Impact of Discharge Planning Combined with "Internet Home Ostomy Care Platform" in Patients with Permanent Colostomy after Rectal Cancer Surgery

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MingYing Li[1], Kun Yu[2], YingJiao Zhang[3], An Mao[4], LiYun Dong[5]

[1]Department of Radiology, The 903 Hospital of The Joint Service Support Force of The Chinese People's Liberation Army, 310013 Hangzhou, Zhejiang, China
[2]Otolaryngology & Head and Neck Center, Cancer Center, Department of Head and Neck Surgery, Zhejiang Provincial People's Hospital (Affiliated People's Hospital, Hangzhou Medical College), 310014 Hangzhou, Zhejiang, China
[3]Department of Gastroenterology, The 903 Hospital of The Joint Service Support Force of The Chinese People's Liberation Army, 310013 Hangzhou, Zhejiang, China
[4]Department of Outpatient, The 903 Hospital of The Joint Service Support Force of The Chinese People's Liberation Army, 310013 Hangzhou, Zhejiang, China
[5]General Surgery, Cancer Center, Department of Colorectal Surgery, Nursing Department, The Zhejiang Provincial People's Hospital (Affiliated People's Hospital, Hangzhou Medical College), 310014 Hangzhou, Zhejiang, China

AIM: Patients with permanent colostomy need continuous nursing management measures. Therefore, this study aimed to investigate the impact of discharge planning combined with "Internet home ostomy care platform" on post-discharge complications, self-management abilities, quality of life, and satisfaction of patients with permanent colostomy after rectal cancer surgery.

METHODS: This retrospective analysis included 72 rectal cancer patients who underwent permanent colostomy in Zhejiang Provincial People's Hospital between January 2021 and December 2021. Patients receiving routine nursing management were included in the control group (n = 36), and those receiving discharge planning combined with "Internet home ostomy care platform" were included in the study group (n = 36). We collected baseline data, complication rate, self-management behavior questionnaire for Chinese enterostomy patients (SBQ-CEP), and Chinese version of the City of Hope Quality of Life-Ostomy Questionnaire (COH-QOL-OQ) and Medical Experience Scale for Outpatient Care of Enterostomy (MES-OCE) score. The complication rate, self-management ability, quality of life, and satisfaction of the two groups were statistically compared and analyzed.

RESULTS: The study group demonstrated significantly higher medical compliance behavior, dietary behavior, symptom management behavior, psychosocial behavior, information management behavior scores, and SBQ-CEP total scores compared to the control group six months after discharge ($p < 0.05$). However, the study group showed a significantly lower incidence of complications than the control group at 1 week, 2 weeks, 1 month, 3 months, and 6 months after discharge ($p < 0.05$). Furthermore, the study group demonstrated significantly lower psychological well-being, physical well-being, spiritual well-being, social well-being scores, and COH-QOL-OQ total scores compared to the control group 6 months after discharge ($p < 0.05$). Additionally, the study group indicated significantly higher environment and process, service attitude, health guidance, diagnosis and treatment effect, overall evaluation of treatment experience scores, and MES-OCE total scores compared to the control group 6 months after discharge ($p < 0.05$).

CONCLUSIONS: Discharge planning combined with "Internet home ostomy care platform" can effectively reduce the risk of complications in patients with permanent colostomy after rectal cancer surgery. It improves patients' self-management abilities, quality of life, and satisfaction. This finding provides an ongoing guarantee for the quality of rehabilitation at home for patients with permanent colostomy.

Keywords: discharge-planning; Internet home ostomy care platform; rectal cancer; permanent colostomy

Introduction

Rectal cancer is a common malignant tumor of the digestive system worldwide, with high incidence and mortality rates [1, 2]. Early manifestations in patients include bloody stools and altered stool shape. As the disease progresses, symptoms may include weight loss, decreased intestinal function, and local tumor infiltration or metastasis. Surgical resection combined with permanent colostomy is currently an effective method for treating rectal cancer [3]. However, due to changes in bowel movements in patients receiving permanent colostomy, improper care can lead to complications and increase the risk of readmission [4]. Additionally, due to the lack of disease cognition, self-care awareness and ability of some patients, their self-management ability is limited, significantly affecting postoperative rehabilitation

Correspondence to: LiYun Dong, General Surgery, Cancer Center, Department of Colorectal Surgery, Nursing Department, The Zhejiang Provincial People's Hospital (Affiliated People's Hospital, Hangzhou Medical College), 310014 Hangzhou, Zhejiang, China (e-mail: zkpfguanli@163.com).

and quality of life [5]. Due to the fact that most patients choose home rehabilitation after permanent colostomy in China, most of them spend the rest of their time outside the hospital in addition to receiving short treatment in the hospital, while the routine nursing lacks the intervention and guidance of extended nursing. Therefore, continuous care is essential to reduce the risk of complications and improve self-management and quality of life for patients with permanent colostomy.

