

Original Article

Effects of a preventive nursing model on postoperative nursing and complications after PTBD in hepatobiliary surgery

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Received October 24, 2019; Accepted November 21, 2019; Epub February 15, 2020; Published February 28, 2020

Abstract: Objective: To investigate the effects of a preventive nursing model on postoperative nursing and complications after percutaneous transhepatic biliary drainage (PTBD) in hepatobiliary surgery. Methods: A retrospective analysis was made about 98 patients after PTBD in hepatobiliary surgery, 49 of whom were treated with traditional a nursing mode of hepatobiliary surgery (the control group) and 49 with a preventive nursing mode (the experimental group). The nursing effects and complications of these two groups at different stages after operation were compared. Results: After nursing, the psychological state, attitude towards treatment, and acceptance of catheterization time after PTBD of the experimental group patients were all significantly better than those of the control group (all $P < 0.001$). After nursing, the scores of life quality in the experimental group were also significantly higher than those in the control group (all $P < 0.001$). After nursing, the total incidence of complications in the experimental group (6.12%) was significantly lower than that in the control group (26.53%) ($P < 0.05$). Two months post discharge, the self-care situation of the experimental group (including whether to use anti-reflux drainage bags and drainage fluid observation, the period and operation mode of replacing drainage bags, the position of drainage bags and punctures) was significantly better than that of the control group (all $P < 0.001$) and the incidences of detachment and blockage of drainage tube and re-hospitalization due to the drainage tube were significantly lower than that of the control group (all $P < 0.05$). Conclusion: The utilization of a preventive nursing model can effectively improve the nursing effects after PTBD from the following aspects including cognition, psychological state and life quality; it largely reduces the incidence of complications after PTBD, improves patients' self-care awareness, and suppresses the re-admission rate after discharge.

Keywords: Preventive nursing, hepatobiliary surgery, PTBD, nursing effect, complications

Introduction

Percutaneous transhepatic biliary drainage (PTBD) is a common first-choice treatment for advanced cholangiocarcinoma, obstructive jaundice and other thorny diseases in hepatobiliary surgery [1]. However, the mechanism of PTBD is percutaneous puncture and liver puncture under imaging technology, and to place the drainage tube in the bile duct, leads to a high incidence of complications after PTBD. The first complication was sub-puncture hemorrhaging with an incidence as high as 25%, and this was related to the poor liver and coagulation function of the patients. Infection is another complication, the incidence of which is not less than

19%, this is related to bacteria in the bile duct caused by the long-term retention of the drainage tube as a foreign body. In addition, nausea, vomiting, bile leakage and even shock are all common complications and they greatly limit the clinical development of PTBD [2]. Previous study also pointed out that the occurrence of these complications greatly affects PTBD in removing the obstruction of the pipeline and alleviating jaundice symptoms, prolonged time of tube usage, and seriously reduced life quality of patients. In addition, most of the patients are older, and they are more prone to negative emotions such as fear and anxiety, which lead to lower treatment enthusiasm and shorter tube usage time [3]. In addition, the drainage tube is

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usually placed for a long time after PTBD, often extending to time outside the hospital, leading to some complications such as detachment and blockage of the drainage tube and even re-hospitalization due to drainage tube reinsertion, which further reduces the quality of prognosis. Therefore, active and effective nursing intervention is very important to reduce the incidence of complications after PTBD and improve the prognosis of patients.

The occurrence of complications after PTBD is not only the main adverse effect of patients, but also the main reason for their acceptance of nursing intervention. The most effective nursing of complications is prevention and intervention, while the traditional nursing mode only includes health promotion and perioperative basic disease nursing, and ignores the nursing measures for complications at all stages after PTBD, so there are still many deficiencies in post-operative nursing. Existing studies suggest that preventive nursing applied to patients after PTBD has a remarkable targeted preventive effect on post-operative complications [4]. Preventive nursing is a kind of nursing mode that helps avoid the occurrence of possible adverse reactions. It has been used to prevent complications after operations for inflammatory bowel disease, and ultimately effectively reduced the incidence of complications in the observation group by about 1/4 [5]. Therefore, based on the viewpoint that the main nursing scheme of complications is prevention rather than treatment, this study proposes the usage of a preventive nursing mode and applies it to patients after PTBD. The purpose of this study is to explore the improvement in patients' self-care consciousness, cognitive ability and psychological state, and ultimately achieve the effect of reducing complications after PTBD.

