

Effects of Continuous Nursing Intervention on Exercise Tolerance and Rehospitalization Rate in Patients with Chronic Heart Failure

Xiao-li Sun

Zhao-yun Shi

Na Wang

Xiao-li Sun, Zhao-yun Shi, Na Wang*, Emergency ward, ward one, Qingdao Municipal Hospital, Qingdao 266000, China, Corresponding author: Na Wang, Address: Qingdao Municipal Hospital, No.1 Jiaozhou Road, Qingdao City. Email: 1107443110@qq.com

Abstract Objective To observe the effect of continuous nursing intervention on exercise tolerance and rehospitalization rate in patients with chronic heart failure. Methods 134 patients with chronic heart failure admitted to our hospital were divided into two groups, routine nursing intervention group (control group) and continuous nursing intervention group (observation group), with 67 cases in each group. The resting and peak heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) of the two groups were recorded. The change of 6min walking distance, modified European Heart Failure Self-Care Behavior Scale (EHFSCB-9) and quality of life (SF-36) of the two groups were compared before and after intervention, and moreover, rehospitalization rate of heart failure of two groups 6 months after discharge was compared between the two groups. Results : Before intervention, there was no significant difference between the two groups ($P>0.05$). After intervention, there was no significant difference in resting and peak HR, SBP and DBP between the two groups and those before intervention ($P>0.05$). Further comparison between the two groups showed that there was no significant difference in resting and peak HR, SBP and DBP between the observation group and the control group ($P>0.05$). After intervention, 6min walking distance and SF-36 scale scores (role physical, physiological function, physical pain, energy, health status, social function, mental health and emotional function) were increased in the two groups ($P<0.05$). Further comparison between the two groups showed that 6min walking distance and SF-36 scale scores (except somatic pain score and role physical score) in the observation group were higher than those in the control group ($P<0.05$), and the EHFSCB-9 scores in the two groups decreased gradually after intervention ($P<0.05$). Further comparison between the two groups showed that the EHFSCB-9 scores in the observation group (except low salt diet score and taking medicine based on doctor's advice score) were lower than those in the control group ($P<0.05$). The rehospitalization rate of heart failure within 6 months after discharge was 11.91% in the observation group, significantly lower than 25.37% in the control group, and the difference was significant ($P<0.05$). Conclusion : Continuous nursing intervention can strengthen the self-care ability of patients with chronic heart failure, improve exercise tolerance and quality of life, and reduce the rehospitalization rate to heart failure within 6 months.

Keywords: Continuous nursing; Chronic heart failure; Exercise tolerance; Rehospitalization rate of heart failure; Quality of life; Self-care ability

Tob Regul Sci.™ 2021;7(5): 1509-1515

DOI: doi.org/10.18001/TRS.7.5.71

There is a progressive decline in cardiac function in patients with chronic heart failure, and most patients die within five years. With the increase of the incidence of heart disease, the incidence of chronic heart failure also showed an obvious increasing trend. The patients had complex conditions, frequent and repeated hospitalization,

many complications and high mortality, which seriously affected the physical and mental health of the patients¹. At present, there are many clinical techniques for the treatment of chronic heart failure. The advent of various new techniques and methods makes the disease condition of most patients under control. However, patient

cooperation during treatment is critical and will have a direct impact on prognosis. Due to the lack of disease-related knowledge of chronic heart failure in some patients, the ability of self-management is poor, resulting in rehospitalization².

Continuous nursing refers to the nursing intervention carried out in this period after the patient's discharge. This nursing mode takes into full consideration of the problems that may occur after the patient's discharge as well as the countermeasures, and develops a personalized nursing intervention plan according to the specific condition, which is conducive to the correct self-management after the patient's discharge³. Continuous nursing plays an important supplementary role in the treatment and nursing work of hypertension, diabetes, coronary heart

disease and other diseases, which is helpful to control the stability of the disease and reduce the risk of rehospitalization⁴. In this study, continuous nursing intervention was applied to patients with chronic heart failure to observe exercise tolerance and rehospitalization rate.

