

## Original Article

# Effect of a nursing intervention strategy oriented by Orem's self-care theory on the recovery of gastrointestinal function in patients after colon cancer surgery

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**Abstract:** Objective: To investigate the effect of nursing intervention strategies based on the Orem self-care theory on the recovery of gastrointestinal function in patients after colon cancer surgery. Methods: In this prospective study, a total of 115 patients with colon cancer who had radical resection of the colon cancer tissue were selected as the research subjects and randomized into two groups: an Orem group (59 cases), which was given nursing based on the Orem self-care model and a control group (56 cases), which was given regular nursing. The postoperative recovery of the two groups was compared. Results: After the intervention, the time to first getting out of bed, gastric tube removal, first postoperative flatus, first fluid food intake and general food intake were significantly earlier than those of the control group. Time of intestinal peristalsis and the average length of hospital stay of the Orem group were much shorter than those of the control group (all  $P < 0.001$ ). The cost of nutrient supply of the Orem group was significantly lower than that of the control group ( $P < 0.001$ ), and the postoperative pain and incidence of complications of patients in the Orem group were significantly lower than those in the control group ( $P < 0.05$ ). After 3 months of follow-up, the scores of positive attitude, intimacy and total score of hope in the hope level of the patients in the Orem group were significantly higher than those in the control group (all  $P < 0.01$ ). There was no significant difference in the positive action scores ( $P > 0.05$ ). Besides, the scores of the Orem group in all dimensions of the quality of life were significantly higher than those of the control group (all  $P < 0.01$ ). Conclusion: Nursing intervention based on the Orem self-care theory can promote the recovery of patients with colon cancer after surgery, speed up the recovery of their gastrointestinal function, and ultimately improve their level of hope and quality of life. Therefore, it is worthy of promotion in clinical practice.

**Keywords:** Orem self-care theory, radical resection of colon cancer, gastrointestinal function, urinary tract infection, physical function

## Introduction

Colon cancer is a common malignant tumor that occurs in the colon. Its cause is mostly related to an unhealthy diet, colon disease history, inherited family colon diseases and some other biochemical or environmental factors [1]. Its incidence and mortality rate rank third among gastrointestinal malignancies and all malignant tumors, and it has an increasing trend every year. Among them, middle-aged men from 40 to 50 are more likely to be affected by colon cancer [2]. If the colon cancer is diagnosed early, surgical treatment is usually applied with an expected cure [3]. As for surgical methods, minimally invasive techniques are

applied, which can avoid the large trauma of traditional open surgery, with less intraoperative bleeding and less body damage. However, when facing this major disease, patients often have poor psychological endurance, and the physical and mental damage caused by the operation still exist. In consequence, many colon cancer patients will experience stress responses such as poor recovery of intestinal function, negative emotions, and loss of hope, which are not conducive to recovery of patients after surgery. In addition to paying attention to the disease itself, the patient's self-care ability is also particularly important in the long postoperative recovery process. Improving patients self-care ability can promote the speed of dis-

ease healing [4]. This means that except for their physical condition, patients' self-care ability should also be focused on comprehensively improving their physical and mental health and quality of life. Therefore, it is extremely important to apply scientific and effective nursing intervention for patients after surgery [5]. Studies have confirmed that the Orem self-care theory derived from the United States pays more attention to the self-care ability of patients and family members, in order to meet the regular care needs of patients [6]. The purpose of the theory is to focus on the goals of care, maintain and promote the self-care ability of patients to the maximum extent so as to speed up the recovery of patients and improve their quality of life. Nursing intervention based on this theory is also applicable to cancer patients who have a longer survival period after malignant tumor surgery and pursue the best quality of postoperative rehabilitation [7]. At present, this theory is commonly used in the clinical care of chronic diseases such as chronic obstructive pulmonary disease and asthma with remarkable effects [8, 9]. However, there is little research concerned with the theory in the application of nursing intervention in patients after gastrointestinal tumor surgery. This study aimed to explore the application effect of Orem's self-care theory in the recovery of gastrointestinal function in patients after colon cancer surgery, in order to provide guidance for clinical care.

