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ORIGINAL RESEARCH

Continuous Nursing Intervention Based on Network Interactive in Early Diabetic Kidney Disease Patients

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Objective: To analyze the effect of continuous nursing intervention based on network interactive platform on improving blood glucose level and self-efficacy in patients with early diabetic kidney disease.

Methods: The control group received basic routine nursing, and the study group received continuous nursing based on the network interactive platform. The blood glucose level, renal function, inflammatory factors, self-efficacy, self-management behavior, nursing efficacy and adverse reactions were compared.

Results: There was no significant difference in baseline data between the two groups. After the application of continuous nursing based on network interactive platform, the blood glucose level and renal function of patients were significantly decreased, and those of the study group were lower than those of the control group. The inflammatory factors in the study group were significantly lower than those in the control group.

Conclusion: In the nursing of patients with early-onset diabetic kidney disease, the application of continuous nursing based on network interactive platform can effectively reduce the level of inflammatory factors, improve the level of blood glucose and renal function, improve the self-efficacy and self-management behavior of patients, and reduce the occurrence of adverse reactions. It is worthy of promotion and application in nursing.

Keywords: continuous nursing of network interactive platform, diabetic kidney disease, blood glucose levels, self efficacy

Introduction

Diabetes mellitus refers to the phenomenon of insufficient secretion or decreased sensitivity of insulin in the body of the patient, resulting in a high level of blood glucose indicators. It is a common chronic metabolic disease in the department of endocrinology.[1,2] At present, for the treatment of diabetes, there is no clinical treatment to solve the problem completely. Most patients need to receive long-term treatment to control the blood glucose index reasonably in the safe range, so as to avoid the complications such as diabetic fundus lesions, cardiovascular and cerebrovascular diseases and diabetic kidney disease caused by the aggravation of the disease.[3] Studies have shown that diabetes is a chronic low-titer inflammatory state. When the level of pro-inflammatory factors in the patient's body increases, the inflammatory response is triggered, and eventually leads to diabetes and diabetic kidney disease.[4,5] Among them, diabetic kidney disease is the most common microvascular complication. Diabetic kidney disease refers to the long-term poor control of blood glucose in diabetic patients, which leads to the decline of urinary albumin and renal function.[6]

The treatment of diabetic kidney disease focuses on lowering blood pressure, lowering glucose, nutritional support, reducing urinary protein exudation, and improving renal function.[7] At the same time of drug treatment, the nursing of diabetic kidney disease is also particularly important. The routine nursing is more basic nursing for patients during the hospital treatment, and the long-term follow-up of patients is not timely.[8] In the medical field, the Internet can convey knowledge more intuitively, simply and vividly, which is convenient for patients to use, help improve the level of patient

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learning, and promote communication between doctors and patients.[9] Continuing care typically includes discharge planning, home guidance, and follow-up check-ups. Continuous care ensures that patients can still receive specialized care from hospital to home by implementing various care measures. Continuity of care can help patients establish a healthy lifestyle, maintain long-term family therapy, reduce the incidence of complications, and improve patients' quality of life.[10] Continuous nursing based on the network interactive platform is a new nursing model that extends the nursing service inside the hospital to the nursing outside the hospital, which is very in line with the current needs of modern nursing.[11] Studies have shown that more than 95% of patients with diabetic kidney disease have insufficient cognition of their own disease, and their understanding is very shallow.[12] They have serious negative emotions such as anxiety and depression in work and daily life, which seriously affect the efficacy of nursing. Therefore, it is particularly important to improve patients' cognition of the disease and treatment compliance on the basis of drug treatment.[13] At present, in the era of rapid information development, especially under the epidemic situation, the development of network is more convenient. The integration of network and reality makes the routine nursing in the hospital can be extended to the nursing outside the hospital, and it is more diverse, which can provide the best prognosis for patients and their families.[14]

Based on this, a total of 80 patients with early diabetic kidney disease treated in our hospital from January 2020 to December 2021 were selected as the research objects, in order to analyze the blood glucose control level and self-efficacy of patients with diabetic kidney disease using the network interactive platform for continuous nursing. The experience is reported as follows.

Materials and Methods

Subjects

In this study, 80 early patients with diabetic kidney disease admitted to Wuwei Traditional Chinese Medicine Hospital from January 2020 to December 2021 were enrolled and the general information including gender, age, BMI, education level, course of disease and other general information were collected. All patients were divided into control group and study group by random table methods, with 40 cases in each group. The clinical data of the two groups were comparable, and there was no significant difference, and $P > 0.05$, no statistical significance.

