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Observation on the Improvement of Cardiac Function in Patients with Coronary Heart Disease by Seamless Nursing

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Abstract: ***Objective**: To explore the impact of seamless nursing on cardiac function in patients with coronary heart disease (CHD). **Methods**: A total of 30 CHD patients admitted to the Department of Cardiology from January 2022 to December 2023 were selected. They were divided into two groups by computerized randomization: the traditional group (15 cases) receiving basic internal medicine nursing, and the experimental group (15 cases) receiving seamless nursing. The cardiac function indicators of the patients were observed. **Results**: Before nursing, there were no significant differences in cardiac function indicators such as left ventricular fractional shortening (FS), left ventricular ejection fraction (LVEF), and 6-minute walk distance (6MWD) between the two groups. After nursing, the FS, LVEF, and 6MWD indicators of both groups were higher than those before nursing, and the indicators in the experimental group were significantly higher than those in the traditional group (P<0.05). **Conclusion**: The application of seamless nursing in the treatment of CHD can enhance the efficacy of clinical treatment, promote the recovery of cardiac function, and has significant nursing advantages.*

Keywords: Seamless Nursing, Coronary Artery Disease, Cardiac Function, Left Ventricular Ejection Fraction, 6-Minute Walk Test, Nursing Outcome.

1. Introduction

Cardiovascular disease (CVD) is a major cause of global disease burden and death, accounting for 32% of global deaths [1]. In China, the prevalence of CVD continues to rise, with approximately 330 million existing cases, including 11.39 million cases of coronary heart disease [2]. Coronary heart disease is a common cardiovascular disease caused by coronary atherosclerosis leading to vascular stenosis or occlusion, resulting in myocardial ischemia, hypoxia, or necrosis. It is also one of the main fatal diseases threatening human health worldwide. Its pathogenesis is complex, closely related to various risk factors such as hypertension, hyperlipidemia, diabetes mellitus, smoking, obesity, and psychosocial factors. It is more common in adults over 40 years old, and men develop the disease earlier than women. In recent years, the incidence has shown a younger trend. The typical clinical symptoms include paroxysmal chest pain, palpitations, and dyspnea after activity. The progression of the disease can induce serious complications such as malignant arrhythmia, heart failure, and cardiogenic shock, and even lead to sudden cardiac death, posing a serious threat to the patient's life safety [3-5].

At present, the clinical treatment of coronary heart disease mainly includes conservative drug treatment, percutaneous coronary intervention (PCI), and coronary artery bypass grafting. However, regardless of the treatment method, nursing intervention is a key link to improve the patient's prognosis. Traditional basic internal medicine nursing is mostly disease-centered, with problems such as fragmented nursing links, unsystematic health education, and insufficient personalized intervention, which are difficult to meet the long-term and continuous physical and mental nursing needs of CHD patients. With the in-depth advancement of the holistic nursing concept, the seamless nursing model has been gradually applied in the field of cardiovascular disease nursing. This model is patient-centered, and by integrating medical resources, optimizing nursing processes, and improving the connection of nursing links, it provides patients with full-cycle and continuous nursing services from admission to discharge and even follow-up after discharge, which can effectively avoid nursing loopholes and improve nursing quality [6-7]. This study compared the effects of seamless nursing and traditional basic nursing on the cardiac function of CHD patients, and deeply explored the clinical application value of seamless nursing. The report is as follows.

2. Materials and Methods

2.1 General Information

A total of 30 CHD patients admitted to the Department of Cardiology of our hospital from January 2022 to December 2023 were selected as the research objects. Inclusion criteria: 1) Meeting the diagnostic criteria for CHD in the "Guidelines for the Diagnosis and Management of Patients with Chronic Coronary Syndrome in China" [8], confirmed by coronary angiography, electrocardiogram, and myocardial enzyme examination; 2) Cardiac function classification was grade II-III (New York Heart Association cardiac function classification standard); 3) Clear consciousness, able to cooperate with nursing intervention and indicator detection; 4) Patients and their families were informed and consented, and signed the informed consent form. Exclusion criteria: 1) Complicated with severe liver and kidney dysfunction, malignant tumors, hematological diseases; 2) With cognitive impairment, mental illness, unable to cooperate with the researcher; 3) Recent acute myocardial infarction, severe arrhythmia; 4) With motor dysfunction, unable to complete the 6-minute walk test.

