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Original Article

Effects of predictive nursing on postoperative complications of prostate cancer and quality of life of patients

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Abstract: Objective: This study aimed to explore effects of predictive nursing on prostate cancer. Methods: A total of 187 prostate cancer patients admitted to our hospital from February 2014 to February 2016 were selected as subjects of research, of which 98 patients received predictive nursing during hospitalization, and were regarded as the research group. The other 89 patients received only routine nursing during hospitalization and were regarded as the control group. The incidence rate of complications, psychological status, recovery time, and prognosis of patients in the two groups were compared. Results: The incidence rate of complications and scores of SDS and SAS in the research group were significantly lower than those in the control group (P<0.001), the recovery time in the research group was significantly shorter than that of the control group (P<0.001), while the quality of life score after surgery in the research group was significantly higher than that of the control group (P<0.001). Conclusion: Predictive nursing can effectively reduce the incidence rate of postoperative complications of prostate cancer patients, accelerate the rehabilitation process of patients, and improve the psychological state and postoperative quality of life of patients.

Keywords: Predictive nursing, prostate cancer, complications, quality of life

Introduction

Prostate cancer is the most common malignant tumor in the male reproductive system at the moment [1]. Other morbidities increase with the age of patients and have obvious regional differences [2]. According to statistics, the number of prostate cancer patients in the United States in 2017 is second only to lung cancer [3]. According to the 2015 global cancer statistics, the incidence rate of prostate cancer in males is the 7th among all tumors, and it is also the only urinary system disease in the top ten causes of morbidity [4]. Prostate cancer not only has a high morbidity, but also has the highest mortality among malignant tumors [5]. According to statistics, the morbidity of prostate cancer in the world standard population has reached 1.86.53/100000 [6]. Moreover, the possibility of lymphatic metastasis in prostate cancer patients is extremely high, and most patients have been diagnosed with tumor invasion to the seminal vesicle [7]. At present, facing the increasingly serious clinical challenges of prostate cancer, scientists are constantly working to find new methods to effectively diagnose and treat prostate cancer [8-10]. With the deepening of research, more and more scholars have pointed out that the intervention of nursing methods may be one of the key factors that affect the prognosis of prostate cancer patients. For example, Cockle-Hearne et al [11] proposed that supportive nursing significantly improved prostate cancer outcomes, while Northouse et al [12] believed that the rehabilitation of patients could be improved through the intervention and nursing of patients and their families. Among them, predictive nursing is one of these nursing methods. Its main function is to carry out predictive intervention on the possible adverse events of patients during hospitalization in real time, so as to achieve the purpose of preventive treatment in advance [13]. In the treatment of prostate cancer, complica-

tions of postoperative infection are a major research target [14]. Coughlin et al [15] achieved remarkable results in studying the value of predictive nursing in a neonatal intensive care unit. We speculated that predictive nursing may have high application value for the treatment of prostate cancer, but there is little research on this topic. Therefore, in this study, through the implementation of predictive nursing intervention for prostate cancer patients, the aim was to prove the application value of predictive nursing in prostate cancer and provide effective reference and guidance for clinical diagnosis and treatment in prostate cancer in years to come.

Materials and methods

General information

A total of 187 prostate cancer patients admitted to our hospital from February 2014 to February 2016 were selected as subjects of research, including 152 males and 35 females, aged 34-68 years, with an average age of (53.8±8.6) years. Among them, 98 patients received predictive nursing during hospitalization and were regarded as the research group. The other 89 patients received only routine nursing during hospitalization and were regarded as the control group. This experiment was approved by the Ethics Committee of our hospital. All the above research subjects signed an informed consent.

Inclusion and exclusion criteria

Inclusion criteria: According to the diagnostic guidelines for prostate cancer [16], prostate cancer was definitely diagnosed with biopsy by the pathology department of our hospital; after the definite diagnosis was made, patients were treated by excision in our hospital; no tumor metastasis occurred; patients were 20-70 years old; patients had complete case data.