### Materials and methods

#### *General information*

A total of 115 colon cancer patients who had radical surgery for colon cancer were selected as the research subjects. By a random number table method, they were divided into an Orem group (59 cases), which were given the Orem self-care theory-oriented nursing and a control group (56 cases), which were given regular nursing. This study was approved by the hospital Medical Ethics Committee of our Hospital.

Inclusion criteria were as follows: patients who met the World Health Organization (WHO; 2000) diagnostic criteria for colorectal cancer, and were diagnosed by colonoscopy and pathological examination; patients who underwent radical surgery of colorectal cancer for the first time, meeting all indications for this opera-

tion, and having successful surgery; patients who had an overall survival time over 3 months as predicted after surgery; patients who were informed of this study and signed an informed consent form, and the family members agreed to participate [10].

Exclusion criteria were as follows: patients who underwent TNM stage IV; patients who had a history of abdominal surgery; patients who had heart, lung, kidney and other major organ dysfunction; patients who had other organ tumors; patients who had communication disorders or mental illness; patients whose education level was below primary school.

#### *Methods*

Patients in both groups began to take compound polyethylene glycol electrolyte powder (Beaufour Ipsen Industrie, H20110092, 4 bags) from two o'clock in the afternoon the day before the surgery for gastrointestinal lavage until the stool was watery and there was no residue. The time of fasting from food and drink was 8-10 hours and 4-6 hours before surgery respectively. The postoperative diet was permitted depending on the recovery of the patient's gastrointestinal function. The intervention time of the two groups was from the time of admission to the follow-up at 3 months after discharge.

#### *Control group*

The control group was given regular nursing, including education for relevant diseases, psychological counseling, prevention and treatment of complications, dietary intervention, etc. Indwelling of a urinary catheter and a gastric tube were set up as usual before surgery. After the surgery, patients were asked to follow the doctor's instructions for pain relief, tube removal, medication, liquid food intake, etc. Patients could try to sit up from the next day after the operation, stand up and walk after 3 days. They were given some guidance on regular medication, diet and daily life activities. Patients were also instructed to do physical exercise and regular rehabilitation activities every day to avoid long-term bed rest.

#### *Orem group*

For the Orem group, nursing intervention oriented by the Orem self-care theory was implemented as follows [11].

(1) Comprehensive compensatory nursing system during the operation stage: ① Psychological nursing: Firstly, the responsible nurse explained the operation methods, procedures and postoperative precautions before the operation, and instructed the patients to relax their mind and ensure rest, so as to eliminate fatigue and stress. Then, nurses would appease the anxiety of patients and encouraged them, helped them release any negative emotions, actively communicated with them and guided them. They explained the importance and persistence of individual participation in nursing through some successful previous operation cases in order to help them build self-confidence, to overcome the disease, and meanwhile actively met the reasonable needs of patients. ② Daily management of the operating room: The operating room was kept at temperature from 24 to 26°C, humidity 45% to 60%, and an infusion heater was used to warm the infusion liquid. Meanwhile we reduced the patient's skin exposure to avoid patients from experiencing air with a low temperature which may cause abnormal metabolism or coagulation disorders. During the operation, nurses would actively cooperate with doctors to closely monitor vital signs such as blood pressure, heart rate, blood oxygen saturation, and they asked the patient's about their feelings of their limb temperature, and tried to avoid exposure during transportation so as to protect the patient's personal privacy. ③ Drainage tube care: nurses ensured the clear and reasonable placement of the gastric tube, drainage tube and urinary tube, and monitored the patient's water and electrolyte balance. If the drainage tube was blocked, it was dredged immediately. If there was a color change or other abnormal features, it was reported to the doctor immediately. Comprehensive disinfection of the urethral opening was required twice a day. ④ Pain care: Nurses evaluated the pain of patients regularly. The principle of analgesic drug use was based on the WHO cancer pain three-step analgesic ladder program, including preemptive analgesia, postoperative intravenous analgesia pumps, self-controlled analgesia pumps, etc. [12]. Drug dosage was individually base on patients pain levels and tolerance to ensure the analgesic effect with the premise of not increasing adverse reactions. At the same time, non-analgesic interventions were carried out as soon as possible, including music and