DATA AND METHODS

General data

134 patients (74 males and 60 females; age range from 45 to 75 years, mean (62.02±9.11) years) with chronic heart failure admitted to our hospital from June 2018 to January 2020 were divided into 2 groups according to the intervention method, with 67 cases in each group. There was no significant difference in general data between the two groups ($P>0.05$). See Table 1

Table 1
Comparison of General Data of Patients in the Two Groups

Group	n	Male / female	Age (years)	Duration of disease (years)	Body mass index (kg/m ²)	Smoking history
Control group	67	38/29	62.52±8.69	4.52±1.26	23.85±2.77	21
Observation group	67	36/31	62.27±9.15	4.48±1.35	23.79±2.86	18

Table 1
Continue

Group	n	Years of education (years)	Complication	Marital status
			Coronary heart disease / hypertension / diabetes	Married / unmarried / divorced / widowed
Control group	67	13.11±3.21	14/15/6	45/11/8/3
Observation group	67	13.05±3.29	12/18/7	48/9/8/2

Inclusion and exclusion criteria

Inclusion criteria: (1) Conform to the standard of "Expert Consensus on Diagnosis and Treatment of Chronic Heart Failure by Integrated Traditional Chinese and Western Medicine"⁵; (2) ≥18 years old and ≤75 years old; (3) New York Heart Association (NYHA) Class II ~ III; (4) Those with normal cognitive function, hearing and comprehension ability and who can cooperate with effect evaluation; (5) Clinical data are complete.

Exclusion criteria: (1) Patients with other severe acute and chronic physical diseases; (2) Malignant tumor; (3) Patients with aphasia and schizophrenia; (4) Patients with intermittent claudication and lower limb instability.

Methods

The control group was given routine nursing intervention. During hospitalization, the patient's condition and vital signs were closely observed, and

the drug was administered according to the doctor's advice. Discharge instructions were provided at the time of discharge, and the return visit time was agreed.

The observation group was given continuous nursing intervention. On the basis of routine nursing intervention, the patient's ability to manage and identify the symptoms of chronic heart failure was evaluated, and the patient was instructed to recognize the worsening symptoms of conditions such as shortness of breath and edema. In case of deterioration, the patient came to the hospital in time; diet management was conducted, with light, high-protein and low-fat diet as main factors, strictly controlling the intake of salt and water; rational medication management was conducted, and the patient was informed of the drug name, usage and dosage as well as drug effect and adverse reactions after discharge. The patients were told to take the drug in strict accordance with

the doctor's advice. Instruct the patients to select the appropriate exercise form for exercise, closely monitor the change of heart rate during exercise, and pay attention to control the time and intensity of exercise, preferably accompanied by family members. Communicate with the patients' families and ask them to create a clean and comfortable home-based rehabilitation environment. Help the patients with emotional management and ask them to contact the psychiatrist if necessary. Follow-up visits were made at regular intervals after discharge, once within 1 week after discharge, and then weekly by telephone until the end of Week 12. A telephone follow-up would be performed every month thereafter until 6 months after discharge.

Observational indexes

The resting and peak heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) of the two groups before and after intervention were recorded. The change of 6min walking distance, modified European Heart Failure Self-Care Behavior Scale (EHFSCB-9) and quality of life (SF-36) of the two groups were compared before and after intervention, and moreover, rehospitalization rate of heart failure of two groups 6 months after discharge was compared between the two groups.

ScoreCriteria

EHFSCB-9 score: including 9 items of daily measurement of body mass, aggravation of

shortness of breath, aggravation of swelling of leg or foot, increase of body mass and seeing the doctor / nurse in case of fatigue, etc., each score ranges from 0 to 5 points, and the total score ranges from 0 to 45 points. The higher the score, the lower the self-care ability⁶.

SF-36 scale score: 8 items including role physical, physiological function, physical pain and energy, etc., each score ranges from 0 to 100 points, and the higher the score, the better the quality of life⁷.

Statistical methods

SPSS19.0 was used to process the data, and the measurement indexes were described by ($\bar{x} \pm s$). Independent sample t test was used to compare among groups, paired t test was used to compare within groups, and χ^2 test was used to compare the counting data. $P < 0.05$ was considered statistically significant.

RESULTS

Comparison of resting and peak HR, SBP and DBP levels between the two groups

There was no significant difference in resting and peak HR, SBP and DBP between the two groups after intervention and those before intervention ($P > 0.05$). Further comparison between the two groups showed that there was no significant difference in resting and peak HR, SBP and DBP between the observation group and the control group ($P > 0.05$). See Tables 2 and 3

Table 2
Comparison of Resting HR, SBP and DBP Levels of Patients in the Two Groups ($\bar{x} \pm s$)

Group	Number of cases	HR (beats/min)		SBP (mmHg)		DBP (mmHg)	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	67	72.56 \pm 12.01	73.26 \pm 11.74	117.25 \pm 15.32	115.58 \pm 14.93	65.88 \pm 5.23	64.89 \pm 5.44
Observation group	67	73.11 \pm 10.58	74.02 \pm 12.45	120.01 \pm 15.42	116.02 \pm 16.24	64.80 \pm 5.28	65.03 \pm 5.17

