

# World Journal of *Clinical Cases*

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Retrospective Study

# Observation of the effect of one-to-one education on high-risk cases of diabetic foot

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**Author contributions:** Fu XJ, Hu SD and Song DD designed this retrospective study; Fu XJ wrote this paper; Fu XJ, Hu SD, Peng YF, Zhou LY, and Shu T were responsible for sorting the data.

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## Abstract

### BACKGROUND

Diabetes is a common chronic disease, and its global incidence is on the rise. The disease is directly attributed to insufficient insulin efficacy/secretion, and patients are often accompanied by multiple complications. Diabetic foot is one of the most common complications of diabetes. Diabetic feet have ulcers and infections, which can eventually lead to amputation. Basic nursing care, such as lowering blood pressure and preventing foot skin infections in clinical nursing work, has positive significance for the prevention and control of diabetic feet.

### AIM

To explore the positive significance of one-to-one education in high-risk cases of diabetic foot.

### METHODS

This observation included 98 high-risk cases of diabetic foot in our hospital during the period from August 2017 to October 2019, and these patients were randomly divided into the basic nursing group and the one-to-one education group with 49 patients per group. The basic nursing group only received routine basic nursing, while the one-to-one education group gave patients one-to-one education on the basis of basic nursing. After nursing, the self-care ability and compliance behavior of the two groups were evaluated and compared between these two groups. The knowledge mastery of the patient and the satisfaction of nursing were accounted.

### RESULTS

The assessment results of patients (self-care responsibility, self-care skills, self-concept and self-care knowledge) were significantly higher in the one-to-one education group than in the basic nursing group. The scores of compliance



additional data are available.

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behaviors (foot bathing, shoes and socks selection, sports health care) in the one-to-one education group were significantly higher than those in the basic nursing group. Patients in the one-to-one education group had a significantly higher level of knowledge mastery and satisfaction of nursing than the basic nursing group.

## CONCLUSION

One-to-one education for high-risk cases of diabetic foot is helpful to improve the cognition and self-care ability of patients with diabetic foot, to ensure that patients follow the doctor's advice of self-care and to improve their nursing satisfaction.

**Key Words:** High risk cases of diabetic foot; One-to-one education; Contrastive research; Basic care; Ability of self-care; Compliance behavior

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**Core Tip:** A patient-centered personalized education program can have a positive effect in nursing activities of various chronic diseases.

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## INTRODUCTION

Diabetes is a common chronic disease, and its global incidence is on the rise. This disease is directly due to insufficient insulin utility/secretion, but the specific mechanism has not been confirmed. There is no clinical treatment to completely cure the disease[1]. Hyperglycemia is a typical characteristic of diabetes. When the body maintains high blood sugar levels for a long time without effective control, there are multiple complications in the body. Diabetic foot is one of the most common complications of diabetes. The diabetic foot has progressive ulceration and infection, which can lead to amputation[2].

Basic nursing care, such as lowering blood pressure and preventing foot skin infection, is of positive significance in prevention and control of diabetic foot. However, due to the long course of diabetes, the hospital lifetime of patients is generally shorter than that of family life. The lack of relevant nursing knowledge in out-of-hospital life leads to poor control of diabetic foot. Therefore, it is very important to help patients master effective foot nursing knowledge and skills.

As a patient-centered personalized education program, one-to-one education makes up for the deficiency of routine education that is not targeted and the low education efficiency in nursing activities. A positive effect has been shown one-to-one education in nursing activities of various chronic diseases[3]. In order to further observe the positive effect of one-to-one education in high-risk cases of diabetic foot, this paper carried out the following comparative study.

