

# Analysis of the Application Effect of Structured Healthcare Education in Brittle Diabetic Patients

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**Abstract:** *Objective:* To explore the application effect of structured healthcare education in patients with brittle diabetes mellitus. *Methods:* 188 brittle diabetic patients admitted to our hospital from May 2021 to December 2023 were selected as the study subjects, and were divided into the control group ( $n = 94$ ) and the observation group ( $n = 94$ ) according to the random number table method. The control group used conventional nursing intervention and the observation group used structured healthcare education. The general information, glycemic indexes, self-efficacy, compliance, and nursing satisfaction of patients in the two groups were observed. *Results:* There was no statistical significance in the basic information of the two groups of patients ( $P > 0.05$ ); after the intervention, the fasting plasma glucose, 2-hour postprandial blood glucose, and HbA1c of the patients in the observation group were lower than those of the control group ( $P < 0.001$ ); after the intervention, the self-efficacy scores of the patients in the two groups increased, and the scores of the observation group were significantly higher than those of the control group ( $P < 0.001$ ); the total adherence rate of the patients in the observation group (90/95.75%) was significantly higher than that of the control group (80/90.10%) ( $\chi^2 = 6.144, P < 0.05$ ); and the total satisfaction rate of patients in the observation group (92/97.87%) was significantly higher than that of the control group (78/82.98%) ( $\chi^2 = 12.042, P < 0.05$ ). *Conclusion:* In patients with brittle diabetes mellitus, structured healthcare education can effectively control patients' blood glucose levels, improve patients' self-efficacy and adherence, and enhance patient satisfaction.

**Keywords:** Structured healthcare education; Brittle diabetes mellitus; Application effect

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## 1. Introduction

Diabetes mellitus, as a chronic metabolic disease, has shown a global trend of increasing incidence year by year<sup>[1]</sup>. Among them, brittle diabetes mellitus, as a special type of diabetes, is characterized by large fluctuations in blood glucose and control difficulty, which brings great challenges to the quality of life and health status of patients. Therefore, nursing education for patients with brittle diabetes is particularly important. With the transformation of the medical model and the updating of nursing concepts, nursing education has gradually changed from traditional disease care to structured healthcare. Structured healthcare education has arisen in this context, which emphasizes patient-centeredness and enables patients to acquire knowledge and skills in disease

management and improve self-management ability through systematic and continuous education and training. In patients with brittle diabetes, structured healthcare education can not only help them better control their blood glucose levels and reduce the occurrence of complications, but also improve their quality of life and enhance their psychological health [2]. The purpose of this paper is to explore the application effect of structured healthcare education in patients with brittle diabetes mellitus. By comparing and analyzing the differences in glycemic control and self-management ability between brittle diabetic patients who received structured healthcare education and those who received conventional nursing interventions, we aim to provide useful references and lessons for clinical nursing practice, and further promote the application and development of structured healthcare education in the field of diabetes care.

## 2. General information and methods

### 2.1. General information

188 cases of patients with brittle diabetes mellitus admitted to our hospital from May 2021 to December 2023 were selected as research subjects, and were divided into the control group ( $n = 94$ ) and the observation group ( $n = 94$ ) according to the random number table method. There was no significance in the basic information statistics of the two groups of patients ( $P > 0.05$ ).

Inclusion criteria: (1) patients diagnosed with brittle diabetes mellitus, with extremely unstable blood glucose levels, prone to hyperglycemia or hypoglycemia; (2) patients possessing sufficient cognitive ability to understand and accept the content of health education; (3) patients voluntarily agreeing to participate in the study and signing the informed consent form.

Exclusion criteria: (1) patients suffering from serious complications; (2) patients in pregnancy or breastfeeding; (3) patients suffering from other serious diseases, such as heart disease, lung tumor, etc.; (4) patients having serious mental health problems and unable to cooperate with the study.

### 2.2. Methods

The control group used conventional nursing interventions. It included monitoring patients' blood glucose levels regularly; providing personalized dietary guidance for the patients; developing an exercise plan suitable for the patients according to their physical conditions and interests; ensuring that the patients took glucose-lowering drugs on time and in the right amount, and adjusting the drug dosage as needed; distributing health promotion pamphlets; and conducting regular follow-up visits.

The observation group adopted structured healthcare education. Structured healthcare education for brittle diabetic patients is a systematic and continuous process.

- (1) First training: Through lectures and videos, the basic knowledge of brittle diabetes mellitus and disease cognition were introduced, so that patients could understand the basic concepts, types, symptoms, diagnostic methods, and treatment principles of diabetes mellitus;
- (2) Second training: Diet and exercise management was carried out through lectures, demonstrations, and group activities. On the basis of reviewing the basics of the first training, patients were instructed to formulate a personalized diet plan and exercise program, with dietary choices of low-sugar and low-calorie foods, and an exercise program that may include, for example, walking, swimming, yoga, etc.;
- (3) Third training: Medication and blood glucose monitoring methods were introduced through lectures, demonstrations, and hands-on practice. It included introducing the role and administration of various types of hypoglycemic drugs, the use of insulin and precautions, the frequency and methods of blood glucose monitoring, and methods to adjust diet and medication according to the results of blood glucose

monitoring. This enabled patients to understand the importance of medication and master the methods and techniques of blood glucose monitoring;

- (4) Fourth training: The prevention of complications and psychological adjustment was carried out to do a good job of foot care, fundoscopic examination, and other methods of self-examination, and at the same time, also carrying out the methods of psychological adjustment, such as meditation, breathing exercises, and the search for social support, to improve the patient's awareness of complications, learn prevention methods, and enhance the ability to cope with the disease.