The patients were divided into the traditional group and the experimental group by computerized random sorting, with 15 cases in each group. In the traditional group, there were 9 males and 6 females; aged 52-79 years, with an average of (63.18±1.62) years; course of disease 0.6-11 years, with an

average of (4.16±0.57) years; cardiac function classification: 10 cases of grade II and 5 cases of grade III; combined with hypertension in 8 cases, hyperlipidemia in 6 cases, and diabetes mellitus in 3 cases. In the experimental group, there were 10 males and 5 females; aged 54-82 years, with an average of (63.22±1.58) years; course of disease 0.6-12 years, with an average of (4.14±0.61) years; cardiac function classification: 11 cases of grade II and 4 cases of grade III; combined with hypertension in 7 cases, hyperlipidemia in 7 cases, and diabetes mellitus in 2 cases. Statistical methods were used to compare the general data such as gender, age, course of disease, cardiac function classification, and complications between the two groups, and there were no significant differences (P>0.05), which were comparable.

2.2 Nursing Methods

2.2.1 Traditional Group

Basic internal medicine nursing interventions were implemented. 1) Disease education: Nurses popularized the pathogenesis, treatment principles, common complications, and precautions of CHD to patients and their families through oral explanation; 2) Medication nursing: Conduct targeted pharmaceutical guidance, clarify the mechanism of action, dosage, adverse reactions, and precautions of various drugs (such as nitrates, antiplatelets, statins), urge patients to take drugs regularly as prescribed by doctors, and guide patients to monitor the reaction after medication independently; 3) Dietary and exercise guidance: Formulate basic dietary plans combined with patients' dietary preferences, emphasizing the principles of low-salt, low-fat, and low-sugar diet; recommend mild exercise methods such as walking and Tai Chi according to patients' cardiac function status, and clarify the taboos on exercise time and intensity.

2.2.2 Experimental Group

The seamless nursing model was implemented to build a full-cycle nursing closed loop of "admission-hospitalization-discharge-follow-up". The specific measures are as follows:

(1) Establishment and Capacity Improvement of Nursing Team: A special seamless nursing team consisting of 1 attending physician of cardiology, 3 responsible nurses, and 2 nursing assistants was established, and the post responsibilities and work connection processes of each member were clarified. Regular special training was carried out, including the latest progress in the diagnosis and treatment of CHD, early identification and intervention of common complications (heart failure, arrhythmia, thromboembolism), seamless nursing process specifications, doctor-patient communication skills, etc.; case discussions were organized once a month to review and optimize the problems arising in the nursing process. A flexible scheduling system was implemented to dynamically adjust the nursing staffing according to the patient flow and the severity of the disease, so as to ensure that the nursing needs of peak periods and critically ill patients are fully met, and avoid nursing interruptions caused by insufficient nursing manpower.

(2) Admission Adaptation and Environmental Optimization Nursing: Within 15 minutes after the patient is admitted to the hospital, the responsible nurse takes the initiative to receive the patient, and leads the patient and their family to familiarize themselves with the department layout through a "one-on-one" guidance method, including key areas such as wards, nurse stations, treatment rooms, and toilets, and introduces the hospital rules and regulations, attending physicians, and nursing team members. In response to the stress response caused by the unfamiliar environment, it is relieved through environmental optimization measures, such as placing green plants in the ward, adjusting the temperature and humidity of the ward to an appropriate range (temperature 22-24℃, humidity 50%-60%), and reducing ward noise interference (daytime noise ≤50dB, nighttime ≤40dB), so as to create a comfortable and warm hospital environment and reduce the patient's psychological discomfort.

(3) Individualized Health Education and Disease Monitoring: 1) Establish a comprehensive patient health file, collect detailed data such as patients' basic information, medical history, medication history, allergy history, and living habits, and carry out "one-on-one" health education with popular language combined with graphic manuals according to the patient's educational level, focusing on correcting the patient's wrong understanding of the disease (such as "symptom relief means recovery", "drugs can be stopped at will", etc.), and strengthening the patient's treatment compliance. 2) Formulate an individualized disease monitoring plan, continuously monitor the patient's vital signs such as heart rate, rhythm, and blood pressure with an electrocardiographic monitor, and measure the patient's body temperature, respiratory rate, and blood oxygen saturation regularly every day; conduct special explanations on the prodromal manifestations of common complications of CHD (such as heart failure, arrhythmia) (such as dyspnea, aggravated chest tightness, frequent palpitations, lower extremity edema, etc.), guide patients and their families to master self-monitoring methods, and inform medical staff in a timely manner if any abnormalities occur. 3) Conduct regular nursing rounds 2-3 times a week, dynamically assess changes in the patient's condition, and adjust the nursing plan in a timely manner.