psychotherapy to divert patients' attention, physical interventions such as body exercises combined with cold and hot compresses, and acupoint massage. ⑤ Physical exercise care: Nurses assisted the patient with the movement of the limbs within an hour after the operation, such as turning over, swing the limbs, etc., and at the same time supplemented this with about 20 minutes of muscle circular compression massage three times a day, each time starting from the place most remote to the place near the heart. Six hours after the operation, nurses raised the bedside of the patient and help them find the most suitable semi-recumbent position. At the same time, nurses instructed the patients to breathe in through the nose and then slowly exhale 3 times a day for 7 seconds each time to restore free breathing as soon as possible and exercise the diaphragm. Each training lasted for 10 minutes. Besides, nurses helped patients turn over and change their positions in time to prevent pressure sores, every two to four hours.

(2) Partial compensatory nursing system after operation, which refers to closely observing various vital signs of patients after operation to avoid infection: ① Diet guidance: Patients were allowed to try liquid food two days after the operation, and gradually transitioned to a normal diet if there was no adverse reaction. It was noted that meals were still mainly light with small meals several times daily that were necessary to prevent indigestion. ② Guidance on getting out of bed activities: Nurses assisted the patients to sit up on the bed one day after the operation. They paid attention to protect the patient's incision, encouraged the patients to try to move out of bed, and assisted the patients to stand. The time of standing by the bed was controlled from 10 to 20 minutes. Three days after the operation, patients could move out of bed with the assistance of the responsible nurse. They could walk slowly indoors for 20 to 30 minutes each time and twice to three times per day. The nurse paid attention to the patient's heart rate, and stopped the activity immediately if the patient felt unwell.

(3) Support and education after discharge, which means that psychological nursing, out-of-hospital guidance, follow-up instructions and other services were provided for patients: ① Establishment of personal health records: The

health records of all patients were made on the day of discharge, which included the basic information of the patient, examination reports, nursing measures, evaluation of postoperative conditions before discharge, etc. ② Multimedia discharge guidance: Video presentations were available to patients including identification and handling of colon cancer complications, health-keeping education manuals, guidance on medication, diet, exercise, sleep and others. Their family members were informed to observe the patient's physical and mental health, and give feedback to the doctor for comprehensive evaluation during the follow-up visit. ③ Regular follow-up visits: During the follow-up, when communicating with family members, it was emphasized that the patient's prognosis recovery was not only related to drugs, but also a wonderful material life, family company and support, as well as encouragement, which could also help to build up the patient's sense of self-existence and hope. In addition, support from other fellow patients was also extremely important. Patients were instructed to join colon cancer patient online groups for information sharing and emotional venting, such as QQ groups or WeChat groups of patients. They could consult medical staff about their own situation, and they could also exchange and interact with each other to share their excellent experience in self-management and recovery after surgery, which could help them reduce stress, as well as avoid loneliness and helplessness.

### Outcome measures

*Main outcome measures:* ① Postoperative clinical indicators included the first time to get out of bed after surgery, the time of gastric tube removal, the average length of hospital stay, and the cost of nutrient support, as well as the degree of pain on the first day after surgery. The pain degree was evaluated based on the Numeric Rating Scale (NRS) [13]. The ends of a dot-shaped ruler respectively indicated no pain and unbearable pain. The patient would pick a number from 0-10 on the ruler representing pain degrees, and the score is proportional to pain degrees. ② Postoperative recovery of gastrointestinal function included the first postoperative flatus, recovery of intestinal peristalsis, first fluid food intake and general food intake. ③ Postoperative complications included inci-

sion infection, urinary tract infection, intestinal infarction, lung infection and other complications. The total incidence of complications equals total number of complications/number of patients \*100%.

