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Original Article

Effects of collaborative nursing model on resilience, anxiety and depression level of elderly patients with heart failure

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Abstract: Objective: To investigate the effects of collaborative nursing model on resilience, anxiety and depression level of elderly patients with heart failure. Methods: Elderly patients with acute exacerbation of chronic heart failure (n = 118) who received treatment in our hospital were selected and divided into the control group (n = 59) and the experimental group (n = 59) according to the random number table. The control group was treated with conventional nursing, while the experimental group received a collaborative nursing model on the basis of the conventional nursing for 3 months. The changes of Connor-Davidson Resilience Scale (CD-RISC), Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD), Exercise of Self-care Agency Scale (ESCA), and Minnesota Living with Heart Failure Questionnaire (MLHFQ) scores were compared between the two groups before and after nursing. Long-term compliance and nursing satisfaction were also compared before and after nursing. Results: After nursing, the CD-RISC and ESCA scores in both groups were increased in the two groups and were higher in the experimental group ($P < 0.05$); the HAMA, HAMD and MLHFQ scores were decreased in the two groups and were lower in the experimental group ($P < 0.05$). The experimental group had better long-term nursing compliance and nursing satisfaction ($P < 0.05$). Conclusion: Compared with conventional nursing, the collaborative nursing model can significantly improve the resilience of elderly patients with heart failure, relieve anxiety and depression, and improve self-care ability, compliance, life quality and nursing satisfaction of patients.

Keywords: Elderly patients with heart failure, cooperative nursing model, resilience, anxiety, depression, self-care ability

Introduction

Heart failure, the final stage of cardiovascular disease, is a clinical syndrome of cardiac function and structural abnormalities induced by cardiovascular diseases, which lead to low left ventricular diastolic function or left ventricular pumping [1, 2]. Elderly patients are exposed to heart failure due to aging and decline in body function. With long duration and protraction of course, heart failure not only seriously affects the life quality of patients, but also easily causes psychological burdens to them. It is reported that 24-40% of patients with heart failure suffer from depression and other negative emotions [3]. An epidemiological survey found that 53% of patients with heart failure were at a low level of mental state, which can explain the patients' negative attitude and poor compliance to the treatment [4]. Thus, the psychological problems have become the clinical focus.

In the past, traditional nursing work tended to pay more attention to the biomedical factors of the disease, while ignoring the psychological and social dimensions, which is not conducive to the prognosis of chronic disease [5]. Based on responsible nursing, collaborative nursing model encourages patients to participate in the nursing process and give full play to their self-care ability, so as to achieve the goal of stabilizing their conditions, and enhance their confidence in overcoming the disease in nursing process, thereby improving their long-term compliance and improve their mental state [6].

Therefore, this article aimed to investigate the effects of collaborative nursing model on resilience, anxiety and depression level of elderly patients with heart failure.

Materials and methods

Patients

Elderly patients with acute exacerbation of chronic heart failure (n = 118) who received treatment in Wuhan Central Hospital, Tongji Medical College, Huazhong University of Science and Technology from November 2018 to March 2020 were selected and divided into the control group (n = 59) and the experimental group (n = 59) according to the random number table. This study was approved by the Medical Ethics Committee of Wuhan Central Hospital, Tongji Medical College, Huazhong University of Science and Technology. Written informed consent form was obtained from all patients and their families.

Inclusion criteria: (1) Patients' heart failure reached the grade in NYHA Functional Classification [7]. (2) Patients were diagnosed as heart failure depending on *Guidelines for Diagnosis and Treatment of Heart Failure in China in 2018* [8]. (3) Patients aged more than 59 years old. (4) Patients were expected to have over 1-year survival time.

Exclusion criteria: (1) Patients had mental illnesses before treatment, such as depression, anxiety, schizophrenia, etc. (2) Patients had severe liver and kidney disease, coronary heart disease, rheumatic heart valve disease, blood coagulation and autoimmune system diseases. (3) Patients had unknown cause of heart failure. (4) Patients had psycho-cognitive abnormalities.

