

Original Article

The effect of online training-based continuous nursing care for rectal cancer-patients undergoing permanent colostomy

Qian Huang^{1*}, Yufen Zhuang^{2*}, Xiaoyi Ye³, Minxiang Li⁴, Zan Liu⁵, Jifang Li³, Zhaoyan Pan⁶

¹Department of General Surgery/Wound Stoma Care Clinic, The Second Affiliated Hospital of Hainan Medical University, Haikou, Hainan 570311, China; ²Department of Surgery, Donghu Branch of The Second Affiliated Hospital of Hainan Medical University, Haikou 570100, Hainan, China; ³Department of General Surgery, The Second Affiliated Hospital of Hainan Medical University, Haikou 570311, Hainan, China; ⁴Department of Nursing, The Second Affiliated Hospital of Hainan Medical University, Haikou 570311, Hainan, China; ⁵Department of Tropical Diseases/Department of Infectious Diseases, The Second Affiliated Hospital of Hainan Medical University, Haikou 570311, Hainan, China; ⁶Department of Thyroid and Breast Surgery/Department of Gastrointestinal Tumor Surgery, The Second Affiliated Hospital of Hainan Medical University, Haikou 570311, Hainan, China. *Equal contributors.

Received September 30, 2020; Accepted November 15, 2020; Epub April 15, 2021; Published April 30, 2021

Abstract: Objective: The study explored and analyzed the effects of online training based continuous nursing care on the health-related life quality and self-care ability of rectal cancer patients undergoing permanent colostomy. Methods: A total of 119 patients who were hospitalized and underwent permanent colostomy due to rectal cancer from January 2018 to December 2019 were collected as research subjects and were divided into the control group (n=57) and the observation group (n=62) based on their admission time. The control group received routine nursing, while the observation group was treated with online training based continuous nursing care in addition to routine nursing. Both groups' self-efficacy, self-care ability, quality of life, psychological status and complications within 6 months after discharge were compared. Results: Both groups had increased scores in self-efficacy, and their dimensional scores and total scores of self-care ability after intervention were higher compared with pre-intervention ($P<0.05$), and the indexes of the observation group after intervention were significantly higher than that of the control group ($P<0.05$). The two groups had remarkably increased SF-36 scores of each dimension after intervention compared with pre-intervention ($P<0.05$), and the observation group had apparently higher SF-36 scores than the control group after intervention ($P<0.05$). The two groups had increased SAS and SDS grades in post-intervention compared with pre-intervention ($P<0.05$), and the observation group had notably higher SAS and SDS scores than the control group ($P<0.05$). The complication rate within 6 months after discharge in the observation group was obviously lower than which in the control group ($P<0.05$). Conclusion: An online training based continuous caring model can effectively improve the self-care ability and self-efficacy of rectal cancer patients with permanent enterostomy, thus promoting better life quality and psychological states, and effectively reducing the incidence of complications after discharge.

Keywords: Online training, continuous nursing model, rectal cancer, permanent colostomy, quality of life, self-efficacy

Introduction

Rectal cancer is a common malignant tumor of the digestive tract with an incidence and mortality rate ranking among the top five malignant tumors nationwide. The mean incidence age of rectal cancer has been gradually decreasing in recent years, while the incidence rate has been

gradually increasing [1]. The disease has subtle early clinical symptoms. After being diagnosed with rectal cancer, most patients need to receive surgical resection based comprehensive treatment, and need to carry a colostomy permanently [2]. However, the colostomy changes the patient's original mode of defecation and makes the patient unable to control it

Nursing care for rectal cancer patients undergoing permanent colostomy

independently, which seriously affects their quality of life and health. Therefore, the nursing intervention for rectal cancer patients undergoing permanent colostomy has become a key focus of clinical concern [3]. As an extension and continuation of in-patient care, continuous nursing can extend the patient-centered care from the hospital to the patient's family, ensuring better quality of life of the patient after being discharge from the hospital [4]. In recent years, researchers have applied the continuous nursing model to clinical nursing and made achievements accompanied by the establishment and development of better care in China [5, 6]. In order for continuous nursing care to play a better role on rectal cancer patients undergoing permanent colostomy, this study, combined online training with continuous nursing care, explored and analyzed the effect of network training based continuous nursing care on health-related life quality and self-efficacy of rectal cancer patients with permanent colostomy. The reports are as follows.