In 1979, a British scholar Fenwick [6], introduced the concept of Readiness for Hospital Discharge. He argued that physiological, psychological and social aspects should be comprehensively considered when assessing whether a patient has the ability to discharge and return to society [6]. However, at present, doctors often determine whether patients can be discharged according to the recovery of patients' physiological indicators, and rarely consider whether patients are ready for discharge in psychological and social aspects. It is particularly crucial for patients with permanent colostomies. In 2016, the American Wound Ostomy Incontinence Association established a minimum discharge standard for ostomy patients in home care Settings (patients should meet 18 nursing skills before discharge) [7]. Unfortunately, this standard has not been widely applied in China. Discharge planning involves the strategic integration of necessary healthcare resources by the medical team to ensure that patients receive complete and uninterrupted care during their transition from hospital to another care environment. This process primarily serves patients who need continuous care after being discharged [8]. Discharge planning ensures continuity of care and facilitates rapid patient recovery. Currently, the primary targets of discharge planning include children in the neonatal intensive care unit [9], dementia patients [10], and those affected by chronic noncommunicable disease [11]. However, there have been no reports on its application in permanent colony patients.

With the development of the Internet and the widespread use of smartphones, various health management models based on mobile Internet platforms have gradually been applied to out-of-hospital continuous care of patients, and the positive impact of these models on nursing outcomes has been previously affirmed [12, 13]. While home nursing services have been commonly practiced worldwide, they have not been popularized in China. In 2019, the General Office of the China Health Commission issued a notice on the pilot work of "Internet Plus Nursing Service", selecting Zhejiang Province and other areas as pilots. This notice ensured that medical institutions should fully consider the nursing needs of distinct groups and rely on Internet technology to extend nursing services from institutions to communities and families. In January 2019, the Zhejiang Internet Hospital platform was officially launched, providing patients with online consultation, online chronic disease referrals, family doctors services, and other services, thereby integrating "service + supervision". As a pilot hospital for the "Internet + Nursing Service" in Zhejiang Province, Zhejiang Provincial People's Hospital has provided Internet-based home nursing service for stoma patients in the city since January 2021. Currently, discharge preparation services in China are still in the initial stage, with continued nursing interventions for patients after discharge mainly relying on traditional approaches such as telephone follow-up, home visits, and outpatient follow-up. These approaches suffer from poor communication timeliness, making it difficult for patients to obtain timely and effective assistance and guidance when they have questions or symptoms. The Development Plan for National Nursing Career (2016–2020) proposed promoting nursing informatization using Internet platforms to improve the quality of nursing services. Based on this, our study combines discharge planning with the "Internet Home Ostomy Care Platform" to explore the feasibility and shortcomings of implementing this nursing plan, aiming to provide a reference for improving continuous nursing care for permanent colostomy patients.

Materials and Methods

Research Subjects

A retrospective analysis was conducted on the baseline and clinical data of 72 rectal cancer patients who underwent permanent colostomy at Zhejiang Provincial People's Hospital between January 2021 and December 2021.

Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) Conforming to the diagnosis of rectal cancer [14] and undergoing permanent colostomy; (2) Age $\geq$18 years old; (3) Stable condition with expected survival time $\geq$6 months; (4) Clear consciousness with good communication and understanding abilities; (5) Basic self-care in daily life, without physical disabilities; (6) Complete follow-up data.

However, exclusion criteria were as below: (1) Occurrence of other malignant tumors; (2) Severe dysfunction of vital organs such as the heart, brain, lungs, and kidneys; (3) Serious mental illness or cognitive impairment; (4) History of previous stoma surgery; (5) Presence of co-infectious diseases or coagulation dysfunction; (6) Primary urinary system diseases.

