

INFLUENCE OF EARLY SYSTEMATIC REHABILITATION EXERCISE INTERVENTION ON CLINICAL EFFECT AND NURSING SATISFACTION OF PATIENTS WITH ACUTE HEART FAILURE IN COMPENSATORY STAGE

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ABSTRACT

Objective: To investigate the influence of early systematic rehabilitation exercise intervention on clinical effect and nursing satisfaction of patients with acute heart failure in compensatory stage.

Methods: In January 2020, our hospital began to carry out early systematic rehabilitation exercise intervention for patients with acute heart failure in compensatory stage. Those receiving intervention from January 2019 to December 2019 were defined as the control group and those receiving intervention from January 2020 to December 2020 were defined as the experimental group. 110 patients were selected from each group. The Minnesota Living with Heart Failure Questionnaire (MLHFQ) score, 6-min walk test (6MWT), forced expiratory volume in 1 second (FEV1), level of B-type natriuretic peptide (BNP), length of stay in coronary care unit (CCU) and total nursing satisfaction of 2 groups were compared.

Results: The MLHFQ score of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P<0.05$). The 6MWT of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P<0.05$). The FEV1 level of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P<0.05$). The BNP level of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P<0.05$). The length of stay in CCU of the experimental group was significantly shorter than that of the control group ($P<0.05$). At the same time, the total nursing satisfaction of the experimental group was significantly higher than that of the control group ($P<0.05$).

Conclusion: Early systematic rehabilitation exercise intervention for patients with acute heart failure in compensatory stage can effectively improve their quality of life, increase their exercise tolerance, promote the recovery of cardiopulmonary function, shorten their length of stay in CCU, and help establish a harmonious nurse-patient relationship.

Keywords: rehabilitation exercise, acute heart failure, compensatory stage, clinical effect, nursing.

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Introduction

Acute heart failure is one of the common critical diseases in the cardiology department, which is characterized by rapid progress of illness, high fatality rate and disability rates⁽¹⁾. Patients with the disease are confined to bed for a long term due to serious decline of somatic functions and more prone to infection, deep vein thrombosis and other complications during the hospitalization, which

seriously affect their rehabilitation process and quality of life⁽²⁾. Some reports contend that^(3,4) after acute heart failure enters the compensatory stage, the clinical prognosis of patients can be significantly improved through active and effective functional exercise in the early stage. For patients with New York Heart Association (NYHA) Class II~IV, the administration of cardio training in hospitalization and domiciliary stages can promote their peak oxygen consumption and overall quality of life,

without increasing mortality. So far, there has been no unified early rehabilitation intervention plan for patients with acute heart failure in compensatory stage, few targeted studies and insufficient evaluation indicators⁽⁵⁾. For the above problems, in January 2020, our hospital began to carry out early systematic rehabilitation exercise intervention for patients with acute heart failure in compensatory stage. 2 groups were compared in terms of the Minnesota Living with Heart Failure Questionnaire (MLHFQ) score, 6-min walk test (6MWT), forced expiratory volume in 1 second (FEV1), level of B-type natriuretic peptide (BNP), length of stay in coronary care unit (CCU) and total nursing satisfaction 1 year before and after intervention, with a view to investigate the influence of early systematic rehabilitation exercise intervention on clinical effect and nursing satisfaction of patients with acute heart failure in compensatory stage. Below, the process will be reported.

Data and methods

General Data

In January 2020, our hospital began to carry out early systematic rehabilitation exercise intervention for patients with acute heart failure in compensatory stage. Those receiving intervention from January 2019 to December 2019 were defined as the control group and those receiving intervention from January 2020 to December 2020 were defined as the experimental group. 110 patients were selected from each group. In the control group, there were 62 males and 48 females, with an average age of (62.57 ± 10.20) years and an average left ventricular ejection fraction (LVEF) of $(47.06 \pm 6.49)\%$. According to the NYHA classification, there were 14 cases of Class II, 46 cases of Class III and 50 cases of Class IV. According to complicating underlying diseases, there were 44 cases of hypertension, 37 cases of diabetes, 61 cases of arrhythmia and 15 cases of cerebrovascular diseases. In the experimental group, there were 60 males and 50 females, with an average age of (62.09 ± 10.48) years and an average LVEF of $(47.61 \pm 6.20)\%$. According to NYHA classification, there were 17 cases of Class II, 41 cases of Class III and 52 cases of Class IV. According to complicating underlying diseases, there were 46 cases of hypertension, 33 cases of diabetes, 64 cases of arrhythmia and 19 cases of cerebrovascular diseases. There was no significant difference between two groups in terms of general data ($P > 0.05$).

Inclusion and Exclusion Criteria

Inclusion criteria:

- conformed to the diagnosis and staging criteria of chronic heart failure⁽⁶⁾;
- New York Heart Association (NYHA) Class II~IV;
- the left ventricular ejection fraction (LVEF) was greater than or equal to 40%;
- aged 18~80;
- with complete clinical data.

Exclusion criteria:

- unable to get out of bed and ambulate in the early stage;
- unable to walk totally unassisted;
- consciousness disorder or cognitive dysfunction;
- mental diseases;
- died during hospitalization;
- progressed to decompensatory stage.

