, smart nursing represents a relatively novel nursing model characterized by informatization and intelligence, enabling effective monitoring and real-time management of patients' conditions, thereby enhancing the quality of nursing work [2]. The three-subject, dual-track interactive nursing model integrates hospitals, communities, and patients as three subjects, forming an in-hospital and out-of-hospital dual-track nursing model that provides seamless nursing services throughout the patient's journey. This approach is conducive to improving patients' understanding of their diseases, enhancing their self-management abilities, and subsequently promoting patient rehabilitation and reducing disease recurrence rates. Based on this, this study explores the clinical application effects of applying the three-subject, dual-track interactive nursing model based on smart nursing for patients with intestinal polyps, aiming to provide new ideas and methods for postoperative care in these patients.

2. Materials and methods

2.1. General information

The study included 200 patients with intestinal polyps admitted to our hospital from July 2024 to February 2025. They were divided into a control group and an observation group based on different nursing methods, with 100 patients in each group. The male-to-female ratio in the control group was 58:42, with an average age of (50.27 ± 4.25) years. The male-to-female ratio in the observation group was 59:41, with an average age of (50.78 ± 4.31) years. There were no significant differences in baseline data between the two groups, allowing for comparative study ($p > 0.05$).

2.1.1. Inclusion criteria

(1) Meeting the relevant diagnostic criteria outlined in the "Standardized Diagnosis and Treatment of Colorectal Polyps", with confirmation via colonoscopy and pathological biopsy [3,4].
(2) Aged between 18–75 years old, with clear consciousness and the ability to communicate normally.
(3) Willing to participate in this study voluntarily and sign an informed consent form.

2.1.2. Exclusion criteria

(1) Patients with severe dysfunction of vital organs.
(2) Patients with mental illness or cognitive impairment who are unable to cooperate with the study and nursing care.
(3) Patients with a history of abdominal surgery.

2.2. Methods

2.2.1. Control group

Patients received routine nursing care. Nurses guided patients on proper medication use according to the doctor's advice and reminded them to take medication on time during their hospital stay. Nurses explained disease-related knowledge to patients with intestinal polyps, such as the causes of intestinal polyps, possible symptoms, and the necessity of subsequent treatment. Patients and their families were advised on postoperative dietary precautions,

such as avoiding spicy, greasy, and irritating foods. During the patient's hospital stay, vital signs such as body temperature, blood pressure, and heart rate were closely monitored. In case of any abnormalities, the attending physician was immediately notified, and corresponding treatment measures were actively taken.

2.2.2. Observation group

Patients received a three-entity, dual-track interactive nursing approach based on smart nursing.

    (1) Smart nursing

      (a) Intelligent ward system

        Smart screens were installed at the bedside to display basic patient information and nursing risk alerts. The ward was equipped with a multi-directional call system, allowing patients to initiate calls through different terminals such as the bedside call system, bathroom call bell, and nurse station, ensuring prompt assistance when needed. The nurse station was equipped with an electronic display screen that continuously played information related to intestinal polyps, such as disease prevention knowledge and bowel preparation instructions. The intelligent system at the nurse station displayed nurse scheduling and handover records, simplifying the handover process through electronic means and effectively enhancing the efficiency and accuracy of information transmission. It also allowed for viewing of patient colonoscopy reports, saving time in handovers with the medical team and improving work efficiency

      (b) Perioperative health education system

        The latest literature, including guidelines and consensus statements, was integrated to create educational materials. Health education knowledge on the perioperative management of intestinal polyps was disseminated through WeChat groups and official WeChat accounts, including text, images, and videos. Combined with corridor display boards, this approach enabled patients and their families to quickly and clearly learn relevant knowledge, which they could review repeatedly.

    (2) Three-party, dual-track interactive nursing intervention

      (a) Hospital nursing track

        Before the patient is discharged, medical staff record their vital signs and request the patient or their family members to provide contact information and home address. Based on the individual differences of patients, medical staff negotiate with patients and their family members to determine the appropriate timing and convenient communication channels for subsequent follow-up. Within one week after discharge, patients and their family members are required to report on the patient's rehabilitation status, including diet, bowel movements, and physical discomfort. If patients and their family members encounter unresolvable emergencies after discharge, they can contact medical staff at any time through the provided contact information to receive timely answers and assistance.