Materials and methods

Clinical materials

A total of 119 rectal cancer patients hospitalized for permanent colostomy from January 2018 to December 2019 were chosen as research subjects. According to admission time, 57 patients admitted from Jan. 2018 to Dec. 2018 were classified in the control group, and 62 patients admitted from Jan. 2019 to Dec. 2019 were placed into observation group. This study received approval from the Hospital Ethics Committee.

Inclusive and exclusive criteria

Inclusive criteria: (1) The patients met the diagnostic criteria for colorectal cancer formulated by the cancer science branch of the Chinese Medical Association [7], were diagnosed by clinical symptoms, imaging and pathological examination; (2) No tumor recurrence or metastasis; (3) Aged between 20-70 years old; and (4) The research subjects signed the informed consent voluntarily.

Exclusive criteria: (1) Patients with disturbance of communication, comprehension or reading; (2) Patients who underwent radiotherapy, chemotherapy or immunotherapy; and (3) Patients

with dysfunction of vital organs, for instance, heart, liver, kidney or lung.

Methods

The control group received routine nursing care, including health instruction at discharge, notice of regular follow-up visits to the hospital, and routine telephone follow-up.

The observation group was treated with online training based continuous nursing care by specific the content as follows: (1) A continuous nursing team was established which included: 1 deputy chief physician, 1 chief nurse, 1 supervisor nurse and 4 nurses. (2) Training of team staff: the team staff received program training by the physician and the chief nurse to master the research objectives as well as the tasks and responsibilities for each member. The training content included knowledge of rectal cancer colostomy, negative induced emotions of patients, and influencing factors of life quality after colostomy, psychological communication skills and measurement of psychological problems. (3) The implementation: the information files of patients at discharge were established, and individualized medical nursing programs for patients after discharge were implemented by the physician and nursing staff, including psychology, daily diet, disease reexamination, exercise, etc.; Patients knowledge was strengthened with health education, which included the self-care of patients, colostomy-related knowledge, prevention and management of complications, etc., which helped to relieve their tension. In addition, patients' successful self-care experiences were shared, and new methods and product introductions were provided to enable patients to better integrate into daily life and build confidence in overcoming the disease. (4) Establishment of Instant Messaging groups such as WeChat and QQ groups: WeChat and QQ groups were set up for patients and their family members to publish their daily self-care diary. The nursing staff sorted out the information released by the patients, established a corresponding nursing diary, and promptly guided or reminded the patients to return to the hospital when abnormal situations occurred. Nurses provided answers to patients' questions by specified times each week, and conducted video calls once a month to understand the changes in

Nursing care for rectal cancer patients undergoing permanent colostomy

patients' psychological emotions and communicate with them in a timely manner. The medical staff reminded the patients of the importance of being on time to come to the hospital for review, and released the latest progress of rectal cancer and treatment of colostomy to them in a timely manner. The nursing program was adjusted in time according to the patients' self-care diary to deal with their adverse reactions. (5) Establishment of public account: The official account of the department was established, and various forms of health knowledge, such as health tips, humorous jokes, inspirational videos, etc., were published in the rectal cancer and colostomy section of the official account to help relieve the patients' tension and reconcile the nurse-patient relationship.

Observation of indexes

(1) The General Self-Efficacy Scale (GSES) was adopted to test the two groups' self-efficacy pre- and post-treatment (6 months after discharge) [7]. The scale was developed by German psychologist Schwarzer and has good reliability and validity. The scale consisted of a total of 10 items, and each item had 4 levels, which were completely incorrect, somewhat correct, mostly correct, and completely correct, with a score of 1 to 4, respectively. A higher score represented higher general self-efficacy.

(2) Using Self-care Ability Scale (ESCA) was used to access the self-care ability of patients' pre- and post-treatment (6 months after discharge) [8]. The ESCA Scale included 4 dimensions, of nursing concept, nursing knowledge, nursing responsibility and nursing skills, with aggregate score of 172. Higher scores indicated stronger self-care ability of the patients.

