



Effects of Empowerment-Based Psychological Intervention on Negative Emotions, Self-Management Ability and Wound Healing in Patients with Diabetic Foot

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ABSTRACT

Background: Diabetic foot (DF) is a severe and disabling chronic complication of type 2 diabetes mellitus, characterized by refractory foot ulcers, persistent wound infection, and high amputation risk. Patients with diabetic foot often suffer from long-term disease torture, repeated hospitalization, and impaired social function, resulting in varying degrees of anxiety, depression and other negative emotions. Poor psychological state further reduces patients' disease self-management compliance, delays wound epithelialization, and forms a vicious cycle of "psychological disorder–poor self-management–delayed wound healing". Empowerment-based psychological intervention is a patient-centered active nursing model, which focuses on stimulating patients' subjective initiative, improving disease cognition, and helping patients establish autonomous disease management awareness. Objective: To explore the application effect of standardized empowerment-based psychological intervention on negative emotion regulation, self-management ability improvement and wound healing promotion in patients with diabetic foot, so as to provide evidence-based nursing reference for clinical rehabilitation intervention of diabetic foot patients. Methods: A single-center prospective randomized controlled intervention study was conducted. A total of 126 patients with diabetic foot admitted to the endocrinology and wound care department of our hospital from January 2024 to July 2025 were enrolled and randomly divided into observation group and control group, with 63 cases in each group. The control group received routine diabetic foot nursing and health education, while the observation group received standardized empowerment-based psychological intervention on the basis of routine nursing. The intervention cycle was 8 weeks. Self-rating Anxiety Scale (SAS), Self-rating Depression Scale (SDS), Diabetic Foot Self-Management Scale, and wound healing rate were compared between the two groups before and after intervention. Results: Before intervention, there were no significant differences in SAS, SDS scores, self-management ability scores and wound area between the two groups ($P>0.05$). After 8 weeks of intervention, the SAS and SDS scores of the observation group were significantly lower than those of the control group ($P<0.05$); the total score and each dimension score of self-management ability were significantly higher than those of the control group ($P<0.05$); the wound healing rate was significantly higher, and the residual wound area was significantly smaller than the control group ($P<0.05$). Conclusion: Empowerment-based psychological intervention can effectively relieve anxiety and depression negative emotions in diabetic foot patients, significantly improve patients' disease self-management ability, accelerate wound healing, and improve clinical nursing and rehabilitation outcomes, which is worthy of clinical promotion and application.

Keywords: *diabetic foot; empowerment intervention; psychological nursing; negative emotion; self-management ability; wound healing; nursing intervention*

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1. Introduction

With the continuous escalation of global diabetes prevalence, the incidence of diabetic chronic complications has shown a continuous upward trend. Diabetic foot is one of the most serious and costly microvascular complications of diabetes, which is mainly manifested by foot sensory disturbance, skin ulceration, secondary infection, and even gangrene and amputation in severe cases (International Diabetes Federation [IDF], 2023). Epidemiological statistics show that the lifetime incidence of foot ulcers in diabetic patients is as high as 19%–34%, and the amputation rate of patients with unhealed refractory wounds is more than 10 times that of the general population, which brings heavy physical pain, economic burden and psychological pressure to patients and their families (Zhang et al., 2024). Long-term repeated wound exudation, dressing change pain, limited limb movement and repeated hospitalization make diabetic foot patients a high-risk group for psychological disorders.

Negative emotions such as anxiety and depression are highly prevalent in diabetic foot patients. Relevant studies have confirmed that the incidence of moderate to severe negative emotions in hospitalized diabetic foot patients exceeds 60%, which is significantly higher than that in ordinary diabetic patients and other chronic disease patients (Li & Wang, 2023). Negative psychological state will affect the body's neuroendocrine and immune regulation function, lead to elevated blood glucose fluctuation, reduce local skin tissue repair ability, inhibit inflammatory factor clearance and epithelial cell proliferation, and further delay wound healing progress (Chen et al., 2023). At the same time, bad mood will reduce patients' treatment cooperation and self-management initiative, resulting in irregular diet, poor foot care, unstandardized medication, and repeated wound deterioration, forming a closed-loop vicious cycle affecting disease prognosis (Liu et al., 2024).

Clinical routine nursing for diabetic foot mainly focuses on wound debridement, dressing change, blood glucose monitoring, dietary guidance and basic health education, which mostly belongs to passive indoctrination nursing mode (Wang et al., 2023). Routine nursing can solve basic nursing problems, but it ignores patients' subjective psychological needs and individual emotional differences, lacks targeted psychological intervention and patient empowerment guidance, and cannot fundamentally improve patients' autonomous disease management awareness and psychological adaptation ability (Zhou et al., 2023). For chronic refractory diseases such as diabetic foot, passive nursing can only achieve superficial nursing effects, while active participation and autonomous management of patients are the core key to long-term disease control and wound rehabilitation.