Exclusion criteria: Exclusion criteria were as follows: patients who combined with other malignant tumors, patients with severe liver and kidney dysfunction, or mental disorders; patients who refused or conflicted with medical investigators; patients who had contraindications to surgery, or were allergic to drugs; patients combined with other cardiovascular and cerebrovascular diseases, autoimmune diseases, or infectious diseases; long-term bedridden patients that were physically disabled and unable to take care of themselves, and patients who transferred to another hospital.

Methods

All patients underwent resection after admission, which was completed by senior surgical clinicians in our hospital. Patients in the postoperative control group only received routine nursing, including: during the treatment, patients and their families were taught routine precautions and nursing points, patients were regularly checked for vital signs every day, and the attending doctors cooperated with patients to carry out corresponding rehabilitation treatment and rehabilitation guidance. On this basis, the research group used predictive nursing, including: 1. Preoperative psychological intervention to patients, initiate talking with patients, about relevant knowledge and precautions of surgery taught to patients. 2. Understanding the previous medical history and health of patients, and urinary catheter installation for patients with dysuria. 3. Customized recipes for patients, including high protein, high-calorie food, and preoperative enjoin for patients to take liquids. 4. Strengthening the observation of postoperative incisions exudation and bleeding, paying close attention to the color and quality of drainage fluid, and changing dressing regularly. 5. Real-time detection of patients' blood pressure, pulse, heartbeat, informing the attending doctor in a timely manner once an abnormality is found. 6. Keeping patients' urethra unblocked, and timely flushing sterile saline or isotonic bladder fluid in case of blood clot obstruction. 7. Fasting for 3 days after surgery, giving liquids after exhausting, and giving high protein, high vitamin and digestible foods after 3-5 days. 8. Assisting and guiding patients to complete rehabilitation training of the pelvic floor muscle, promote recovery of external sphincter function, and conducting acupuncture and physiotherapy when necessary. Differences of nursing contents between the two groups were mainly the first, third, sixth, seventh and eighth points of those mentioned in the research group.

Observation indicators

Main indicators: Clinical efficacy: acute, chronic, and recurrent urinary retention and prostatic

venous hemorrhage are clearly improved, symptoms of frequent micturition and dysuria have clearly disappeared, and urine flow rate is determined to be cured when it returns to normal. The clinical symptoms are relieved, and the urine flow rate is basically normal and is judged to be markedly effective. The clinical symptoms improve and the urine flow rate is determined to be effective after improvement compared with that before treatment. If the clinical symptoms and signs do not improve or even worsen, it is considered ineffective. The effective treatment rate = (cure + markedly effective + effective patients)/total number ×100%.

Complications of patients after surgery: complications of patients were recorded. The incidence rate of complications = number of complications/total number ×100%.

Recovery time: postoperative exhaust time, indwelling time of urinary catheter, duration of pain, and total hospital stays.

Secondary indicators: Psychological state: psychological state of patients was evaluated by self-rating anxiety scale (SAS) as well as self-rating depression scale (SDS). Active state: Barthel index [17] was used to evaluate the self-care ability of patients, with a total score of 100 points. Higher score means stronger self-care ability.

Pain situation: visual analogue scale (VAS) was used to evaluate the pain situation of patients. The above tree investigations were conducted one day before surgery and five days after surgery.

Nursing satisfaction: the self-made nursing satisfaction questionnaire was used to evaluate patients' nursing satisfaction, and the survey was conducted when patients were discharged from the hospital, with a total score of 100 points. The survey content included the satisfaction degree of nursing staff, nursing ability, self-income, etc. Scores >90 are rated as very satisfactory, scores 80-90 are rated as satisfactory, scores 60-79 are rated as requiring improvement, and scores <60 are rated as unsatisfactory.

Quality of life: patients' quality of life was evaluated by the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30) [18]. The scores included the field of symptoms (exhaustion, pain, nausea, vomiting, inappetence, insomnia and dreaminess) and functions (cognitive function, emotional function, physical function, social function, as well as role function). The scores in each field were converted into standard score of 0-100 using the range linear formula. The lower the score in the field of symptoms is, the less obvious the symptom is. The higher the score in the field of functions is, the better the function is. The investigation was completed independently by patients after knowing the meaning of each investigation content. The investigation was conducted 3 months after patients were discharged from hospital.

