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Original Article

Study concerning evidence-based nursing and clinical efficacy of interventional therapy in patients with coronary heart disease

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Abstract: Objective: The aim of the current study was to explore the effects of evidence-based nursing on interventional therapy for patients with coronary atherosclerotic heart disease. Methods: A total of 108 patients with coronary heart disease were randomly divided into the control group and experimental group, with 54 cases in each group. The control group was given routine nursing, while the experimental group was given evidence-based nursing. Physical function measurements (Physical Function Scale, CM-PPT), 30-second arm flexion tests (30-ACT), 10 sitting position test measurements (STS10), 6-minute walking tests (6MWT), depression scores (Self-Rating Depression Scale, SDS), anxiety scores (Self-Rating Anxiety Scale, SAS), pain scores (Numerical Rating Scale, NRS), daily living abilities (Barthel index), quality of life levels (China questionnaire of quality of life in patients with cardiovascular diseases, CQQC), and nursing satisfaction scores (Seattle Scale, SAQ) of the two groups, before and after three months of nursing, were recorded. Results: Compared with routine nursing, evidence-based nursing improved physical function levels of patients more effectively ($P < 0.05$), reduced anxiety and depression ($P < 0.05$), improved daily living abilities and quality of life ($P < 0.05$), and improved nursing satisfaction scores ($P < 0.05$). Conclusion: Application of evidence-based nursing intervention model in patients with coronary heart disease can alleviate bad moods and pain, as well as improve physical function, daily living abilities, quality of life, and nursing satisfaction scores.

Keywords: Coronary heart disease (CHD), interventional therapy, evidence-based nursing, clinical efficacy, nursing satisfaction

Introduction

Coronary heart disease (CHD) is one of the most common cardiovascular diseases. It is also called ischemic heart disease due to myocardial ischemia and hypoxia caused by coronary artery atherosclerosis. CHD occurs most commonly in people over 40 years old. Incidence rates are higher in males than in females. It is one of the main causes of death, worldwide. CHD deaths account for about 30% of worldwide deaths. The costs of CHD are an important source of medical expenses [1-3]. According to the findings of cardiovascular diseases in China in 2016, the number of patients with CHD in China reached 11 million. It is estimated that, by 2020, CHD will become the most important cause of disabilities and deaths in China [4]. According to statistics of the American Heart Association, about one third of deaths in America, in 2013, were related to cardiovascular diseases [5]. CHD seriously affects human health, bringing about heavy medical and economic burdens.

At present, interventional operations, coronary artery bypass grafting, and thrombolysis are the main treatments of CHD. With the development of medical technology, the prognosis of patients with CHD has been effectively improved. However, there is no one way to cure CHD thoroughly [6]. The main goals of treatment of CHD are to improve symptoms, relieve pain, improve prognosis, and prolong life [7].

However, due to the poor self-management behavior of some patients, drug therapy or surgical treatments, alone, often fail to achieve desired effects. Nursing assistance is often needed in the clinical treatment process. Routine nursing has not met the increasing demand for treatment. Evidence-based nursing is a scientific nursing model based on the idea of evidence-based medicine. Evidence-based nursing emphasizes the scientific service for patients by demonstration [8]. Evidence-based nursing has effectively improved quality levels of nursing staffs and quality levels of nursing via continuing education [9]. In recent years, evidence-based nursing has gradually been applied for treatment of heart diseases, including heart failure [10, 11]. However, there are few reports concerning CHD.

The current study explored the application value of evidence-based nursing for treatment of patients with CHD, aiming to provide guidance for clinical nursing.