(3) We evaluated life quality before and after intervention (6 months after discharge) by MOS 36-Item Short Form Health Survey (SF-36) [9]. Sf-36 contains 8 dimensions, including physical functioning, role-physical, bodily pain, social functioning, mental health, role-emotional, vitality and general health. Each dimension scored between 0-100. Higher scores signified better quality of life.

(4) We evaluated the mental state of the patients before and after the intervention (6 months after discharge) by the Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS). The total score of each scale was

100 points, and higher scores indicated more serious degree of anxiety and depression [10].

(5) The complications occurring in the two groups within 6 months after discharge were recorded and compared.

Statistical analysis

Excel software and SPSS22.0 were used to analyze the data. The enumeration counting data was compared by *t*-test, and the measurement was remarked by percentage and compared by chi-squared test. Statistical meaning was accepted at $P < 0.05$.

Results

Comparison of clinical materials

The comparison of clinical materials between groups of patients showed insignificant differences ($P > 0.05$), as shown in **Table 1**.

Comparison of self-efficacy before and after intervention

The self-efficacy scores between groups before intervention had insignificant differences ($P > 0.05$). After intervention, the two groups' self-efficacy scores were significantly higher than before ($P < 0.05$), and the index of observation group after intervention was obviously higher than that of the control group ($P < 0.05$), as shown in **Table 2** and **Figure 1**.

Comparison of self-care ability of patients pre- and post-intervention

Both groups had increased scores in self-efficacy, and also each dimensional score and total score of self-care ability after intervention were higher compared with pre-intervention ($P < 0.05$), and the indexes of the observation group after intervention were significantly higher than that of the control group ($P < 0.05$), illustrated in **Table 3**.

Comparison of life quality between the two groups of patients before and after intervention

The two groups had remarkably increased SF-36 scores of each dimension after intervention compared with pre-intervention ($P < 0.05$), and the observation group had apparently higher SF-36 scores than the control group after

Nursing care for rectal cancer patients undergoing permanent colostomy

Table 1. Comparison of clinical materials between the two groups

Clinical information	Observation group (n=62)	Control group (n=57)	t/ χ^2	P
Gender				
Male	37	31	0.339	0.560
Female	25	26		
Age (years old, $\bar{x} \pm s$)	45.82 \pm 7.02	46.18 \pm 8.12	0.259	0.796
Marital status				
Married	48	41	0.475	0.491
Single	14	16		
Degree of education				
Junior high school and below	17	15	0.018	0.892
High school and above	45	42		
Payment mode of medical expenses				
Private treatment	21	23	0.535	0.465
By social security or public expense	41	34		

Table 2. Comparison of self-efficacy between the two groups before and after intervention (points, $\bar{x} \pm s$)

Group	Number of cases	Before intervention	After intervention	t	P
Observation group	62	18.97 \pm 1.64	23.18 \pm 2.03	12.703	0.000
Control group	57	19.14 \pm 1.77	21.06 \pm 1.91	5.567	0.000
T	-	0.544	5.584	-	-
P	-	0.588	0.000	-	-

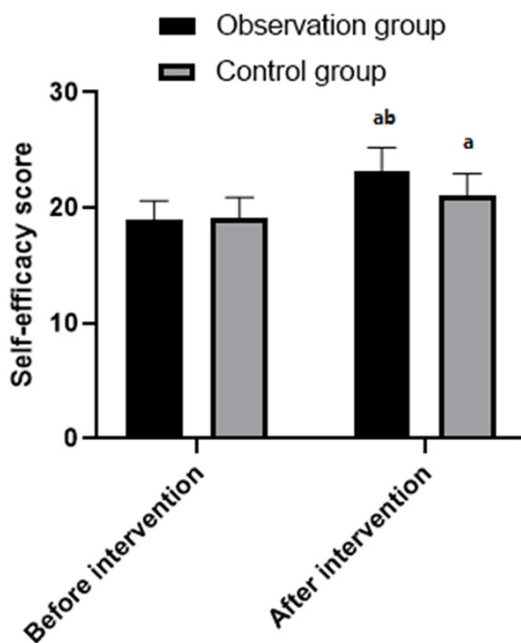


Figure 1. Comparison of self-care efficacy between the two groups before and after intervention. (Note: Compared with before intervention, ^a $P < 0.05$; compared with control group, ^b $P < 0.05$).

intervention ($P < 0.05$), see **Table 4**.