Research Methods

A retrospective analysis was conducted on the baseline and clinical data of 72 patients, including age, gender, marital status, education level, incidence of complications after discharge (at 1 week, 2 weeks, 1 month, 3 months, 6 months), self-management behavior questionnaire for Chinese enterostomy patients (SBQ-CEP), Chinese version of the City of Hope Quality of Life-Ostomy Questionnaire (COH-QOL-OQ), and Medical Experience Scale for Outpatient Care of Enterostomy (MES-OCE) scores. The research design and selection of the study subjects are outlined in Fig. 1.

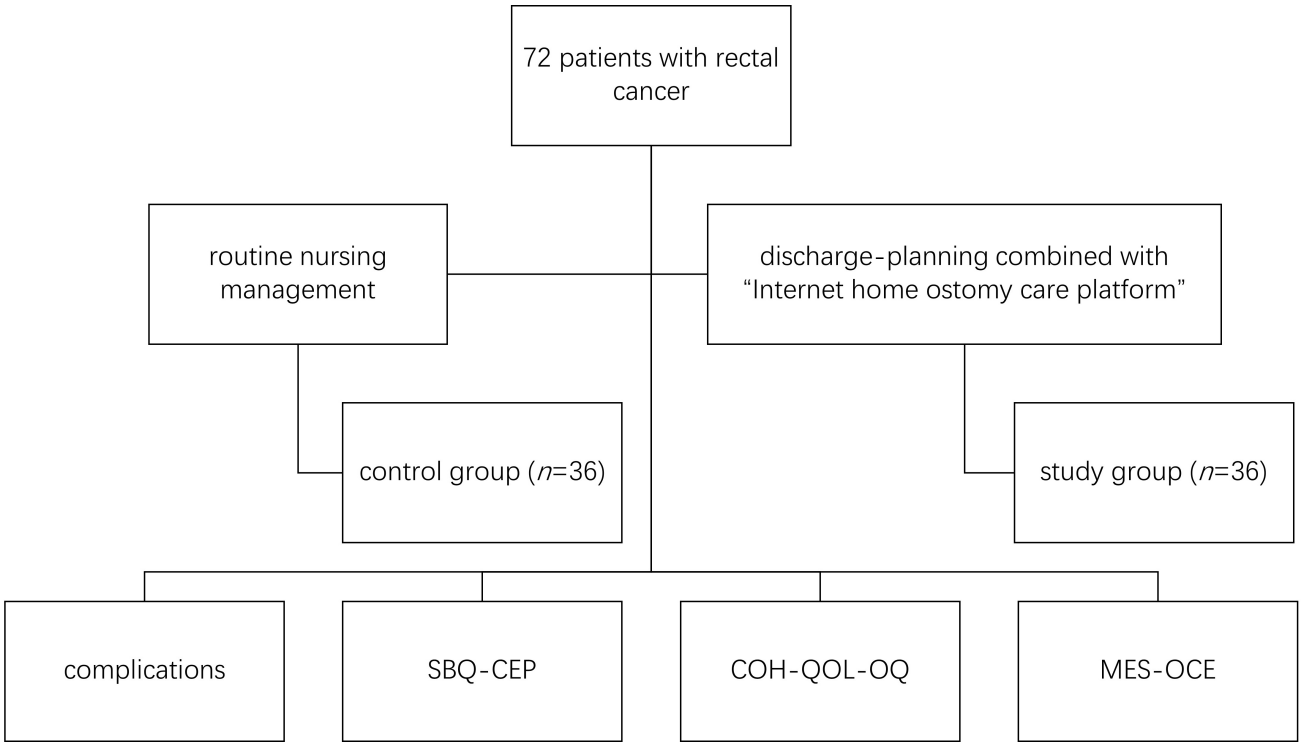

Fig. 1. Selection and grouping of the study subjects. SBQ-CEP, self-management behavior questionnaire for Chinese enterostomy patients; COH-QOL-OQ, Chinese version of the City of Hope Quality of Life-Ostomy Questionnaire; MES-OCE, Medical Experience Scale for Outpatient Care of Enterostomy.

(1) Self-management ability: SBQ-CEP [15] was used to evaluate the self-management ability of patients before discharge and 6 months after discharge. This questionnaire included 5 dimensions: medical compliance behavior, dietary behavior, symptom management behavior, psychosocial behavior, and information management behavior, with 40 items. Each item was rated on a 5-level Likert scoring method. The total score was calculated as the sum of the scores for each dimension, ranging from 40 to 200 points. The higher the score, the better the patient's self-management ability.