Methods

The patients in the control group received conventional nursing. They were informed of the significance of the standard treatment according to the doctor's orders for disease outcome when they were admitted to the Wuhan Central Hospital. During the hospitalization, their daily medication, weight, pulse, blood pressure and other conditions were recorded in detail. The following self-management was carried out after discharge. (1) Diet care: Patients should focus on low-fat, low-salt and easy-to-digest meals, to strictly control sodium intake (< 6 g/d). If patients had an acute episode of heart failure accompanied by volume overload, sodium intake should be controlled within 6 g/d. If the body weight was less than 85 kg, the fluid intake should be controlled at 30 mL/kg·d; otherwise, the fluid intake should be controlled at 35 mL/kg·d. Besides, alcohol and smoking were not allowed. (2) Diuretic management: Patients who received long-term diuretic treatment needed appropriate potassium supplementation to avoid hypokalemia; besides, their blood potassium and blood sodium levels were monitored. (3) Symptom management: Patients and their families were instructed to manage risk factors for inducing heart failure, such as blood pressure, heart rate, shortness of breath, fatigue, edema, weight gain, etc. (4) Activity management: According to personal tolerance, some aerobic exercises can be performed appropriately, and family members must be nearby to supervise and take care of the patients during exercise. If there were obvious signs of breathing difficulties, precordial discomfort, severe dizziness, fatigue, patients should stop and rest immediately. If the rest failed to relieve the symptoms, medical attention should be sought immediately.

The experimental group received collaborative nursing based on conventional nursing. (1) A collaborative nursing team was established consisting of an attending physician, a head nurse and a responsible nurse. The attending physician was responsible for diagnosing the condition and customizing treatment plans. The responsible nurse evaluated the patient's condition based on the medical record information issued by the physician, and formulated a personalized nursing plan. The head nurse took charge of supervising and guiding the implementation of the responsible nurse. Before performing the nursing tasks, the head nurse and the responsible nurse were trained and examined on collaborative nursing related knowledge and skills. The basic knowledge of heart failure, standardized treatment, self-management measures and emergency preventive measures were written into the *Self-management Handbook for Elderly Patients with Heart Failure* that was distributed to patients. The content was combined with text and pictures for easy understanding by pa-

tients. The cover of the manual was printed with the contact information of relevant medical staff for convenient contact consultation after discharge. (2) Collaborative education: After admission for 1-2 days, lectures were given to patients and their families to explain the pathogenesis, clinical manifestations, and treatment plans of heart failure, and the significance of self-management to control the development of the disease, so as to improve patient compliance with treatment. After admission for 3-10 days, the concept of collaborative nursing was explained to patients and their families, and the nursing content was demonstrated for patients. Patients' families were guided to actively participate in home nursing work, and supervise patients' lifestyles throughout the process, so as to find and solve problems in time. (3) Psychological cooperative nursing: Medical staff communicated more with the patients, sensed their bad mood in time, did a good job of psychological counseling, and suggested their families to chat with the patients more. Further encouragement, support and care were given to the patients to strengthen their confidence in healing. Besides, the medical staff needed to understand the real thoughts and needs of patients through communication, and provided them with positive psychological hints to get rid of psychological burdens. (4) Sleeping collaborative management: It was recommended that patients wear loose pajamas, and choose to play some sleep-aid music in the ward according to their sleep quality and psychological mood. The family members assisted the patients to relax their muscles. To be specific, the helper held the patients' wrist with the hand, told them to bend the forearm, stretch it to form a confrontation, let them feel muscle tension before relaxing. After that, muscle contractions on the upper and lower arms, abdominal muscles, back muscles, facial muscles were performed on to relax the body muscles. (5) Peer collaborative education: During the hospital stay, regular salons about patient disease education were held. A WeChat group was set up to explain the experience of disease treatment. Patients could communicate with each other to release their depression and inner conflicts, while giving encouragement in addition to share good solution, and solve bad problems. The nursing period lasted for 3 months, and the nursing guidance for patients who had been hospitalized for less than 3 months would be offered when they returned to the clinic or through follow-up methods such as WeChat and telephone.

Outcome measures

Main outcome measures: The Connor-Davidson Resilience Scale (CD-RISC), a self-administered scale containing 25 items that exhibit good psychometric properties, including optimism (5 items), tenacity (13 items) and self-improvement (7 items), was used to evaluate patients' resilience before nursing and at 3 months after nursing [9]. CD-RISC adopts 0-4 grade scoring method with 100 scores. High scores represent better resilience.

Hamilton Depression Scale (HAMD) was used to evaluate patients' depressive mood before nursing and at 3 months after nursing [10]. HAMD contains 24 items, including depressed mood, suicide, feelings of guilt, etc. Most of the items have 0-4 scores, while some has 0-2 scores. A score of less than 8 is considered "normal"; 8-20 is considered "potential" illness; 21-35 is considered "certain" illness; 36 or more (out of a possible 40) is considered "severe" illness.

