

The Effect of Nursing Intervention Application in Patients with Diabetes Mellitus and Urinary Tract Infection

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Abstract: *Objective:* To analyze the effect of using a comprehensive nursing intervention model for patients with diabetes mellitus and urinary tract infections. *Methods:* 60 patients with diabetes mellitus combined with urinary tract infection who were admitted to the hospital from November 2021 to November 2023 were randomly divided into the observation group and the control group, and were treated with conventional nursing interventions and comprehensive nursing interventions respectively. The nursing status of the two groups was compared and analyzed. *Results:* After the intervention, the observation group showed lower levels of fasting blood glucose and other indicators, and lower anxiety and depression scores, $P < 0.05$. After the intervention, the observation group's blood creatinine and other biochemical indicators improved significantly, $P < 0.05$. *Conclusion:* For the treatment of patients with both diabetes mellitus and urinary tract infections, nursing staff should pay attention to the development of nursing interventions to enhance the level of patients' glucose control, improve the patients' bad moods, and improve patients' therapeutic efficacy.

Keywords: Diabetes mellitus; Patients with urinary tract infections; Nursing interventions; Application

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1. Introduction

An in-depth analysis of the physiological characteristics of diabetic patients reveals that they are chronically hyperglycemic, leading to metabolic disorders and severe electrolyte imbalances, which significantly increase the likelihood of complications. Among the main pathological mechanisms of diabetes, it is mainly related to problems such as insufficient insulin secretion or impaired pancreatic islet function. With the prolongation of the disease, patients may face a variety of complications that can damage key tissues such as the heart and nerves, leading to multi-organ dysfunction and seriously affecting the quality of daily life. In addition, diabetic patients have a

relatively weakened immune system, which makes them more susceptible to the threat of bacterial infections, especially urinary tract infections, which are at a significantly higher risk. When diabetic patients develop symptoms of urinary tract infection, the condition tends to deteriorate rapidly due to the superimposed influence of various factors such as the environment, which not only seriously affects the improvement of the quality of life of the patients, but also imposes more stringent requirements on the development of nursing care. In the nursing process of such patients, in addition to cooperating with the doctor to impose appropriate antibacterial drugs for patients, special attention should also be paid to the adjustment of nursing interventions. Through the relevant studies, the active implementation of nursing interventions in the care of patients with diabetes mellitus combined with urinary tract infection can effectively improve the clinical symptoms of patients and further enhance the effect of glycemic control [1]. The purpose of this study is to explore the application effect of nursing interventions in patients with both diabetes mellitus and urinary tract infection, to effectively improve the nursing program for patients with diabetes mellitus, and to provide a scientific basis.

2. Information and methods

2.1. General information

The research subjects selected for this study were patients with diabetes mellitus combined with urinary tract infections admitted to the hospital from November 2021 to November 2023, totaling 60 cases, which were randomly divided into two groups. In the observation group, there were 19 males and 11 females, with a mean age of 45.36 ± 5.36 years and a mean disease duration of 7.36 ± 3.56 years. In the control group, there were 18 males and 12 females, with a mean age of 45.43 ± 5.32 years and a mean disease duration of 7.51 ± 3.42 years. The data of the two groups were analyzed, showing no significant difference ($P > 0.05$).

Inclusion criteria: Patients with diabetes mellitus and symptoms of urinary tract infection were selected.

Exclusion criteria: Patients with urologic disease or cognitive abnormalities were excluded.

2.2. Methodology

Both groups underwent conventional treatment, such as glycemic control therapy and antibiotic therapy, which may involve oral hypoglycemic drugs or insulin, and antibiotic therapy such as ceftriaxone and levofloxacin was given to the patients.

2.2.1. Control group control methods

Routine nursing interventions, such as instructing patients to take medications, regularly testing patients' blood glucose levels, and implementing routine education and dietary interventions.

2.2.2 Control methods for the observation group

Comprehensive nursing interventions were used. One is to focus on blood sugar control. If the patient is in a state of high blood sugar for a long time, the rate of bacterial growth and reproduction is relatively fast, which leads to symptoms such as urinary tract infection. Therefore, attention should be paid to the patient's blood glucose control to improve the level of prevention and treatment of urinary tract infections. Nursing staff can combine the actual condition of the patient's condition, guide the patient to take hypoglycemic drugs, such as bimatoprost, or guide the patient to inject insulin. Combined with the patient's body indexes, take into account the patient's dietary preferences, adjust the patient's dietary structure, and improve the level of calorie intake

control ^[2]. At the same time, nursing staff can guide patients to carry out exercises, such as playing Tai Chi, etc., to enhance the insulin sensitivity of patients and improve the effectiveness of patients' blood glucose control.