(2) Quality of life: The COH-QOL-OQ [16] was used to assess the quality of life of patients 6 months after discharge. This questionnaire included four dimensions: psychological well-being, physical well-being, spiritual well-being, and social well-being, with 32 items. Each item was represented from "best" to "worst" with a score ranging from 0–10. The total score was calculated as the sum of the scores for each dimension, ranging from 0–320 points. The higher the score, the poorer the patient's quality of life.

(3) Satisfaction: MES-OCE [17] was used to evaluate the patient's satisfaction six months after discharge. This scale included 8 dimensions: environment and process, service attribute, technical level, health guidance, customer products, diagnosis and treatment expenses, diagnosis and treatment effect, and overall evaluation of treatment experience, with 36 items. Each item was evaluated using a 5-point Likert scoring method. In this scoring approach, the values were assigned as "completely disagree = 1", "disagree = 2", "uncertain = 3", "agree = 4", and "completely agree = 5". The total score was calculated as the sum of scores for various dimensions, ranging from 36–180 points. The higher the score, the higher the patient satisfaction.

Grouping Methods

Based on nursing management methods, study subjects were categorized into two groups (Fig. 1). The patients who received routine nursing management were included in the control group (n = 36), while patients who received discharge planning in combination with "Internet home ostomy care platform" management were included in the study group (n = 36).

(1) The control group received routine discharge guidance and follow-up, which included the following specific content: Before discharge, nurses advised the patient to maintain a light diet and moderate exercise. Furthermore, they guided patients and their families about replacing surgical bags. After discharge, nurses followed up on the recovery of patients through telephone calls, providing targeted guidance to address any questions or concerns raised by the patients.

(2) The study group received discharge planning in combination with "Internet home ostomy care platform" management, as detailed below:

(A) Discharge planning: From 3 days before discharge until the day of discharge, we evaluated the needs of patients

Table 1. Comparison of baseline characteristics between the two experimental groups.

Variables	Study group (n = 36)	Control group (n = 36)	χ^2/t	p
Average age (mean ± SD, years old)	58.89 ± 9.68	57.92 ± 9.74	0.425	0.672
Gender [n (%)]			0.057	0.812
Male	21 (58.33)	20 (55.56)		
Female	15 (41.67)	16 (44.44)		
Marital status [n (%)]			0.000	1.000
Married	32 (88.89)	33 (91.67)		
Unmarried	4 (11.11)	3 (8.33)		
Education level [n (%)]			0.235	0.889
Junior high school and below	13 (36.11)	12 (33.33)		
High school/vocational school	16 (44.44)	18 (50.00)		
College degree or above	7 (19.44)	6 (16.67)		

Note: SD, standard deviation.

and their caregivers to develop a personalized discharge plan. These assessments include knowledge related to the disease, caregiver needs, psychological needs, and the economic and environmental needs of both patients and caregivers. Furthermore, we assessed patients' diet, defecation, medication, wound healing, and control of underlying disease to confirm whether they meet discharge criteria. Moreover, the patients and their families were provided with necessary health education, particularly on emptying stoma bags, replacing stoma bags, identifying, preventing, and treating stoma complications, purchasing stoma supplies, principles of diet and exercise, body fluid management, lifestyle management, and medication guidance. Additionally, we evaluated the patients' and their families' understanding of the procedure as mentioned above through questions and practical exercises, correcting any mistakes. They were provided with psychological intervention by encouraging patients to express their feelings and thoughts about the stoma, timely addressing negative emotions, assisting them in accepting the stoma, and encouraging family members to give emotional support. Finally, they were assessed for preparation of discharge materials and items, including the patient's personal belongings, discharge summary, post-discharge drugs, medication guidance list, post-discharge ostomy care supplies, and a self-made enterostomy Nursing Manual.

