

Review Article

Effects of high-quality nursing on cognitive impairment of patients with both diabetes and heart failure and risk event incidence in them

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Abstract: Objective: To analyze the effects of high-quality nursing on cognitive impairment of patients with both diabetes and heart failure and risk event incidence in them. Methods: Altogether 165 patients with both diabetes and heart failure nursed under a high-quality nursing mode in our hospital were enrolled as an observation group, and 158 patients with both diseases nursed under a routine nursing mode in our hospital were selected as a control group. The two groups were compared in terms of the Mini-Mental State Examination (MMSE) result and risk event incidence before and after nursing. Results: Before nursing intervention, the two groups had no obvious difference in various indexes ($P > 0.05$), while after it, the observation group showed better heart rate and pulse than the control group ($P < 0.001$), and both groups got significantly improved MMSE score, but the observation group got a higher score than the control group ($P < 0.05$). In addition, after nursing intervention, the two groups showed improved heart function indexes, and the observation group showed better heart function indexes than the control group ($P < 0.001$). The observation group showed a lower incidence of hypoglycemia, and a higher rate of achieving targeted blood pressure than the control group (both $P < 0.05$). After intervention, the two groups got a significantly decreased bad emotion score and a significantly improved life quality score, and the observation group showed a lower bad emotion score and a higher life quality score than the control group. Furthermore, the observation group showed a markedly lower rate of nursing error, lower complaint rate, and higher nursing satisfaction than the control group (all $P < 0.05$). Conclusion: For patients with both diabetes and heart failure, high-quality nursing can improve their life quality and cognitive functions, and lower risk event incidence in them, so it is of relatively high application value.

Keywords: High-quality nursing, diabetes comorbid with heart failure, cognitive impairment, risk event

Introduction

Diabetes is a common clinical endocrine disease with high morbidity. According to statistics, more than 4,510,000 people worldwide suffer from it, and many studies have reported that it is often accompanied by various diseases in occurrence, of which heart failure is a common complication. With the aging of population, both diabetes and heart failure show an increased morbidity in the world, and their prognosis is poor due to the difficulty of treating them. Statistically, 1.5-2% of the elderly suffer from the two diseases at the same time. It is

expected that the prevalence of the two diseases will increase exponentially in the coming decades, and the risk of death for it will increase by 40-80% [1-4]. Patients with diabetes and heart failure are usually overwhelmed with different degrees of negative emotions during treatment, such as anxiety and depression, which seriously compromises their life quality. A previous study revealed that the self-care mode of patients with both diabetes and heart failure was relatively complicated, and its suggestion on diet, behavior, drugs, and others was different [5]. A study tested the comprehensive nursing intervention mode on patients with both

diabetes and heart failure, and found that the mode could significantly improve their life quality and alleviate their adverse emotions [4]. However, this study did not test other outcomes such as hospitalization and clinical indexes, so it has certain limitations.

With the continuous development of society, peoples' living standards are gradually improving, and the clinical attention to nursing is also gradually increasing, so the nursing requirements are more and more strict and clear, and conventional nursing methods are unable to meet the requirements of modern society now. Therefore, it is extremely important to find a nursing mode that can meet the needs of people to the greatest extent [6, 7]. High-quality nursing is a patient-centered intervention with improved service concept, strengthened basic nursing, and intensified implementation of the responsibility system of nursing staff [8]. A study by Wu and others revealed that high-quality nursing could significantly alleviate anxiety and depression of acute stroke patients in MRI examination, and enjoyed a good application value in improving the examination completion rate, shortening examination time, and lifting nursing satisfaction [8]. However, there has been no study on high-quality nursing in patients with both diabetes and heart failure at present.

This study aimed to compare the effects of routine nursing and high-quality nursing on cognitive impairment and risk event incidence in patients with both diabetes and heart failure, so as to explore the application value of high-quality nursing in the two comorbid diseases.