## MATERIALS AND METHODS

### Basic information

Ninety-eight patients with high risk of diabetic foot in our hospital from December 2017 to September 2019 were enrolled. The 98 patients met the diagnostic criteria for diabetes in the Chinese Guidelines for the Prevention and Control of Type 2 Diabetes Mellitus[4] and the diagnostic criteria for early diabetic foot in the Wagner classification[5]. Inclusion criteria: (1) Education level above primary school and able to talk with others normally in Chinese; (2) No mental disorders, schizophrenia, severe depression; (3) Good compliance, nonviolence and self-harm; and (4) Volunteer to

accept the observation after knowing the purpose and nursing methods of this study. Exclusion criteria: (1) Complicated with renal function injury and serious cardiovascular and cerebrovascular diseases; (2) Basic information is inadequate; and (3) Any of the above four inclusion criteria has been not adopted. Patients were randomly divided the basic nursing group and the one-to-one education group. There were 49 patients assigned to each group. Comparison of sex, age, household registration, course of disease, cultural background and other information were not significantly different ( $P > 0.05$ ) (Table 1). The contents of this study have been admitted to and approved by the Ethics Committee of our hospital.

### Method

**Basic nursing group:** (1) The patient was admitted to the hospital to receive a blood glucose test, daily diet control and exercise guidance; and (2) General education, through the distribution of knowledge manuals, oral presentations and other ways to explain daily life matters needing attention.

**One-to-one education group:** (1) A comprehensive assessment of the patient's education level, personality characteristics and severity of the illness at the time of admission to provide basic guidance for the formulation of subsequent individualized health education programs; and (2) One-to-one education: (a) Select senior nurses with rich nursing experience and good communication skills conducted the one-to-one instruction. Based on the knowledge of the patient's condition and education, the nurses explained the occurrence, development, common complications, occurrence and development of diabetes in order to further improve the patient's cognition of diabetic foot. Nurses were to make full use of the advantages of one-to-one knowledge explanation in the process of education, fully play the functions of answering questions and solving questions and psychological guidance and maintain the relationship between the nurse and patient. The duration of each education session was maintained at 15-30 min, using the slides and graphic materials if necessary to complete the explanation. After 7 d of education, a review and assessment of knowledge was conducted in which the head of assessment was the nurse responsible. They also checked and filled gaps and consolidated the achievements of the education. The education was adjusted based on the patient's characteristics and study ability; (b) The main points of nursing were explained, the main points of preventive nursing of diabetic foot, the clinical manifestations of ulcer, numbness and the main countermeasures after occurrence were summarized, and the systematic explanation was completed to help the patients master the key points of self-care and improve the efficiency of education. In addition to the nursing points, the patients were informed of the important role of blood glucose control in the diabetic foot control, and the importance of blood glucose management was improved; (c) Using one-to-one self-management education to improve patient self-care skills and improve the self-care ability of patients from theoretical knowledge of nursing skills. The nursing staff explained the daily foot care methods, such as the selection of cotton socks, loose and breathable shoes and the treatment of shoes and socks after exercise. If necessary, the nursing staff guided personal care, such as toenail trimming, foot massage, *etc.* Toenail trimming should be done once a week; pruning should not be too deep to prevent skin damage. Nursing staff demonstrated foot massage to promote blood circulation until the patient fully mastered the technique. Patients were informed that the water temperature should be controlled to 40 °C when washing their feet to prevent scalding of the skin, and the time of foot soaking should be controlled to 10 min to avoid prolonged immersion affecting the skin. Patients were informed of clinical manifestations and corresponding treatment measures of the diabetic foot to avoid infection caused by improper nursing; and (d) One-to-one discharge guidance for patients. One day before discharge, one retrospective summary was conducted (summary of past knowledge education results, 1 h of knowledge review, further consolidation of the results of education). In addition, patients were informed of the importance of receiving out-of-hospital follow-up, requirement of a reserve mobile phone, QQ number, *etc.*, to grasp the situation of out-of-hospital self-compliance in the process of out-of-hospital follow-up in real time.