Comparison of the two groups' psychological states pre- and post-intervention

The two groups had increased SAS and SDS grades post-intervention compared with pre-intervention ($P < 0.05$), and

the observation group had notably higher SAS and SDS scores than the control group ($P < 0.05$), as shown in **Table 5**; **Figures 2** and **3**.

Comparison of both groups' complication rates

The complication rate within 6 months after discharge in the observation group was obviously lower than which in the control group ($P < 0.05$), as recorded in **Table 6**.

Discussion

Rectal cancer is a common digestive malignant tumor. With changes in lifestyle and diet, the incidence rate, disability and mortality of people with rectal cancer has shown an increasing annual trend, which seriously threatens human life and health and affects people's quality of life [11]. Laparoscopic surgical resection of tumor tissue and postoperative permanent colostomy are routine clinical methods used to improve patients' clinical symptoms [12]. However, a colostomy will change the patient's normal mode of defecation, which is difficult to

Nursing care for rectal cancer patients undergoing permanent colostomy

Table 3. Comparison of self-care ability between the two groups before and after intervention

Dimension	Observation group (n=62)				Control group (n=57)			
	Before intervention	After intervention	t	P	Before intervention	After intervention	t	P
Concept of self-care	22.08±2.71	26.74±3.21 ^a	8.734	0.000	21.75±2.53	24.02±3.05	4.325	0.000
Knowledge of self-care	28.97±3.74	38.96±5.62 ^a	11.652	0.000	29.18±3.26	33.56±5.28	5.329	0.000
Responsibility for self-care	22.37±2.36	28.84±3.11 ^a	13.049	0.000	22.18±2.72	25.37±2.79	6.181	0.000
Self-care skills	28.06±4.24	41.64±7.21 ^a	12.784	0.000	27.69±3.97	33.54±6.28	5.945	0.000
Total score	98.93±15.28	139.72±21.73 ^a	12.091	0.000	99.79±16.27	117.28±17.84	5.469	0.000

Note: compared with control group, ^aP<0.05.

Table 4. Comparison of quality of life between the two groups of patients before and after intervention (points, $\bar{x} \pm s$)

Dimension	Observation group (n=62)				Control group (n=57)			
	Before intervention	After intervention	t	P	Before intervention	After intervention	t	P
Physical Functioning	59.83±5.21	71.82±5.78 ^a	12.133	0.000	60.21±6.28	65.28±4.92	4.798	0.000
Role-physical	51.72±3.97	60.66±4.79 ^a	11.315	0.000	50.98±4.71	56.39±4.03	6.589	0.000
Bodily Pain	45.10±3.57	57.63±4.10 ^a	18.148	0.000	44.72±3.32	52.64±5.28	9.587	0.000
Social Functioning	46.72±6.18	57.85±4.66 ^a	11.323	0.000	46.22±5.93	50.73±3.79	4.838	0.000
Mental Health	52.61±5.97	67.13±5.08 ^a	14.585	0.000	52.26±5.31	61.94±4.26	10.735	0.000
Role-emotional	54.67±6.88	70.28±7.21 ^a	12.333	0.000	55.08±5.12	63.47±6.98	7.317	0.000
Vitality	40.16±4.73	52.31±5.84 ^a	12.730	0.000	39.80±4.60	45.62±5.17	6.350	0.000
General health	45.26±4.92	56.37±3.79 ^a	14.086	0.000	44.97±5.63	50.23±4.28	5.615	0.000

Note: compared with control group, ^aP<0.05.