Prognosis: all patients were followed up for 3 years. Follow-up was conducted by telephone and re-examination of hospital. Deadline and cut-off event were February 2019 and/or the death of patients. Prognosis of patients in the two groups for 3 years were recorded.

Statistical methods

All experimental results were calculated by SPSS 24.0 statistical software (Beijing Sichuang Weita Information Technology Co., Ltd.). All graphs were drawn by Graphpad 8 (Shenzhen Qiruitian Software Technology Co., Ltd.) and the results were checked twice. The counting data such as effective cure rate and incidence rate of complications were expressed in the form of (rate), chi-square test was conducted for comparison between groups, and the measurement data such as postoperative evacuation time and total hospital stays were expressed in the form of (mean ± standard deviation). The comparison between groups adopted T test, the survival rate was calculated by Kaplan-Meier, the comparison of survival rate was tested by Log-rank, and $P<0.050$ was considered to be statistically significant difference.

Results

Comparison of general data

There was no significant difference in age, BMI, TNM staging, differentiation degree, previous medical history, smoking, drinking, gender,

Table 1. Comparison of general data of patients in the two groups (n (%))

	Research group (n=98)	Control group (n=89)	t or x^2	*P*
Age	51.6±8.8	52.2±9.1	0.305	0.760
BMI (kg/m^2)	23.14±2.54	23.26±2.48	0.326	0.745
TNM staging			0.213	0.645
I-II	86 (87.76)	80 (89.89)		
III-IV	12 (12.24)	9 (10.11)		
Differentiation degree			0.467	0.494
Poorly differentiated	8 (8.16)	5 (5.62)		
Moderately and highly differentiated	90 (91.84)	84 (94.38)		
Previous medical history			0.318	0.853
Hypertension	21 (21.43)	17 (19.10)		
Diabetes	67 (68.37)	61 (68.54)		
No	10 (10.20)	11 (12.36)		
Smoking			0.205	0.651
Yes	68 (69.39)	59 (66.29)		
No	30 (30.61)	30 (33.71)		
Drinking			0.075	0.785
Yes	52 (53.06)	49 (55.06)		
No	46 (46.94)	40 (44.94)		
Gender			0.254	0.614
Male	81 (82.65)	71 (79.78)		
Female	17 (17.35)	18 (20.22)		
Place of residence			0.778	0.378
Town	60 (61.22)	60 (67.42)		
Countryside	38 (38.78)	29 (32.58)		
Degree of education			0.210	0.647
Below high school graduate	54 (55.10)	52 (58.43)		
High school graduate and above	44 (44.90)	37 (41.57)		

place of residence, and degree of education of patients between the two groups (P>0.050), as shown in **Table 1**.

Comparison of clinical efficacy

The effective cure rate of patients in the research group was 93.88%, which was not significantly different from 92.13% in the control group (P>0.050), as shown in **Table 2**.

Incidence rate of complications in the research group was lower than that in the control group

The incidence rate of complications in the research group was 4.08%, and that in the control group was 15.73%. Clearly, the incidence rate of complications in the research group was significantly lower than that in the control group (P=0.007), as shown in **Table 3**.

Rehabilitation time in the research group was shorter than that in the control group

The postoperative evacuation time, indwelling time of urinary catheter, duration of pain, and total hospital stay of the research group were significantly shorter than that of the control group (P<0.00), as shown in **Figure 1**.

Psychological states in the research group are better than that in the control group

There was no significant difference in SAS and SDS scores between the two groups before treatment (P>0.050), the SAS and SDS scores of the research group after treatment were significantly lower than those of the control group (P<0.001), the SAS and SDS scores after treatment in both groups were significantly lower than those before treatment (P<0.001), as shown in **Figure 2**.

Active state in the research group was better than that in the control group

There was no significant difference in Barthel index of patients in both groups before treatment (P>0.050). After treatment, the Barthel index in the research group was significantly higher than that in the control group (P<0.001). Barthel index in both groups was significantly lower after treatment than that before treatment (P<0.001), as shown in **Figure 3**.