Materials and methods

Patient selection

The present study was approved by the Ethics Committee of Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute. A retrospective analysis was made on 98 patients after PTBD in hepatobiliary surgery, 49 of whom were treated with a traditional nursing mode of hepatobiliary surgery (the control group) and 49 with a preventive nursing mode (the experimental group). The related patients

and their family members were all informed and they have provided informed consent.

Inclusion criteria

(1) Patients who were treated by PTBD in the department of hepatobiliary surgery of Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute. (2) Patients who were expected to have out-of-hospital catheterization for more than 2 months. (3) Patients with no serious organ diseases such as heart, brain and kidney. (4) Patients with language expression ability [6].

Exclusion criteria

(1) Patients with abnormal coagulation mechanism caused by hematopoietic diseases. (2) Patients with severe organ diseases; (3) Patients with mental disorders and cognitive impairment. (4) Patients who quit the nursing treatment halfway.

Methods

The control group received a routine nursing mode [7], including routine pre-operative, post-operative and post-discharge instructions. Pre-operative care: Introduce the general situation of the hospital environment, doctors and nurses, and inform about the operation time, the time of restricted diet before operation, the attention during operation, etc. Post-operative care: Inform patients about diet and exercise requirements, the time of fasting, restoring diet and dietary choices. Discharge care: Inform patients and their families about the care of the drainage tube, and timely review.

In addition to the control group, the experimental group received preventive nursing about cognitive, psychological, self-care and complications, as follows [8]:

Cognitive nursing

In helping patients to have a comprehensive understanding of disease-related knowledge, healthy beliefs and healthy behaviors, can patients better cope with the disease, cooperate with nursing, and actively prevent complications.

Cognition of disease-related knowledge: designated nurse introduces basic knowledge of dis-

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ease to patients and their families, including physiological anatomy, pathological mechanism, hazards, etc. Introduce the effectiveness of PTBD treatment, the necessity and methods of post-operative nursing, thus helping patients to cooperate with nursing due to increased knowledge. Finally, emphasize the points for attention after operation to prevent related complications.

Recognition of healthy beliefs: help patients and their families realize the importance of maintaining healthy beliefs. On one hand, help patients have the ability to self-regulate and maintain healthy beliefs, prevent patients from being impatient with indwelling drainage tubes. On the other hand, help patients' families have positive attitude, have the determination to assist in nursing and guide patients' families to pay close attention to the patients' healthy beliefs and improve their bad beliefs in time.

Cognition of healthy behavior: designated nurse demonstrates and introduces healthy behaviors to patients and their families, including the replacement of drainage tubes, observation of drainage fluids, recording of drainage flow and dumping of drainage fluids, which is conducive to improving the enthusiasm of patients to cooperate with nursing.

Mental nursing

First, from the beginning of patients receiving nursing care, designated nurses should carry out health knowledge education to patients, including disease knowledge, treatment knowledge, etc., to enhance patients' confidence by broadening patients' knowledge and understanding. In the education process, attention should be paid to maintain a relaxed atmosphere and humorous language to relax the patients' mood, help them better accept disease care and nursing, and play a preventive role in psychological disorders. Second, the designated nurse should communicate with patients patiently. After obtaining patients' trust, they should tentatively inquire about the patients' inner needs and anxieties, and analyze the causes and degrees of their anxieties, so as to relieve their anxieties in time, meet their needs and give appropriate advice, so as to prevent their psychological anxiety from turning into psychological disorders, therefore reduce the degree of nursing cooperation, which is not conducive to recovery.