Table 5. Comparison of psychological states of the two groups before and after intervention (points, $\bar{x} \pm s$)

Group	Number of cases	SAS	SDS
Observation group (n=62)	Before intervention	61.82±6.21	59.87±6.44
	After intervention	49.83±5.44 ^a	47.96±4.79 ^a
	t	11.436	11.684
	P	0.000	0.000
Control group (n=57)	Before intervention	61.02±7.48	60.29±7.21
	After intervention	54.38±6.12	52.07±4.26
	t	5.187	7.411
	P	0.000	0.000

Note: compared with control group, ^aP<0.05.

adapt to and will create negative emotions and reduce patients' life quality. Hence scientific and effective nursing interventions are needed for rectal cancer patients undergoing permanent colostomy [13].

Continuous nursing care provides timely, accurate and targeted guidance to patients by means of follow-up visits, disease reexamina-

tion, patient-fellowship and modern communication. The continuous nursing care enables patients to adapt to a new life more quickly, improves their postoperative quality of life, thus effectively solving the transition of patients from hospital to family, which achieves good social benefits [14]. Meanwhile, in this research, the traditional continuous nursing service is combined with a modern online platform to

construct a continuous nursing service which is based on the network education mode.

Modern medical treatment not only aims to effectively treat the symptoms of patients' diseases, but also improves their physical function and mental and emotional states. Self-efficacy refers to the ability, judgment and belief of an individual or one's self-grasp and feelings of

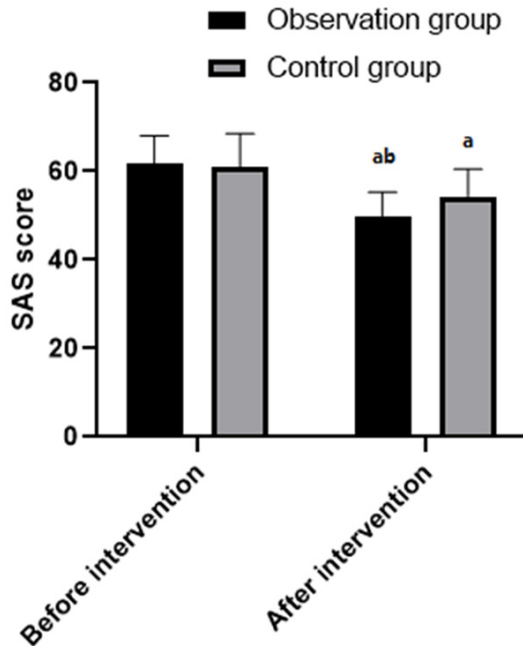


Figure 2. Comparison of SAS scores between the two groups before and after intervention. (Note: Compared with before intervention, ^a $P < 0.05$; compared with control group, ^b $P < 0.05$).

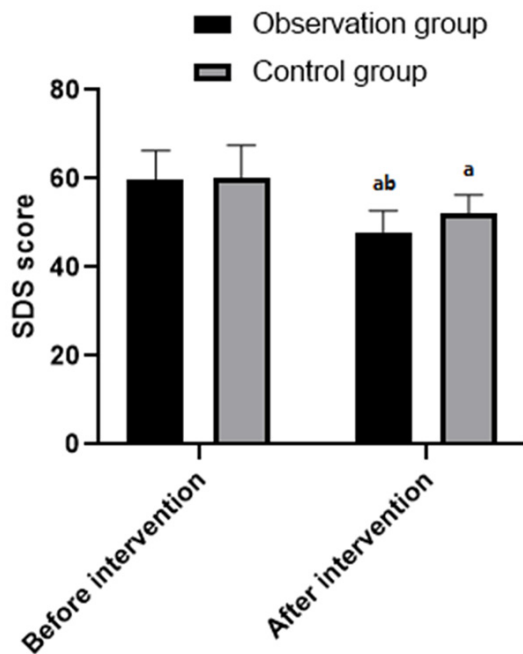


Figure 3. Comparison of SDS scores between the two groups before and after intervention. (Note: Compared with before intervention, ^a $P < 0.05$; compared with control group, ^b $P < 0.05$).