*Secondary outcome measures:* ① Hope level scores after 3 months of follow-up: The Herth Hope Scale (HHS) was used for hope evaluation (Cronbach's  $\alpha$  is 0.850) [14]. The scale includes three dimensions: the positive attitude when facing the present and the future, positive action, and intimacy with others. The total score of hope is the average score of the total scores of the three dimensions. The scores were classified into 4 levels, namely, strongly disagree, disagree, agree, and strongly agree. The score of hope was proportional to the level of hope, and would be evaluated before the intervention and after 3 months of follow-up. ② Quality of life scores after 3 months of follow-up: The MOS 36-item short-form health survey (SF-36) was used for evaluation (Cronbach's  $\alpha$  was 0.804) [15]. The scale consists of 4 items, namely, physiological function, physical function, material life, and social function. Scores of each part was from 0 to 100 points. The total score was proportional to the quality of life.

### Statistical methods

All statistical data were analyzed by the professional software SPSS 21.0. Measurement data were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm sd$ ). The comparison between groups was performed by independent sample t test, and the comparison before and after surgery within groups was performed by paired sample t test, which was represented by t. All the count data were expressed as the number of cases/percentage (n/%), which were conducted by  $\chi^2$  test and expressed as  $\chi^2$ .  $P < 0.05$  was considered as a statistically significantly difference.

### Results

#### *Comparison of the general information between the two groups of patients*

There was no statistical difference in the general information of patients in the two groups (all  $P > 0.05$ ). See **Table 1**.

**Table 1.** General information between the two groups of patients ( $\bar{x} \pm sd$ )

Groups	Control group (n=56)	Orem group (n=59)	$\chi^2/t$	P
Gender (male/female)	35/21	37/22	0.001	0.981
Age (years)	55.7±6.2	54.4±5.7	0.901	0.370
Course of the disease (years)	1.21±0.25	1.23±0.20	0.475	0.636
BMI (kg/m <sup>2</sup> )	22.37±2.91	22.62±2.86	0.465	0.643
Tumor focus (case)			0.699	0.874
Right colon cancer	24	27		
Transverse hemicolon cancer	5	3		
Left colon cancer	8	8		
Sigmoid colon cancer	19	21		
Pathological type (case)				
Adenocarcinoma	47	51	1.340	0.720
Mucous adenocarcinoma	5	4		
Poorly differentiated adenocarcinoma	4	3		
Low differentiated adenocarcinoma	0	1		
Lymph node metastasis (case)			0.046	0.831
Yes	17	19		
No	39	40		
TNM stages (case)			0.074	0.964
I	19	21		
II	28	28		
III	9	10		
Complications (case)				
Diabetes	11	9	0.385	0.535
Hypertension	8	10	0.154	0.694
Malnutrition	19	22	0.141	0.707

**Table 2.** Comparison of postoperative clinical indicators between the two groups of patients ( $\bar{x} \pm sd$ )

Groups	Control group (n=56)	Orem group (n=59)	t	P
First out of bed activity (d)	7.29±0.72	3.55±0.36	34.946	0.000
Time for removal of gastric tube (d)	4.39±0.47	3.22±0.31	15.672	0.000
Time of Hospital stay (d)	17.45±2.58	10.77±3.14	12.428	0.000
Cost of nutrient support (thousand RMB)	2.95±0.74	2.02±0.46	8.044	0.000
Pain scores	6.88±1.22	3.96±0.67	15.793	0.000

*Comparison of postoperative clinical indicators between the two groups of patients*

The time to first getting out of bed activity after operation, and gastric tube removal of patients in the Orem group was significantly earlier than those of patients in control group. Compared with the control group, the average length of hospital stay of the Orem group were significantly shorter (all  $P < 0.001$ ). The cost of nutrient support of patients in the Orem group was significantly lower than that of the control group ( $P < 0.001$ ). One day after the operation, the

pain degree of patients in the Orem group was significantly lower than that of the control group ( $P < 0.001$ ). See **Table 2**.