Hamilton Anxiety Scale (HAMA) was used to assess the severity of patients' anxiety before nursing and at 3 months after nursing [11]. HAMA is a 14-item scale, whose answers by patients are scored from 0 to 4, including feelings of anxiety, sensation of tension, insomnia, sensory changes, etc. A score of less than 7 is considered "normal"; 7-13 is considered "potential" illness; 14-20 is considered "certain" illness; 21-29 is considered "obvious" illness; 30 or more is considered "severe" illness.

Exercise of Self-care Agency Scale (ESCA) was used to self-care ability before nursing and at 3 months after nursing [12]. The scale contains 4 projects with 43 items and a total of 172 scores, such as self-concept (8 items, 0-32 scores), sense of self-protection score (6 items, 0-24 scores), self-care skills (12 items, 0-48 scores), health knowledge (17 items, 0-68 scores). Answers by patients are scored from 0 to 4. Higher scores indicate better self-care ability.

Secondary outcome measures: Minnesota Living with Heart Failure Questionnaire (MLHFQ) was adapted to access patients' quality of life

Table 1. Comparison of general data (x ± sd, n)

Group	Control group (n = 59)	Experimental group (n = 59)	t/χ^2	P
Gender (male/female)	36/23	38/21	$\chi^2 = 0.145$	0.703
Age (year)	70.56±7.01	69.08±6.81	t = 1.163	0.247
Course (year)	9.64±5.32	8.27±3.66	t = 1.630	0.106
Primary disease				
Myocardial ischemia with coronary artery disease	14	16	$\chi^2 = 0.179$	0.672
Myocardial infarction	17	17	$\chi^2 = 0.000$	1.000
Viral myocarditis	8	9	$\chi^2 = 0.069$	0.793
Diabetic cardiomyopathy	9	7	$\chi^2 = 0.289$	0.591
Pulmonary arterial hypertension	11	10	$\chi^2 = 0.058$	0.810
Combined diseases				
Hypertension	18	20	$\chi^2 = 0.155$	0.694
Diabetes	13	11	$\chi^2 = 0.209$	0.647
Hyperlipidemia	16	18	$\chi^2 = 0.650$	0.684

before and at 3 months after nursing [13]. Affective condition (0-25 scores), physical activity (0-40 scores) and other condition (0-40 scores) are included. There are 21 items scored from 0 to 5 with total sores of 105. Higher scores indicate poorer self-care ability.

A self-made questionnaire was used for long-term nursing compliance at 3 months after nursing. The questions consist of reasonable diet, standardized medication, living habits, pay attention to rest, psychological emotions, regular follow-up visits, etc. Complete compliance (execution ≥ 80%), general compliance (execution = 50-79%) and no compliance (execution < 50%) were defined according to patient execution. Overall compliance rate = (complete compliance + general compliance)/total number of cases × 100%.

A self-made questionnaire was used for nursing satisfaction at 3 months after nursing. Nursing attitude, nursing skills, communication skills and health education are the content in the questionnaire. The questionnaire is scored from 0 to 4, including very satisfied (90-100 scores), satisfied (80-89 scores), general satisfied (70-79 scores), unsatisfied (60-69 scores), and very unsatisfied (0-59 scores) with the total score of 100. Satisfaction = (very satisfied + satisfied)/total number of cases × 100%.

Statistical analysis

SPSS 23.0 statistical software was used for statistical processing. Measurement data were expressed as mean ± standard deviation (x ± sd). Independent t-test was used for comparison between groups, and paired t-test for comparison within groups before and after nursing. Count data were expressed as case/percentage (n, %) and tested by Chi-square test. $P < 0.05$ was considered statistically significant.

Results

Comparison of general data

There were no statistically significant differences between the two groups i general data such as gender, age, course of disease, primary disease, and combined diseases ($P > 0.05$). See **Table 1**.

Comparison of RISC scores

Before nursing, there was no significant difference in RISC scores between the two groups ($P > 0.05$). After nursing, the scores of optimisms, tenacity, self-improvement and total scores were increased, and the experimental group had higher scores than the control group (all $P < 0.001$). See **Table 2**.