Methods

General materials

A total of 165 patients with both diabetes and heart failure nursed under a high-quality nursing mode in our hospital were enrolled as an observation group, and 158 patients with the two diseases nursed under a routine nursing mode were selected as a control group. The observation group consisted of 98 males and 67 females, with an average age of 64.28 ± 8.21 years and body mass index (BMI) of 25.79 ± 4.28 kg/m², including 86 patients in II stage and 79 patients in III stage of the New York Heart Association (NYHA) classification. The control

group consisted of 93 males and 65 females, with an average age of 65.01 ± 8.39 years and BMI of 26.11 ± 4.31 kg/m², including 83 patients in II stage and 75 patients in III stage of NYHA classification. The study was approved by the Ethics Committee. Each subject signed a full informed consent form after understanding the study in detail.

The inclusion criteria were as follows: patients confirmed with diabetes based on their symptoms, fasting blood glucose, glucose tolerance, etc.; patients confirmed with heart failure based on echocardiography, clinical signs and symptoms, B-type natriuretic peptide, amino terminal B-type natriuretic peptide precursor level, etc.; and patients able to actively cooperate with the work and accompanied by family members.

The exclusion criteria were as follows: patients without complete clinical data; patients with other severe diseases such as autoimmune disease, renal failure, and severe hematological diseases; patients with psychiatric history or family history of hereditary psychosis; and patients with liver or kidney dysfunction.

Nursing methods

Patients in the control group were nursed under a routine nursing mode as follows: the changes of their vital signs were monitored on a daily basis, and the nursing staff were arranged to tell the patients to arrange their rest and sleep time reasonably, to record and care about those with early symptoms of anxiety and depression, and to ask special personnel to accompany them. The nursing staff were also arranged to communicate more with the patients to relieve the tense atmosphere in the ward during the treatment, and to maintain a quiet and comfortable environment. Patients in the observation group were nursed as follows: (1) High-quality team: a special nursing team was set up, and the team was equipped with professional knowledge, and had a good mastery of key points and matters needing attention during nursing. The team was trained regularly in terms of professional knowledge and nursing about diabetes comorbid with heart failure. They designed a personalized and humanized nursing scheme for each patient according to his/her condition, and urged the patient to implement them. (2) Psychological

intervention: the nursing staff were arranged to assess the psychological state of the patients according to their personality, family background, and others, to introduce adverse effects of negative emotions to the patients and their family members, to patiently answer the questions from the patients, and to provide psychological soothe for them to help them hold a positive and correct attitude towards their diseases. If necessary, the staff were arranged to invite psychologists to participate in psychological intervention and to introduce good control cases to the patients to strengthen their confidence against diseases. (3) Diet intervention: a reasonable and healthy daily diet scheme was developed according to the patient's own physical quality. The patients' total calorie intake was controlled, and it was recommended to reduce salt, sugar and fat intake, and to stop taking high-calorie food. The total caloric intake of each patient was calculated according to his/her body needs, nutritional status and exercise amount to ensure a reasonable and balanced intake of nutrients for them. The patients' weight changes were recorded and evaluated at intervals to avoid water-sodium retention. (4) Cognitive intervention: the nursing staff were arranged to introduce knowledge about diabetes and heart failure and the correlation between the two diseases to the patients patiently in different communication ways according to their actual educational level and cognition, and to actively answer their questions to improve their cognition from the root, namely the disease knowledge. (5) Behavioral intervention: the nursing staff were arranged to introduce knowledge about medication and treatment method of common adverse reactions to the patients with an appropriate method selected according to their personality and situation to help them understand the importance of medication under advice from the doctor/physician. The staff regularly fed back the disease of each patient to doctors, patiently guided them to take medication correctly, and also guided them to carry out appropriate muscle group training and 6-min walking training to relax body and mind. The staff told the patients to arrange their sleep and rest time reasonably and to develop good eating and lifestyle habits, and also paid attention to their physical quality and diurnal temperature variation. (6) Prevention of hypoglycemia: measures were

taken to avoid hypoglycemia during treatment as much as possible, and to monitor their clinical signs closely. The heart rate, pulse and body temperature of the patients were monitored. In case of any abnormal situation, measures were taken in time, and the situation was reported to doctors to ensure reasonable and timely treatment.