(4) Psychological Nursing Intervention: Due to repeated illness and worry about prognosis, CHD patients often have negative emotions such as anxiety and depression, and poor psychological status can aggravate myocardial ischemia through neurohumoral regulation mechanisms, affecting the recovery of cardiac function. The nursing team uses the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS) to assess the psychological status of patients at admission, during hospitalization, and before discharge, and formulates individualized psychological counseling plans for patients with negative emotions: 1) Establish a trusting relationship through empathetic communication, listen to patients' demands, and provide psychological support; 2) Guide patients to divert their attention and relieve psychological pressure through relaxation training, music therapy, playing chess, reading, etc.; 3) Invite patients with well-controlled conditions to share treatment experience to enhance patients' confidence in treatment; for patients with severe negative emotions, timely refer to psychologists for professional intervention.

(5) Precise Management of Lifestyle: 1) Dietary nursing: Combined with the patient's body mass index (BMI), blood lipid level, and complications (such as hypertension, diabetes mellitus), a personalized dietary plan was formulated in conjunction with a dietitian, clarifying the daily calorie intake standard (1500-1800kcal per day for obese patients, 2000-2200kcal per day for patients with normal weight), emphasizing the principles of low-salt (≤5g per day), low-fat (fat intake accounts for ≤25% of total calories), and low-sugar diet, increasing dietary fiber intake (25-30g per day), recommending the consumption of fresh vegetables, fruits, whole grains, and high-quality proteins (such as fish, poultry, soy products), and avoiding foods high in cholesterol and saturated fatty acids. For patients with combined diabetes mellitus, strictly control carbohydrate intake and select low-glycemic index foods; for patients with constipation, increase dietary fiber and water intake (1500-2000ml per day), and use laxatives as prescribed by doctors if necessary to avoid increased myocardial oxygen consumption caused by increased abdominal pressure due to strenuous defecation, which may induce angina pectoris or even myocardial infarction. 2) Exercise nursing: An individualized exercise rehabilitation plan was formulated according to the patient's cardiac function classification and exercise tolerance. The baseline exercise tolerance was evaluated using the 6-minute walk test. Patients with cardiac function grade II can perform exercises such as walking and brisk walking for 15-20 minutes each time, twice a day; patients with cardiac function grade III mainly perform bedside activities, gradually transitioning to indoor walking for 10-15 minutes each time, 1-2 times a day. During exercise, closely monitor the patient's heart rate, blood pressure, and subjective feelings. The heart rate during exercise should not exceed (170 - age) beats per minute, and there should be no discomfort such as chest tightness or shortness of breath. Strenuous exercise should be avoided. 3) Smoking cessation and alcohol restriction intervention: Conduct special smoking cessation guidance for smoking patients, explain the mechanism of smoking-induced damage to coronary arteries, provide smoking cessation methods (such as nicotine replacement therapy), and follow up the smoking cessation effect regularly; guide drinking patients to strictly limit alcohol intake, with men not exceeding 25g of alcohol per day and women not exceeding 15g of alcohol per day, avoiding heavy drinking.

(6) Continuous Discharge Nursing: 1) One day before discharge, the nursing team provides discharge guidance to patients and their families, including standardized home medication, self-monitoring methods of the condition, precautions for diet and exercise, follow-up time (recheck electrocardiogram, cardiac ultrasound, blood lipids, etc. 1 month, 3 months, 6 months, and 1 year after surgery), and distributes the "Home Nursing Manual for Coronary Heart Disease" to ensure that patients and their families master the key nursing points. 2) Establish a discharge follow-up mechanism, combining telephone follow-up with WeChat group management. The first follow-up is conducted within 1 week after discharge, and then once a month for 6 consecutive months to dynamically assess the patient's home nursing status, answer the patient's questions in a timely manner, and correct irregular nursing behaviors; for patients with unstable conditions, increase the follow-up frequency and suggest re-admission for re-examination if necessary.