Comparison of HAMA and HAMD scores

Before nursing, there were no significant differences in HAMA and HAMD scores between the two groups ($P > 0.05$). After nursing, HAMA and HAMD scores were decreased in the two groups, and were lower in the experimental group ($P < 0.001$). See **Table 3** and **Figure 1**.

Table 2. Comparison of RISC scores (x ± sd, scores)

Group	Control group (n = 59)	Experimental group (n = 59)	t	P
Optimism				
Before nursing	11.51±1.22	11.69±2.34	0.524	0.601
After nursing	13.96±2.39***	17.72±3.24***	7.173	< 0.001
Tenacity				
Before nursing	32.74±4.44	33.84±5.49	1.197	0.234
After nursing	37.63±5.32***	45.35±6.17***	7.279	< 0.001
Self-improvement				
Before nursing	13.24±2.42	12.76±1.97	1.182	0.240
After nursing	16.01±3.04***	20.38±4.27***	6.404	< 0.001
Total				
Before nursing	57.59±7.47	58.14±7.36	0.403	0.688
After nursing	70.49±8.84***	82.33±10.19***	6.742	< 0.001

Note: Compared with before nursing in the same group, ***P < 0.001. RISC, Connor-Davidson Resilience Scale.

Table 3. Comparison of HAMA and HAMD scores (x ± sd, scores)

Group	Control group (n = 59)	Experimental group (n = 59)	t	P
HAMA				
Before nursing	11.51±2.22	11.09±2.34	1.000	0.319
After nursing	6.56±1.39***	4.72±0.84***	8.702	< 0.001
HAMD				
Before nursing	15.24±2.64	14.84±2.49	0.847	0.399
After nursing	7.63±1.52***	5.35±1.07***	9.421	< 0.001

Note: Compared with before nursing in the same group, ***P < 0.001. HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale.

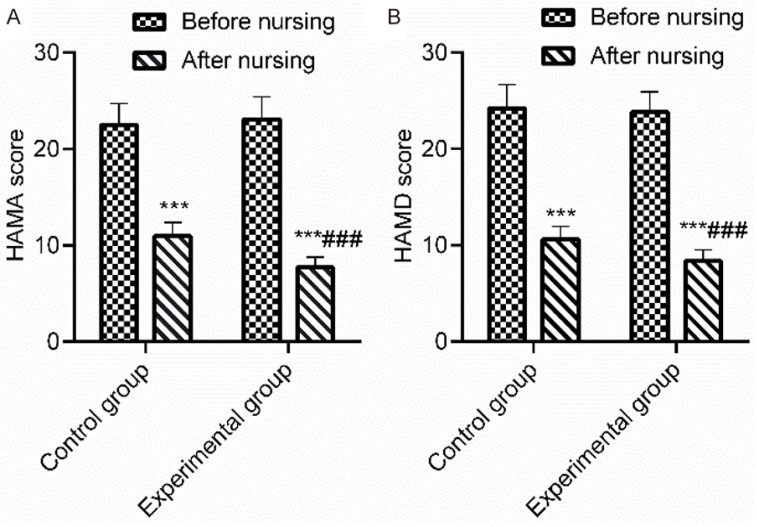

Figure 1. Comparison of HAMA and HAMD scores. A. HAMA score; B. HAMD score. Compared with before nursing in the same group, ***P < 0.001. Compared with the control group after nursing, ###P < 0.001. HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale.

Comparison of ESCA scores

Before nursing, there was no significant difference in ESCA scores between the two groups (P > 0.05). After nursing, self-concept score, sense of self-protection score, self-care skills score, health knowledge score and total score were increased in both groups. And the experimental group had even higher scores (P < 0.001). See **Table 4** and **Figure 2**.

Comparison of MLHFQ scores

Before nursing, no significant difference in MLHFQ scores was found between the two groups (P > 0.05). After nursing, affective condition score, physical activity score and other score of the both groups were decreased. And the experimental group had even lower scores (all P < 0.001). See **Table 5** and **Figure 3**.

Comparison of long-term nursing compliance

The experimental group had higher long-term nursing compliance than the control group (P < 0.05). See **Table 6**.

Comparison of nursing satisfaction

The experimental group had higher nursing satisfaction than the control group (P < 0.05). See **Table 7**.