Inclusion and Exclusion Criteria

Inclusion Criteria

(1) Patients who met the clinical diagnostic criteria for early diabetic kidney disease; (2) The 24-hour urinary micro-albumin was 20–300mg; (3) All subjects and their families agreed to participate in the study and signed an informed consent form. (4) Patients with barrierless communication and good compliance.

Exclusion Criteria

(1) With severe cardiac diseases; (2) urinary albumin > 300mg/g; (3) patients with mental and cognitive disorders; (4) patients with of the patients had immune dysfunction.

Methods

Control Group

The patients in the control group were treated with basic routine nursing, the basic information and detailed information of the patients were understood in time after admission, the basic situation of the patients was fully understood, the records were made carefully, and the relevant precautions were informed in the treatment, the bad emotions of the patients during the nursing were relieved, the patients were followed up after discharge, and the relevant contraindications were informed, so as to promote the effective recovery of the patients.

Study Group

On the basis of the control group, patients in the study group were intervened by continuous nursing based on network interactive platform, and the specific measures were as follows: (1) An extended care team was established, and a senior

physician from the Department of psychology, nephrology and Endocrinology each carried out health education and answered questions for patients and their families. At the same time, the network platform was operated and managed by two nurse-in-charge, two responsible nurses and one network operator. (2) The wechat public accounts of the groups were established, and the personal files of the patients were established, including basic information, past medical history, and the examination results and diagnosis of this time. (3) The dynamic information of diabetic kidney disease was updated in real time every week to ensure that patients and their families could keep track of it at any time. (4) Health education of diabetic kidney disease knowledge was carried out in the form of text and pictures, and related rehabilitation training videos were recorded to ensure patients' understanding of the disease. (5) The platform was used to release the expert consultation meetings and free consultations, and encourage family members to actively participate and cooperate. (6) Increase the interaction between patients through the interactive communication section and improve the treatment enthusiasm of patients. (7) Three doctors were organized to give psychological counseling to patients and provide targeted training guidance from 18:00 to 19:00 every Wednesday and Friday evening. (8) For patients who need further consultation, they can make an appointment in the online further consultation module. (9) Patients were followed up through the network, and patients and their family members were instructed to release the condition regularly and fill in the relevant questionnaires, so that nursing staff could grasp the condition of patients in time.

Observation Indicators and Evaluation Criteria

Blood Glucose Related Indicators

The blood glucose and renal function of the two groups before and 1 month after intervention were compared. The fasting blood glucose (FPG) and 2h postprandial blood glucose (2hPBG) was detected by blood glucose analyzer 24h before and 24h after nursing. HbA1C enzymatic method was used to detect the glycosylated hemoglobin (HbA1C) of patients 24 hours before and 24 hours after nursing. mALB and UACR were detected by automatic biochemical analyzer AU5800 produced by the United States.

The Levels of Inflammatory Factors

After the intervention for one month, 3mL of venous blood was taken from the patients in the morning, and the serum was centrifuged at 3000r/min for 10 minutes by using the model TDZ6-WS produced by Hunan Herxi Equipment Company. Methods The levels of interleukin-6 (IL-6), interleukin-8 (IL-8) and tumor necrosis factor-α (TNF-α) were detected by enzyme-linked immunosorbent assay.

Comparison of Self-Efficacy and Self-Management Behavior

Self-efficacy refers to an individual's perception or belief that they can adopt adaptive behaviors in the face of challenges in their environment. A person who believes that he can handle all kinds of things will be more active and proactive in life. This perception of "what can be done" reflects an individual's sense of control over their environment. Therefore, self-efficacy is a theory of self-confidence that looks at an individual's ability to deal with various pressures in life. The General Self-Efficacy Scale (GSES)[15] was used to score the self-efficacy of patients before and one month after nursing. The score ranged from 0 to 4, and the lower the score, the worse the self-efficacy of patients.

The SDSCA scale[16] consists of 10 items, reflecting 7 aspects, including general diet, fruit diet, vegetable diet, lipid diet, exercise, blood glucose monitoring, and foot care. The higher the score, the higher the level of self-management. The Self-management Behavior Scale (SDSCA) of diabetic patients was used to evaluate the self-management behavior before intervention and 3 months after intervention, with a total score of 0~100 points, and the higher the score, the better the self-management behavior.