### 2.3. Observation indicators

- (1) General information: Gender, average age, weight, average duration of disease.
- (2) Glucose indicators: Fasting plasma glucose (FPG), 2-hour postprandial glucose, glycated hemoglobin (HbA1c).
- (3) Self-efficacy score: Patients' self-efficacy was assessed using the Diabetes Management Self-Efficacy Scale (C-DMSES), which contains four dimensions, namely, exercise and body weight, nutrition and diet, medication and treatment, and blood glucose and foot monitoring, with higher scores indicating higher self-efficacy.
- (4) Adherence: A self-administered adherence scale was used to assess patients' adherence to care.
- (5) Satisfaction: Patient satisfaction was assessed using the Newcastle Satisfaction with Nursing Scales (NSNS)

### 2.4. Statistical methods

Statistical processing was performed with SPSS20.0, and the measurement data were expressed using mean  $\pm$  standard deviation (SD), and the two-sample *t*-test and  $\chi^2$  test were used for comparison between groups, with  $P < 0.05$  as the difference being statistically significant.

## 3. Results

### 3.1. Comparison of general information of patients in the two groups

As shown in Table 1, the basic information of the two groups of patients was not statistically significant ( $P > 0.05$ ).

**Table 1.** Comparison of general information of patients in two groups

Groups	Gender (male/female)	Average age	Weight	Average duration of disease
Control group ( $n = 94$ )	56/38	56.58 $\pm$ 4.03	62.31 $\pm$ 4.25	10.23 $\pm$ 5.34
Observation group ( $n = 94$ )	60/34	56.68 $\pm$ 4.01	62.65 $\pm$ 4.35	10.36 $\pm$ 5.46
$\chi^2/t$	0.360	0.171	0.542	0.165
<i>P</i>	0.548	0.865	0.588	0.869

### 3.2. Comparison of blood glucose levels between the two groups of patients before and after intervention

As shown in Table 2, after the intervention, the FPG, 2-hour postprandial blood glucose, and HbA1c of the patients in the observation group were lower than those in the control group ( $P < 0.001$  for all).

**Table 2.** Comparison of blood glucose levels before and after intervention in the two groups of patients

Groups	FPG (mmol/L)		2-hour postprandial blood glucose (mmol/L)		HbA1c (%)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group ( <i>n</i> = 94)	10.51 ± 2.36	8.67 ± 2.15	14.67 ± 3.34	11.68 ± 3.25	8.65 ± 1.54	8.26 ± 1.35
Observation group ( <i>n</i> = 94)	10.56 ± 2.31	7.21 ± 1.56	14.52 ± 3.25	9.62 ± 3.11	8.74 ± 1.63	7.15 ± 1.15
<i>t</i>	0.204	5.329	0.312	4.440	0.389	6.068
<i>P</i>	0.839	0.000	0.755	0.000	0.698	0.000

### 3.3. Comparison of self-efficacy scores of patients in two groups

As shown in **Table 3**, after the intervention, the self-efficacy scores of the patients in both groups increased, and the scores of the observation group were significantly higher than those of the control group ( $P < 0.001$ ).

**Table 3.** Comparison of self-efficacy scores between the two groups

Groups	Exercise and weight		Nutrition and diet		Medications and treatments		Blood glucose and foot monitoring	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group ( <i>n</i> = 94)	18.75 ± 3.88	21.62 ± 4.26	55.23 ± 9.21	65.32 ± 10.27	15.29 ± 3.62	18.39 ± 3.84	17.85 ± 3.88	21.35 ± 5.54
Observation group ( <i>n</i> = 94)	18.79 ± 3.92	25.36 ± 5.23	54.63 ± 9.16	70.31 ± 11.26	15.32 ± 3.58	21.65 ± 4.12	17.69 ± 3.92	25.64 ± 5.87
<i>t</i>	0.070	5.376	0.448	3.175	0.057	5.612	0.281	5.153
<i>P</i>	0.944	0.000	0.655	0.002	0.955	0.000	0.779	0.000

### 3.4. Comparison of patient adherence between the two groups

As shown in **Table 4**, the overall compliance rate of patients in the observation group (90/95.75%) was significantly higher than that of the control group (80/90.10%) ( $\chi^2 = 6.144$ ,  $P < 0.05$ ).