Complication nursing

Evaluate the possible complications and analyze their causes according to the actual situation of patients, take appropriate measures to avoid the factors that may induce complications, and pay close attention to the signs of complications:

Biliary tract hemorrhage: it is often caused by the side hole of the drainage tube falling off into the liver parenchyma or hepatic vessels of the normal puncture tract. Therefore, nurses should pay attention to the fixation and protection of the catheter. Once it is confirmed that the drainage lateral foramen has moved into the liver parenchyma or hepatic vessels, the drainage tube lateral foramen should be immediately adjusted to be fully located in the biliary tract to prevent the formation of a biliary fistula. Once an arteriobiliary fistula has been confirmed, hepatic artery embolization should be performed immediately to prevent shock caused by excessive bleeding.

Infection: often caused by excessive pressure in the biliary tract. In this case, pressure injection by cholangiography can easily cause the infected bile to enter into the blood through the communicating branch between the capillary bile duct and the liver, which can lead to sepsis, infection, shock, etc. Therefore, nurses should observe whether the patient has biliary obstruction before cholangiography, and consider releasing more bile in advance to reduce pressure. Then, inject the contrast agent below the amount of released bile and avoid rapid injection to prevent infection. Infection can also be caused by bacteria entering the biliary system, occurring when the drainage tube is flushed due to bleeding or blockage. Therefore, nurses should pay attention to aseptic technical operations when washing the catheter to prevent infection. At the same time, patients can take preventive anti-infection drugs according to the patient's beliefs before infection occurs. If infection has occurred, also pay attention to patients' temperature besides basic anti-infective measures in order to prevent sweating, shock and so on.

Bile leakage: it is often caused by deviation of the puncture site, improper placement and falling out of the drainage tube, so nurses should pay attention to whether the drainage tube is unobstructed and strengthen its fixation to pre-

vent it from falling off, so as to prevent bile leakage. In addition, if bile leakage has occurred, peritonitis symptoms such as abdominal pain, chills, rebound pain are also commonly found. Paying close attention to this sign and check it in time to avoid symptoms aggravation.

Self-care ability education

The self-care abilities include in-hospital and out-of-hospital self-care capabilities, and in-hospital self-care plays a key role, out-hospital self-care plays an auxiliary role. First, nurses should introduce and emphasize the importance of drainage tube self-care, and demonstrate, explain and guide in the knowledge of drainage tube self-care to the patients and their families, teach them to change drainage bag, drainage tube and observe drainage fluid. These above education is mainly used for out-of-hospital nursing to prevent complications, and also used for in-hospital nursing to assist nurses to prevent accidents. Second, guide patients to take self-care during in-hospital activities, prevent the occurrence of retrograde infection, and guide patients' families to pay close attention to patients' skin, sclera and urine color abnormalities in hospital, and especially outside the hospital. If any abnormal situation occurs, take timely medical treatment. At the same time, patients should accept receiving activities and dietary guidance before discharge, avoid moving the drainage tube, take light diet and balanced nutrition, pay attention to vitamin intake, in order to prevent excessive fat induced bile secretion and intra-biliary pressure increase. The nurses should print and distribute drainage tube self-care manuals, in order to prevent patients and their families from forgetting the points for attention.

Observation indicators and evaluation criteria

Statistical tables made by Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute were used for the observation and evaluation. The patients who are still in hospital filled in the tables by themselves, and the patients who have been discharged are followed up by telephone.

Main observation indicators

(1) Psychological state: including the psychological state after nursing, treatment attitude and the acceptance of tube usage time af-

ter PTBD of patients in the two groups. Psychological state is divided into stability, anxiety and fear. Attitudes toward treatment can be divided into active cooperation, general cooperation and uncooperative. Acceptance of tube usage time after PTBD is divided into >3 months, 1-3 months and <1 month. The stratification of the above three indicators is all from good to bad. (2) Quality of life: quality of life questionnaire (QLQ-C30) of European Cancer Therapy and Research Organization [9] was used to evaluate the life quality of patients in the two groups before and after nursing. Evaluation criteria include cognitive function, physical function, role function, social function and emotional function, totaling 30 items, with a total score of 126. The higher the score, the better the quality of life. (3) Postoperative complications: include nausea, vomiting, infection, hemorrhage, bile leakage, shock and other complications in the two groups. Complications in the two months after discharge include the incidence of detachment and blockage of drainage tube and re-hospitalization due to drainage tube.