Nursing Effect

The clinical efficacy was evaluated according to the improvement of symptoms and signs after nursing. Marked effect: normal heart rate, physical activity, normal breathing, normal renal function and stable blood glucose level; Effective: blood glucose level and renal function were significantly improved; Ineffective: There was no improvement in performance after care. Total effective rate = (marked effective + effective)/total cases ×100%.

Adverse Reactions

The adverse reactions of the two groups during the nursing period were compared, including nausea and vomiting, urinary tract infection, hypoglycemia and renal function decline.

Statistical Analysis

The data were collected and analyzed by SPSS 26.0 software and the pictures were processed by GraphPad Prism 8. Measurement data were expressed as ($\bar{x}\pm s$), the paired-sample *t*-test was used for two different time comparisons within the group, and the *t*-test of two independent samples was used for the between-group comparison. Count data were expressed as rate (%), and chi-square test χ^2 was used to compare whether there was statistical difference. P<0.05 was considered statistically significant.

Results

Baseline Data

A total of 40 patients were enrolled in the control group, including 26 males and 14 females, aged from 40 to 70 years old, with an average age of (46.84±5.29) years old, BMI of 21.2–31.0kg/m2, with an average of (24.89±2.14) kg/m2. The disease duration was 12–25 months, with an average of 15.1±1.1 months. A total of 40 patients were enrolled in the study group, including 28 males and 12 females, aged 40–73 years, with an average age of (47.56±5.36) years, BMI of 21.0–31.0kg/m2, with an average of (24.65±2.14) kg/m2. The disease duration was 12–26 months, with an average of 15.3±1.1 months. The two groups were comparable, and there was no significant difference in gender, age, BMI index and other baseline data (P>0.05). See Table 1 for details.

Comparison of Blood Glucose Indexes and Renal Function

The glycemic index of the study group were lower than those of the control group (all P<0.001). The renal function level of the study group were lower than those of the control group (all P<0.001). See Table 2 for details.

Comparison of Inflammatory Factors

The levels of inflammatory factors in the study group were significantly decreased, and those in the study group were lower than those in the control group (all P < 0.001). See Table 3 for details.

Table 1 Comparison of Baseline Data

	Control Group	Study Group	t/χ^2	P
n	40	40		
Gender (Male/Female)	26/14	28/12	0.228	0.633
Age (years old)	46.84±5.29	47.56±5.36	0.605	0.547
BMI (kg/m^2)	24.89±3.26	24.65±4.05	0.292	0.771
Level of education			0.056	0.813
College or below	27	26		
Bachelor or above	13	14		
Duration (months)	14.67±2.36	15.13±2.59	0.830	0.409

Table 2 Comparison of Blood Glucose Index and Renal Function ($\bar{x}\pm s$)

	n	FPG (mmol/L)	2hPBG (mmol/L)	HbA1c/%	mALB (mg/mL)	UACR (mg/g)
Control group	40	7.64±1.55	10.34±1.79	7.61±2.21	7.64±0.55	10.34±1.79
Study group	40	5.81±1.46	8.66±1.24	5.17±1.67	5.81±0.46	8.66±1.24
t		5.435	4.879	5.571	3.939	4.879
p		<0.001	<0.001	<0.001	<0.001	<0.001

Table 3 Levels of Inflammatory Factors ($\bar{x}\pm s$)

	n	IL-6 (ug/L)	IL-8 (ng/L)	TNF-α (ug/L)
Control group	40	31.29±7.58	34.84±7.64	1.27±0.77
Study group	40	26.12±5.34	29.35±5.96	0.95±0.46
t		3.587	6.429	1.291
p		<0.001	<0.001	<0.001

Comparison of Self-Efficacy and Self-Management Behavior

The GSES scores and SDSCA scores of the study group were all higher than those of the control group, that is, the study group had better self-efficacy and self-management behavior (all $P < 0.05$). See Table 4 for details.

Nursing Effect

The nursing efficacy of the control group and the study group were 80.00% and 95.00%, respectively, that is, the effective rate of the study group was higher than that of the control group ($P = 0.043$). See Table 5 for details.

Adverse Reactions

The number of patients with nausea and vomiting, urinary tract infection and renal function decline in the study group was 8 cases in the control group while 3 cases in the study group. The incidence of adverse reactions of the two groups were comparable ($P = 0.077$). See Table 6 for details.