*Comparison of gastrointestinal function recovery between the two groups of patients*

The first postoperative flatus, intestinal peristalsis recovery, first fluid food and general food intake of patients in the Orem group were much earlier than those in the control group. This indicated that the recovery of gastrointestinal function of patients in the Orem group

**Table 3.** Comparison of gastrointestinal functional recovery between the two groups of patients ( $\bar{x} \pm sd$ )

Groups	Control group (n=56)	Orem group (n=59)	t	P
First postoperative flatus	4.01±0.58	2.87±0.64	9.992	0.000
Time of intestinal peristalsis recovery	5.66±0.93	3.11±0.78	15.962	0.000
First time of fluid food intake	4.19±0.62	3.26±0.36	9.770	0.000
First time of general food intake	8.63±0.24	5.13±0.46	51.521	0.000

**Table 4.** Comparison of the incidence of postoperative complications between the two groups of patients (n, %)

Groups	Control group (n=56)	Orem group (n=59)	$\chi^2$	P
Incision infection	4 (7.14)	2 (3.39)	0.818	0.366
Urinary tract infection	2 (3.57)	0 (0.00)	2.144	0.143
Intestinal infarction	2 (3.57)	1 (1.69)	0.398	0.528
Lung infection	4 (7.14)	1 (1.69)	2.050	0.152
Incidence of complications (%)	12 (21.43)	4 (6.78)	5.148	0.023

were significantly faster than those of the control group (all  $P < 0.001$ ). See **Table 3**.

*Comparison of the incidence of postoperative complications between the two groups of patients*

The incidence of postoperative complications such as incision infection, urinary tract infection, intestinal infarction, and lung infection in the Orem group (6.78%) were significantly lower than those of the control group (21.43%;  $P < 0.05$ ). See **Table 4**.

*Comparison of hope level scores between the two groups of patients before nursing and after 3 months of follow-up*

Before nursing, there was no significant difference in the hope levels scores between the two groups of patients (all  $P > 0.05$ ). While after 3 months of follow-up, scores of the positive attitude, intimacy with others and the total score of hope in the Orem group were significantly higher than those in the control group (all  $P < 0.01$ ). There was no significant difference in the score of positive action between the two groups ( $P > 0.05$ ). See **Figure 1** for details.

*Comparison of scores of quality of life between the two groups of patients before nursing and after 3 months of follow-up*

Before nursing, there was no significant difference in the scores of the two groups of patients'

quality of life in all dimensions (all  $P > 0.05$ ). While after 3 months of follow-up, the physiological, physical and social functions and material life of patients in the Orem group were significantly higher than those of the control group (all  $P < 0.01$ ). See **Figure 2** for details.

**Discussion**

With the increase in the early diagnosis rate of malignant tumors, as well as the development of radiotherapy, chemotherapy, and surgical techniques, patients with colon cancer can significantly prolong their overall survival time after radical surgery [16]. As a major disease of the digestive system, the inevitable mechanical stimulation during abdominal surgery and the severe pain when anesthesia ends can cause the excitement of patient's sympathetic nervous system, hinder the gastrointestinal peristalsis, and make patients unable to have exhaust and defecate normally. If it keeps going, it will cause intestinal flatulence, intestinal adhesions, abdominal wall adhesions, and even intestinal infarction or other complications that could endanger patient's life [17]. Usually after the surgery, in addition to the body discomfort caused by the surgery itself, the changes in the diet because of the difference of patient's digestive tract structure from what it used to be are also one of the urgent problems in the patient's postoperative rehabilitation. Therefore, the recovery of patient's gastrointestinal tract after surgery is crucial, and reasonable nursing intervention has a positive effect on promoting gastrointestinal peristalsis, restoring gastrointestinal function, and improving prognosis [18].