Minor observation indicators

(4) Self-care: statistical tables made by Cancer Hospital of China Medical University, Liaoning Cancer Hospital & Institute were used for the evaluation of self-care [10]. Evaluation criteria include whether to use anti-reflux drainage bag, observation of drainage fluid, cycle and operation mode of replacing drainage bag, location of drainage bag and puncture. Whether to use anti-reflux drainage bag or not is divided into two options: yes and No. The observation of drainage fluid was divided into three options: once a day, once every few days and no observation. The cycle of replacing drainage bags is divided into three options: weekly, irregular and non-replaceable. Operating mode is divided into aseptic and non-aseptic options. The position of the drainage bag and puncture can be divided into three options: always lower than puncture, occasionally lower than puncture, and no attention. Options for all the above indicators range from good to bad.

Statistical analysis

Statistical analysis is carried out using SPSS 21.0. The measurement data is shown as mean \pm standard deviation and t-test is used for independent samples. Before and after self-com-

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Table 1. Comparison of general data among two groups [n (%), $\bar{x} \pm sd$]

Groups	Control group (n=49)	Experimental group (n=49)	$\chi^2/Z/t$	P
Gender (Male/Female)	26/23	27/22	0.041	0.839
Mean age (year)	64.9±13.8	65.2±14.1	0.106	0.916
Family per capita income (Ten thousand CHY)	3.32±0.45	3.33±0.44	0.111	0.912
BMI(kg/m ²)	24.43±2.34	24.41±2.36	0.042	0.967
Cultural level [n (%)]				
Primary school	16 (32.65)	17 (34.69)	0.046	0.831
Middle school	22 (44.90)	21 (42.86)	0.041	0.839
University	11 (22.45)	10 (20.41)	0.061	0.806
Diseases [n (%)]				
Cholangiocarcinoma	12 (24.49)	13 (26.53)	0.054	0.817
Gallbladder neoplasms	5 (10.20)	4 (8.16)	0.122	0.727
Duct stricture	3 (6.12)	4 (8.16)	0.154	0.695
Ampullary carcinoma	5 (10.20)	4 (8.16)	0.122	0.727
Obstructive jaundice	24 (48.98)	24 (48.98)	0	1

Table 2. Comparison of psychological status between two groups after nursing [n (%)]

Groups	Control group (n=49)	Experimental group (n=49)	χ^2	P
Psychological state				
Stability	13 (26.53)	41 (83.67)	32.337	0
Anxiety	23 (46.94)	7 (14.29)	12.298	0
Fear	13 (26.53)	1 (2.04)	12	0
Attitude towards treatment				
Active cooperation	12 (24.49)	43 (87.76)	39.822	0
General cooperation	28 (57.14)	5 (10.20)	24.169	0
Uncooperative	9 (18.37)	1 (2.04)	7.128	0
Acceptance of tube-taking time				
>3 months	12 (24.49)	38 (77.55)	27.603	0
1~3 months	21 (42.86)	8 (16.33)	8.277	0
<1 month	16 (32.65)	3 (6.12)	11.034	0

Comparison of psychological status between two groups after nursing

After nursing, the psychological state, attitude towards treatment and acceptance of tube usage time after PTBD in the experimental group were significantly better than those in the control group (all $P < 0.001$) (**Table 2** and **Figure 1**).