Pain score in the research group was lower than that in the control group

There was no significant difference in VAS score in both groups before treatment (P>0.050), and

Table 2. Comparison of clinical efficacy of patients between the two groups (n (%))

	Research group (n=98)	Control group (n=89)	X^2	*P*
Cure	42 (42.86)	35 (39.33)		
Markedly effective	30 (30.61)	25 (28.09)		
Effective	19 (19.39)	22 (24.72)		
Ineffective	6 (6.12)	7 (7.87)		
Effective cure rate (%)	93.88	92.13	0.219	0.640

Table 3. Comparison of complications of patients between the two groups (n (%))

	Research group (n=98)	Control group (n=89)	c^2	*P*
Shock	0 (0.00)	2 (2.25)		
Urinary tract infection	2 (2.04)	5 (5.62)		
Urinary incontinence	1 (1.02)	3 (3.37)		
Bladder contraction	0 (0.00)	2 (2.25)		
Urethral stricture	1 (1.02)	2 (2.25)		
Incidence rate of complications (%)	4.08	15.73	7.275	0.007

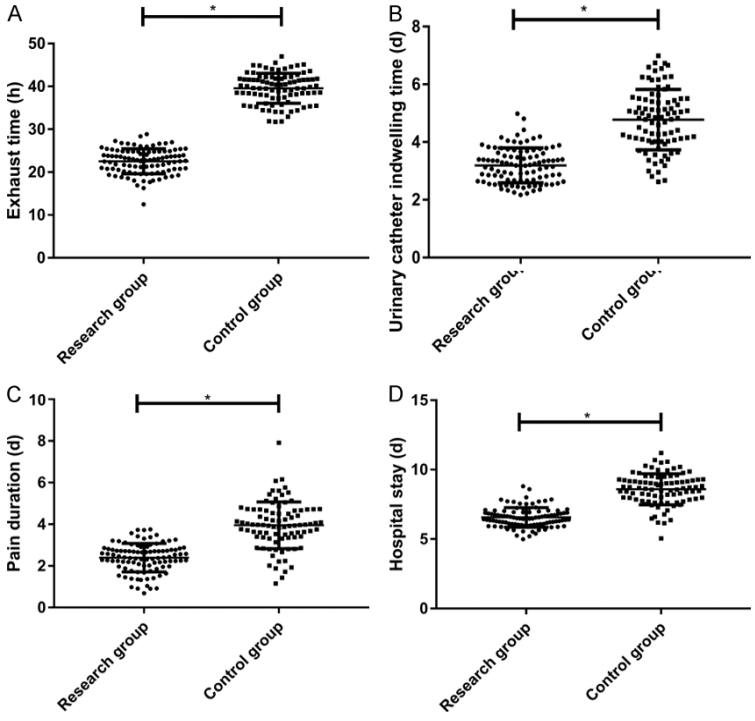

Figure 1. Comparison of rehabilitation time of patients between the two groups. A. Compared with the control group, the evacuation time of patients in the research group was significantly shorter (*P<0.001). B. Compared with the control group, the indwelling time of urinary catheter of patients in the research group was significantly shorter (*P<0.001). C. Compared with the control group, the duration of pain of patients in the research group was significantly shorter (*P<0.001). D. Compared with the control group, the total hospital stay of patients in the research group was significantly shorter (*P<0.001).

the VAS score in the research group after treatment was significantly lower than that in the control group (P<0.001), as shown in **Figure 4**.

Nursing satisfaction in the research group was better than that in the control group

There was no significant difference of patients between the two groups who were evaluated as needing improvement (P>0.050), while people who were very satisfied in the research group was significantly higher than those in the control group (P<0.001), the satisfied patients were significantly lower than the control group (P=0.009), and the dissatisfied patients were also lower than the control group (P=0.049). See **Table 4**.