Secondly, general care measures are implemented. Nursing staff should inform patients to increase the amount of drinking water appropriately, preferably more than 2500 ml, to enhance the balance of patients' body fluids, to increase the frequency of patients' urinary elimination, so that the residence time of bacteria in the bladder has been shortened, and to enhance the level of bladder flushing ^[3]. At the same time, nursing staff should monitor the patient's condition and do a good job of recording information.

Thirdly, infection control care is carried out. After the application of antibiotics, the patient's condition should be observed to confirm whether the patient has any adverse reactions, explain the drug-related knowledge to the patient, inform the patient of the value of the drug application, enhance the patient's compliance, and guarantee the implementation of infection control measures.

Fourth, symptomatic care is practiced. If a diabetic patient has a urinary tract infection, the main manifestation is fever, and as the patient's body temperature rises, they may have chills or other symptoms. Nursing staff should pay attention to the implementation of warming measures, and instruct the patient to cover with thick bedding. When the patient's fever subsides, if the patient's clothing is soaked with sweat, the clothing and bed linen should be changed in time to improve the patient's comfort ^[4]. At the same time, warm water can also be used to scrub the patient. If the patient has a high fever, ice can be used to improve the level of physical cooling. If the patient has waist and abdominal pain phenomenon, the nursing staff can massage the pain area, or use hot compresses to reduce the patient's pain.

Fifth, nursing staff should focus on hygiene care to improve health. If the patient is a woman, let her make use of clean and sterile soft paper after urination to clean the perineum and perianal urine, improve the cleanliness of the perineum, and ensure the dryness of the perineum ^[5]. After defecation, the anus should be cleaned and the perineum should be washed regularly with water once a day. After urination and defecation, male patients should flush the urethra or perianal area, etc. with the help of water, and instruct patients to change their underwear daily.

Sixth, psychological care is provided. With the increase in the age of diabetic patients, their body functions show certain characteristics of decline, and the difficulty of their condition control is relatively high, patients may produce a lot of bad emotions, such as anxiety. The patients taking the corresponding medication for a long time may lead to a variety of complications and reduce the quality of life of the patients, so pessimism and disappointment during the treatment process may promote adverse effects. Therefore, nursing staff should pay attention to the psychological care of patients, perform face-to-face mode of communication with patients, enhance the patient's trust in the nursing staff, let the patient take the initiative to talk about their demands, analyze the causes of patients' bad mood, combined with the patient's personality characteristics, to establish a targeted psychological guidance strategy to improve the patient's negative emotions and improve the patient's confidence in treatment. At the same time, nursing staff can carry out health education, explaining to patients the etiology of the disease mechanism and care. They can use video playback and picture explanations to strengthen the patient's understanding of the relevant knowledge and improve the patient's awareness of self-management ^[6].

2.3. Observation of indicators

The patient's fasting blood glucose and other indicators were measured with the help of a blood glucose tester.

Patients' emotional status was assessed by SAS and SDS scales. Patients' levels of blood urea nitrogen and blood creatinine were measured using a fully automated biochemical analyzer.

2.4. Statistical treatment

During data processing, SPSS 23.0 was applied, and the count data were rowed χ^2 test. Measurement data line t -test. If $P < 0.05$, the difference between the data was significant.

3. Results

3.1. Blood glucose indicators

As shown in **Table 1**, after the intervention, the blood glucose level was relatively lower in the observation group, $P < 0.05$.

Table 1. Glycemic indexes before and after intervention in both groups (Mean \pm SD)

Groups	Samples	Fasting blood glucose (mmol/L)		Postprandial 2h blood glucose (mmol/L)		Glycosylated Hemoglobin (%)	
		Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
Observation group	30	12.21 \pm 1.78	6.32 \pm 0.97	15.65 \pm 1.32	8.92 \pm 1.57	11.32 \pm 2.04	6.27 \pm 0.72
Control group	30	12.24 \pm 1.64	8.26 \pm 0.87	15.71 \pm 1.29	11.27 \pm 1.18	11.29 \pm 2.08	9.01 \pm 0.95
<i>t</i>	-	0.658	9.543	0.862	8.857	0.746	9.842
<i>P</i>	-	0.509	0.001	0.535	0.004	0.627	0.001

3.2. Psychological state

As shown in **Table 2**, after the intervention, SAS and SDS scores were relatively lower in the observation group, $P < 0.05$.

Table 2. Psychological state scores before and after the intervention in both groups (Mean \pm SD)

Groups	Samples	SAS score		<i>t</i>	<i>P</i>	SDS scores		<i>t</i>	<i>P</i>
		Pre-intervention	Post-intervention			Pre-intervention	Post-intervention		
Observation group	30	77.45 \pm 4.23	41.26 \pm 3.24	9.957	0.001	77.32 \pm 5.64	42.24 \pm 3.37	10.567	0.001
Control group	30	77.56 \pm 4.26	54.23 \pm 4.31	8.247	0.010	77.28 \pm 5.72	57.32 \pm 5.26	9.862	0.001
<i>t</i>	-	0.577	12.524	-	-	0.239	13.125	-	-
<i>P</i>	-	0.612	0.001	-	-	0.842	0.001	-	-

3.3. Biochemical indicators

As shown in **Table 3**, after the intervention, the blood urea nitrogen and blood creatinine levels were relatively higher in the observation group, $P < 0.05$.