Comparison of quality of life score between the two groups before and after nursing

Before nursing, there was no significant difference in the scores of cognitive, physical,

role, social and emotional functions between the two groups ($P > 0.05$). After nursing, the scores of cognitive, physical, role, social and emotional functions of the two groups were significantly increased (all $P < 0.05$) and the increase of the experimental group was significantly higher than that of the control group (all $P < 0.001$). See **Table 3** and **Figure 2**.

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Results

General data comparison of the experimental group and the control group

The results below showed that there was no statistical difference in general data among the two groups before treatment ($P > 0.05$) (**Table 1**).

Comparisons of postoperative complication incidence between the two groups

After nursing, the incidence of total complications such as nausea, vomiting, infection, hemorrhage, bile leakage and shock in the experimental group (6.12%) was significantly lower than that in the control group (26.53%) ($P < 0.05$). See **Table 4**.

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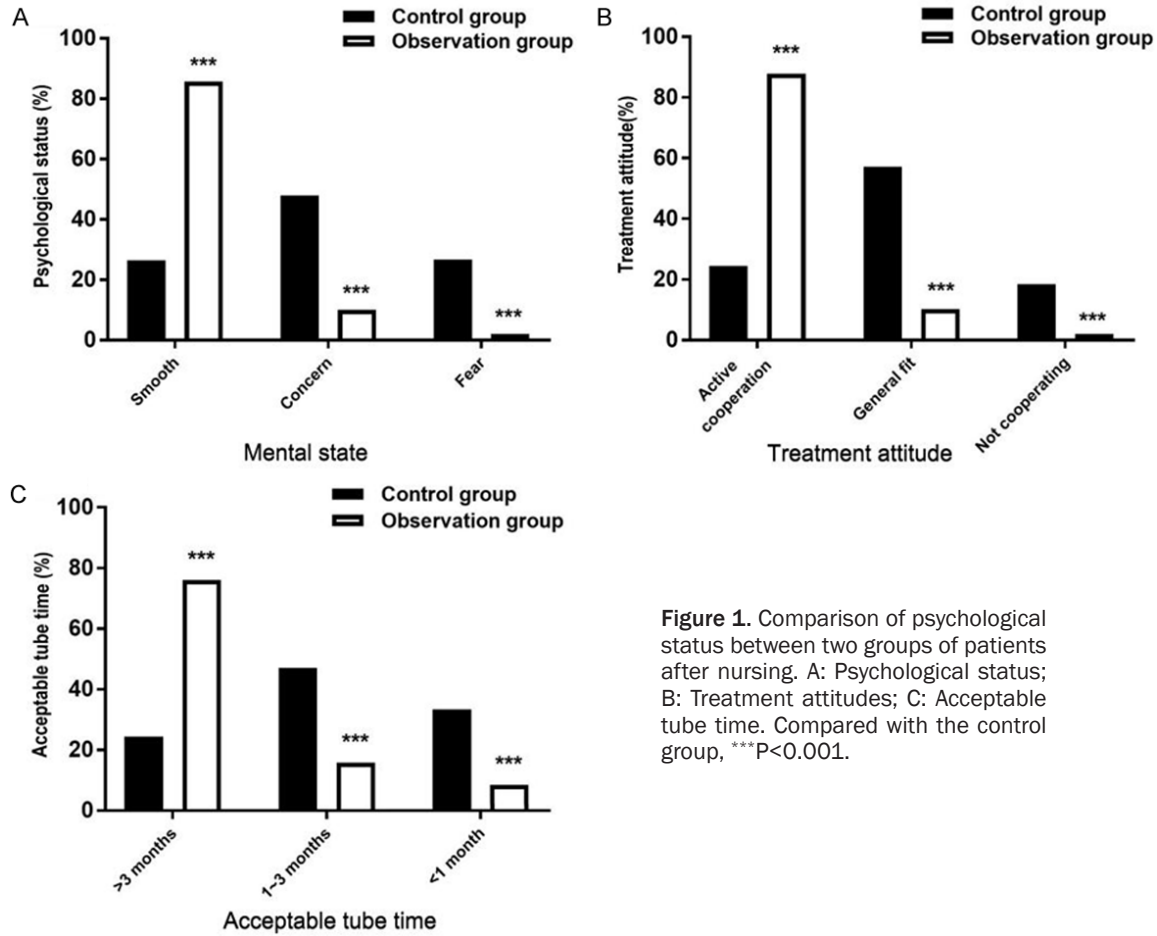


Figure 1. Comparison of psychological status between two groups of patients after nursing. A: Psychological status; B: Treatment attitudes; C: Acceptable tube time. Compared with the control group, ***P<0.001.