2.3 Evaluation Indicators

The cardiac function indicators of the two groups of patients were measured and evaluated before nursing intervention (within 24 hours after admission) and after nursing intervention (within 24 hours before discharge). The core indicators include: 1) Left ventricular fractional shortening (FS): Measured by the modified Simpson method of two-dimensional echocardiography, reflecting left ventricular systolic function, with a normal reference value of 25%-45%; 2) Left ventricular ejection fraction (LVEF): Also measured by the modified Simpson method of two-dimensional echocardiography, it is a core indicator for evaluating left ventricular systolic function, with a normal reference value of 50%-70%. LVEF <40% can diagnose systolic heart failure; 3) 6-minute walk distance (6MWD): Measured in accordance with the standard procedure recommended by the American Heart Association (AHA). The patient is guided to walk at a constant speed in a straight corridor 30m long, and the walking distance within 6 minutes is recorded to evaluate the patient's exercise tolerance. 6MWD <150m is severe heart failure, 150-450m is moderate heart failure, and >450m is mild heart failure.

2.4 Statistical Analysis

SPSS 24.0 statistical software was used for data processing and analysis. Measurement data were expressed as mean ± standard deviation (x±s). Paired t-test was used for comparison before and after nursing in the group, and independent sample t-test was used for comparison between groups; count data were expressed as rate (%), and chi-square test was used. $P<0.05$ was considered statistically significant.

3. Results

Before nursing intervention, there were no significant differences in FS, LVEF, and 6MWD between the two groups ($P>0.05$); after nursing intervention, the FS, LVEF, and 6MWD of both groups were significantly higher than those before nursing, with statistically significant differences ($P<0.05$); and the increase range of the above cardiac function indicators in the experimental group was significantly greater than that in the traditional group, with a statistically significant difference between the groups ($P<0.05$). See Table 1.

Table 1: Statistics of Cardiac Function Indicators in Two Groups of CHD Patients Before and After Nursing [±s]

Group	n	Time	FS (%)	LVEF (%)	6MWD (m)
Traditional Group	15	Before Nursing	21.56±1.27	38.51±1.45	328.24±25.09
		After Nursing	23.53±1.43	40.04±1.57	356.72±31.16
		t value	3.989	2.773	2.757
		P value	0.000	0.010	0.010

Experimental Group	15	Before Nursing	21.49±1.31	38.49±1.51	330.19±25.11
		After Nursing	29.81±1.69	46.72±1.77	379.62±35.04
		t value	15.070	13.700	4.441
		P value	0.000	0.000	0.000
		t1 value	10.987	10.935	2.891
		P1 value	0.000	0.000	0.039

Note: t1 value/P1 value are the statistical values of the two groups after nursing.

4. Discussion

As a chronic ischemic cardiovascular disease, the core goals of CHD treatment are to improve myocardial blood supply, protect cardiac function, prevent complications, and improve patients' quality of life. As an important auxiliary means of clinical treatment, the quality of nursing intervention directly affects the treatment effect and prognosis of patients [9]. Due to the lack of systematicness and continuity, the traditional basic internal medicine nursing model is difficult to achieve precise full-cycle nursing for patients, and its effect in improving patients' cardiac function and treatment compliance is limited.

The seamless nursing model is characterized by "full-cycle, no breakpoints, and individualization". By integrating nursing resources and optimizing nursing processes, it achieves full-course nursing coverage from admission to discharge and even home rehabilitation [10]. Its improvement effect on the cardiac function of CHD patients is mainly achieved through the following mechanisms: Firstly, the professional construction of the nursing team and the flexible scheduling system ensure the continuity and pertinence of nursing services, avoid nursing loopholes caused by insufficient manpower or poor process connection, and provide stable and high-quality nursing guarantee for patients; Secondly, admission adaptation and environmental optimization nursing effectively reduce the patient's stress response, and the relief of stress response can reduce sympathetic nerve excitement, reduce myocardial oxygen consumption, alleviate myocardial ischemic damage, and create good conditions for the recovery of cardiac function; Thirdly, individualized health education and disease monitoring strengthen the patient's disease cognition and self-management ability, enabling patients to identify changes in their condition early and intervene in a timely manner, effectively preventing the occurrence of complications and avoiding further deterioration of cardiac function; In addition, targeted psychological nursing relieves the patient's negative emotions, and the improvement of negative emotions can regulate neurohumoral balance, reduce the release of stress hormones such as catecholamines, reduce the adverse effects on coronary arteries, and improve the patient's treatment compliance to ensure the effective implementation of various treatment and nursing measures [11-12]; Finally, the precise management of lifestyle and continuous discharge nursing realize the long-termization of nursing intervention, help patients establish healthy dietary and exercise habits, continuously consolidate the treatment effect, effectively delay the progression of the disease, and promote the continuous improvement of cardiac function.