Discussion

Due to the long course, poor prognosis, and easy recurrence, heart failure has a serious impact on the patients' life quality. Thus, it is very easy to cause various bad psychologies of patients, leading to a high incidence of depression and anxiety [14]. The patients

Table 4. Comparison of ESCA scores (x ± sd, scores)

Group	Control group (n = 59)	Experimental group (n = 59)	t	P
Self-concept				
Before nursing	15.68±2.78	16.34±3.02	1.235	0.219
After nursing	26.71±5.56***	33.85±6.78***	6.255	< 0.001
Sense of self-protection				
Before nursing	13.42±3.12	12.56±3.98	1.306	0.194
After nursing	17.63±3.39***	20.59±4.54***	4.013	< 0.001
Self-care skills				
Before nursing	20.21±6.65	21.48±6.43	1.055	0.294
After nursing	35.82±5.47***	40.19±6.49***	3.955	< 0.001
Health knowledge				
Before nursing	31.24±4.63	30.39±4.56	1.005	0.317
After nursing	45.95±4.51***	51.96±5.52***	6.476	< 0.001
Total				
Before nursing	81.28±9.57	82.61±9.81	0.745	0.458
After nursing	125.73±14.84***	146.65±16.86***	7.154	< 0.001

Note: Compared with before nursing in the same group, ***P < 0.001. ESCA, Exercise of Self-care Agency Scale.

with negative self-acceptance and coping attitude will likely face the hindered treatment and unstable outcomes [15].

Collaborative nursing, originated in the United States, is a new nursing model that learns from each other's strengths. Studies have confirmed that this nursing model has satisfactory implementation effects when applied to clinical heart failure [16]. It is still in the exploratory stage in China with incomplete rules about object, method and content of collaborative nursing, not to mention the nursing staff unequipped with the concept of collaborative nursing, which affects the quality of collaborative nursing to a certain extent. As a new nursing operation, this nursing mode combines nursing staff, patients, and family members, and implements effective methods to fully stimulate the enthusiasm of patients, thereby improving the effect of nursing. Compared with conventional nursing methods, collaborative nursing integrates clinically available resources to achieve the goal of improving the initiative of patients and their families and fully mobilizing their enthusiasm [17, 18]. In order to better assist the patients to make progress together, stimulating the enthusiasm of family members, and improving the quality of family care are conducive to improving the mental state and self-management level of patients. In addition, psychological collaborative nursing, sleep collaborative management, and peer collaborative education can further enhance the nursing effect [19].

In this study, after nursing, the experimental group had higher resilience scores and lower HDMD and ADMA scores than the control group, suggesting that collaborative nursing can effectively improve the mental state of patients, and encourage them to actively face the disease and improve self-care ability. People's mood response includes the interacted two parts: "body" and "emotion". The patient's psychological factors are of great significance to the development of the disease. When the patient has a strong rejection psychology, the optic nerve endocrine system will release various stress factors such as cortisone and catecholamines, which will lead to excessive energy consumption and hormone secretion disorders and may have irreversible consequences for the disease [20, 21]. Therefore, it is of great importance to discover the patient's bad emotions in time and provide psychological counseling. In addition, educating and guiding the family members to participate in the nursing work is another way to enhance communication with the patients so as to rescue the patients out of unease and place them in inner safety zone. Through some specific measures, such as playing music and muscle relaxation, the patient's "emotion" was first relaxed, followed by their tension through conscious muscle relaxation, so as to achieve a