**Table 1 Comparison of the basic information of the two groups**

Basic information		Basic nursing group, n = 49	One-to-one education group, n = 49	$\chi^2/t$	P value
Sex	Male	26 (53.06)	27 (55.10)	0.084	0.772
	Female	23 (46.94)	22 (44.90)		
Household registration	Urban	29 (59.18)	30 (61.22)	0.087	0.768
	Rural	20 (40.82)	19 (38.78)		
Cultural background	Junior high school	4 (8.16)	3 (6.12)	0.314	0.575
	High school	21 (42.86)	20 (40.82)	0.086	0.770
	College or above	24 (48.98)	26 (53.06)	0.333	0.564
Course of disease in yr		5.63 $\pm$ 0.87	5.71 $\pm$ 0.89	0.450	0.654
Age in yr		58.69 $\pm$ 4.21	58.91 $\pm$ 4.29	0.256	0.798

## RESULTS

### **Comparison of self-care capacity scale scores between the one-to-one education group and basic nursing group**

The one-to-one education group score of the self-care was  $35.98 \pm 3.65$ , self-concept was  $26.19 \pm 2.57$ , self-care responsibility was  $27.94 \pm 3.11$  and self-care knowledge was  $44.89 \pm 4.01$  of the self-care capacity scale (ESCA) scores. In the control group, the score of the self-care was  $26.87 \pm 3.16$ , self-concept was  $20.13 \pm 3.02$ , self-care responsibility was  $21.06 \pm 2.09$  and self-care knowledge was  $35.16 \pm 3.16$ . The scores of the one-to-one education group were statistically higher than those of the basic nursing group ( $P < 0.05$ ) (Table 2).

### **Comparison of compliance behavior scores between the one-to-one education group and basic nursing group**

In the score of compliance behavior in the one-to-one education group, the score of foot bathing was  $8.63 \pm 1.01$ , exercise health care was  $8.51 \pm 0.97$ , and shoes and socks selection was  $9.04 \pm 1.24$ . In the basic nursing group, the score of foot bathing was  $6.87 \pm 0.81$ , exercise health care was  $6.94 \pm 0.83$  and shoes and socks selection was  $8.05 \pm 1.01$ . The scores of compliance behavior in the one-to-one education group were significantly higher than those in the basic nursing group ( $P < 0.05$ ) (Table 3).

### **Comparison of patient mastery between the one-to-one education group and the basic nursing group**

In the one-to-one education group, the percentages of master, basically master and never master were 63.27%, 34.69% and 2.04%, respectively. The overall knowledge mastery rate was 97.96%. In the basic nursing group, the percentages of master, basically master and never master were 44.90%, 30.61% and 24.49%, respectively. In addition, the overall knowledge mastery rate was 75.51%. The patient mastery of the one-to-one education group was significantly higher than that of basic nursing group ( $P < 0.05$ ) (Table 4).

### **Comparison of the nursing satisfaction degree between the one-to-one education group and the basic nursing group**

In one-to-one education group, the percentages of very satisfactory, basically satisfactory and unsatisfactory were 67.35%, 32.65% and 0.00%, respectively. The overall nursing satisfaction degree was 100.00%. In the basic nursing group, the percentages of very satisfactory, basically satisfactory and unsatisfactory were 48.98%, 28.57% and 22.45%, respectively. The overall nursing satisfaction degree was 77.55%. The degree of nursing satisfaction of the one-to-one education group was significantly higher than that of basic nursing group ( $P < 0.05$ ) (Table 5).

**Table 2 Comparison of self-care capacity scale scores of the one-to-one education group with the basic nursing group**

ESCA scores	One-to-one education group, <i>n</i> = 49	Basic nursing group, <i>n</i> = 49	<i>t</i>	<i>P</i> value
Self-care skills	35.98 ± 3.65	26.87 ± 3.16	13.209	0.001
Self-concept	26.19 ± 2.57	20.13 ± 3.02	10.697	0.001
Self-care responsibility	27.94 ± 3.11	21.06 ± 2.09	12.853	0.001
Self-care knowledge	44.89 ± 4.01	35.16 ± 3.16	13.341	0.001

Data are presented as mean ± s, score. ESCA: Self-care capacity scale.

**Table 3 Comparison of compliance behavior score between the two groups**

Compliance behavior score	One-to-one education group, <i>n</i> = 49	Basic nursing group, <i>n</i> = 49	<i>t</i>	<i>P</i> value
Foot bathing	8.63 ± 1.01	6.87 ± 0.81	9.516	0.001
Exercise health care	8.51 ± 0.97	6.94 ± 0.83	8.609	0.001
Shoes and socks selection	9.04 ± 1.24	8.05 ± 1.01	4.333	0.001

Data are presented as mean ± s, score.