Observation indexes

1) The two groups were compared in changes of cardiac functions, pulse, and heart rate before and after nursing intervention; 2) Their cognitive functions before and after nursing intervention were assessed using the Mini-Mental State Examination (MMSE) [9], and a higher MMSE score indicated a better cognitive function. 3) The EORTC Quality of Life Questionnaire (QLQ-C30) was employed to assess life quality score of the two groups, and they were compared in the situation of achieving targeted blood pressure, hypoglycemia event incidence, risk event incidence, nursing satisfaction, etc. 4) The self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were adopted to assess the emotion changes of the two groups before and after nursing intervention [10, 11]. Higher score indicated more obvious anxiety and depression symptoms.

Statistical analysis

In this study, the collected data were statistically analyzed using SPSS20.0. Enumeration data were expressed by the number of cases/percentage [n (%)], and comparison between the two groups was carried out using χ^2 . Measurement data were expressed by the mean \pm standard deviation ($\bar{x} \pm sd$), and comparison between the two groups was conducted using the t test, and comparison of them before and after intervention was performed using the repeated measures analysis of variance. Post analysis was performed using the LSD-t test. $P < 0.05$ indicates a significant difference.

Results

Comparison in general clinical data

Statistical comparison between the two groups in general clinical data are shown in **Table 1**.

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Table 1. Comparison between the two groups in general clinical data ($\bar{x} \pm sd$)/n [%]

	The observation group (n=165)	The control group (n=158)	χ^2/t	P-value
Sex			0.009	0.922
Male	98 (59.39)	93 (58.86)		
Female	67 (40.61)	65 (41.14)		
Average age (Y)	64.28ge ag	65.01ge ag	0.790	0.430
BMI (kg/m ²)	25.79 kg/mg	26.11 kg/mg	0.669	0.504
Smoking or not?			0.487	0.825
Yes	52 (31.52)	48 (30.38)		
No	113 (68.48)	110 (69.62)		
Drinking or not?			0.159	0.690
Yes	45 (27.27)	40 (25.32)		
No	120 (72.73)	118 (74.68)		
Systolic blood pressure (mmHg)	127.78ic blo	129.13ic blo	0.773	0.440
Diastolic blood pressure (mmHg)	78.81olic b	79.03olic b	0.222	0.825
NYHA classification			0.005	0.941
II stage	86 (52.12)	83 (52.53)		
III stage	79 (47.88)	75 (47.47)		

Table 2. Comparison between the two groups in heart rate and pulse before and after intervention ($\bar{x} \pm sd$)

	Pulse (times/min)		Heart rate (times/min)	
	Before intervention	After intervention	Before intervention	After intervention
The observation group	108.43±24.39	84.13±16.47*	130.73±24.39	90.21±17.32*
The control group	107.74±23.43	95.39±17.53*	131.08±23.18	98.68±15.48*
t	0.299	4.875	0.154	3.719
P-value	0.765	<0.001	0.878	<0.001

Note: *indicates that in comparison with the same group before intervention, $P < 0.001$.

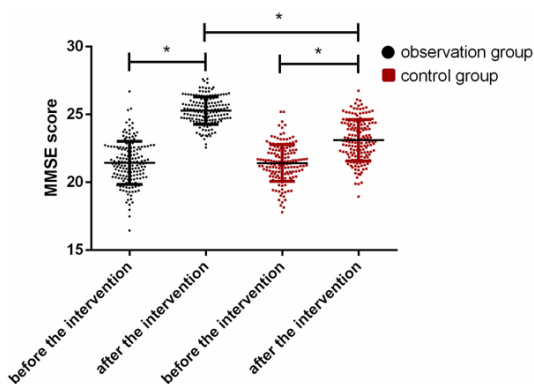


Figure 1. Comparison between the two groups in MMSE score. After intervention, both groups got significantly increased MMSE score ($P < 0.05$), and the observation group got a higher score than the control group ($P < 0.05$). Note: * indicates that in terms of comparison between two groups, $P < 0.05$.