Table 3. Blood urea nitrogen and serum creatinine levels before and after intervention in both groups (Mean ± SD)

Groups	Samples	Blood urea nitrogen (mmol/L)		<i>t</i>	<i>P</i>	Blood creatinine (μmol/L)		<i>t</i>	<i>P</i>
		Pre-intervention	Post-intervention			Pre-intervention	Post-intervention		
Observation group	30	6.26 ± 0.78	8.58 ± 0.83	12.364	0.001	102.68 ± 11.26	140.23 ± 10.51	14.367	0.001
Control group	30	6.24 ± 0.81	7.08 ± 0.52	11.567	0.001	102.62 ± 11.21	113.24 ± 11.24	13.264	0.001
<i>t</i>	-	0.862	11.034	-	-	0.757	10.239	-	-
<i>P</i>	-	0.435	0.001	-	-	0.534	0.001	-	-

4. Discussion

In recent years, China's aging population has gradually increased, coupled with certain changes in people's living habits, making the prevalence of diabetes increase. Analysis of the physiological characteristics of diabetic patients shows that a long state of high blood sugar can cause certain abnormalities in organ function, and the body resistance becomes relatively weak, increasing the susceptibility of patients to pathogenic bacteria, easily leading to urinary infections and other symptoms. With the increase of the patient's disease time, the plasma osmolality is increased, the sugar metabolism is in a state of disorder, the glycolysis ability is relatively weak, the phagocytosis ability of macrophages and so on is decreased, which will enhance the risk of the patient's urinary tract infection. At the same time, in patients with metabolic system disorders, the protein decomposition rate is relatively fast, synthesis efficiency is not high, immunoglobulin synthesis has a certain degree of deficiency, and the patient's immunity is relatively low, providing convenient conditions for the colonization of pathogenic bacteria. In addition, the blood flow rate of diabetic patients is relatively slow, there is a certain lack of blood circulation, and the clearance efficiency of pathogenic bacteria is relatively low, which will enhance the growth and reproduction rate of pathogenic bacteria [7].

In the clinical field, when treating patients with diabetes mellitus combined with urinary tract infections, not only will conventional hypoglycemic drugs and antibiotics be applied, but also nursing interventions will be implemented. Among them, blood glucose control nursing interventions can be carried out to reduce patients' blood glucose concentration through glucose-lowering drugs or insulin, guide patients to form good living habits, regular exercise, healthy diet, and so on, to improve the effect of blood glucose control and alleviate patients' infection symptoms. The results of this study showed that after the intervention, the blood glucose level of the observation group was relatively low. The reason is mainly the implementation of the patient's blood glucose control measures based on the actual condition of the patient's condition, the use of drug therapy, and so on, to promote the reduction of the patient's blood glucose level [8]. At the same time, the nursing staff will adjust the patient's dietary structure, increase the patient's intake of crude fiber food, control the patient's calorie intake, supplemented by exercise, and so on, to guide the patient to form a healthy lifestyle, improve the patient's hemodynamic indexes and other indicators of the improvement of the level of the patient, to alleviate the patient's clinical symptoms.

The results of this study showed that after the intervention, the anxiety and depression scores of the patients

in the observation group were relatively low. The reasons may be due to the relatively high degree of attention of nursing staff to the psychological emotions of patients. Through verbal communication and observation of patients' demeanor and behavior to confirm the existence of patients' bad emotions, explore the causes of patients' bad emotions, establish personalized psychological care measures, and do a good job of patients' psychological appeasement work to improve patients' confidence in treatment, so that the patients take the initiative to participate in the treatment ^[9]. At the same time, the implementation of health education measures, through video pictures, manuals, and other methods, will inform patients of disease-related knowledge, so that patients fully grasp the key points of disease care and enhance the patients' self-care awareness, so the patient's state of mind is more stable.

Through this study, it was found that after the intervention, the observation group's life indicators improved significantly. The reason may be because the improvement of the patient's blood glucose control level will further improve the patient's metabolic disorders and other conditions, which makes the patient's urinary tract infection symptoms improve and promotes the improvement of the patient's blood creatinine and other levels ^[10].

In conclusion, for the treatment of diabetes mellitus and urinary tract infection patients, the optimization of nursing interventions, such as dietary care, glycemic control, and psychological care can improve the stability of the patient's blood glucose and other indicators, alleviate the patient's bad mood, promote the reduction of clinical symptoms, and improve the patient's quality of life.

Disclosure statement

The authors declare no conflict of interest.

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