Studies have confirmed that the Orem self-care theory has significant effects in the nurs-

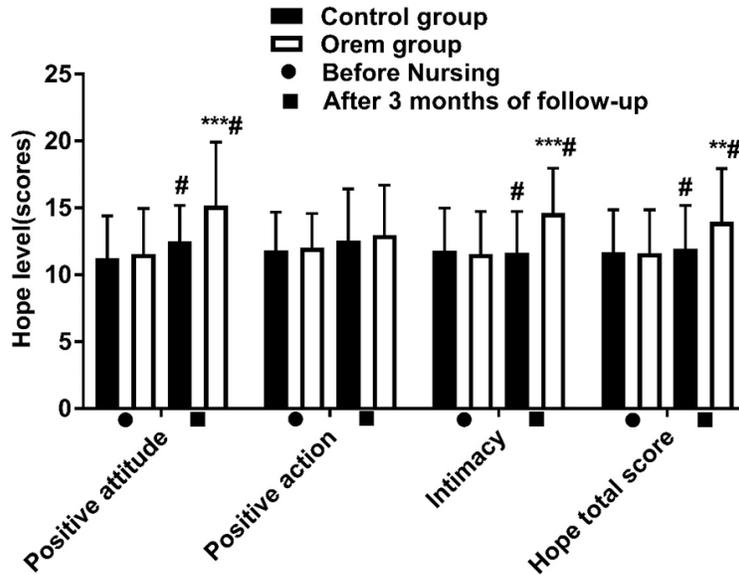


Figure 1. Comparison of hope level scores between the two groups of patients before nursing and after 3 months of follow-up. Compared within the same group before nursing, #P<0.05; compared with control group after 3 months of follow-up, \*\*\*P<0.001, \*\*P<0.01.

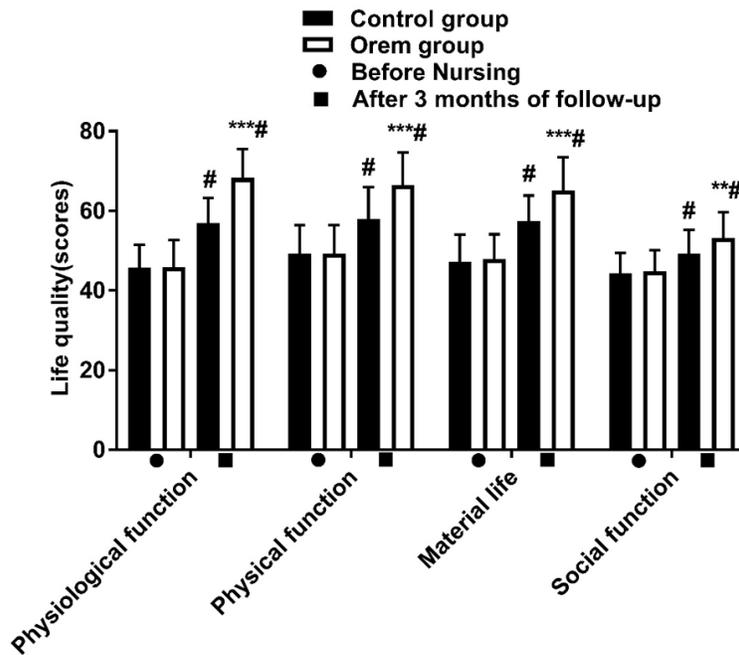


Figure 2. Comparison of scores of the quality of life between the two groups of patients before nursing and after 3 months of follow-up. Compared within the same group before nursing, #P<0.05; compared with control group after 3 months of follow-up, \*\*\*P<0.001, \*\*P<0.01.

ing after interventional treatment of lung cancer. In addition to improving the self-care ability of patients, it can effectively avoid dyspep-

sia after surgery [19]. Nursing intervention based on the Orem self-care theory can also improve the social function and overall quality of life of migraine patients, reduce migraine-related disability, effectively reduce fatigue in patients with multiple sclerosis and also reduce burdens for personal, family and social resources [20, 21]. The above reports have provided scientific evidence that Orem's self-care theory effectively improves the quality of life of patients and the recovery of digestive function of cancer patients after surgery. Therefore, we may consider implementing nursing intervention based on Orem self-care theory according to the specific nursing needs of colon cancer patients before and after surgery to promote the recovery of gastrointestinal function and the improvement of quality of life for long-term living.