The results of this study showed that after nursing intervention, the FS, LVEF, and 6MWD indicators of both groups were significantly higher than those before nursing, but the increase range of the experimental group was significantly greater than that of the traditional group ($P<0.05$). As core indicators for evaluating left ventricular systolic function, the increase in FS and LVEF indicates a significant improvement in the patient's left ventricular systolic capacity; as an important indicator for evaluating the patient's exercise tolerance, the increase in 6MWD reflects the enhancement of exercise capacity and the improvement of quality of life after the improvement of cardiac function. This result is consistent with the conclusions of previous studies [13-14], confirming the significant advantage of the seamless nursing model in improving the cardiac function of CHD patients.

From the perspective of evidence-based nursing, all measures of the seamless nursing model are formulated based on the pathophysiological mechanism of CHD and clinical nursing needs, with clear scientific basis. For example, the emphasis on low-salt, low-fat, and high dietary fiber in dietary management is in line with the principles of prevention and control of atherosclerosis; the formulation of individualized exercise plans according to cardiac function classification in exercise nursing avoids myocardial damage caused by excessive exercise and achieves the effect of exercise rehabilitation; continuous discharge nursing makes up for the deficiency of traditional nursing that "ends at discharge". Through long-term follow-up, the sustainability of nursing effect is ensured, which is consistent with the concept of "full-cycle rehabilitation nursing" emphasized in the "Guidelines for Percutaneous Coronary Intervention (2025)".

This study has certain limitations, such as small sample size, short study cycle, and failure to evaluate the long-term prognosis of patients (such as re-hospitalization rate and mortality). Future studies can expand the sample size, extend the follow-up time, further verify the impact of the seamless nursing model on the long-term prognosis of CHD patients, and explore the integrated traditional Chinese and Western medicine seamless nursing model, such as integrating traditional Chinese medicine health preservation concepts and acupoint massage into nursing processes to provide more targeted nursing services for patients.

5. Personal Experience

As a chronic cardiovascular disease, CHD has a long course and is prone to recurrence, and there is no radical cure. Long-term and effective nursing management is crucial to improving the patient's prognosis. Through the practice of this study, the author deeply realizes that the traditional basic nursing model can no longer meet the nursing needs of modern CHD treatment, while the seamless nursing model fully reflects the "patient-centered" nursing concept by building a full-cycle nursing closed loop. In clinical practice, the seamless nursing model not only requires nurses to have solid professional knowledge and skills, but also good

communication skills and teamwork ability, and be able to formulate precise nursing plans according to the individual differences of patients.

In the process of implementing seamless nursing, nurse-patient communication is a key link to improve nursing effect. Through active and empathetic communication, a good nurse-patient trusting relationship can be established, and the patient's compliance with treatment and nursing can be enhanced. At the same time, the importance of continuous discharge nursing cannot be ignored. Many patients are prone to problems such as irregular medication and recurrence of bad living habits after discharge due to lack of professional guidance, leading to repeated illness. Through telephone follow-up and WeChat group management, these problems can be found and corrected in a timely manner, providing continuous professional support for patients' home rehabilitation.

In addition, the construction of the nursing team is the guarantee for the effective implementation of the seamless nursing model. Regular special training and case discussions can continuously improve the professional quality and emergency response ability of nurses, ensuring the standardized implementation of nursing measures. The flexible scheduling system can dynamically adjust the staffing according to patient needs, avoid the waste and shortage of nursing resources, and improve the quality and efficiency of nursing services.

In summary, the seamless nursing model has significant advantages in the nursing of CHD patients, which can effectively promote the recovery of patients' cardiac function, improve nursing quality and patient satisfaction, and is worthy of widespread clinical promotion and application. In the future nursing work, we need to continuously optimize the nursing process, improve nursing measures, explore nursing models more in line with patient needs, and provide more high-quality and precise nursing services for CHD patients.

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