Intervention method

Control Group

The control group was treated with the routine rehabilitation exercise intervention plan, and the specific measures included: 1) patients with NYHA Class II finished walking exercise indoors, 5~10min/time, twice a day; 2) patients with NYHA Class III sat by the bed, 5~10min/time, 3 times a day. If they felt better, moved to the chair beside the bed, 5~10min/time, twice a day; 3) patients with NYHA Class IV completed shoulder and elbow joint movements when their illness was stable, 3~5min/time, twice a day.

Experimental Group

The experimental group was treated with the early systematic rehabilitation exercise intervention plan, and the specific measures included:

- an intervention management group was set up, with the head nurse as the leader. The team members included 2 CCU doctors, 1 respiration doctor, 1 rehabilitation doctor and 4 senior CCU nurses;
- relevant literature was consulted and a semi-structured interview table was drawn up, to understand the current situation of early rehabilitation intervention, investigate the patients' worries about the disease, weakness, expected assistance from nurses, concerned about rehabilitation exercise, expected recovery of self-care ability after discharge, etc. The doctors and nurses discussed and determined an early standardized rehabilitation exercise intervention plan together;

• organized the experts in the hospital to demonstrate the intervention plan, including the experts from the vasculocardiology department, CCU, rehabilitation department and respiration department, who had been working for more than 15 years, with a professional title of deputy senior/senior. An early standardized rehabilitation intervention plan was deliberated on and developed; 4 the early standardized rehabilitation intervention plan was as follows: a. patients with NYHA Class IV exercised for 10~20 min, sat in bed for 5 minutes, with their back apart from the bed; stretched their instep tight for 15s, pointed their tiptoe upwards for 15s, made a 360° circle, with the ankle joint as the center, 5 times for 1 group, 2~4 groups; lay flat, bent and straightened the knees, 5 times for 1 group, 2~4 groups; b. patients with NYHA Class III exercised for 10~20 min, sat up with the aid of a nurse, touched the ground with both feet at the edge of the bed for 5-10 min; did chest expansion exercise, 5 times for 1 group, 2~4 groups; moved on to the next stage after training for 3 days; c. patients with NYHA Class III-IV exercised for 10~20 min, stood for 5~10min, walked by the bed for less than 10min; lifted the upper arms forward, raised the upper arms backward, bent and stretched the elbow, bent the waist forward, backward, left and right. Each movement lasted for 5~6s and repeated twice for each group.

Observed Indicators

1) the Minnesota Living with Heart Failure Questionnaire (MLHFQ) was used to evaluate the quality of life, with 21 items and a total score of 105. The higher score, the worse quality of life⁽⁷⁾;

2) the 6MWT adopted used to evaluate exercise tolerance, and the walking distance within 6min was recorded. For those with obvious breathing difficulty, cold sweat and chest pain, the test should be stopped immediately⁽⁷⁾;

3) the Italian MIR SpiroLab III Portable Spirometer was used to detect FEV1;

4) 4~5ml of fasting venous blood in the morning was drawn, centrifuged at 3000g/min for 10min and the supernatant was taken to detect the BNP level. The detection instrument was Roche Cobas C2000 Automated Biochemical Analyzer;

5) the length of stay in CCU;

6) the nursing satisfaction was evaluated by patients' self-rating, with a total score of 10, of which 9-10 represented very satisfied, 7-8 represented basically satisfied, and ≤ 6 represented dissatisfied.

Statistical Method

SPSS20.0 software was selected to process data. The measurement data were compared using a t-test and expressed as ($\bar{x} \pm s$). The enumeration data were compared using a χ^2 test and expressed as %. $P < 0.05$ was considered to be statistically significant.

Results

Comparison between Two Groups in Terms of MLHFQ Score and 6MWT Before and After Intervention

The MLHFQ score of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P < 0.05$). The 6MWT of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P < 0.05$). See Table 1.

Group	Number of Cases	MLHFQ Score (pts)		6MWT (m)	
		Before Intervention	12 Months After Intervention	Before Intervention	12 Months After Intervention
Control Group	110	75.67±16.47	59.80±10.54 [*]	204.64±60.70	244.10±72.62 [*]
Experimental Group	110	74.80±15.90	53.49±8.89 [*]	202.98±63.67	278.39±85.45 [*]

Table 1: Comparison between two groups in terms of MLHFQ Score and 6MWT before and after intervention.

^{*} $P < 0.05$ compared with the control group; ^Δ $P < 0.05$ compared with before intervention

Comparison between two groups in terms of fev1 and bnp levels before and after intervention

The FEV1 level of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P < 0.05$). The BNP level of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P < 0.05$). See Table 2.

Group	Number of Cases	FEV1 (L)		BNP (pg/ml)	
		Before Intervention	12 Months After Intervention	Before Intervention	12 Months After Intervention
Control Group	110	1.36±0.33	1.88±0.47 [*]	1534.64±147.70	908.10±102.62 [*]
Experimental Group	110	1.42±0.36	2.17±0.54 [*]	1529.58±145.67	753.39±80.45 [*]

Table 2: Comparison between two groups in terms of FEV1 and BNP levels before and after intervention (Pts).