Hjorth M et al. pointed out that incentive strategies based on Orem nursing theory can effectively reduce the nursing needs of patients with liver cirrhosis [22]. Through their long-term follow-up, it was found that secondary prevention based on the Orem theoretical model with the participation of nurses can also relieve the patient's disease symptoms. Maslampak M H et al. discussed the application of Orem-based self-care theory in the prevention of diabetic foot ulcer and pointed out that this self-care model can effectively reduce the risk of amputation and reduce the medical expenses, thereby improving the quality of life of

patients [23]. This indicates that the incentive intervention strategy and patient self-care ability can reduce the patient's nursing needs and

alleviate their disease symptoms. In this study, preoperative psychological care for colon cancer patients is essential. Health education, negative emotion counseling, and demonstration of successful cases are good ways to encourage patients to build self-confidence. At the same time, studies have confirmed that cancer pain is usually related to factors such as cancer focus and metastasis, surgical trauma and related complications, prolonged bed rest after operation, and individual physical conditions [24]. After radical operation for colon cancer, most patients have different degrees of pain. Severe postoperative pain can cause strong stress responses in patients, affect the body's immunity, increase myocardial oxygen consumption, disrupt metabolic functions and affect the prognosis of patients. In this study, a comprehensive compensation system was used during the operation. Nurses cooperated with doctors throughout the operation to protect the gastric tube, drainage tube and urinary tube from infection. At the same time, according to the WHO cancer pain analgesic program, the pain management plan was scientifically formulated, and drug intervention was combined with non-analgesic drugs intervention to reduce the pain of patients as much as possible.

Studies have proved that early postoperative limb activity can speed up the metabolism of patients who had colon cancer resection, inhibit the excitement of the sympathetic nervous system, enhance the excitement of the parasympathetic nervous system, relieve symptoms such as intestinal flatulence, and help patients restore their appetite and promote nutrient absorption [25]. It can ultimately speed up wound healing and shorten hospital stay. However, in the current domestic traditional nursing, patients can easily ignore or even don't know the effectiveness and importance of early out of bed activities. They usually lie in bed to relieve fatigue and pain, but it is often counterproductive. In this study, early limb exercise care was performed, and the patients began to adjust their body position before getting off the bed. Nurses helped patients do limb exercise and massage was conducted to relax the limb muscles and relieve fatigue of patients. Changing the body position every 2 to 4 hours can also effectively prevent the pressure sores and venous thrombosis in the lower extremities, promote blood circulation and return, expand

peripheral blood vessels, promote gastrointestinal peristalsis, and prevent constipation. The semi-recumbent position after surgery can control the tension of the postoperative incision, promote its healing, and relieve the pain of patients. Meanwhile, a partial compensation nursing system was used after surgery to provide guidance on out of bed activities to accelerate recovery, promote a reasonable diet to assist gastrointestinal peristalsis so as to help patients transit to a normal diet as soon as possible. Since chewing food can regulate the patient's taste, it will improve oral comfort and promote the recovery of gastrointestinal function. In addition, regular breathing exercises and bedside rehabilitation exercises can effectively advance the patient's postoperative flatus and defecation, helping to remove the gastric tube as soon as possible and finally recover from the hospital. The results of this study showed that the time to get out of bed and remove the gastric tube in the Orem group were significantly earlier than those in the control group; the average length of hospital stay and the recovery time of gastrointestinal function of patients in the Orem group were significantly shorter than those in the control group; the nutrient support cost was significantly lower than those in the control group; the postoperative pain of patients 3 days after surgery in the Orem group was also significantly lower than that of the control group; and the incidence of postoperative complications of the Orem group (6.78%) such as incision infection, urinary tract infection, intestinal infarction, and lung infection was significantly lower than that of the control group (21.43%). Orem self-care theory-oriented nursing intervention ensures that patients after colon cancer surgery will enjoy comprehensive and systematic nursing intervention during hospitalization, which effectively improves the gastrointestinal function of the patient and promotes the recovery process of the patients.