The two groups had no significant difference in aspects including sex, average age, BMI, smok-

ing, drinking, systolic blood pressure, diastolic blood pressure, and NYHA classification (all $P > 0.05$).

Changes of heat rate and pulse

As shown in **Table 2**, before nursing intervention, the two groups had no distinct difference in respiratory (all $P > 0.05$), while after nursing intervention, both groups showed declined pulse and heart rate (both $P < 0.001$), and the observation group performed better in the two aspects than the control group (both $P < 0.001$).

Comparison between the two groups in MMSE score

As shown in **Figure 1**, before intervention, the two groups showed no obvious differences in MMSE score ($P > 0.05$), while after intervention, both groups got an increased MMSE score ($P < 0.05$), and the observation group got a higher score than the control group ($P < 0.05$).

Table 3. Changes of cardiac function indexes of the two groups ($\bar{x} \pm sd$)

	6MWT (m)		Left ventricular ejection fraction (%)		Cardiac output (L/min)	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
The observation group (n=165)	267.28±27.47	346.51±25.31*	43.78±4.43	55.34±6.09*	4.10±1.21	5.93±1.32*
The control group (n=158)	268.12±26.17	327.88±26.38*	43.65±4.51	54.07±6.43*	4.04±1.14	5.23±1.24*
t	0.286	6.353	0.215	1.823	0.438	5.113
P-value	0.775	<0.001	0.830	0.069	0.661	<0.001

Note: *indicates that in comparison with the same group before intervention, P<0.001.

Table 4. Comparison between the two groups in hypoglycemia event incidence and the situation of achieving goal blood pressure n [%]

	Hypoglycemia event incidence	Rate of achieving goal blood pressure
The observation group (n=165)	5 (3.03)	157 (95.15)
The control group (n=158)	20 (12.66)	115 (72.78)
X ²	10.480	30.370
P-value	0.001	<0.001

Changes of cardiac function indexes

According to **Table 3**, before intervention, the two groups had no difference in cardiac function indexes (P>0.05), while after intervention, the two groups showed increased cardiac output, left ventricular ejection fraction, and distance in six-minute walk test (6MWT) (all P<0.001), and the observation group was no different from the control group in left ventricular ejection fraction, but showed higher cardiac output and 6MWT distance than the control group (both P<0.001).

Comparison between the two groups in hypoglycemia event incidence and the situation of achieving goal blood pressure

Statistical comparisons between the two groups in hypoglycemia event incidence and the situation of achieving targeted blood pressure are shown in **Table 4**. It can be seen that the observation group showed a lower hypoglycemia event incidence and a higher rate of achieving targeted blood pressure than the control group (3.03% vs. 12.66%, P<0.05; 95.15% vs. 72.78%, P<0.001).

Comparison of psychological status of the patients

The psychological status score of the two groups before and after intervention is shown

in **Figure 2**. Before intervention, the two groups had no difference in psychological status score (P>0.05), while after intervention, the two groups got significantly decreased SAS and SDS scores (both P<0.05), and the observation group got significantly lower scores than the control group (both P<0.05).

Comparison between the two groups in life quality

Comparison between the two groups in life quality of five aspects (role function (RF), physical function (PF), cognitive function (CF), emotion function (EF), and social function (SF)) are shown in **Figure 3**. Before intervention, the two groups had no obvious difference in life quality score (P>0.05), while after intervention, the two groups showed increased scores in RF, PF, CF, EF, and SF (all P<0.05), and the observation group got significantly higher scores in the five aspects than the control group (all P<0.05).

Comparison between the two groups in nursing risk event incidence

After nursing intervention, the observation group showed a significantly lower rate of nursing error than the control group (1.27% vs. 6.06%, P<0.05), and the observation group had a significantly lower complaint rate than the control group (5.06% vs. 11.52%, P<0.05). See **Table 5**.