Quality of life in the research group was better than that in the control group

There were no significant differences in EORTC-QLQ-C30 scores in the field of symptoms like exhaustion, nausea, vomiting, and inappetence, and those in the field of functions like cognitive function and social function between the two groups (P>0.050); nevertheless, the pain score of the research group was significantly lower than that of the control group (P<0.001); emotional function, physical function, and role function in the field of functions were significantly higher than those in the control group (P<0.001). More details were shown in **Table 5**.

Prognosis in the two groups

Of 187 patients, 8 were lost during the 3-year follow-up, wi-

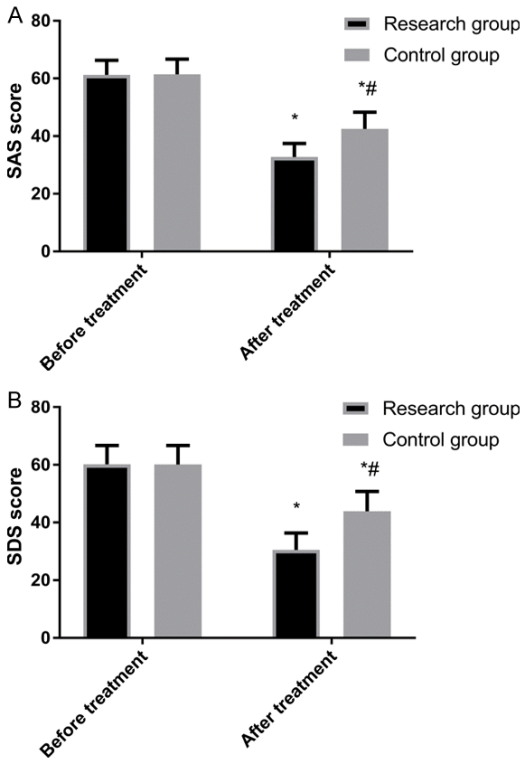

Figure 2. Comparison of psychological states of patients between the two groups. A. SAS scores of the two groups were compared, # represents comparison with SAS scores of the research group after treatment (P<0.001), and * represents comparison with SAS scores before treatment in the same group (P<0.001). B. SDS scores of the two groups were compared, # represents comparison with SDS scores of the research group after treatment (P<0.001), and * represents comparison with SDS scores before treatment in the same group (P<0.001).

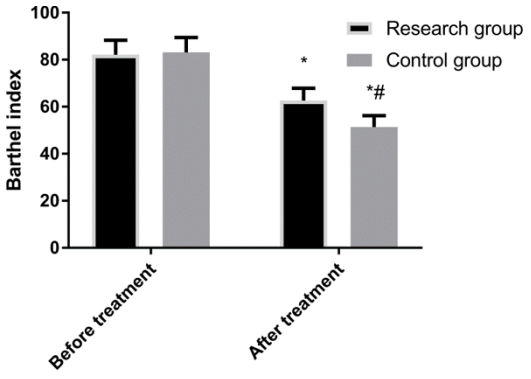

Figure 3. Comparison of active state of patients between the two groups. # represents compared with the Barthel index after treatment in the research group (P<0.001). * represents compared with the Barthel index before treatment in the same group (P<0.001).

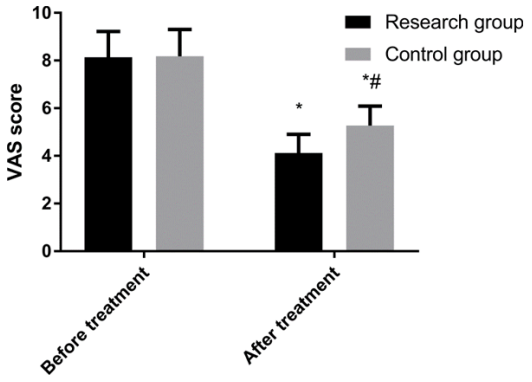

Figure 4. Comparison of pain score of patients between the two groups. # represents compared with the VAS score of patients in the research group after treatment (P<0.001). * represents compared with the VAS score before treatment in the same group, P<0.001.

th a follow-up success rate of 95.72%. Among them, the research group lost 5 cases and the control group lost 3 cases. The 3-year total mortality in the research group was 16.13%, and there was no significant difference compared with 23.26% in the control group (P>0.050). More details were shown in **Figure 5**.