^{*} $P < 0.05$ compared with the control group; ^Δ $P < 0.05$ compared with before intervention

Comparison between Two Groups in Terms of Length of Stay in CCU

The length of Stay in CCU in the control group and the experimental group was (10.58±3.90)d and (9.07±2.77)d respectively. The length of stay in CCU of the experimental group was significantly shorter than that of the control group ($P < 0.05$).

Comparison between two groups in terms of total nursing satisfaction

The total nursing satisfaction of the

experimental group was significantly higher than that of the control group ($P<0.05$). See Table 3.

Group	Number of Cases	Very Satisfied	Basically Satisfied	Dissatisfied	Total Satisfaction (%)
Control Group	110	41	49	20	81.82
Experimental Group	110	64	42	4	96.36*

Table 3: Comparison between two groups in terms of total nursing satisfaction.

* $P<0.05$ compared with the control group

Discussion

In this study, to guarantee the exercise safety of patients with acute heart failure, before the start of intervention, a professional team comprehensively evaluated the exercise tolerance of the patients and developed specific indicators for discontinuing the exercise. The author observed that there were 2 cases in the control group and 3 cases in the experimental group who entered the decompensatory stage of acute heart failure due to the change of illness. In the remaining cases, no serious adverse events were observed, which suggested that the early standardized rehabilitation exercise plan adopted in this study was operable clinically.

According to the results of this study, the MLHFQ score of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P<0.05$), which indicated that early standardized rehabilitation intervention can significantly improve the quality of life of patients with acute heart failure in compensatory stage. In recent years, the fundamental and clinical research on heart failure keeps deepening, and the nursing philosophy has also gradually shifted to patient-oriented. The requirements for clinical nursing staff continue to grow. While paying attention to the patients' illness and treatment outcome, it is also necessary to show more concern about the patients' quality of life⁽⁸⁾. Owing to limitation of motion, weakness, anxiety and reduced self-care ability after they are admitted to hospital, patients with acute heart failure have significantly worse quality of life⁽⁹⁾. In this study, the early systematic rehabilitation intervention plan was to administer targeted exercise intervention on the basis of ensuring life safety, so as to further improve the patients' oxygenation function and increasing the oxygen uptake of body. It has been reported that neck exercise can improve self-care ability by spurring muscles all over the body into action⁽¹⁰⁻¹¹⁾. The early standardized rehabilitation exercise intervention adopted in this study ranged from local movement to systemic exercise to. It began with

exercise in and around the bed and then shifted to intra-ward and resistance trainings according to the recovery of illness, to promote the patients' mobility and self-care ability step by step. This measure can also improve the patients' self-confidence in rehabilitation, relieve their depression and anxiety induced by the disease and improve the quality of life. Moreover, patients will also feel encouragement and support from medical staff through the early rehabilitation intervention exercise, which is of great value for closing the gap among doctors, nurses and patients and improving the perceived level of social support⁽¹²⁾. As indicated by this study, the total nursing satisfaction of the experimental group was significantly higher than that of the control group ($P<0.05$).

According to the results of this study, the 6MWT of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P<0.05$); the FEV1 level of the experimental group after intervention was significantly higher than that of the control group and before intervention ($P<0.05$); the BNP level of the experimental group after intervention was significantly lower than that of the control group and before intervention ($P<0.05$), which implied that the early standardized rehabilitation intervention plan for patients with acute heart failure in compensatory stage can effectively improve their cardiopulmonary function and increase the intensity and duration of exercise under the premise of tolerance. Among them, the additional resistance training for patients with NYHA Class II is more favorable to promoting the blood oxygen reserve and exercise tolerance during the rehabilitation exercise.

Relevant studies have shown that⁽¹³⁻¹⁴⁾ regular aerobic exercise can slow down the remodeling of left ventricular to a certain extent, improve the systolic and diastolic functions of heart, increase myocardial perfusion, lower peripheral vascular resistance, improve the utilization rate of peripheral oxygen and antagonize sympathetic dystonia. Other studies have also revealed that⁽¹⁵⁻¹⁶⁾ early exercise intervention can effectively increase the strength of respiratory muscle, reduce oxygen consumption and accelerate the rehabilitation of cardiopulmonary function. Through the joint effects of active exercise, passive exercise and resistance training, early standardized rehabilitation intervention can promote the exercise tolerance of patients with acute heart failure in an all-round way, protect the cardiopulmonary function, and finally achieve the purpose of rapid

rehabilitation. According to the results of this study, the length of stay in CCU of the experimental group was significantly shorter than that of the control group ($P < 0.05$), which further confirmed the above viewpoint.

To sum up, early systematic rehabilitation exercise intervention for patients with acute heart failure in compensatory stage can effectively improve their quality of life, increase their exercise tolerance, promote the recovery of cardiopulmonary function, shorten their length of stay in CCU, and help establish a harmonious nurse-patient relationship. However, it should be noted that this study is a single-center study with a small sample size, so the research results are subject to bias and the conclusion obtained is yet to be confirmed by subsequent multi-center research with a large sample size.

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