Comparison between the two groups in nursing satisfaction

The nursing satisfaction of the two groups is shown in **Figure 4**. The satisfaction rate of the observation group was 93.94%, and that of the control group was 80.38%, so the former is

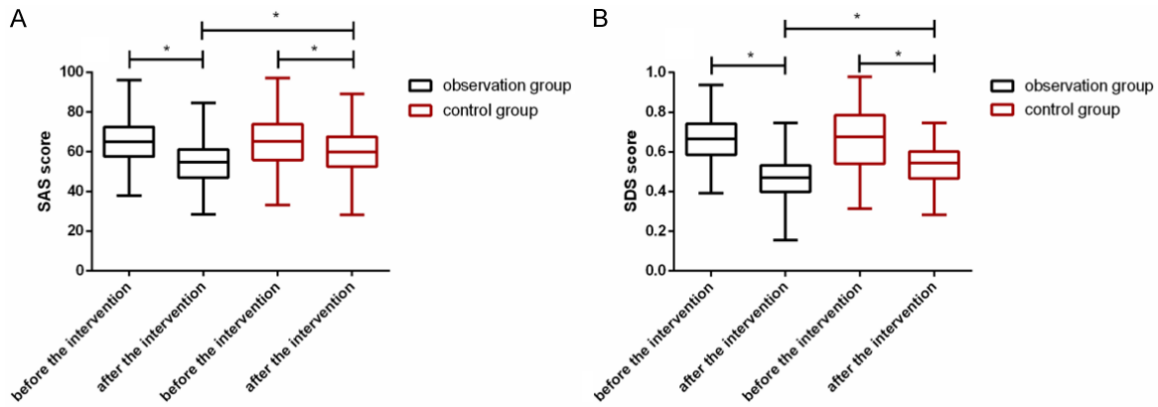


Figure 2. Psychological status score of the two groups before and after intervention. After intervention, the two groups got significantly decreased SAS and SDS scores (both $P < 0.05$), and the observation group got significantly lower scores than the control group (both $P < 0.05$). Note: * indicates that in terms of comparison between two groups, $P < 0.05$.