**Table 4 Comparison of patient mastery between the two groups**

Patient mastery	One-to-one education group, <i>n</i> = 49	Basic nursing group, <i>n</i> = 49	$\chi^2$	<i>P</i> value
Master	31 (63.27)	22 (44.90)	6.795	0.009
Basically master	17 (34.69)	15 (30.61)	0.379	0.538
Never master	1 (2.04)	12 (24.49)	21.903	0.001
Knowledge mastery rate	48 (97.96)	37 (75.51)	21.903	0.001

Data are presented as *n* (%).

**Table 5 Comparison of nursing satisfaction degree between the two groups**

The degree of nursing satisfaction	One-to-one education group ( <i>n</i> = 49)	Basic nursing group ( <i>n</i> = 49)	$\chi^2$	<i>P</i> value
Very satisfactory	33 (67.35)	24 (48.98)	6.934	0.008
Basically satisfactory	16 (32.65)	14 (28.57)	0.382	0.531
Unsatisfactory	0 (0.00)	11 (22.45)	25.289	0.001
Nursing satisfaction degree	49 (100.00)	38 (77.55)	25.289	0.001

Data are presented as *n* (%).

## DISCUSSION

Diabetes is one of the main chronic diseases affecting human physical and mental health and is positively correlated with the regional economy and living standards. The incidence of diabetes in China has been increasing each year during the modernization and rebuilding period, and there are more than 100 million cases of diabetes. The course of the disease is long, and there are no cures. As the disease progresses, the organs and nerves are affected by hyperglycemia for a long time, making the individual prone to disease and causing a variety of complications[6]. Diabetic foot is one of the most common complications of diabetes, and the disease is characterized by the occlusion of lower extremity atherosclerosis caused by long-term hyperglycemia. The clinical symptoms of patients include abnormal plantar sensations

and limb numbness, and infection and ulceration easily occur with the aggravation of the disease. To prevent the spread of limb infection, the patient must undergo amputation[7,8].

Clinical studies suggest that diabetic foot can occur more than 10 years after the disease and can be effectively prevented by properly controlling the blood sugar level. However, if good blood glucose control is not maintained, diabetic foot may occur in 2-3 years. Diabetic patients with lower limb numbness, dry skin and other manifestations have a high risk of diabetic foot[9]. Considering that hyperglycemia causes diabetic foot, the key to preventing diabetic foot is to control the blood glucose level in individuals at risk of developing diabetic foot[10,11]. Because the course of diabetes is long and patients sometimes require professional care in a hospital, patients with diabetes need to effectively perform self-care at home to control and maintain their blood sugar level in the long term. In addition, during the development of diabetic foot, skin breakage and infection are the main causes of foot ulcers. Due to insufficient blood supply and nutrition to the lower limbs in the presence of a foot lesion, wound healing is difficult, and patients are required to fully understand how to care for their foot and prevent foot injuries[12].

Educating patients on wound care is an important part of clinical nursing work and can improve a patient's self-management ability, enabling doctors, nurses and patients to participate in disease management. Patient education plays an important role in the treatment and prevention of various diseases. In the management of basic diseases such as diabetes and hypertension, patient education is more important than the clinical treatment[13,14]. The conventional methods of educating patients with high-risk cases of diabetic foot lack selectivity and pertinence. The efficiency of education is generally low, so it is necessary to further improve the methods used for patient education[15,16].