Table 3
Comparison of Peak HR, SBP and DBP Levels of Patients in the Two Groups ($\bar{x} \pm s$)

Group	Number of cases	HR (beats/min)		SBP (mmHg)		DBP (mmHg)	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	67	105.23 \pm 14.23	110.23 \pm 10.22	148.56 \pm 18.22	146.32 \pm 14.55	75.83 \pm 5.22	74.58 \pm 5.36
Observation group	67	106.58 \pm 13.52	108.96 \pm 9.33	145.63 \pm 15.89	146.74 \pm 15.28	76.01 \pm 5.17	74.98 \pm 5.87

Compared with those before intervention of the group, * $P < 0.05$; compared with those before intervention of the control group, # $P < 0.05$

Comparison of 6min walking distance in the two groups 6min walking distance of the observation group was higher than that of the control group ($P<0.05$). See Table 4

After intervention, the 6min walking distance of the two groups increased gradually ($P<0.05$). Further comparison between the two groups showed that

Table 4 Comparison of 6min Walking Distance of Patients in the Two Groups ($\bar{x}\pm s$, m)			
Group	Number of cases	6min walking distance	
		Before intervention	After intervention
Control group	67	365.63 \pm 52.02	389.66 \pm 45.12*
Observation group	67	371.66 \pm 47.45	418.55 \pm 49.63*#

Compared with those before intervention of the group, * $P<0.05$; compared with those before intervention of the control group, # $P<0.05$

Comparison of EHFSCB-9 score in patients of the two groups showed that the scores of EHFSCB-9 in the observation group (except low salt diet score and taking medicine based on doctor's advice score) were lower than those in the control group ($P<0.05$). See Table 5.

After intervention, the scores of EHFSCB-9 in the two groups decreased gradually ($P<0.05$). Further comparison between the two groups

Table 5 Comparison of EHFSCB-9 scores of Patients in the Two Groups ($\bar{x}\pm s$, points)									
Group	Num ber of case s	Daily measurement of body mass		Seeing the doctor / nurse in case of aggravation of shortness of breath		Seeing the doctor / nurse in case of aggravation of swelling of leg or foot		Seeing the doctor / nurse in case of increase of body mass	
		Before interventio n	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	67	3.78±1.01	3.12±0.67*	1.68±0.52	1.42±0.36*	2.42±0.86	1.98±0.41*	3.89±0.94	2.98±0.69*
Observation group	67	3.81±1.07	2.41±0.56*	1.70±0.55	1.21±0.25*	2.38±0.92	1.38±0.38*#	3.85±0.89	2.34±0.51*
			#		#				#

Table 4 Continue							
Group	Number of cases	Limit liquid intake		Seeing the doctor / nurse in case of fatigue		Low salt diet	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	67	3.23 \pm 0.54	2.36 \pm 0.51*	3.25 \pm 0.63	2.31 \pm 0.52*	2.36 \pm 0.45	1.89 \pm 0.32*
Observation group	67	3.28 \pm 0.55	1.85 \pm 0.43* #	2.30 \pm 0.58	1.85 \pm 0.40*#	2.40 \pm 0.48	1.79 \pm 0.39*

Table 4 Continued							
Group	Number of cases	Take medicine based on doctor's advice		Regular exercise		Total score	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	67	1.65 \pm 0.58	1.41 \pm 0.36*	2.56 \pm 0.31	2.14 \pm 0.26*	24.25 \pm 3.15	19.75 \pm 3.11*
Observation group	67	1.69 \pm 0.52	1.32 \pm 0.48*	2.51 \pm 0.36	1.53 \pm 0.24*#	23.98 \pm 3.54	15.52 \pm 2.53*#

Compared with those before intervention of the group, * $P<0.05$; compared with those before intervention of the control group, # $P<0.05$

Comparison of SF-36 scale scores in the two groups physiological function, physical pain, energy, health status, social function, mental health and emotional function in the two groups gradually increased

After intervention, the scores of role physical,

function in the two groups gradually increased

($P < 0.05$). Further inter-group comparison showed that the scores of various SF-36 scales (except physical pain score and role physical score) in the

observation group were higher than those in the control group ($P < 0.05$). See Table 6