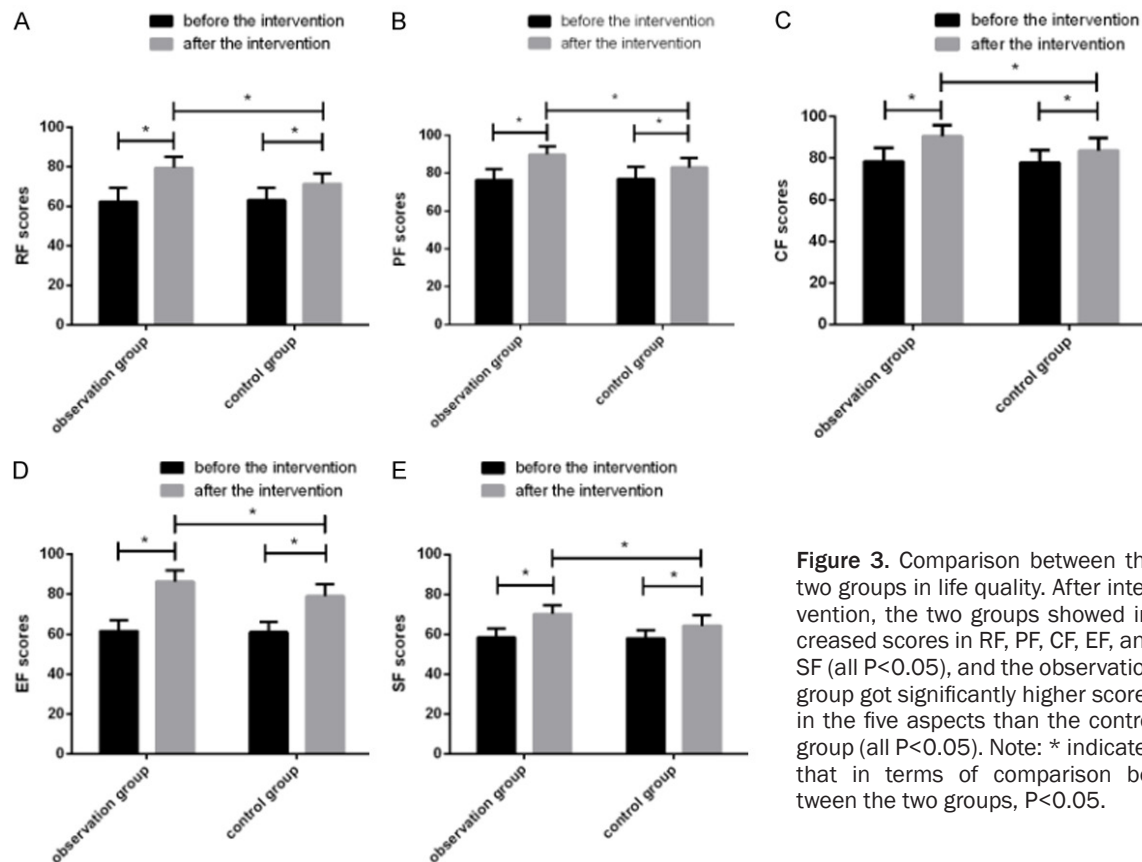


Figure 3. Comparison between the two groups in life quality. After intervention, the two groups showed increased scores in RF, PF, CF, EF, and SF (all $P < 0.05$), and the observation group got significantly higher scores in the five aspects than the control group (all $P < 0.05$). Note: * indicates that in terms of comparison between the two groups, $P < 0.05$.

Table 5. Comparison between the two groups in nursing risk event incidence n [%]

	Rate of nursing error	Complaint rate
The observation group (n=165)	2 (1.27)	8 (5.06)
The control group (n=158)	10 (6.06)	19 (11.52)
χ^2	5.187	4.386
P-value	0.023	0.036

higher than the latter ($t=8.665$, $P=0.003$).

Discussion

A previous study revealed that patients with diabetes faced higher risks of dementia and Alzhei-

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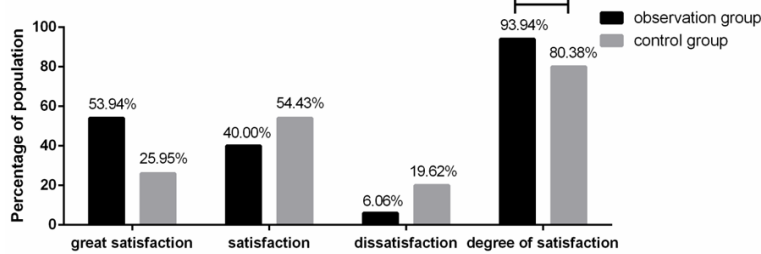


Figure 4. Nursing satisfaction of the two groups. The observation group showed significantly higher nursing satisfaction than the control group ($t=8.665$, $P=0.003$). Note: * indicates that in terms of comparison between the two groups, $P<0.05$.

mer's disease than those without the disease by 47% and 39%, respectively [12]. As one of the risk factors for cognitive impairment of patients, diabetes is relatively common in the elderly population, which is mainly manifested by the decline of thinking, memory, and learning abilities. When it progresses to the advanced stage, patients will be unable to take care of themselves, resulting in a serious decline in life quality [13]. It has been reported that patients with heart failure also face a high incidence of cognitive impairment, and usually suffer from different degrees of cognitive disorders, which bring many troubles to them, and cause an increased mortality and recurrence rate, and poor prognosis [14, 15]. Dunbar and others [3] found that intervention under comprehensive self-care mode could effectively improve the life quality of patients with both diabetes and heart failure and lower the development of diseases. High-quality nursing mainly intervenes with patients' life, behavior, diet, and others through various ways, aiming at providing comprehensive and integrated high-quality nursing services for them, and it is a relatively novel intervention mode in recent years [16]. At present, there is a series of problems demanding prompt solution during the treatment period of the patients with diabetes, so it is required to develop an appropriate nursing scheme for those patients. Therefore, from the perspective of nursing, this study analyzed the influences of high-quality nursing on risk event, cardiac functions, and life quality of patients during treatment.