Table 4 Comparison of Self-Efficacy and Self-Management Behavior ($\bar{x}\pm s$)

	GSES Scores		SDSCA Scores	
	Before	After	Before	After
Control group	27.26±5.36	31.25±6.16	68.26±17.25	80.33±16.21
Study group	28.31±6.03	35.68±6.87	67.11±15.31	88.78±17.05
t	0.823	3.036	0.753	2.272
P	0.413	0.003	0.753	0.026

Table 5 Comparison of Nursing Efficacy (n)

Group	n	Obvious Effect	Effective	Invalid	Total Effective Rate
Control group	40	20	12	8	32 (80.00)
Study group	40	29	9	2	38 (95.00)
χ^2					4.114
p					0.043

Table 6 Comparison of Adverse Reactions (n)

	n	Nausea and Vomiting	Urinary Tract Infections	Low Blood Sugar	Decreased Renal Function	Incidence Rate
Control group	40	3	1	2	2	8
Study group	40	1	0	1	1	3
χ^2						3.130
p						0.077

Discussion

In recent years, with the improvement of the national economic level, people's living environment has also changed greatly, and their living and eating habits have also changed, which has led to a sharp increase in more chronic diseases. Among them, diabetic kidney disease is the most common complication of diabetes because of its high incidence. At present, it has developed into the most common cause of end-stage renal disease in middle-aged and elderly people.[17] It has the characteristics of long course of disease and repeated condition. At present, there is no specific drug for the treatment of this disease in clinical practice, and most patients need long-term or lifelong medication for treatment, so patients need to have high autonomy and compliance. Zhao Yi et al[18] reported in 2021 that compared with conventional nursing, the network continuous nursing can effectively improve the blood glucose level and renal function of patients. This was also confirmed by the results of this study. The results of this study showed that the blood glucose level of the study group was lower than that of the control group. The renal function index of the study group was significantly improved, that is, the study group was better than the control group. In the extended nursing service of network interactive platform, nursing members can communicate through the form of network and multimedia to build relevant platforms to ensure that patients can communicate in real time without the limitation of time and space, especially patients can communicate with doctors in time after hospital. At the same time, the diversity of the network can make the nursing model more vivid, with pictures and videos. It is more easy to understand and profound to master the condition of patients.[19] At the same time, nursing staff can timely understand the patients' situation by monitoring blood glucose data upload, which is convenient for the continuity of work and the improvement of patients' blood glucose and renal function. Xu Meifang et al[20] showed that extended nursing based on network interactive platform could significantly improve the self-efficacy and self-management behavior of patients, and reduce the levels of inflammatory factors. In this study, the levels of inflammatory factors in the study group were lower than those in the control group, and the scores of self-efficacy and SDSCA in the study group were higher than those in the control group. Extended nursing based on the network interactive platform can effectively meet the needs of patients with diabetic kidney disease for functional training, diet, medication knowledge and other related diseases, and can enhance the self-management behavior of patients, so as to improve the self-efficacy and self-management behavior.[21–23] The research results of Zhou Shenghuo et al[24] showed that the extended nursing of the network had a good effect on the nursing of patients and reduced the occurrence of complications. In this study, the nursing effect of the study group was higher than that of the control group, and the incidence of adverse reactions in the control group and the study group was 20% and 7.5%, respectively, that is, the study group was lower than the control group. Network extended nursing can guide patients in full time when patients have doubts, and through the daily uploads of patients' data, the patients' conditions can be timely grasp, and the nursing plan can be timely adjusted according to the patients' conditions, so as to improve the nursing effect and reduce the prognosis.[25–28]

Conclusion

The continuous nursing intervention of network interactive platform has a significant effect on improving the blood glucose level and self-efficacy nursing of patients with early diabetic kidney disease. The adoption of this nursing model can significantly improve the blood glucose level and renal function level of patients. This resulted in further improvements in the self-efficacy and self-management behavior of the patients. However, due to the influence of factors such as the single center of this study and the low sample size, the accuracy of the research results may lead to a certain deviation. Therefore, we look forward to the appearance of randomized controlled trials with larger sample size and more centers for further discussion in the future.

Data Sharing Statement

All data generated or analysed during this study are included in this published article.

Ethics Approval and Consent to Participate

This study has been approved by Wuwei Traditional Chinese Medicine Hospital's ethics committee. Patients and their families were informed of the research content and voluntarily signed the informed consent. All the methods were carried out in accordance with the Declaration of Helsinki.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors have no conflicts of interest to declare for this work.

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