(B) Internet home ostomy care platform: Zhejiang Internet Hospital was used as an online nursing service platform following these steps: Internet signing and registration. The patients and family members were guided to follow the hospital's WeChat public account. They were instructed to click on "Medical service" and then "mine". After feeding the required information, such as name, ID number, and hospital number, they can click submit to complete registration. Online service: Patient can select "Online nursing service", where a nurse will be available 24 hours to provide online nursing care. Patient can describe their symptoms and submit a picture of their stoma. If self-care is inadequate under the guidance of a nurse, an on-site service can be arranged. On-site service: The patients were instructed to select "Nursing service home" and then "ostomy care" and provided the "Patient information" and "Home location". After submitting and completing the payment, a relevant person from the nursing department will contact the patient or their family by phone to confirm the details. Subsequently, a trained nurse will be assigned to provide on-site service at the scheduled time.

After arriving at the patient's home, the nurse will confirm the start of the service through the app and proceed with professional on-site nursing service. After completing the care, the nurse will record the service, take photos, and upload them to the app. The entire nursing process will be documented. The nurses who provide on-site service are registered nurses with 5 years or more experience at our hospital and have accomplished the training and assessment in ostomy-related courses. The ostomy care costs 258 yuan (35.49 USD)/time, with 70% of the total cost going to the on-site nurse, 20% to the hospital, and 10% to the Internet company.

Statistical Treatment

The results were summarized in an Excel worksheet (version 2013, Microsoft Corporation, Redmond, WA, USA) by two relevant experts. Data were analyzed using SPSS 27.0 software (International Business Machines Corporation, Armonk, NY, USA). The measurement data following a normal distribution were analyzed using the Kolmogorov-Smirnov test. Furthermore, continuous variables were presented as mean ± standard deviation (SD), and the quantitative variables between the study and control groups were compared using an independent samples *t*-test. Moreover, categorical variables, such as gender, marital status, education level, and complications, were compared using the Chi-squared test. A *p*-value less than 0.05 was considered statistically significant.

Table 2. Comparison of SBQ-CEP scores between the two groups before and after discharge ($\bar{x} \pm s$, points).

Experimental groups	n	Medical compliance behavior		Dietary behavior		Symptom management behavior	
		Before discharge	Six months after discharge	Before discharge	Six months after discharge	Before discharge	Six months after discharge
Study group	36	9.89 ± 2.19	15.64 ± 1.50*	25.81 ± 4.17	44.89 ± 3.21*	22.56 ± 1.83	36.92 ± 1.56*
Control group	36	9.72 ± 2.02	13.03 ± 1.72*	24.94 ± 3.84	33.25 ± 3.53*	22.47 ± 1.81	28.61 ± 1.59*
t		0.336	6.884	0.911	14.622	0.194	22.395
p		0.738	<0.001	0.365	<0.001	0.847	<0.001

Table 2. Continued ($\bar{x} \pm s$, points).

Experimental groups	n	Psychosocial behavior		Information management behavior		Total scores	
		Before discharge	Six months after discharge	Before discharge	Six months after discharge	Before discharge	Six months after discharge
Study group	36	23.83 ± 2.31	38.72 ± 2.13*	5.78 ± 1.82	11.36 ± 1.79*	87.86 ± 5.75	147.53 ± 4.49*
Control group	36	23.25 ± 2.47	29.50 ± 2.27*	5.19 ± 1.60	8.69 ± 1.35*	85.58 ± 5.94	113.08 ± 5.92*
t		1.036	17.748	1.443	7.136	1.652	27.833
p		0.304	<0.001	0.153	<0.001	0.103	<0.001

Note: "*" indicates a significant difference before discharge and 6 months after discharge within the same group ($p < 0.05$); SBQ-CEP, self-management behavior questionnaire for Chinese enterostomy patients.

Results

Comparison of Baseline Characteristics

There were no significant differences in the baseline characteristics such as age, gender, marital status, and education level between the two groups ($p > 0.05$, Table 1).

Comparison of Self-Management Abilities

There was no significant difference in patients' SBQ-CEP scores between the two groups before discharge ($p > 0.05$). However, six months after discharge, the SBQ-CEP scores for both groups significantly increased compared to their scores before discharge ($p < 0.05$). Notably, the study group exhibited significantly higher medical compliance behavior, dietary behavior, symptom management behavior, psychosocial behavior, information management behavior, and SBQ-CEP scores compared to the control group six months post-discharge ($p < 0.05$, Table 2).

Incidence of Complications

The study group demonstrated a significantly lower incidence of complications than the control group at one week, two weeks, one month, three months, and six months after discharge ($p < 0.05$, Table 3).