Table 6 Comparison of SF-36 Scale Scores between the Two Groups ($\bar{x} \pm s$, points)									
Group	Number of cases	Role physical		Physiological function		Physical pain		Energy	
		Before intervention	After intervention n	Before intervention n	After intervention	Before intervention	After intervention n	Before intervention	After intervention
Control group	67	51.02 \pm 5.33	67.01 \pm 7.11 *	54.21 \pm 4.86	71.55 \pm 5.88*	53.36 \pm 5.11	64.85 \pm 5.23 *	51.69 \pm 5.03	63.36 \pm 5.56 *
Observation group	67	50.89 \pm 6.02	68.63 \pm 6.41 *	63.98 \pm 5.03	82.35 \pm 6.05* #	52.98 \pm 5.46	66.85 \pm 5.82 *	52.11 \pm 4.82	71.96 \pm 5.29 *#

Table 6 Continued									
Group	Number of cases	Health condition		Social function		Mental health		Emotional function	
		Before intervention	After intervention n	Before intervention	After intervention n	Before intervention	After intervention n	Before intervention	After intervention n
Control group	67	52.88 \pm 4.25	62.85 \pm 5.69 *	52.89 \pm 5.30	61.22 \pm 5.85 *	54.23 \pm 6.32	72.36 \pm 7.14 *	60.23 \pm 5.33	72.14 \pm 6.33 *
Observation group	67	52.17 \pm 6.02	70.14 \pm 5.22 *#	52.91 \pm 5.18	72.02 \pm 6.53 *#	52.98 \pm 6.88	85.33 \pm 6.56 *#	58.96 \pm 6.25	84.12 \pm 8.15 *#
Compared with those before intervention of the group, * $P < 0.05$; compared with those before intervention of the control group, # $P < 0.05$									

Comparison of rehospitalization rate of heart failure 6 months after discharge in the two groups

The rehospitalization rate of heart failure within

6 months after discharge was 11.91% in the observation group, significantly lower than 25.37% in the control group, and the difference was significant ($P < 0.05$). See Table 7

Table 7 Comparison of Rehospitalization Rate of Heart Failure Within 6 Months after Discharge between the Two Groups (n)		
Group	n	Rehospitalization rate of heart failure within 6 months after discharge (%)
Control group	67	17 (25.37)
Observation group	67	8 (11.91) #
Compared with control group, # $P < 0.05$		

DISCUSSION

The patients with chronic heart failure had severe myocardial injury, decreased ventricular pump blood function, dyspnea, asthenia and lower extremity edema, which were progressively aggravated with disease progression⁸. "Report of Cardiovascular Disease in China 2016"⁹ found that the most common causes of cardiovascular mortality in China were coronary atherosclerotic heart disease and rheumatic heart disease, which account for more than 40% of deaths in Chinese residents compared with malignancies, and are expected to continue to grow rapidly in the future. Improving the self-management ability of patients

on the basis of standardized treatment is the most important point in long-term control of stable disease and in reducing the waste of medical resources caused by rehospitalization^{10,16}.

A¹¹ survey found that patients with chronic heart failure often lack correct disease-related knowledge, lack of self-management ability, and fail to construct a healthy lifestyle, which are the root causes of the recurrence, deterioration and rehospitalization of chronic heart failure. Conventional nursing mode only pays attention to the intervention of patients in hospital, but less to the intervention of patients after discharging from hospital. Continuous nursing is also called

extended nursing. It lays emphasis on intervening the patient after discharge. When the patient is admitted to hospital, it is necessary to formulate the intervention plan after discharge, fully consider the problems that may occur after discharge as well as the corresponding intervention scheme, so that the patient can still receive good medical care service after discharge, so as to ensure the therapeutic effect¹². Nilsson, Westheim,¹³ believed that extended nursing had a positive effect on improving the quality of life and prognosis of patients with chronic heart failure.

This study found that there was no significant difference in resting and peak HR, SBP and DBP between the two groups after intervention, and the 6min walking distance after intervention was higher than that after continuous nursing intervention. This result suggests that continuous nursing intervention can effectively improve the exercise tolerance of patients with chronic heart failure, though it cannot significantly improve the hemodynamic indexes such as blood pressure and heart rate. This is because continuous nursing improves the patient's exercise tolerance by instructing the patient to choose the appropriate form of exercise after discharge from hospital.