Table 3. Comparison of quality of life score between two groups before and after nursing ($\bar{x} \pm sd$)

Groups	Control group (n=49)	Experimental group (n=49)	t	P
Cognitive function				
Before-nursing	54.11±6.77	54.17±6.73	0.044	0.965
After-nursing	61.01±9.91 [#]	67.75±9.83 [#]	3.38	0
Physical function				
Before-nursing	54.81±6.88	54.77±6.89	0.029	0.977
After-nursing	63.31±9.01 [#]	69.53±9.02 [#]	3.415	0
Role function				
Before-nursing	58.21±6.82	58.43±6.81	0.16	0.873
After-nursing	63.09±8.21 [#]	69.00±8.85 [#]	3.427	0
Social function				
Before-nursing	52.32±4.29	51.33±4.31	1.14	0.257
After-nursing	65.34±8.32 [#]	71.21±8.21 [#]	3.515	0
Emotional function				
Before-nursing	56.12±6.01	56.21±5.89	0.075	0.94
After-nursing	63.01±6.21 [#]	70.38±7.64 [#]	5.24	0

Note: [#]vs Before-nursing, P<0.05.

Comparison of self-care status of the two groups of patients after 2 months post discharge

Two months after discharge, self-care in the experimental group (including whether to use anti-reflux drainage bag, observation of drainage fluid, cycle and operation mode of replacing drainage bag, position of drainage bag and puncture) was significantly better than that in the control group (P<0.001) (Table 5).

Complications of the incidence of detachment and blockage of drainage tube and re-hospitalization due to drainage tube of the two groups in the two months post discharge

The incidence of detachment and blockage of drainage tube and re-hos-

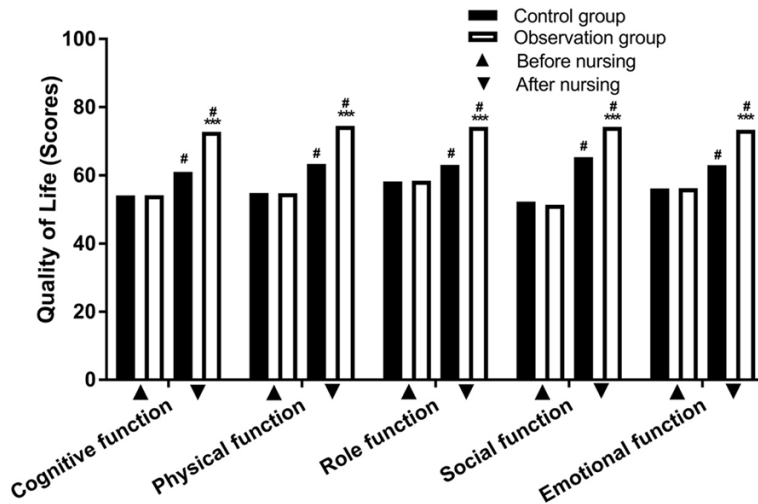


Figure 2. Comparison of quality of life scores between two groups of patients before and after nursing. Compared with the control group, ^{###}P<0.001; Compared with before nursing, [#]P<0.05.