Material and methods

Study subjects

A total of 108 patients with coronary heart disease were randomly divided into the control group and experimental group, with 54 cases in each group. The control group was given routine nursing, while the experimental group was given evidence-based nursing based on routine nursing. Inclusion criteria: Patients meeting WHO diagnostic criteria of CHD in 2012 [12]; Patients aged 50-70 years old; Patients had complete case data and volunteered to participate in this study. Exclusion criteria: Patients with unstable coronary heart disease; Patients with intermittent myocardial infarction; Patients with acute myocardial infarction; Patients with infectious diseases; Patients with severe cardiac dysfunction; Tumor patients; Patients with grade III hypertension; Patients with liver and kidney failure; Patients with incomplete case data; Patients with mental or learning dysfunction. The current study was approved by the Affiliated Hospital of Jining Medical University Ethics Association. Informed consent was provided by the patients and their families.

Nursing methods

The control group was given routine nursing. The experimental group received evidence-based nursing in addition to routine nursing. The nursing time was 3 months. Nursing methods strictly referred to routine nursing operation guidelines, evidence-based nursing operation guidelines, and extended nursing operation guidelines in 2013 [13, 14].

Routine nursing: Patients were advised to take medicine according to the doctor's instructions. They were guided to take medicine correctly. Clinical efficacy and adverse reactions after taking medicine were closely observed. Basic information of the patients was collected and filed. Family and social-cultural situations of the patients were understood. Knowledge about the disease was administered. Good nurse-patient relationships were established. The ward was kept clean and quiet with good ventilation. Temperature and humidity levels were maintained in the appropriate range. Vital signs of the patients were closely observed. The patients were guided in performing rehabilitation exercise. They were told to maintain a healthy diet and living habits. Moreover, psychological counseling was provided.

Evidence-based nursing: The evidence-based nursing group was established. Details of the patients were collected. A nursing evaluation for each of the patients was carried out. Evidence-based problems were raised, specialized, and structured. For the problems, the patients were referred to relevant literature, aiming to find the scientific basis. They reviewed the validity and popularization of scientific evidence. Combining the scientific evidence with the clinical experience of nursing staff, the wishes, values, and conditions of patients were considered. A personalized nursing model was then formulated. The nursing plan was implemented. Effects were evaluated by self-evaluations, peer reviews, and other methods.

Outcome measures

Measurements of physical function were based on the Physical Function Scale (CM-PPT), 30-seconds arm flexion tests (30-ACT), 10 sitting position test measurements (STS10), and 6-minute walking tests (6MWT). Assessment of psychology was based on depression scores (Self-Rating Depression Scale, SDS) and anxiety scores (Self-Rating Anxiety Scale, SAS). Pain scores were based on the Numerical Rating Scale (NRS). The Barthel index was used to measure daily living abilities. Quality of life was

Table 1. General data

	Control group (n = 54)	Experimental group (n = 54)	χ^2/t	P
Gender			0.178	0.673
Male	37 (68.52)	39 (72.22)		
Female	17 (31.48)	15 (27.78)		
Age	65.33 ± 16.44	69.15 ± 18.78		
Coronary lesions vessels			0.444	0.505
Single [n (%)]	15 (27.78)	12 (22.22)		
Double [n (%)]	39 (72.22)	42 (77.78)		
Weight [n (%)]			0.172	0.679
≥ 50 Kg	36 (66.67)	38 (70.37)		
< 50 Kg	18 (33.33)	16 (29.63)		
Residence [n (%)]			0.149	0.700
City	30 (55.56)	28 (51.85)		
Country	24 (44.44)	26 (48.15)		
Exercise [n (%)]			0.159	0.690
No	33 (61.11)	35 (64.81)		
Yes	21 (38.89)	19 (35.19)		
Education			0.745	0.689
Illiteracy	8 (14.81)	7 (12.96)		
High school or below	44 (81.48)	43 (79.63)		
High school or above	2 (3.70)	4 (7.41)		
Residence			1.525	0.467
Living alone	5 (9.26)	7 (12.96)		
Living with spouse	40 (74.07)	42 (77.78)		
Living with children	9 (16.67)	5 (9.26)		
Monthly income (yuan)			0.729	0.694
≤ 1000	5 (9.26)	6 (11.11)		
1000-2000	31 (57.41)	34 (62.96)		
> 2000	18 (33.33)	14 (25.93)		

assessed by the China questionnaire of quality of life in patients with cardiovascular diseases (CQQC). Moreover, the Seattle Scale (SAQ) was used to measure nursing satisfaction.