whether they are capable of completing an activity to a certain degree [15]. It advocates

enhancing the confidence of patients, improving their self-care efficacy, motivating them to make self-determinations, and implement self-management by using their knowledge and skills [16, 17]. Permanent colostomy is a life-long situation, and the treatment efficacy is closely related to the patient's mood, quality of life, and patient's subjective well-being, etc. [18, 19]. The outcome of our study has revealed that the self-efficacy scores in both groups of patients after intervention were remarkably higher than those in the pre-intervention, and the self-efficacy scores of the observation group were significantly superior than those in control group after the intervention; after the intervention, the scores of patients in both groups were considerably higher than those in pre-intervention, and scores the observation group were much better than those of control group in post-intervention. Similar to related research results of other scholars [20, 21], a good trusting relationship has been established between nursing staff and patients through online platforms based continuous nursing intervention, allowing patients and their families to participate in the self-care process, thereby improving the patients' self-efficacy and self-care ability. In the process of continuous nursing care, medical staff can help patients to establish self-care files, record the self-care behavior of patients throughout the process, and play a role in reminding patients about good care. At the same time, medical staff can motivate patients through videos, social platforms and hospital checkups, so that patients can feel that their behaviors receive timely feedback, which will further encourage patients to improve their self-care ability, enable them to be more confidence in self-care, and develop good habits of self-care [22, 23].

In terms of life quality, the two groups had remarkably increased SF-36 scores in each dimension after intervention compared with pre-intervention, and the observation group had apparently higher SF-36 scores than the control group after intervention. According to literature reports [24, 25], health education and life guidance for patients post-discharge from hospital can help them to acquire better relevant knowledge and skills, form healthy behaviors and improve their life quality. In this study, there was a vital improvement in the life quality of the patients in the observation group that may be connected with the application of

Nursing care for rectal cancer patients undergoing permanent colostomy

Table 6. Comparison of complication rates between the two groups

Group	Number of cases	Colostomy Infection	Colostomy Stricture	Colostomy Retraction	Contact dermatitis	Total
Observation group	62	0 (0.00)	0 (0.00)	1 (1.61)	2 (3.22)	3 (4.84)
Control group	57	2 (3.51)	1 (1.75)	2 (3.51)	4 (7.02)	9 (15.79)
χ^2	-	-	-	-	-	3.928
<i>P</i>	-	-	-	-	-	0.048

the health education received by the patients during out of hospitalization guidance on self-care practice, while the low improvement in the life quality of the patients in the control group may be related to the failure to receive timely help after discharge and the failure of medical staff to answer questions in a timely manner.

The improvement of the psychological status of subjects in the observation group, after receiving effective continuous nursing intervention, was significantly better than which in the control group. This may related to the improvement of patients' self-efficacy and self-care ability. Through effective self-care, patients improved the degree of control over the disease, which is more conducive to the improvement of their psychological state. In addition, in the process of self-care after discharge from hospital, regular communication between professional medical staff and patients can promote the improvement of patients' psychological state, effectively improve their confidence, and in the meantime contribute to the improvement of nurse-patient relationships [26, 27]. Furthermore, the complication rate of the observation group within 6 months post-discharge was apparently lesser than that of the control group, which further suggested that the continuous caring intervention can effectively improve patients' self-care ability, thus contributing to the a decline in complication rates.

However, this study had a small sample size and a short postoperative observation time, and the nursing plan included still needs to be further improved. In the follow-up study, the research staff will further improving the nursing model, expanding the sample size and extending the observation time to further analyze the effect of the improvement of self-care ability on the long-term postoperative living conditions of patients.

In conclusion, online training based continuous nursing care can effectively improve the self-care ability and self-efficacy for rectal cancer patients with permanent colostomy, thereby contributing to the progress of patients' life quality and psychological status, and effectively reducing the complication rate after discharge.

Disclosure of conflict of interest

None.