Table 4. Comparisons of postoperative complications incidence between the two groups [n (%)]

Group	Control group (n=49)	Experimental group (n=49)	χ^2	P
Nausea and vomiting	2 (4.08)	1 (2.04)	-	-
Infection	4 (8.16)	1 (2.04)		
Hemorrhage	4 (8.16)	0 (0.00)		
Bile leakage	2 (4.08)	1 (2.04)		
Shock	1 (2.04)	0 (0.00)		
Total incidence	13 (26.53)	3 (6.12)	7.47	0.006

pitalization due to drainage tube of the experimental group within two months post discharge was significantly lower than that of the control group (all P<0.05) (Table 6 and Figure 3).

Discussion

In clinical practice, researchers are committed to finding suitable nursing modes for PTBD patients to reduce the incidence of complications all the time [11-13]. The previous individualized nursing of Brandon D et al. [14], cognitive nursing of Becker H et al. and perioperative nursing of Gockel I et al., all had certain nursing effects [15, 16], but the prevention effect on complications was not clear. Therefore, our present study proposes preventive nursing and applies it to PTBD patients in order to analyze the effect of preventive nursing on reducing postoperative risk.

One of the nursing priorities in this study is to prevent complications. The key point is that nurses should analyze the mechanisms of complications before they occur, and take appropriate actions to formulate programs to avoid complications. Besides, they should formulate solutions when complications have occurred in order to prevent further aggravation. Sebo P et al. [17] pointed out that the incidence of complications was significantly reduced by about 50% in the preoperative prophylactic care of surgical patients compared with the conventional nursing scheme [17]. In this study, preventive nursing was used to avoid the possibility of complications from the source by preventing the related causes such as bile leakage, infection and bleeding, by strengthening the catheter, supplemented by other nursing measures such as taking antibiotics, etc. Consistent with previous reports, our study shows that compared with the control group, the incidence of

complications such as biliary leakage and infection in the experimental group is significantly lower, further confirming the superiority of preventive care for complications, which is due to the avoidance of related issues before complications occur [18, 19].

Studies have shown that the drainage tube is usually kept for a long time after PTBD, often extending to the patient's life outside the hospital, so the effect of recovery outside the hospital often depends on their own self-care ability [20, 21]. Therefore, this study also takes self-care ability education as a model of preventive nursing. Introducing the meaning of self-care and demonstrating the process of self-care, so that patients and their families can have self-care ability. At the same time, the nurses guide patients' self-care methods on exercise and diet, and their family members' effective atten-

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Table 5. Comparison of self-care status of two groups of patients after 2 months post discharge [n (%)]

Groups	Control group (n=49)	Experimental group (n=49)	χ^2	P
Whether to use anti-reflux drainage bag				
Yes	26 (53.06)	45 (91.84)	18.455	0
No	23 (46.94)	4 (8.16)		
Observation of drainage fluid				
Once/d	12 (24.49)	44 (89.80)	4.124	0
Once/several d	26 (53.06)	4 (8.16)		
No observation	11 (22.45)	1 (2.04)		
Cycle of replacing drainage bag				
Every week	12 (24.49)	45 (91.84)	4.243	0
Irregular	27 (55.10)	4 (8.16)		
No replacement	10 (20.41)	0 (0.00)		
Mode of replacing drainage bag				
Sterile	21 (42.86)	46 (93.88)	29.49	0
Non-sterile	28 (57.14)	43 (87.76)		
Position of drainage bag and puncture				
Always lower than puncture	12 (24.49)	44 (89.80)	4.124	0
Occasionally lower than puncture	26 (53.06)	4 (8.16)		
No attention	11 (22.45)	1 (2.04)		

Table 6. Complications of the incidence of detachment and blockage of drainage tube and re-hospitalization due to drainage tube of the two groups in two months post discharge [n (%)]