**Table 4.** Comparison of adherence between the two groups

Groups	Full adherence	Partial adherence	Non-adherence	Total adherence rate
Control group ( <i>n</i> = 94)	48 (51.06%)	32 (34.04%)	14 (14.89%)	80 (90.10%)
Observation group ( <i>n</i> = 94)	72 (76.60%)	18 (19.15%)	4 (4.26%)	90 (95.75%)
$\chi^2$	-	-	-	6.144
<i>P</i>	-	-	-	0.013

### 3.5. Comparison of patient satisfaction between the two groups

As shown in **Table 5**, the overall satisfaction rate of patients in the observation group (92/97.87%) was significantly higher than that of the control group (78/82.98%) ( $\chi^2 = 12.042$ ,  $P < 0.05$ ).



**Table 5.** Comparison of patient satisfaction between the two groups

Groups	Very satisfied	Fairly satisfied	Dissatisfied	Total satisfaction rate
Control group ( <i>n</i> = 94)	46 (48.94%)	32 (34.04%)	16 (17.02%)	78 (82.98%)
Observation group ( <i>n</i> = 94)	65 (69.15%)	27 (28.72%)	2 (2.13%)	92 (97.87%)
$\chi^2$	-	-	-	12.042
<i>P</i>	-	-	-	0.001

#### 4. Discussion

Brittle diabetes mellitus, also known as “unstable diabetes mellitus,” is a type of diabetes mellitus in which blood glucose fluctuates significantly and is difficult to control. The instability of this condition is mainly due to the complete failure of the patient’s pancreatic islet function, which makes the patient completely dependent on exogenous insulin for glycemic control. However, the significant differences between exogenous insulin and physiological insulin secretion in terms of pharmacogenetic characteristics and regulation, coupled with the lack of effective co-regulation, result in frequent and large fluctuations in blood glucose, both high and low. Brittle diabetes mellitus is mainly seen in patients with type 1 diabetes mellitus as well as in certain patients with advanced type 2 diabetes mellitus with near-islet failure [3]. For these patients, due to the loss of islet function, blood glucose regulation becomes extremely difficult and they are prone to extremes of hypoglycemia and hyperglycemia. Hypoglycemia may lead to symptoms such as panic, sweating, and shaking hands, which may even be life-threatening in severe cases; whereas hyperglycemia may lead to a variety of complications, such as retinopathy, nephropathy, neuropathy, etc., which seriously affects the quality of life of patients [4,5]. Therefore, for patients with brittle diabetes mellitus, in addition to conventional medication and blood glucose monitoring, it is particularly important to strengthen healthcare education and improve patients’ self-management ability.

This study pointed out that after the intervention, the FPG, 2-hour postprandial blood glucose, and HbA1c of the patients in the observation group were lower than those of the control group (all  $P < 0.001$ ), indicating that structured healthcare education can effectively control the blood glucose level of patients with brittle diabetes mellitus. As a systematic and targeted nursing approach, structured healthcare education can help patients with brittle diabetes better master core skills such as diet management, exercise, medication, and blood glucose monitoring. These skills can help patients adjust their treatment plans more accurately and avoid large fluctuations in blood glucose. In addition, structured healthcare education emphasizes patient participation and self-management, enabling patients to be more proactive in monitoring and adjusting their blood glucose levels in their daily lives, thereby improving treatment outcomes and quality of life.

This study also revealed that after the intervention, all self-efficacy scores of patients in both groups increased, and all scores of the observation group were significantly higher than those of the control group (all  $P < 0.001$ ), confirming the advantages of structured healthcare education in improving patients’ self-efficacy, which is because the method not only provides knowledge and skills, but also helps brittle diabetic patients build their self-confidence and self-efficacy through training and practice [6]. During the education process, patients have the opportunity to personally participate and practice, such as developing dietary plans and performing exercise workouts, and these practical experiences make patients feel empowered to control and manage their condition [7]. In addition, structured healthcare education also focuses on psychological support and emotional care to help patients establish a positive mindset and the courage to face difficulties, further improving self-efficacy.

This study also found that the total adherence rate of patients in the observation group (90/95.75%) was significantly higher than that of the control group (80/90.10%) ( $\chi^2 = 6.144$ ,  $P < 0.05$ ), which indicates

that the method is also effective in improving patients' treatment adherence. This is because the method makes brittle diabetic patients more aware of the dangers of diabetes and the need for treatment through systematic and continuous education and training. Through education, patients are able to recognize the importance of behaviors such as taking medication on time, exercising regularly, and eating sensibly in controlling their condition, which leads to more conscious adherence to the treatment plan. In addition, structured healthcare education provides professional guidance and feedback to help patients solve problems and confusions encountered in the process of disease management in a timely manner, and enhances patients' trust and acceptance of the treatment plan, thus improving treatment adherence. The satisfaction rate of patients who receive structured healthcare education also increases, which is due to the fact that this method can provide personalized, comprehensive, and systematic healthcare services for patients. During the education process, patients feel cared for and supported by the healthcare team, and their questions and concerns are answered and guided promptly. This comprehensive and thoughtful service makes patients feel respected and cared for, enhances their trust in the healthcare team, and in turn promotes satisfaction <sup>[8]</sup>.

## 5. Conclusion

In conclusion, structured healthcare education for patients with brittle diabetes mellitus can effectively control patients' blood glucose levels, improve patients' self-efficacy and adherence, and enhance patient satisfaction.

## Disclosure statement

The author declares no conflict of interest.

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