Statistical methods

SPSS 19.0 software (Asia Analytics Formerly SPSS China) was used for statistical analysis. Enumeration data are expressed by [n (%)]. Comparisons between the two groups were performed by χ^2 tests. Measurement data are expressed by (mean ± sd). Comparisons between the two groups were performed by independent sample t-tests. Comparisons before and after nursing were performed by paired t-tests. $P < 0.05$ indicates statistical significance.

Results

General data shows no differences

There were 54 patients in the control group, including 37 males (68.52%) and 17 females (31.48%), aged (65.33 ± 16.44) years. There were 54 patients in the experimental group, including 39 males (72.22%) and 15 females (27.78%), aged (69.15 ± 18.78) years. There were no significant differences in gender, age, number of coronary lesions vessels, weight, residence, exercise habits, and education levels between the two groups ($P > 0.05$) (**Table 1**).

Evidence-based nursing shows better physical function

There were no significant differences in CM-PPT, 30-ACT, STS10, and 6MWT between the two groups before nursing ($P > 0.05$). CM-PPT, 30-ACT, and 6MWT scores in the experimental group were higher than those in the control group after nursing (all $P < 0.05$). 6MWT in the control group, after nursing, was higher than that before nursing. There were no significant differences in CM-PPT, 30-ACT, and STS10 scores, before and after nursing, in the control group ($P > 0.05$). CM-PPT, 30-ACT, and 6MWT scores in the experimental group, after nursing, were higher than those before nursing (all $P < 0.05$). STS10 scores in the experimental group, after nursing, were lower than those before nursing ($P < 0.05$) (**Table 2**).

Evidence-based nursing improved psychology

There were no differences in SAS and SDS scores between the two groups before nursing ($P > 0.05$). SAS and SDS scores in the two

Table 2. Physical function measurement

		Control group (n = 54)	Experimental group (n = 54)	t	P
CM-PPT (min)	Before nursing	10.118 ± 2.650	10.567 ± 2.396	0.924	0.368
	After nursing	10.322 ± 2.248	13.079 ± 2.224*	6.408	< 0.001
30-ACT (times)	Before nursing	19.755 ± 2.470	19.830 ± 2.516	0.156	0.876
	After nursing	20.548 ± 1.883	22.314 ± 2.295*	4.369	< 0.001
STS10 (s)	Before nursing	31.622 ± 6.760	30.728 ± 6.134	0.720	0.473
	After nursing	29.536 ± 4.664	28.298 ± 4.629*	1.384	0.169
6MWT (m)	Before nursing	579.846 ± 49.598	595.613 ± 46.633	1.702	0.092
	After nursing	604.108 ± 32.923*	650.438 ± 29.009*	8.094	< 0.001

Note: *Indicates that P < 0.05 compared with the same group before nursing.

Table 3. Psychological state scores before and after nursing

		Control group (n = 54)	Experimental group (n = 54)	t	P
SAS	Before nursing	60.66 ± 10.72	61.23 ± 10.05	0.285	0.776
	After nursing	32.03 ± 0.91*	24.78 ± 0.65*	47.640	< 0.001
SDS	Before nursing	60.53 ± 6.99	61.54 ± 7.73	0.712	0.478
	After nursing	34.05 ± 1.31*	29.08 ± 1.05*	21.754	< 0.001

Note: *Indicates that P < 0.05 compared with the same group before nursing.