A previous study concluded that high-quality nursing could speed up the rehabilitation of children with both heart failure and pneumonia, and improve their respiratory function by lowering their respiratory rate and heart rate [17].

This study revealed that during clinical treatment, nursing intervention contributed to lowering the pulse and heart rate of patients with both diabetes and heart failure, and high-quality nursing contributed to a more significant result in those aspects than routine nursing. A study showed that patients with Alzheimer's disease nursed under a comprehensive nursing intervention mode got a significantly high-

er MMSE score than those nursed under a routine nursing mode [18], which suggested that different nursing methods brought different improvement effects to cognitive functions. This study found that nursing could effectively improve the MMSE score during treatment, and high-quality nursing intervention contributed to a higher MMSE score than routine nursing. It suggested that high-quality nursing intervention was more effective than routine nursing in alleviating cognitive impairment. Cardiac function index and distance in 6MWT can effectively reflect the efficacy of intervention therapy for patients with heart failure [19, 20]. Related studies showed that routine nursing combined with cardiac rehabilitation could significantly improve the distance in 6MWT [21]. Moreover, a previous study compared the effects of comprehensive self-care intervention and routine nursing on patients with both heart failure and diabetes, and found that comprehensive self-care was more effective in improving heart function and 6MWT distance test [3]. This study revealed that nursing intervention could improve patients' cardiac functions, and high-quality nursing exerted much more obvious effects on improving cardiac outputs and distance in 6MWT. A previous study pointed out that patients with diabetes faced a relatively high risk of hypoglycemia, and good control of blood glucose helped to improve their prognosis [22, 23]. In addition, this study found that patients with both diabetes and heart failure nursed under a high-quality nursing mode showed a lower incidence of abnormal blood glucose and a higher rate of achieving targeted blood pressure than those nursed under a routine nursing mode. It indicated that high-quality nursing could effectively control blood sugar content and had good effects on reducing the occurrence of hypoglycemia events in patients.

Some studies concluded that anxiety and depression were the main common emotional disorders in patients with diabetes or chronic heart failure, and these emotions could indirectly affect the treatment efficiency [24, 25]. A study by Zhou and others revealed that systematic self-management care model could effectively improve the life quality of patients with type 2 diabetes and relieve their negative emotions such as anxiety and depression [26]. It was similar to the following results of this study: Nursing intervention could effectively lower the SAS and SDS scores of patients with both diabetes and heart failure, and high-quality nursing could more effectively reduce negative emotions, and it exerted a greater effect on treatment. It has been reported that high-quality nursing can promote the recovery of neurological function of stroke patients, and significantly improve their life quality [27]. This study employed QLQ-C30 to assess the life quality of the patients, and it was turned out that high-quality nursing contributed to higher scores in RF, PF, CF, EF, and SF, and effectively improved patients' life quality and prognosis. A literature revealed that high-quality nursing mode could ease the relationship between patients with kidney disease and nurse staff and reduce risk events in them [28]. Based on this study, it can be seen that high-quality nursing intervention could significantly reduce the occurrence of risk events in patients with both diabetes and heart failure, and could improve the doctor-patient relationship. According to statistical analysis of the survey on nursing satisfaction of the patients enrolled in this study, patients nursed under the high-quality nursing mode showed a higher nursing satisfaction, which revealed that high-quality nursing could bring better medical experience to patients and help patients resist diseases more comfortably and cooperatively than conventional psychological nursing.

This study has comprehensively compared the application of routine nursing and high-quality nursing in patients with both diabetes and heart failure, but it still has certain limitations. For example, it has not carried out a long-term follow-up investigation on the prognosis of the patients, and there are many factors affecting the cognitive functions of patients with the two diseases, so the influence of nursing in different hospitals on the recovery of cognitive functions should be specifically analyzed to better improve the poor prognosis of patients.

To sum up, for patients with both diabetes and heart failure, high-quality nursing can improve their life quality and cognitive functions, and lower risk event incidence, so it is of a relatively high application value.

Disclosure of conflict of interest

None.

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