Discussion

Prostate cancer, as the primary malignant tumor threatening men's life and health, has a rising trend in morbidity and mortality worldwide [19]. Research by Higano et al [20] showed that the morbidity of prostate cancer was second only to lung cancer in New Zealand, Australia, and European and America. In order to effectively improve the cure and prognosis of prostate cancer, scientists are committed to exploring all factors that may affect the rehabilitation of prostate cancer in clinical practice [21]. At present, the rehabilitation of more and more tumor diseases has been significantly improved after the intervention of postoperative nursing methods [22, 23]. However, there is still little research on postoperative nursing of prostate cancer, and it is still unknown which nursing method is most suitable for prostate cancer patients. However, this experiment is of great significance to clinical diagnosis and treatment of prostate cancer in the future by analyzing the influence of predictive nursing on postoperative prostate cancer patients.

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

	Research group (n=98)	Control group (n=89)	c^2	*P*
Very satisfied	59 (60.20)	28 (31.46)	15.492	<0.001
Satisfied	28 (28.57)	42 (47.19)	6.904	0.009
Needing improvement	11 (11.22)	10 (11.24)	6.150	0.998
Dissatisfied	3 (3.06)	9 (10.11)	3.862	0.049

Table 5. Comparison of EORTC-QLQ-C30 scores

		Research group (n=98)	Control group (n=89)	t	*P*
The field of symptoms	Exhaustion	11.85±6.01	12.05±5.24	0.242	0.810
	Pain	10.68±4.52	15.28±5.87	6.034	<0.001
	Nausea	8.66±1.54	8.59±2.04	0.266	0.790
	Vomiting	6.42±3.84	6.82±4.02	0.696	0.486
	Inappetence	6.04±2.15	6.16±2.08	0.387	0.699
	Insomnia and dreaminess	12.25±5.52	21.58±6.28	10.812	<0.001
The field of functions	Cognitive function	74.63±6.94	75.13±7.05	0.488	0.626
	Emotional function	68.14±5.95	52.86±8.94	13.874	<0.001
	Physical function	72.82±4.82	61.84±6.27	13.492	<0.001
	Social function	76.59±7.05	75.93±7.46	0.622	0.535
	Role function	68.25±5.84	60.41±7.57	7.969	<0.001

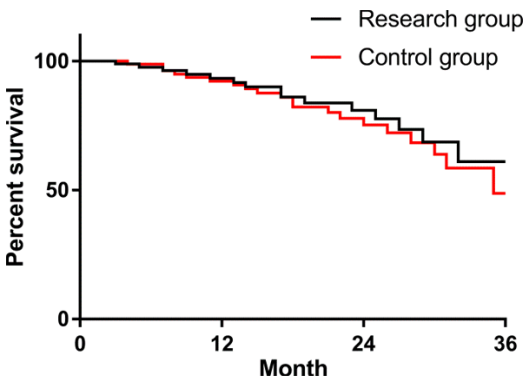

Figure 5. Prognosis 3-year survival curve.

The results of this experiment showed that there was no significant difference in clinical efficacy of patients between the two groups, suggesting that predictive nursing had no significant effect on the efficacy after surgery. By comparing the incidence rate of complications of patients between the two groups, we confirmed that patients in the research group had significantly lower complications than those in the control group, suggesting that predictive nursing could effectively reduce the possibility of postoperative complications in prostate cancer patients. It was speculated that the reason why the incidence rate of complications in the research group was significantly lower than that in the control group was due to the following factors: 1. Preoperative guiding of patients in high protein and high-calorie food intake could effectively improve the wound healing of patients after surgery, improve the rehabilitation process of patients and reduce the occurrence of incision infection. This could be shown by comparing the postoperative evacuation time, indwelling time of urine catheter, and the pain duration of patients in the research group was significantly shorter than those in the control group. 2. Real-time monitoring of patients' vital signs could effectively prevent patients from hemorrhagic shock, and the occurrence of infectious complications could be found in time at the early stage of occurrence and corresponding intervention treatment could be carried out, thus avoiding secondary injury of patients after surgery. None of patients in the research group had shock, and this could be used as a corroboration of this conclusion. 3. Aseptic treatment measures for urinary catheter could effectively reduce the occurrence of urinary catheter-related infection (such as urinary tract infection) in patients, help maintain a relatively clean and stable rehabilitation envi-