Empowerment-based psychological intervention is a new type of patient-centered active nursing intervention model derived from health empowerment theory. Different from traditional passive psychological counseling, empowerment intervention focuses on breaking patients' negative disease cognition, stimulating their internal motivation for disease management, helping patients master professional disease knowledge and self-care skills, and enabling patients to independently assume the responsibility of disease management (García et al., 2022). In recent years, empowerment psychological intervention has been gradually applied in chronic disease nursing such as diabetes and hypertension, but there are few standardized and systematic intervention studies targeting diabetic foot patients, and the intervention mechanism and quantitative efficacy on patients' negative emotions, self-management and wound healing need further systematic verification (Huang et al., 2024).

Based on the above research gaps, this study constructed a standardized and targeted empowerment-based psychological intervention program for diabetic foot patients, set up a routine nursing control group, and adopted prospective randomized controlled research design to systematically analyze the intervention effect of this model on patients' psychological state, self-management ability and wound rehabilitation. The purpose is to provide standardized, evidence-based and operable new nursing intervention methods for clinical diabetic foot rehabilitation nursing, and improve the overall nursing quality and long-term prognosis of diabetic foot patients.

2. Materials and Methods

2.1 Study Design and Participants

This study adopted a prospective, single-center, randomized controlled intervention study design. The research subjects were hospitalized patients with diabetic foot treated in the Endocrinology Department and Chronic Wound Care Center of our hospital from January 2024 to July 2025. A total of 126 patients who met the inclusion criteria were enrolled, and they were randomly divided into observation group (empowerment psychological intervention + routine nursing) and control group (routine nursing) by random number table method, with 63 cases in each group. This study was approved by the hospital ethical review committee, and all patients signed informed consent voluntarily.

2.2 Inclusion and Exclusion Criteria

Inclusion criteria: (1) Meet the international diagnostic criteria for diabetic foot formulated by IDF, and grade 1–3 diabetic foot ulcers; (2) Age 40–75 years, clear consciousness, normal language expression and communication ability; (3) Course of diabetes ≥ 5 years, first onset or recurrent foot ulcer with stable vital signs; (4) Complete clinical data, able to cooperate with intervention training and follow-up evaluation; (5) Voluntary participation in the study and signing informed consent.

Exclusion criteria: (1) Combined with severe diabetic nephropathy, diabetic encephalopathy, cardiovascular and cerebrovascular severe complications; (2) Combined with malignant tumor, severe immune system disease or infectious diseases; (3) Pre-existing mental illness, cognitive dysfunction or long-term use of psychotropic drugs; (4) Severe foot gangrene requiring emergency amputation; (5) Dropped out of the study, poor intervention compliance or incomplete follow-up data.

2.3 Intervention Methods

2.3.1 Control group

The control group received routine diabetic foot standardized nursing intervention throughout the 8-week intervention cycle. The main contents included: regular blood glucose monitoring and hypoglycemic drug guidance, strict low-sugar and high-fiber dietary nursing, routine foot wound debridement, disinfection and sterile dressing change, prevention of wound infection, basic foot skin care guidance, and conventional oral health education on diabetic foot disease knowledge, daily precautions and rehabilitation knowledge. Regular ward rounds and condition observation were performed every day, and symptomatic nursing was given according to patients' physical discomfort.

2.3.2 Observation group

On the basis of all routine nursing measures in the control group, the observation group received standardized empowerment-based psychological intervention, which was divided into four core modules: disease cognition empowerment, negative emotion empowerment, self-management skill empowerment, and social support empowerment. The intervention was implemented by professionally trained specialized nurses, with one-on-one targeted intervention + group centralized intervention combined mode, 3 times a week, 40 minutes each time, for a total of 8 weeks of standardized intervention.

(1) Disease cognition empowerment: Combined with patients' educational level and disease cognition status, personalized disease knowledge popularization was carried out. Through picture albums, short videos and case explanation, the pathogenesis of diabetic foot, wound healing influencing factors, blood glucose management importance and complication prevention knowledge were explained in detail. Correct patients' wrong cognition such as "incurable wound" and "fear of treatment", eliminate their blind worry about the disease, and establish objective and rational disease cognition.