The purposes of one-to-one patient education, for which individualized educational programs are developed, are to improve the pertinence and effectiveness of the educational program and to improve the efficiency of education[17,18]. In clinical practice, it is beneficial to evaluate patient characteristic and educational background before the implementation of an educational program so that an appropriate follow-up educational program can be developed and implemented. Individualized educational programs can provide basic information about the occurrence and development of diabetes and diabetic foot, thereby improving the patient's knowledge of the disease. Individualized educational programs can improve the patient's awareness of how to control his or her blood sugar level, summarize the main aspects of daily nursing care and encourage the patient to master the main contents of self-care quickly. In addition, through on-site guidance, one-to-one patient education can improve patients' daily foot nursing skills and prevent foot skin damage in daily life, which is an advantage of individualized patient education. The content of the program can be adjusted according to the progress of the patient, and psychological counseling and other work can be performed to improve patient compliance[19].

In this study, all of the self-care capacity scale scores and compliance behaviors of the one-to-one education group were significantly better than those of the basic nursing group ( $P < 0.05$ ), which shows that one-to-one education can directly improve the self-care ability of patients and encourage them to complete self-care in accordance with their doctor's orders. The patients in the one-to-one education group gained more knowledge and had a higher level of nursing care satisfaction than did those in the basic nursing group ( $P < 0.05$ ), which suggests that the efficiency of one-to-one education is higher and that the patients can more easily learn the relevant information with the one-to-one program. With one-to-one education, the differences in learning ability and personality among the patients were fully respected, and the level of satisfaction of the patients was generally higher.

In the study by Tseng *et al*[20], the clinical value of one-to-one patient education for high-risk cases of type 2 diabetic foot was explored. As a result, the scores of basic knowledge of diabetic foot, self-care behavior and health behavior in the experimental group (one-to-one health education) were significantly higher than those in the control group (routine health education). The authors believe that the one-to-one tutoring health education method involving nursing can encourage patients with a high risk of diabetic foot to master the information provided on their own disease and feet, establish a healthy lifestyle and improve their behavioral awareness, which has a significant effect on the development of diabetic foot. The results and conclusions of this study are similar to those listed above, but the number of patients included in this study is small. Therefore, we need to perform follow-ups to gather additional data.

## CONCLUSION

In summary, one-to-one education programs for patients with high-risk cases of diabetic foot can improve a patient's understanding of the disease, nursing abilities and nursing satisfaction, can play a positive role in the control of diabetic foot and can be actively popularized.

## ARTICLE HIGHLIGHTS

### Research background

Diabetic foot is one of the most common complications of diabetes. Basic nursing care, such as lowering blood pressure and preventing foot skin infections in clinical nursing work, has a positive significance for the prevention and control of diabetic feet.

### Research motivation

In clinical practice, it is beneficial to evaluate patients' characteristics and educational backgrounds before the implementation of an educational program so that an appropriate follow-up educational program can be developed and implemented. Individualized educational programs can provide basic information about the occurrence and development of diabetes and diabetic foot, thereby improving the patient's knowledge of the disease. The individualized educational program can improve the patient's awareness of how to control his or her blood sugar level, summarize the main aspects of daily nursing care and encourage the patient to master the main contents of self-care quickly.

### Research objectives

The purposes of one-to-one patient education, for which individualized educational programs are developed, are to improve the pertinence and effectiveness of the educational program and to improve the efficiency of education.

### Research methods

In the basic nursing group, the patient was admitted to the hospital to receive a blood glucose test and received general knowledge education. In the one-to-one education group, a comprehensive assessment of the patient's education level was determined, and the patient received one-to-one education. The patients were assessed on their self-care capacity through the self-care capacity scale and on their compliance behavior. Patient mastery and degree of nursing satisfaction were obtained. All the data in this observational study were analyzed by Statistic Package for Social Science statistical software.

### Research results

In this study, all the self-care capacity scale scores and compliance behaviors of the one-to-one education group were significantly better than those of the basic nursing group ( $P < 0.05$ ). The patients in the one-to-one education group gained more knowledge and had a higher level of nursing care satisfaction than did those in the basic nursing group ( $P < 0.05$ ).

### Research conclusions

One-to-one education programs for patients with high-risk cases of diabetic foot can play a positive role in the control of diabetic foot.

### Research perspectives

One-to-one education programs for patients with high-risk cases of diabetic foot can improve the patients' understanding of the disease, nursing abilities and nursing satisfaction and is worthy promotion.

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