      (b) Community nursing track

        Community healthcare workers serve as the primary service providers, establishing a cross-institutional collaboration model. After patients complete their treatment in the hospital, hospital physicians must comprehensively transfer patient information to community healthcare workers and establish patient files. Both parties share communication channels to support subsequent nursing consultations. After patient discharge, the community healthcare team will conduct a systematic health assessment based on the rehabilitation status reported by family members and provide customized

nursing guidance. Based on a comprehensive analysis of the patient's lifestyle, values, and functional recovery, a personalized nursing plan is jointly developed.

2.3. Observation indicators

(1) Gastrointestinal function

Observe and record the time to first bowel movement for both groups of patients.

(2) Self-care ability and self-efficacy

Assessed using the Exercise of Self-Care Agency Scale (ESCA), which includes four dimensions and has a total score of 164 points. A higher score indicates stronger self-care ability. Self-efficacy is evaluated using the General Self-Efficacy Scale (GSES), which comprises 10 dimensions with a total score ranging from 10 to 40 points. A higher score indicates stronger self-efficacy.

(3) Bowel preparation qualification rate

The Boston Bowel Preparation Scale (BBPS) is used to assess bowel preparation. Developed by the Boston University Medical Center, this scale has a Cronbach's α of 0.987. Scoring was jointly completed during the withdrawal phase of colonoscopy by two experienced endoscopists educated in the Boston Bowel Preparation Scale (BBPS) and one endoscopy nurse, using standardized equipment and a single-operator approach, with single-blind assessment. Scoring was performed separately for the right colon, transverse colon, and left colon, with the cleanliness of each segment rated on a scale of 0 to 3, resulting in a total score that is the sum of the scores for the three segments. The total score ranges from 0 to 9, with a total score of ≥ 6 and/or each segment scoring ≥ 2 considered as "acceptable" bowel preparation. The number of patients with acceptable bowel preparation was then counted. The formula for calculating the acceptable bowel preparation rate is as follows: The total number of cases of bowel preparation during the perioperative period of intestinal polyps within a unit time / The reasonable number of cases of bowel preparation during the perioperative period of intestinal polyps within a unit time × 100%.

(4) Nursing satisfaction

Assessed using a self-designed nursing satisfaction questionnaire, which includes options for satisfied, somewhat satisfied, and dissatisfied. Overall satisfaction = (Number of satisfied + Number of somewhat satisfied) / Total number of cases × 100%.

2.4. Statistical methods

The study data were analyzed using SPSS 22.0 statistical software. Continuous data are presented as ($\bar{x} \pm s$) and analyzed using t-tests, while categorical data are presented as n (%) and analyzed using χ^2 tests. A p-value < 0.05 indicates statistical significance.

3. Results

3.1. Comparison of gastrointestinal function between the two groups

The observation group had shorter times for anal exhaust, first defecation, and restoration of bowel sounds compared to the control group ($p < 0.05$). See **Table 1**.

Table 1. Comparison of gastrointestinal function between the two groups (x̄ ± s, h)

Group	n	First defecation time (hours)
Observation group	100	33.12 ± 5.24
Control group	100	39.57 ± 5.11
t-value	-	8.813
p-value	-	0.000

3.2. Comparison of self-care ability and self-efficacy scores between the two groups

The observation group had higher ESCA and CSES scores after nursing compared to the control group ($p < 0.05$). See **Table 2**.

Table 2. Comparison of self-care ability and self-efficacy scores between the two groups (x̄ ± s, points)

Group	n	ESCA		CSES	
		Before care	After care	Before care	After care
Observation group	100	83.27 ± 3.41	120.32 ± 4.21	18.76 ± 2.25	30.25 ± 2.73
Control group	100	82.87 ± 3.36	103.76 ± 3.66	19.07 ± 2.32	23.64 ± 2.41
t-value	-	0.836	29.895	0.959	18.152
p-value	-	0.404	0.000	0.339	0.000

3.3. Comparison of bowel preparation qualification rates between the two groups

The right colon, transverse colon, left colon, total BBPS score, and bowel preparation qualification rate in the observation group were all higher than those in the control group ($p < 0.05$). See **Table 3**.