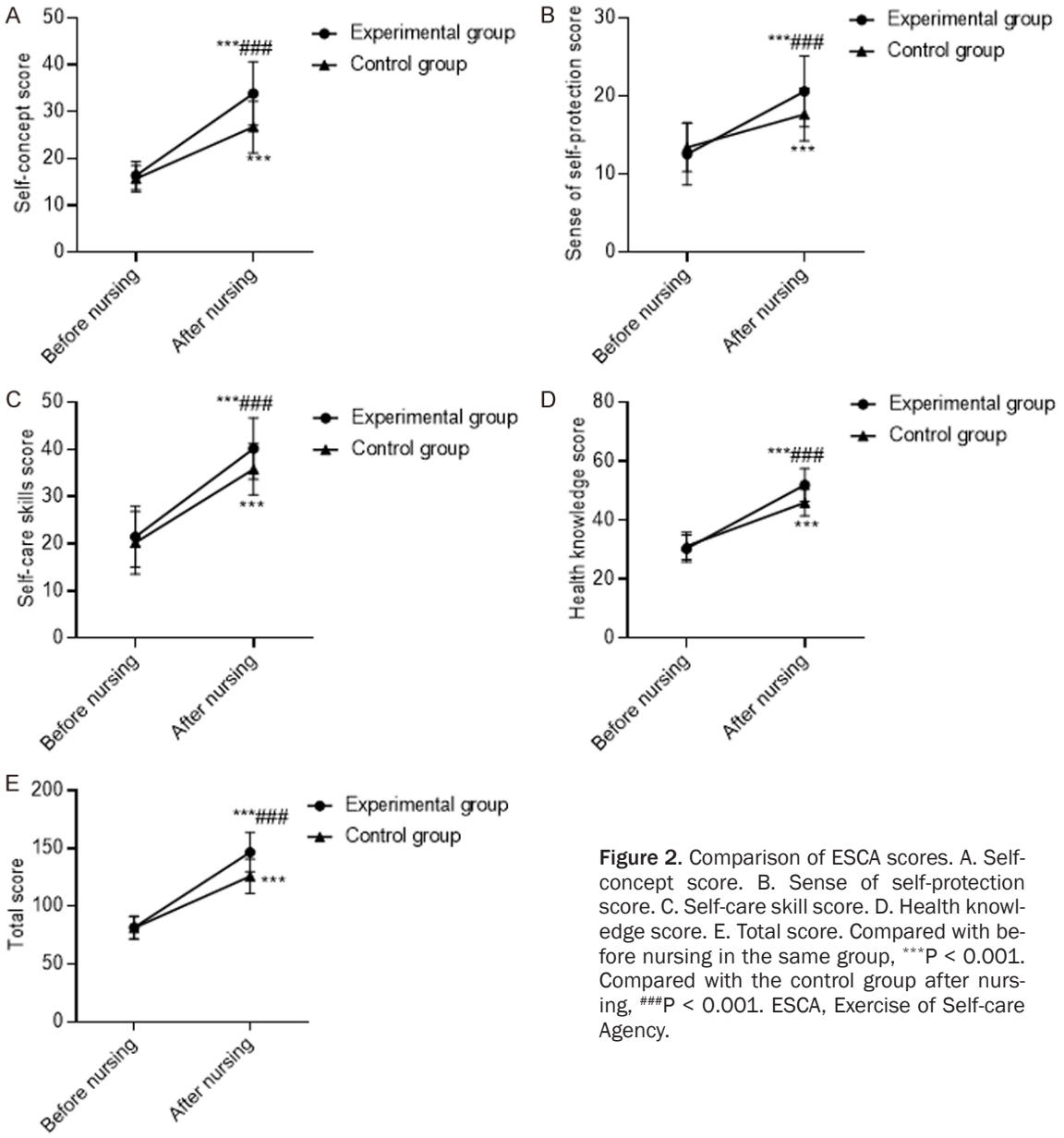

Figure 2. Comparison of ESCA scores. A. Self-concept score. B. Sense of self-protection score. C. Self-care skill score. D. Health knowledge score. E. Total score. Compared with before nursing in the same group, ***P < 0.001. Compared with the control group after nursing, ###P < 0.001. ESCA, Exercise of Self-care Agency.

Table 5. Comparison of MLHFQ scores (x ± sd, scores)

Group	Control group (n = 59)	Experimental group (n = 59)	t	P
Physical activity				
Before nursing	31.56±3.52	30.72±3.65	1.272	0.206
After nursing	18.45±2.61***	12.32±2.35***	13.407	< 0.001
Affective condition				
Before nursing	18.42±1.75	18.45±1.78	0.092	0.927
After nursing	13.12±1.51***	9.12±1.08***	16.550	< 0.001
Other scores				
Before nursing	29.45±2.45	28.72±2.47	1.612	0.110
After nursing	13.61±1.50***	10.23±1.19***	13.559	< 0.001

Note: Compared with before nursing in the same group, ***P < 0.001. MLHFQ, Minnesota Living with Heart Failure Questionnaire.

state of physical and mental relaxation and improve the patient's sleep quality [22]. At the same time, because patients have the same experience, peer collaborative education may be more contagious and persuasive than nursing staff, and it is more conducive to the improvement of patients' compliance behavior and self-care ability. Patients can tell each other their inner thoughts, which can also allow the patients to get a reasonable outlet and relieve their mental pain.