(2) Negative emotion empowerment intervention: Regular psychological assessment was performed for patients. For patients with anxiety and depression, one-on-one emotional communication and psychological guidance were adopted to encourage patients to take the initiative to vent negative emotions. Guide patients to master self-emotion regulation skills such as breathing relaxation training, music

relaxation and positive psychological suggestion. Help patients recognize the adverse effects of negative emotions on wound healing and blood glucose control, and stimulate their subjective initiative of active emotional regulation.

(3) Self-management skill empowerment: Conduct systematic training on diabetic foot self-management skills, including standard foot cleaning and care methods, daily foot self-inspection skills, reasonable exercise guidance, scientific diet matching, standardized medication and blood glucose self-monitoring methods. Let patients independently master whole-process self-care skills, change passive acceptance of nursing into active autonomous management, and improve long-term disease management ability.

(4) Social support empowerment: Communicate with patients' family members, popularize diabetic foot nursing knowledge to family caregivers, guide families to provide positive emotional companionship and life care for patients, reduce patients' sense of loneliness and inferiority. Encourage patients to communicate with fellow patients in the ward, share rehabilitation experience, build mutual encouragement and mutual support rehabilitation atmosphere, and enhance patients' rehabilitation confidence and treatment persistence.

2.4 Observation Evaluation Indicators

2.4.1 Negative emotions: Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) were used to evaluate patients' anxiety and depression levels before and after intervention. The higher the score, the more severe the negative emotion.

2.4.2 Self-management ability: The self-compiled Diabetic Foot Self-Management Evaluation Scale was adopted, including four dimensions: blood glucose management, foot care, diet and exercise management, and medication compliance. The total score range is 0–100 points, and the higher the score, the better the patient's self-management ability.

2.4.3 Wound healing effect: Record the wound area of patients before and after intervention, calculate the wound healing rate, and evaluate the wound rehabilitation effect. Wound healing rate = (pre-intervention wound area - post-intervention wound area) / pre-intervention wound area × 100%.

2.5 Statistical Analysis

SPSS 26.0 statistical software was used for data analysis. Measurement data conforming to normal distribution were expressed as mean ± standard deviation ($\bar{x} \pm s$). Independent sample t-test was used for inter-group comparison, and paired t-test was used for intra-group comparison before and after intervention. Counting data were expressed as rate (%), and χ^2 test was used for comparison. $P < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1 Baseline Data Comparison

A total of 126 patients completed the intervention and follow-up, with no loss to follow-up in both groups. There were no statistically significant differences in age, gender, diabetes course, wound grade, educational level and baseline SAS, SDS, self-management scores between the two groups before intervention ($P > 0.05$). The baseline data of the two groups were balanced and comparable, which met the requirements of randomized controlled intervention study.

3.2 Comparison of Negative Emotion Scores Before and After Intervention

Before intervention, there was no significant difference in SAS and SDS scores between the two groups ($P > 0.05$). After 8 weeks of intervention, the SAS and SDS scores of both groups were significantly lower than those before intervention ($P < 0.05$). After intervention, the SAS (42.36 ± 3.58) and SDS (41.25 ± 3.26) scores of the observation group were significantly lower than those of the control group (SAS: 48.62 ± 4.15 , SDS: 47.38 ± 3.92), and the inter-group difference was statistically significant ($P < 0.05$). It indicated that empowerment psychological intervention could more effectively relieve patients' anxiety and depression negative emotions.

3.3 Comparison of Self-Management Ability Scores

Before intervention, the total score and each dimension score of self-management ability of the two groups were basically consistent, with no statistical difference ($P>0.05$). After intervention, the self-management total score, blood glucose management, foot care, diet exercise and medication compliance scores of the two groups were significantly improved compared with baseline ($P<0.05$). The total self-management score of the observation group (82.35 ± 6.12) was significantly higher than that of the control group (71.68 ± 5.89), and each dimension score was significantly better than the control group ($P<0.05$).

3.4 Comparison of Wound Healing Effect

Before intervention, there was no significant difference in wound area between the two groups ($P>0.05$). After 8 weeks of intervention, the wound area of both groups was significantly reduced, and the wound healing rate of the observation group (78.65 ± 8.32)% was significantly higher than that of the control group (62.38 ± 7.96)%, and the difference was statistically significant ($P<0.05$). No wound deterioration or new infection occurred in either group during the intervention period.

4. Discussion

Diabetic foot is a chronic refractory disease with long rehabilitation cycle and poor prognosis, and its rehabilitation effect is not only affected by physical pathological factors such as blood glucose level and local wound microenvironment, but also closely related to patients' psychological state and disease self-management behavior (Jiang et al., 2023). Traditional routine nursing focuses on passive disease care and health education, ignores patients' subjective psychological experience and autonomous management potential, resulting in limited long-term nursing effect, which is difficult to meet the individualized rehabilitation needs of diabetic foot patients (Su et al., 2024).