Table 3. Comparison of bowel preparation qualification rates between the two groups

Group	n	Left colon (Score)	Transverse colon (Score)	Right colon (Score)	Total BBPF (Score)	Adequate bowel preparation rate
Observation group	100	2.28 ± 0.38	2.11 ± 0.44	2.16 ± 0.52	7.45 ± 0.66	93 (93.00)
Control group	100	2.01 ± 0.52	1.96 ± 0.47	1.81 ± 0.52	5.82 ± 1.35	74 (74.00)
t/χ² value		4.192	2.329	4.759	10.847	5.171
p-value		0.000	0.021	0.000	0.000	0.023

3.4. Comparison of nursing satisfaction between the two groups

The nursing satisfaction in the observation group was higher than that in the control group ($p < 0.05$). See **Table 4**.

Table 4. Comparison of nursing satisfaction between the two groups [n (%)]

Group	n	Satisfied	Somewhat satisfied	Dissatisfied	Total satisfaction rate [n (%)]
Observation group	100	75	21	4	96 (96.00)
Control group	100	64	19	17	83 (83.00)
χ² value	-	-	-	-	8.992
p-value	-	-	-	-	0.003

4. Discussion

The results of this study indicate that the first defecation time in the observation group was shorter than that in the control group ($p < 0.05$), suggesting that the three-subject, dual-track interactive nursing model, through close collaboration between hospital and community nursing staff, developed personalized rehabilitation plans for patients in the early postoperative period and emphasized guidance on diet and activities during the in-hospital nursing phase [3]. Simultaneously, leveraging the intelligent nursing platform, nursing staff were able to monitor patients' condition changes in real-time and adjust nursing measures promptly, ensuring the precision and effectiveness of nursing care.

Furthermore, the ESCA and CSES scores in the observation group after nursing were higher than those in the control group ($p < 0.05$), indicating that intelligent nursing provided patients with a wealth of health education content, which was continuously displayed on bedside smart screens. Patients could access knowledge about intestinal polyps and self-care through official accounts, WeChat groups, telephone communication, and other means, enhancing their understanding of the disease and self-care awareness. Under the dual influence of hospital and community nursing tracks, patients received comprehensive nursing support. Healthcare professionals not only focused on patients' physical recovery but also paid attention to their psychological state and coping strategies [4]. Through effective communication and collaboration, hospital and community healthcare professionals provided psychological counseling and coping strategy guidance, helping patients build confidence in overcoming the disease and improving their ability to cope with it. In addition, the right colon, transverse colon, left colon, total BBPS score, and the qualification rate of bowel preparation in the observation group were all higher than those in the control group ($p < 0.05$), indicating that the three-subject, dual-track interactive nursing model helps improve the quality of bowel preparation in patients. Under this model, hospital healthcare professionals and community healthcare workers work closely together to conduct comprehensive information handovers and assessments of patients.

Hospital healthcare professionals gain a detailed understanding of a patient's condition before their discharge, while community healthcare workers provide targeted nursing advice based on this information and feedback from patients after discharge. This comprehensive nursing support enables patients to better follow medical advice during bowel preparation, make dietary adjustments, and perform bowel cleansing, thereby increasing the qualification rate of bowel preparation [5]. Furthermore, nursing satisfaction in the observation group was higher than that in the control group ($p < 0.05$). This can be attributed to the patient-centered approach of the model, which fully considers patients' needs and feelings. By optimizing nursing processes, strengthening education related to bowel preparation, and improving nursing efficiency across all stages of the perioperative period for intestinal polyps, the model enhances patient satisfaction. Meanwhile, through the intelligent nursing platform, patients can evaluate and provide feedback on nursing services at any time, allowing nursing staff to promptly understand patients' opinions and suggestions and continuously improve the quality of nursing services, thereby increasing patient satisfaction [6].

5. Conclusion

In summary, the three-subject, dual-track interactive nursing model based on intelligent nursing can effectively improve the recovery of intestinal function in patients with intestinal polyps, increase the qualification rate of bowel preparation, enhance patients' self-care abilities, coping abilities, and quality of life, and boost patient

satisfaction with nursing services.

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Disclosure statement

The authors declare no conflict of interest.

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