Comparison of Quality of Life

The study group showed significantly lower psychological well-being, physical well-being, spiritual well-being, social well-being scores, and COH-QOL-OQ scores compared to the control group 6 months after discharge ($p < 0.05$, Table 4).

Comparison of Satisfaction

The study group demonstrated significantly higher environment and process, service attitude, health guidance, diagnosis and treatment effect, overall evaluation of treatment experience scores, and total MES-OCE scores compared to the control group 6 months after discharge ($p < 0.05$). However, the two groups had no significant difference in scores for patients' technical level, stoma products, and diagnosis and treatment expenses before discharge ($p > 0.05$, Table 5).

Discussion

Permanent colostomy is a common surgical treatment for colorectal cancer. However, due to postoperative changes in the physical, physiological and anatomical images of patients, permanent colostomy will affect their social interaction and daily life experience. Many patients have limited disease knowledge and low self-care awareness, resulting in inadequate self-management, improper ostomy care, and a higher risk of postoperative complications [18, 19, 20]. Therefore, adequate discharge preparation and continuous care during the home recovery period are particularly crucial.

In this study, the study group demonstrated significantly higher scores in medical compliance behavior, dietary behavior, symptom management behavior, psychosocial behavior, information management behavior, and SBQ-CEP total scores compared to the control group six months after discharge. Additionally, the study group showed a significantly lower incidence of complications at one week, two weeks, one month, three months, and six months after discharge. These observations indicate that discharge planning in combination with "Internet home ostomy care platform"

Table 3. Incidence of complications between the two groups after discharge [n (%)].

Experimental groups	n	One week after discharge	Two weeks after discharge	One month after discharge	Three months after discharge	Six months after discharge
Study group	36	21 (58.33)	15 (41.67)	13 (36.11)	9 (25.00)	8 (22.22)
Control group	36	29 (80.56)	24 (66.67)	23 (63.89)	18 (50.00)	18 (50.00)
χ^2		4.189	4.531	5.556	4.800	6.020
p		0.041	0.033	0.018	0.028	0.014

Table 4. Comparison of COH-QOL-OQ scores between the two groups after discharge ($\bar{x} \pm s$, points).

Experimental groups	n	Psychological well-being	Physical well-being	Spiritual well-being	Social well-being	Total scores
Study group	36	40.94 ± 5.93	56.83 ± 7.04	20.53 ± 4.38	35.28 ± 4.48	153.58 ± 11.40
Control group	36	44.44 ± 5.25	60.08 ± 6.64	23.61 ± 4.98	37.94 ± 4.80	166.08 ± 12.10
t		–2.651	–2.014	–2.789	–2.438	–4.511
p		0.010	0.048	0.007	0.017	<0.001

Note: COH-QOL-OQ, Chinese version of the City of Hope Quality of Life-Ostomy Questionnaire.

can potentially improve patients' self-management abilities and reduce the risk of complications. These findings are attributed to several factors, including discharge preparation plan and complication management. In the discharge preparation plan, nurses use stoma model demonstrations, one-on-one education, and video teaching to enhance health education and provide demonstration guidance. Furthermore, in complication management, the patients are taught to identify and manage complications. They are encouraged to ask questions to ensure that patients and their families are well-prepared before discharge. This approach facilitates a smooth transition from hospital to home, reducing complications risk.

Provencher *et al*. [21] found that implementing discharge planning helps alleviate the risk of unplanned hospitalization in elderly patients. Rahpeima *et al*. [22] examined patients after coronary angioplasty and reported that an interdisciplinary discharge preparation planed improved treatment compliance and reduced readmission rates. Moreover, Wales *et al*. [23] implemented discharge planning for individuals aged 70 and above, observing that it was effective and cost-efficient in reducing functional difficulties. However, ostomy care, a professional skill operation, presents significant challenges for many patients. Despite receiving relevant training before discharge, patients often face practical issues in replacing the ostomy. The application of the "Internet home ostomy care platform" allows patients to log in to the network platform, schedule on-site services, and select service personnel, enabling nurses to provide prompt and careful nursing services. This process effectively integrates existing medical resources, facilitates the sharing of high-quality nursing resources, and addresses patients' difficulties in seeking medical care and professional nursing knowledge. Most patients showed that after receiving multiple "online about nurses" door-to-door services, continuous learning and self-experience accumulation not only improved practical ostomy nursing skills but also contributed to the prevention and early identification of complications, ultimately reducing the risk of complications. Girestam Croonquist *et al*. [24] highlighted that providing door-to-door oral care to elderly patients in nursing homes improves the Mucosal Plaque Score Index, Modified Sulcus Bleeding Index, and root care. Wang *et al*. [25] used mobile applications to provide online care for stoma patients, indicating that self-efficacy of patients significantly increased during the follow-up period, and the incidence of stoma complications significantly decreased. Similarly, Sier *et al*. [26] demonstrated that home visits, as a new nursing approach, improve the quality of care. Unlike the studies that provide only one online or home care approach, this study combines discharge planning, online consultation, and home service into a comprehensive continuous care plan.