This study showed that after standardized empowerment-based psychological intervention, the anxiety and depression levels of diabetic foot patients were significantly reduced, and the negative emotion improvement effect was significantly better than that of routine nursing group. The core mechanism is that empowerment intervention breaks the indoctrination-type nursing mode, takes patients' psychological needs as the starting point, corrects patients' negative disease cognition through cognitive empowerment, helps patients correctly understand the disease rehabilitation rules, and eliminates the negative psychology of pessimism, fear and abandonment of treatment (Miao et al., 2023). At the same time, targeted emotional guidance and relaxation training enable patients to master active emotional regulation methods, effectively relieve long-term disease-induced emotional pressure, and improve patients' psychological adaptation and disease coping ability.

This study also confirmed that empowerment psychological intervention can significantly improve the self-management ability of diabetic foot patients. Different from traditional passive health education, skill empowerment and cognition empowerment enable patients to systematically master professional disease management and foot care skills, clarify the importance of standardized self-management for wound healing and disease control, and transform external nursing supervision into internal autonomous management motivation (Zhang et al., 2023). Under the guidance of empowerment nursing, patients' medication compliance, blood glucose self-monitoring initiative, daily foot care standardization and diet exercise management level are comprehensively improved, which provides a solid behavioral guarantee for disease rehabilitation.

Good psychological state and standardized self-management behavior are important prerequisites for promoting wound healing. On the one hand, the relief of negative emotions can stabilize the body's neuroendocrine level, reduce stress hormone secretion, avoid blood glucose fluctuation caused by emotional tension, and improve the local microcirculation and immune repair ability of foot wounds (Chen & Liu, 2024). On the other hand, efficient self-management can ensure long-term stable blood glucose control, avoid repeated wound infection and deterioration caused by irregular nursing, create a good internal environment for wound epithelial cell proliferation and

tissue repair, and effectively accelerate wound healing progress (Wang et al., 2024). This study's wound healing data further verified the positive chain reaction of "empowerment intervention-improved psychology-optimized behavior-promoted rehabilitation".

In addition, social support empowerment in the intervention model builds a good family and peer rehabilitation atmosphere for patients, effectively reduces patients' sense of social isolation and inferiority, enhances patients' rehabilitation confidence and treatment persistence, and avoids treatment interruption and poor compliance caused by negative emotions (Yang et al., 2024). Compared with single psychological counseling, multi-dimensional empowerment intervention covers cognition, emotion, skill and social support, with more comprehensive intervention dimensions and more lasting clinical effect, which is more suitable for long-term rehabilitation nursing of chronic diabetic foot diseases.

5. Study Limitations and Clinical Enlightenment

This study is a single-center small-sample intervention study with a short intervention cycle of only 8 weeks, which can only verify the short-term intervention effect of empowerment psychological intervention. Long-term follow-up is lacking to observe the long-term recurrence rate of foot ulcers and long-term self-management maintenance effect of patients. In addition, this study only included patients with grade 1–3 diabetic foot, and the applicability to severe gangrene patients needs further verification. Future research can carry out multi-center, large-sample randomized controlled trials, extend the intervention and follow-up cycle, and conduct subgroup analysis according to disease severity, age and educational level to further optimize the individualized empowerment intervention scheme.

Clinically, nursing staff should change the traditional passive nursing concept, attach importance to the psychological stress and emotional problems of diabetic foot patients, and actively promote empowerment-based active psychological intervention model. Through multi-dimensional cognition, emotion, skill and social empowerment, patients' internal rehabilitation motivation can be stimulated, patients' psychological state and self-management behavior can be fundamentally improved, and the overall rehabilitation quality of diabetic foot patients can be comprehensively improved.

6. Conclusion

Empowerment-based psychological intervention, as a new patient-centered active nursing model, has significant clinical application value in diabetic foot rehabilitation nursing. Standardized multi-dimensional empowerment intervention can effectively alleviate anxiety and depression negative emotions in diabetic foot patients, comprehensively improve patients' disease self-management ability and treatment compliance, stabilize blood glucose level, improve wound local repair microenvironment, and significantly accelerate foot wound healing. The intervention model has safe and reliable short-term clinical effect, comprehensive intervention dimensions and strong clinical operability, which can make up for the deficiencies of traditional routine nursing, and is worthy of popularization and application in clinical chronic wound nursing and diabetic foot rehabilitation intervention.

7. References

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