The research conducted by Mohammadi S et al. found that educational intervention based on the Orem self-care model can effectively reduce the average burden of home care workers in the nursing of patients with spinal cord injury [26]. Some clinical data have shown that surgical patients who are assisted and supervised by nurses in the hospital, that receive comprehensive compensation system nursing during

the operation, and perform active or passive postoperative functional exercises, do well in recovery. Although it is effective in rehabilitation, after being discharged from the hospital, patients were disconnected from the hospital and it is hard for patients to improve self-care ability to reach an ideal recovery effect [27]. In addition, some patients and their families did not pay enough attention to postoperative rehabilitation. Although they took the medicine as prescribed by the doctor, they did not have high compliance with diet and exercise. This will slow the recovery of the gastrointestinal function of patients, which greatly affects the patient's rehabilitation compliance and hope level, and even affects the quality of life of patients and their families. Besides, family members of cancer patients have to bear both economic and psychological pressures during the long rehabilitation nursing process. Therefore, increasing the awareness of patients and their families on rehabilitation care after hospital discharge is a key to the problem. In this study, patients were provided with continuing nursing intervention after discharge base on multi-dimensional support and education in order to improve the patient's hope level and their quality of life. The hope level reflected the belief in achieving certain goals in the future, such as firm confidence in overcoming the disease, which represented the patient's affirmation of self-worth and the desire for self-expression. In other words, the evaluation of hope level played an important role in the comprehensive recovery of the patient. For cancer patients, the key to improve their hope level was to gain more social support, and social support mainly came from family members and fellow patients. Therefore, it was necessary to emphasize family companionship and spiritual support to patients and encourage colon cancer patients to join the online patient groups and share with each other their own situations. Regular follow-up visits ensured that patients with colon cancer could still enjoy professional nursing and rehabilitation guidance after they were discharged from the hospital. The results of this study showed that after 3 months of follow-up, in addition to the positive action score, the total scores of positive attitude, intimacy, and hope and the SF-36 scores of all dimensions in the Orem group were significantly higher than those of the control group. This may be attributed to the Orem self-care theory-

oriented intervention strategy which make up for the lack of medical resources and knowledge of patients after discharge from the hospital and can improve the patient's self-care ability as well as family cooperation.

Orem self-care theory mainly includes three aspects: self-care theory, self-care defect theory, and nursing system theory [28]. This study innovatively adopted the corresponding nursing system according to the nursing needs of patients at different stages, and achieved comprehensive results. During the operation, patients who have no self-care ability would be given a comprehensive compensation nursing system. After the operation, since patients already had partial self-care ability and only needed some assistance from nurses, they would be given a partial compensation nursing system. Most patients could absolutely take care of themselves after discharge, but they still needed rehabilitation guidance, especially on mental health, quality of life and hope, so support and education were provided after their discharge. For patients with gastrointestinal tumors such as colon cancer, this study can also provide more detailed and individualized care of patients' diet. Meanwhile, it focuses on the hope level of cancer patients. In the future, further studies should be done on the factors of impact of hope level on patients after colon cancer surgery. Besides, this study can also provide a more comprehensive reference and guidance for the prognosis and rehabilitation of cancer patients after surgery.

In summary, apart from its safety, the nursing intervention strategy oriented by Orem's self-care theory can shorten the hospital stay of patients after colon cancer surgery, promote the recovery of their gastrointestinal function, and reduce the incidence of postoperative pain and complications, as well as increase their hope level and long-term quality of life. Therefore, it is worthy of clinical promotion.

### **Disclosure of conflict of interest**

None.

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