Address correspondence to: Zhaoyan Pan, Department of Thyroid and Breast Surgery/ Department of Gastrointestinal Tumor Surgery, The Second Affiliated Hospital of Hainan Medical University, No. 48 Baishuitang Road, Longhua District, Haikou 570311, Hainan, China. Tel: +86-0898-66809173; E-mail: panzhaoyan123@163.com

References

- [1] Sun X, Han H, Qiu H, Wu B, Lin G, Niu B, Zhou J, Lu J, Xu L, Zhang G and Xiao Y. Comparison of safety of loop ileostomy and loop transverse colostomy for low-lying rectal cancer patients undergoing anterior resection: a retrospective, single institute, propensity score-matched study. *J BUON* 2019; 24: 123-129.
- [2] Takahashi H, Takasu K, Nakaya S, Yanagita T, Ando N, Nakai N, Maeda Y, Shiga K, Hirokawa T, Morimoto M, Ogawa R, Hara M, Matsuo Y and Takiguchi S. Laparoscopic extraperitoneal sigmoid colostomy using the totally extraperitoneal hernia repair technique after abdominoperineal resection for rectal cancer. *Surg Today* 2019; 49: 977-980.
- [3] Andersson G, Engström Å and Söderberg S. A chance to live: women's experiences of living with a colostomy after rectal cancer surgery. *Int J Nurs Pract* 2010; 16: 603-608.
- [4] Duluklu B and Çelik SŞ. Effects of lavender essential oil for colorectal cancer patients with permanent colostomy on elimination of odor, quality of life, and ostomy adjustment: a ran-