Table 4. NRS pain scores before and after nursing

		Control group (n = 54)	Experimental group (n = 54)	t	P
NRS	Before nursing	8.10 ± 1.29	7.89 ± 1.76	0.707	0.481
	After nursing	6.41 ± 1.19*	3.03 ± 0.78*	17.456	< 0.001

Note: *Indicates that P < 0.05 compared with the same group before nursing.

Table 5. Barthel index before and after nursing

		Control group (n = 54)	Experimental group (n = 54)	t	P
Barthel	Before nursing	59.51 ± 5.86	58.15 ± 6.15	1.176	0.242
	After nursing	63.83 ± 6.20*	70.65 ± 8.21*	5.270	< 0.001

Note: *Indicates that P < 0.05 compared with the same group before nursing.

groups decreased after nursing (P < 0.05). SAS and SDS scores, after nursing, in the experimental group were higher than those in the control group (P < 0.05) (**Table 3**).

Evidence-based nursing lowers NRS pain scores

There were no differences in NRS scores between the two groups before nursing (P > 0.05). NRS scores of the two groups decreased after nursing (P < 0.05). NRS scores, after nursing, in the experimental group were higher than those in the control group (P < 0.05) (**Table 4**).

Evidence-based nursing improves daily living abilities

There were no differences in the Barthel index between the two groups before nursing (P > 0.05). The Barthel index of the two groups increased after nursing (P < 0.05). The Barthel index of the experimental group, after nursing, was higher than that of the control group (P < 0.05) (**Table 5**).

Evidence-based nursing improves life quality

There were no differences in quality of life score between the two groups before nursing (P > 0.05). Compared to the control group, total scores of CQQC, physical dimension, illness dimension, medical condition, general life, and psychosocial scores, after nursing, in the experimental group were higher (P < 0.05). There were no differences in work condition scores between the two groups after nursing (P > 0.05). Results of comparisons within the group showed that physical dimension, medical conditions, and general life scores of the control group, after nursing, were higher than those before nursing. There were no significant differences in total scores of CQQC, illness dimension, and

Table 6. Quality of life scores before and after nursing

		Control group (n = 54)	Experimental group (n = 54)	t	P
Total score of CQQC	Before nursing	61.63 ± 14.43	59.42 ± 16.37	0.576	0.567
	After nursing	63.67 ± 10.74	79.65 ± 12.58*	7.099	< 0.001
Physical dimension	Before nursing	17.87 ± 7.22	19.17 ± 6.33	0.995	0.322
	After nursing	21.18 ± 9.91*	30.05 ± 13.26*	3.937	< 0.001
Illness dimension	Before nursing	14.49 ± 2.60	14.77 ± 3.38	0.483	0.630
	After nursing	14.94 ± 3.00	16.80 ± 2.35*	3.587	0.001
Medical condition	Before nursing	3.11 ± 1.07	3.32 ± 1.23	0.947	0.346
	After nursing	3.60 ± 1.32*	4.19 ± 1.02*	2.599	0.011
General life	Before nursing	6.54 ± 2.69	6.10 ± 2.44	0.890	0.375
	After nursing	7.84 ± 2.52*	9.15 ± 2.44	2.744	0.007
Psychosocial	Before nursing	13.95 ± 2.94	13.61 ± 3.49	0.548	0.585
	After nursing	12.89 ± 3.54	14.27 ± 3.56	2.020	0.046
Work condition	Before nursing	3.70 ± 1.06	3.58 ± 1.75	0.431	0.667
	After nursing	4.11 ± 1.26	4.54 ± 1.40*	1.678	0.096

Note: *Indicates that P < 0.05 compared with the same group before nursing.