The quality of life for patients with permanent colostomy after discharge is affected by many factors. In this study, 6 months after discharge, the study group demonstrated significantly lower psychological well-being, physical well-being, spiritual well-being, and social well-being scores, as well as COH-QOL-OQ total scores compared to the control group. In contrast, the study group showed significantly higher scores in environment and process, service attitude, health guidance, diagnosis and treatment effect, overall treatment experience, and MES-OCE total scores compared to the control group 6 months after discharge. These observations suggest that combining discharge planning with the "Internet home ostomy care platform" can improve patients' quality of life and satisfaction. Regarding quality-of-life improvements, patients with permanent colostomy need substantial energy and time from caregivers, and the "Internet home ostomy care platform" reduces this burden. Secondly, the door-to-door service of ostomy care provides convenience, allowing patients to get professional nursing services at home, saving time and energy of going to the hospital to register and queue up, and allowing a quicker return to their routine. Thirdly, psychological problems are common among ostomy patients. The discharge planning

Table 5. Comparison of MES-OCE scores between the two groups after discharge ($\bar{x} \pm s$, points).

MES-OCE	Study group (n = 36)	Control group (n = 36)	*t*	*p*
Environment and process	30.31 ± 3.74	26.00 ± 4.13	4.634	<0.001
Service attitude	24.03 ± 2.90	21.56 ± 3.01	3.548	0.001
Technical level	13.08 ± 1.92	13.64 ± 2.02	–1.198	0.235
Health guidance	21.69 ± 4.00	19.72 ± 3.55	2.213	0.030
Stoma products	11.33 ± 2.00	11.06 ± 2.20	0.560	0.577
Diagnosis and treatment expenses	16.58 ± 2.25	15.89 ± 2.48	1.245	0.217
Diagnosis and treatment effect	16.89 ± 2.38	15.44 ± 2.27	2.636	0.010
Overall evaluation of treatment experience	8.39 ± 1.02	7.25 ± 1.38	3.977	<0.001
Total scores	142.31 ± 8.83	130.56 ± 6.50	6.431	<0.001

of this study includes psychological intervention, enabling patients to address their issues adequately and relieve psychological pressure.

Additionally, improving patients' self-management abilities and reducing the risk of complications directly improved their quality of life. In terms of improving satisfaction, discharge planning provides comprehensive guidance on diet, exercise, body fluid management, lifestyle management, medication guidance, psychological intervention, and preparation of discharge materials. This ensures that patients obtain continuous care services after discharge, improving their satisfaction. Furthermore, some patients reported that they felt nervous, stressed, and irritable when visiting the hospital for medical treatment. Conversely, receiving nursing care at home in a familiar environment made them warm and comfortable. Finally, while hospital visits usually involve one medical staff attending to many patients, door-to-door service offers one-on-one exclusive services, increasing patient satisfaction. García-Perea *et al*. [27] investigated fibromyalgia patients and found that online nursing services improved patients' mood and quality of life. Furthermore, Levine *et al*. [28] reported that in-home nursing increased the continuity of care, improved patient comfort, and enhanced relationship between patients and their in-home nursing team.

The clinical significances of this study were as follows: Firstly, this nursing model ensures that patients receive professional treatment and care before and after discharge, offering systematic and continuous guidance on specialized disease care in a closed-loop process. Secondly, using the "Internet Home Ostomy Nursing Platform" enables patients to access homogeneous and high-quality nursing services, alleviating the panic and anxiety caused by inadequate nursing skills among patients and their families and substantially reducing the risk of readmission. Finally, during the on-site care, nursing staff can provide synchronous follow-up for the patient's family, enabling the patient to return to normal life as soon as possible after surgery and improving their quality of life.