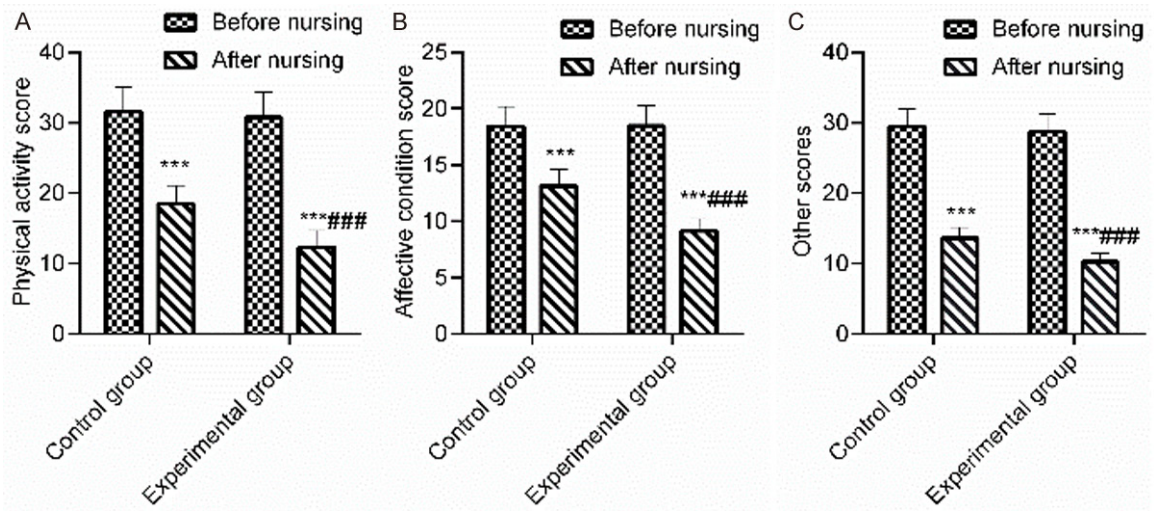

Figure 3. Comparison of MLHFQ scores. A. Physical activity score. B. Affective condition score. C. Other scores. Compared with before nursing in the same group, ***P < 0.001. Compared with the control group after nursing, ###P < 0.001. ESCA, Exercise of Self-care Agency Scale.

Table 6. Comparison of long-term nursing compliance (n, %)

Group	Complete compliance	General compliance	No compliance	Overall compliance
Control group (n = 59)	26 (44.07)	18 (30.51)	15 (25.42)	44 (74.58)
Experimental group (n = 59)	39 (66.10)	16 (27.12)	4 (6.78)	55 (93.22)
χ^2		5.789		14.668
P		0.026		0.006

Table 7. Comparison of nursing satisfaction (n, %)

Group	Very satisfied	Satisfied	General satisfied	Unsatisfied	Very unsatisfied	Overall satisfaction
Control group (n = 59)	26 (44.07)	19 (32.20)	11 (18.64)	2 (33.90)	1 (1.69)	45 (76.27)
Experimental group (n = 59)	37 (62.71)	17 (28.81)	4 (6.78)	1 (1.69)	0 (0.00)	54 (91.53)
χ^2			4.121			5.081
P			0.042			0.024

After nursing, the experimental group had better improvement of self-care ability and quality of life and long-term compliance, which confirmed that collaborative nursing was more conducive to improving patients' self-care ability and quality of life, and has good benefits for long-term prognosis. This model combines medical care, patients, and family members through scientific and continuous nursing intervention. Family members play a very good role in supervising patients in life, thereby helping patients to live a beneficial lifestyle and improving their self-care ability and quality of life [23, 24]. In daily life, diet, diuretics and activities were adjusted to relieve clinical symptoms. Patients and their families were taught to correctly identify the influencing factors of heart failure, and guidance on disease response was provided, so that patients can have correct prevention and response measures for disease development. Through these measures, family members and patients were actively involved in the entire treatment and rehabilitation process, so as to face the disease more actively, carry out disease management correctly, and improve the quality of life [25]. In addition, in this study the experimental group also had significantly higher nursing satisfaction than the control group. It can be seen that through the combination of scientific management and humanistic care, the outcomes of patients' disease were promoted, and the quality of

care was improved, which also provided a scientific basis for the long-term management mechanism of the hospital. However, due to the small and single sample size of this study, clinical research will be expanded in the future.

In summary, the collaborative nursing model can significantly improve the resilience of elderly patients with heart failure, relieve anxiety and depression, and improve self-care ability, compliance, life quality and nursing satisfaction of patients.

Disclosure of conflict of interest

None.

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