ronment for urinary system of patients, and accelerate the rehabilitation process of patients. 4. Postoperative dietary guidance and rehabilitation training were beneficial to the rehabilitation of patients. The total hospital stay of patients in the research group was significantly shorter than that in the control group, which proved that the overall rehabilitation process of patients applying predictive nursing was significantly shorter than that in the control group.

Further comparison of the psychological state of patients in the two groups revealed that the scores of SDS and SAS of patients in the research group were significantly lower than those in the control group, suggesting that predictive nursing could effectively improve the psychological state of prostate cancer patients. Tumor patients usually suffer from irritability, anxiety, depression, resistance, and other negative conditions due to unknown diseases, fear of surgery, and confusion of treatment results during surgery [24]. This has a great adverse effect on the follow-up treatment after surgery, and one of the main causes of doctor-patient disputes is also due to patients' distrust and resistance to medical staff. However, predictive nursing requires nurses to actively communicate with patients, teaches patients relevant knowledge of diseases and matters needing attention in treatment and rehabilitation, which can not only reduce patients' fear of unknown diseases and their rehabilitation consciousness, avoid adverse postoperative effects caused by their own reasons, but also support the relationship between doctors and patients, improve patients' sense of dependence and trust on medical personnel, and build confidence in overcoming diseases. This is also conducive to improving the postoperative rehabilitation of patients, thus causing the difference of the Barthel index and VAS score of patients in both groups. The survey results of nursing satisfaction of patients in the two groups showed that the probability of patients in the research group giving a score of very satisfactory was significantly higher than that in the control group, while the probability of patients not satisfied was significantly lower than that in the control group, which further proved the implementation value of predictive nursing in prostate cancer. It can effectively improve the overall impression of patients on medical staff and change their inherent views on hospitals, which is of great significance for the rehabilitation of diseases and the improvement of doctor-patient relationship.

The survey results of the quality of life of patients showed that the pain score in the field of symptoms in the research group was significantly lower than that of the control group, and the emotional function, physical function, and role function in the field of functions were significantly higher than those of the control group, which also suggested that predictive nursing had a certain effect on the improvement of patients' quality of life after discharge. Among them, the investigation factors for the differences were consistent with the ideas speculated above, while the differences in body function and role function we speculated might be due to certain influence of the spouse after radical prostatectomy. We will improve the experiment through longer-term follow-up investigation and follow-up treatment. However, comparing the inventory of patients in the two groups with a 3-year prognosis, it was found that there was no significant difference in mortality between the two groups, suggesting that the prognosis of patients in the two groups was relatively consistent and would not be affected by different nursing measures. However, by comparing the true death toll of patients in the two groups, we discovered that the death toll of patients in the control group was more than that in the research group, and the reason for no statistical difference between the two groups might be due to the small number of research subjects included in this experiment and the short follow-up time. It was not excluded that there might be statistical differences in prognosis between the two groups after the study volume is expanded. We will improve this point as soon as possible.

At present, the application of postoperative nursing for malignant tumors has become a major research focus in clinical practice. However, there is still little research on nursing for prostate cancer, and there are many deficiencies in this experiment due to the limited experimental conditions. If there are many nursing methods in clinical practice, this experiment focuses on exploring the application of predictive nursing, and does not rule out that there may be other methods more suitable for

postoperative nursing of prostate cancer patients. In the future, we will conduct more in-depth research on this point, and also hope that relevant researchers can further improve the research on postoperative nursing for prostate cancer patients with us.

To sum up, predictive nursing can effectively reduce the incidence rate of postoperative complications of prostate cancer patients, accelerate the rehabilitation process of patients, and improve the psychological state and postoperative quality of life of patients.

Disclosure of conflict of interest

None.

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