It is worth noting that although this study confirmed the positive significance of the nursing model for permanent colostomy patients at home, there are still some challenges in the practical application of the "Internet home ostomy care platform" as a new nursing model. For example, some patients have reported a low awareness rate of this service, suggesting a need for increased popularization and publicity. It is recommended that communities, media, and other items increase the promotion of related services. Additionally, the platform lacks a unified charging standard and medical insurance policy support, with costs mainly borne by patients. While permanent colostomy patients need lifelong care and face a long-term risk of complications, some patients feel that the value of on-site colostomy care justifies the price. However, for some incapacitated or elderly patients, this service is still a significant financial burden. It is recommended that hospitals introduce nursing discount packages and that the government integrates these services into medical insurance or the long-term nursing insurance system. Additionally, the on-site service needs to provide consumables, and there are still problems in the management of these supplies. Jachan *et al*. [29] found that there are deficiencies in health and drug management among German home care service personnel. It is recommended to include consumables in platform management, allowing patients or family members to choose and purchase required items through the platform, with delivery directly to their homes. Moreover, nurses should not bring relevant consumables to the patients doorstep. Additionally, door-to-door service has certain risks. For example, in China, nurses are not authorized to prescribe medication, making it challenging to manage emergencies promptly and effectively. Furthermore, the personal safety of nurses and the disposal of medical waste need policy and institutional protection. It is recommended that service nurses take the medical waste back to the hospital for proper disposal and upload photos after completing on-site nursing services.

Although the "Internet home ostomy care platform" provides considerable convenience for patients, the essence of medical services relies on prioritizing the quality of life and health needs of patients. Therefore, the platform's nursing services should respect the dignity of every patient's life, rather than only focusing on applying technical approaches.

Additionally, during home nursing, patients have the right to know and make decisions about their own conditions. The platform and nursing staff should fully inform patients of the risks, limitations, and possible consequences of online diagnosis and treatment and proceed with care only after obtaining the informed consent of patients. Additionally, nursing staff should adhere to the principles of objectivity, fairness, honesty, and credibility, ensuring that they do not deviate from medical ethics due to financial interests. This study has the specific limitations that need to be addressed. Due to limited nursing human resources and other factors in the hospital, this study included data only within 6 months after discharge. In contrast, postoperative adaptation to permanent colostomy is a long-term process, requiring attention to patients' long-term outcomes. This study lacks an evaluation of objective indicators, such as serological markers of patients. Furthermore, the SBQ-CEP, COH-QOL-OQ, and MES-OCE are retrospective questionnaires, and patients may be affected by external factors during the filling process. Additionally, this is a single-center study with relatively homogenous sample sources, which may lead to bias.

In the future, it will be necessary to expand the sample size and conduct multi-center trials. The intervention mode of the discharge preparation plan and the "Internet home ostomy nursing platform" should be appropriately implemented. Furthermore, it is necessary to improve the corresponding rules and regulations in practice, and to develop a detailed, practical, scientific, and personalized intervention model.

Conclusions

Discharge planning combined with "Internet home ostomy care platform" can effectively reduce the risk of postoperative complications in patients with permanent colostomy. It improves patients' self-management abilities, quality of life, and satisfaction. This finding provides ongoing assurance for the quality of rehabilitation at home for patients with permanent colostomy. However, it is worth pointing out that the problems of "Internet home ostomy care platform", as an emerging nursing model, should not be ignored. Furthermore, it is suggested to increase public awareness, improve relevant laws and regulations, enhance supporting facilities, reduce implementation costs, and improve the overall quality of medical services.

Availability of Data and Materials

The data required during the current study are available on the request of corresponding author.

Author Contributions

MYL and LYD designed the research study. AM participated in the questionnaire survey and sorting. KY and YJZ analyzed the data. LYD wrote the manuscript. All authors contributed to the drafting or important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study follows the ethical guidelines established in the Helsinki Declaration of the World Medical Congress and has been approved by Zhejiang Provincial People's Hospitall's Ethics Committee (2019KY200); The patient is aware of this study and has signed an informed consent form. This study follows the principle of confidentiality.

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Conflict of Interest

The authors declare no conflict of interest.

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