The EHFSCB-9 score is a common tool for assessing self-management in patients with chronic heart failure with good reliability and validity¹⁴. The SF-36 scale is a common tool that reflects a patient's quality of life¹⁵. The results of this study showed that the scores of EHFSCB-9 were lower in those accepted continuous nursing intervention than those who accepted the conventional nursing intervention except for low salt diet score and taking medicine based on doctor's advice score; the scores of SF-36 were higher in those accepted continuous nursing intervention than those who accepted the conventional nursing intervention except for physical pain score and role physical score; the rehospitalization rate of heart failure within 6 months after discharge was lower than those who accepted conventional nursing intervention. This finding suggests that continuous nursing intervention may enhance self-care, improve quality of life, and reduce the risk of exacerbation in patients with chronic heart failure. The reason is that the continuous nursing strengthens the patients' ability to manage and identify the symptoms of chronic heart failure,

promotes the patients to actively carry out reasonable diet and exercise, strictly follow the doctor's advice, and helps the patients to dredge the bad mood, regularly follow up to timely find and correct the patient's bad behavior, so that the patients' self-management ability is enhanced, the disease condition is better controlled, and the rehospitalization rate caused by heart failure is decreased within 6 months.

Chronic heart failure is in a critical condition and complex, and the patients' prognosis is poor. Medical treatment is only one aspect of the treatment of this disease, which needs to be combined with various interventions such as diet, exercise and mood. Therefore, high-quality and comprehensive nursing intervention is an important part of the treatment of this disease. In view of the present situation of patients with chronic heart failure who have poor self-management ability, this study is worth popularizing in clinical nursing work by carrying out continuous nursing to enhance patients' self-care ability and have certain advantages in improving exercise tolerance and quality of life, and at the same time, it is helpful to maintain the stable condition and prevent the rehospitalization due to the deterioration of heart failure within a short period of time.

In conclusion, continuous nursing intervention can strengthen the self-care ability of patients with chronic heart failure, improve exercise tolerance and quality of life, and reduce the rehospitalization rate to heart failure within 6 months.

REFERENCES

1. Albert D, Ward A. Tobacco cessation in the dental office. *Dental Clinics of North America*. 2012;56(4):747.
2. Li S-l, Zhou S-h, Lin Y-j. The value of continuous nursing in patients after cardiac mechanical valve replacement. *Journal of Cardiothoracic Surgery*. 2020;15(1):1-5.
3. Baird D, Jackson AC, Higgins RO, Murphy BM, Tully PJ. Screening, assessment and treatment for depression in patients with chronic heart failure. *British Journal of Cardiac Nursing*. 2018;13(8):386-393.
4. Guo J, Zhang H, Zhang H, Zhang L, Zhao L. Application of continuous nursing based on Wechat platform in patients with coronary heart disease after intervention therapy. *Investigación Clínica*. 2020;61(1):298-305.
5. Xu Q, Bauer R, Hendry BM, et al. The quest for modernisation of traditional Chinese medicine. *BMC Complementary and Alternative Medicine*.

- 2013;13(1):1-11.
6. Vellone E, Jaarsma T, Strömberg A, et al. The European Heart Failure Self-care Behaviour Scale: new insights into factorial structure, reliability, precision and scoring procedure. Patient education and counseling. 2014;94(1):97-102.
7. Ware Jr JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Medical care. 1992;473-483.
8. Shi X, Bao J, Zhang H, et al. Emergency medicine in China: A review of the history of progress and current and future challenges after 40 years of reform. The American journal of emergency medicine. 2020;38(3):662-669.
9. Du H, Li L, Bennett D, et al. Fresh fruit consumption and major cardiovascular disease in China. N Engl J Med. 2016;374:1332-1343.
10. Dickinson MG, Allen LA, Albert NA, et al. Remote monitoring of patients with heart failure: a white paper from the Heart Failure Society of America Scientific Statements Committee. Journal of cardiac failure. 2018;24(10):682-694.
11. 李滌凡, 尹德榮, 黃文伶, et al. 老年慢性心力衰竭患者自我管理現況調查和影響因素的研究. 中国护理管理. 2020;20(3):360-366.
12. Brennan EJ. Chronic heart failure nursing: integrated multidisciplinary care. British Journal of Nursing. 2018;27(12):681-688.
13. Nilsson BB, Westheim A, Risberg MA. Long-term effects of a group-based high-intensity aerobic interval-training program in patients with chronic heart failure. The American journal of cardiology. 2008;102(9):1220-1224.
14. Sun J, Zhang Z-W, Ma Y-X, Liu W, Wang C-Y. Application of self-care based on full-course individualized health education in patients with chronic heart failure and its influencing factors. World journal of clinical cases. 2019;7(16):2165.
15. Sun J, Zhang Z-W, Ma Y-X, Liu W, Wang C-Y. Application of self-care based on full-course individualized health education in patients with chronic heart failure and its influencing factors. World journal of clinical cases. 2019;7(16):2165-2175.
16. Malla, S., & Brewin, D. G. An Economic Account of Innovation Policy in Canada: A Comparison of Canola, Wheat, and Pulses. AGBIOFORUM, 2020; 22(1), 25-36.