Nursing care for rectal cancer patients undergoing permanent colostomy

- domized controlled trial. *Eur J Oncol Nurs* 2019; 42: 90-96.
- [5] Chudner A, Gachabayov M, Dyatlov A, Lee H, Essani R and Bergamaschi R. The influence of diverting loop ileostomy vs. colostomy on post-operative morbidity in restorative anterior resection for rectal cancer: a systematic review and meta-analysis. *Langenbecks Arch Surg* 2019; 404: 129-139.
- [6] Ito N, Ishiguro M, Uno M, Kato S, Shimizu S, Obata R, Tanaka M, Makoto K, Nagano M, Sugihara K and Kenichi K. Prospective longitudinal evaluation of quality of life in patients with permanent colostomy after curative resection for rectal cancer: a preliminary study. *J Wound Ostomy Continence Nurs* 2012; 39: 172-177.
- [7] Jutesten H, Draus J, Frey J, Neovius G, Lindmark G, Buchwald P and Lydrup ML. High risk of permanent stoma after anastomotic leakage in anterior resection for rectal cancer. *Colorectal Dis* 2019; 21: 174-182.
- [8] Zhang JE, Wong FKY and Zheng MC. The pre-operative reaction and decision-making process regarding colostomy surgery among Chinese rectal cancer patients. *Eur J Oncol Nurs* 2017; 28: 107-113.
- [9] Wang S, Wang W, Zhu B, Song G and Jiang C. Efficacy of prophylactic mesh in end-colostomy construction: a systematic review and meta-analysis of randomized controlled trials. *World J Surg* 2016; 40: 2528-2536.
- [10] Saunders S and Brunet J. A qualitative study exploring what it takes to be physically active with a stoma after surgery for rectal cancer. *Support Care Cancer* 2019; 27: 1481-1489.
- [11] Tamura H, Otani A, Tsukui M, Toge K, Otani T, Hirose Y, Morimoto Y, Yoshino K, Kido T, Endo K, Kameyama H, Kobayashi T and Wakai T. Two episodes of colostomy-associated intestinal perforation during chemotherapy for metastatic rectal cancer. *Gan To Kagaku Ryoho* 2016; 43: 2172-2174.
- [12] Yilmaz E, Çelebi D, Kaya Y and Baydur H. A descriptive, cross-sectional study to assess quality of life and sexuality in Turkish patients with a colostomy. *Ostomy Wound Manage* 2017; 63: 22-29.
- [13] Yang X, Li Q, Zhao H, Li J, Duan J, Wang D, Fang N, Zhu P and Fu J. Quality of life in rectal cancer patients with permanent colostomy in Xi'an. *Afr Health Sci* 2014; 14: 28-36.
- [14] Lívia de Oliveira A, Loures Mendes L, Pereira Netto M and Gonçalves Leite IC. Cross-cultural adaptation and validation of the stoma quality of life questionnaire for patients with a colostomy or ileostomy in Brazil: a cross-sectional study. *Ostomy Wound Manage* 2017; 63: 34-41.
- [15] Silva MMRL, Junior SA, de Aguiar Pastore J, Santos ÉMM, de Oliveira Ferreira F, Spencer RMSB, Calsavara VF, Nakagawa WT and Lopes A. Late assessment of quality of life in patients with rectal carcinoma: comparison between sphincter preservation and definitive colostomy. *Int J Colorectal Dis* 2018; 33: 1039-1045.
- [16] Didaiiller R, Denost Q, Loughlin P, Chabrun E, Ricard J, Picard F, Zerbib F and Rullier E. Antegrade enema after total mesorectal excision for rectal cancer: the last chance to avoid definitive colostomy for refractory low anterior resection syndrome and fecal incontinence. *Dis Colon Rectum* 2018; 61: 667-672.
- [17] Vonk-Klaassen SM, de Vocht HM, den Ouden ME, Eddes EH and Schuurmans MJ. Ostomy-related problems and their impact on quality of life of colorectal cancer ostomates: a systematic review. *Qual Life Res* 2016; 25: 125-133.
- [18] Jörgren F, Johansson R, Arnadottir H and Lindmark G. The importance of rectal washout for the oncological outcome after Hartmann's procedure for rectal cancer: analysis of population-based data from the Swedish colorectal cancer registry. *Tech Coloproctol* 2017; 21: 373-381.
- [19] Xu S, Zhang Z, Wang A, Zhu J, Tang H and Zhu X. Effect of self-efficacy intervention on quality of life of patients with intestinal stoma. *Gastroenterol Nurs* 2018; 41: 341-346.
- [20] Thyø A, Emmertsen KJ, Pinkney TD, Christensen P and Laurberg S. The colostomy impact score: development and validation of a patient reported outcome measure for rectal cancer patients with a permanent colostomy. A population-based study. *Colorectal Dis* 2017; 19: 25-33.
- [21] Herrle F, Sandra-Petrescu F, Weiss C, Post S, Runkel N and Kienle P. Quality of life and timing of stoma closure in patients with rectal cancer undergoing low anterior resection with diverting stoma: a multicenter longitudinal observational study. *Dis Colon Rectum* 2016; 59: 281-290.
- [22] Sun Z, Adam MA, Kim J, Turner MC, Fisher DA, Choudhury KR, Czito BG, Migaly J and Mantyh CR. Association between neoadjuvant chemoradiation and survival for patients with locally advanced rectal cancer. *Colorectal Dis* 2017; 19: 1058-1066.
- [23] Lee L, Saleem A, Landry T, Latimer E, Choudhury P and Feldman LS. Cost effectiveness of mesh prophylaxis to prevent parastomal hernia in patients undergoing permanent colostomy for rectal cancer. *J Am Coll Surg* 2014; 218: 82-91.
- [24] Bølling Hansen R, Staun M, Kalhauge A, Langholz E and Biering-Sørensen F. Bowel function and quality of life after colostomy in individuals

Nursing care for rectal cancer patients undergoing permanent colostomy

- with spinal cord injury. *J Spinal Cord Med* 2016; 39: 281-289.
- [25] Jin Y, Zhang J, Zheng MC, Bu XQ and Zhang JE. Psychosocial behaviour reactions, psychosocial needs, anxiety and depression among patients with rectal cancer before and after colostomy surgery: a longitudinal study. *J Clin Nurs* 2019; 28: 3547-3555.
- [26] Zhou X, Wang B, Li F, Wang J and Fu W. Risk factors associated with nonclosure of defunctioning stomas after sphincter-preserving low anterior resection of rectal cancer: a meta-analysis. *Dis Colon Rectum* 2017; 60: 544-554.
- [27] Chen Z, Leng J, Gao G, Zhang L and Yang Y. Direct inpatient costs and influencing factors for patients with rectal cancer with low anterior resection: a retrospective observational study at a three-tertiary hospital in Beijing, China. *BMJ Open* 2018; 8: e023116.