Groups	Incidence of drainage tube detachment	Incidence of drainage tube blockage	Incidence of re-hospitalization due to drainage tube
Control group (n=49)	11 (22.45)	11 (22.45)	13 (26.53)
Experimental group (n=49)	2 (4.08)	2 (4.08)	3 (6.12)
χ^2	7.184	7.184	7.470
P	0.007	0.007	0.006

tion to abnormal situations. The purpose of this education is to cooperate with the nursing doctors in the hospital and lead to self-care outside the hospital, so as to effectively avoid the complications both inside the hospital, and especially outside the hospital. In addition, Grant M C, Yang D et al. also pointed out that the higher the self-care ability of patients after operation, the lower the incidence of complications outside hospital [22]. At the same time, Ingadottir B, Blondal K et al. pointed out that the improvement of self-care ability of patients after operation can also improve the nursing cooperation degree of patients [23]. The prophylactic self-care ability education in this study includes introductory knowledge and on-

site demonstration, which is easy to understand and highly accepted by patients. It enables patients to learn how to drain catheters, change catheters and observe drainage fluids in advance, thus avoiding complications such as infection and bleeding caused by catheter shedding and abnormal color of drainage fluids. Therefore, the results of our study showed that the self-care situation of the experimental group was significantly better than that of the control group two months post discharge, which showed that the preventive nursing had a significant effect on the improvement of patients' self-care ability. At the same time, the results of this study showed that the incidence of out-of-hospital complications in the experimental group was significantly lower than that in the control group 2 months post discharge, indicating that the preventive nursing program in this study

also has a good effect on improving the complications of patients after discharge. The greatly improved self-care ability of the experimental group effectively prevents the occurrence of related complications.

At the same time, this research model also includes cognitive and psychological nursing. Cognitive nursing includes knowledge of disease, healthy beliefs and healthy behavior. By helping patients have better cognitive abilities about the disease, they can have less confusion and even panic about treatment and nursing, so the cognitive nursing can be used as a basis for improving patients' cooperation and enthusiasm. Some studies have pointed out

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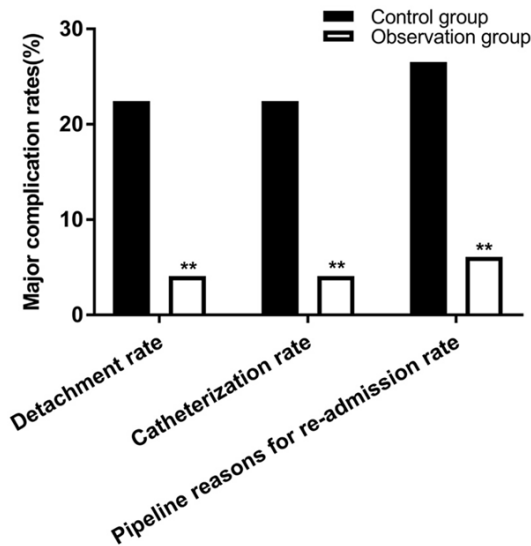


Figure 3. Comparison of the incidence of tube removal, the incidence of tube blockage, and the rate of re-admission cause of the two groups after discharge. Compared with the control group, ** $P < 0.01$.

that psychological nursing is a common element in nursing nowadays. Long-term tube usage inevitably causes patients to have negative emotions, if not alleviated in time, it is easy to affect patients' enthusiasm [24, 25]. The psychological nursing in this study is preventive psychological nursing, which starts with the improvement of the patient's environment, plays a preventive role in advance, avoids adverse reactions when negative emotions occur, and further enhances the patient's self-care enthusiasm and reduces the occurrence of complications. The results of this study showed that the psychological state of the experimental group improved significantly after nursing compared with the control group, and the quality of life improved significantly after nursing. It indicated that the improvement of the psychological state and quality of life of the patients benefited from the preventative nursing model of this study, possibly because of the psychological improvement, the reduction of complications and the improvement of the quality of life of the patients in this study. The advantage of this study is that the concept of prevention runs through the whole nursing process, alleviating the suffering of patients. The disadvantage of this study is that the actual cognitive level of patients is not counted, and the improvement of their cognitive level lacks basis.

To sum up, the implementation of a preventive nursing model can improve PTBD patients' cognitive, psychological status and quality of life, improve patients' self-care ability, reduce post-operative complications with clear effects, and it is worth promoting in clinical practice.

Disclosure of conflict of interest

None.

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