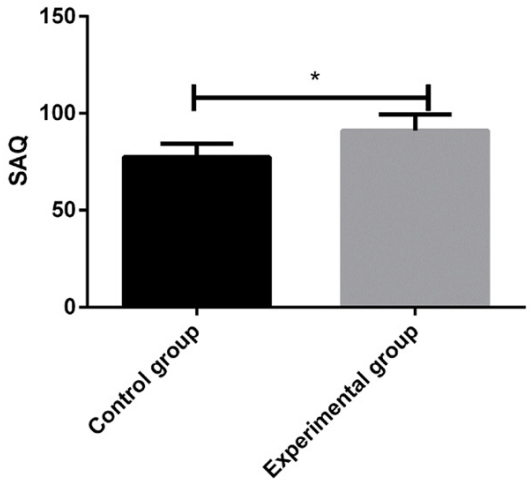

Figure 1. Results of SAQ scores (* indicates that P < 0.05).

work condition scores in the control group, before and after nursing. Total scores of CQQC, physical dimension, illness dimension, medical conditions, general life, and work condition scores in the experimental group, after nursing, were significantly higher than those before nursing (P < 0.05). There were no significant differences in psychosocial scores in the experimental group, before and after nursing (**Table 6**).

Evidence-based nursing improves nursing satisfaction

SAQ scores showed that nursing satisfaction levels in the experimental group were significantly higher than those in the control group (P < 0.05) (**Figure 1**).

Discussion

With the trend of an aging population, incidence rates of CHD have increased year by year. Due to social and economic development, as well as improvement of living standards, occurrence of CHD has shown a younger trend [15]. The longer course of CHD causes a serious financial burden to families and individuals. Pain caused by myocardial ischemia also leads to the emergence of negative patient emotions. It also affects daily living abilities, quality of life, and the prognosis of patients [16, 17]. In recent years, with the widespread use and maturity of clinical nursing technology, the roles of nursing in the treatment of cardiovascular diseases have become more and more important. With improved awareness of law and self-protection, the requirements of nursing mode and quality levels of nursing staffs have become higher and higher [18]. The current study explored the application value of evidence-based nursing in patients with coronary heart disease, providing reference for clinical nursing treatment of coronary heart disease in the future.

A total of 108 patients with CHD were included in this study. They were randomly divided into two groups. There were no statistical differences in age, sex ratios, and other basic data between the two groups. First, changes in physical function, before and after nursing, in the

two groups were analyzed. CM-PPT, 30-ACT, STS10, and 6MWT scores have been widely used in medical evaluations. These can accurately and effectively reflect muscle strength and cardiopulmonary function of patients [19-21]. Results of 6MWT testing showed that both nursing models could significantly improve exercise endurance and cardiac reserve function of patients with CHD. Results of CM-PPT, 30-ACT, 6MWT, and STS10 tests showed that evidence-based nursing can improve upper limb muscle strength, muscle endurance, and lower limb strength, as well as overall physical function. Many studies have reported that, due to the course of disease, treatment costs, and aging, patients with CHD are prone to negative emotions. These severely affect treatment effects. With the development of nursing models, more and more attention has been paid to the physical and mental health conditions of patients [5, 22]. Results of the current study showed that the two nursing models had significant effects on anxiety and depression levels of patients. After the combination of evidence-based nursing, these effects were significantly enhanced. Pain is a common clinical symptom of CHD, mainly due to acute pain caused by myocardial ischemia and hypoxia. Sudden angina pectoris may even lead to death of patients [23]. Present results showed that evidence-based nursing provides good pain management effects on patients with CHD. Evidence-based nursing effectively improved daily living abilities, quality of life levels, and nursing satisfaction. Evidence-based nursing finds external evidences, such as systematic reviews of relevant literature, and formulates a nursing plan according to scientific evidences and problems encountered in clinical practice, including clinical knowledge and patient needs [24, 25]. According to a study of chronic heart failure, evidence-based nursing was shown to effectively improve the quality of life of pregnant women with heart failure after cesarean sections. It was shown to promote the cultivation of healthy behavior [26]. However, the concept of evidence-based nursing and related knowledge have not yet been completely popularized. Nurses with different knowledge levels have different levels of mastery of evidence-based nursing. Therefore, it is necessary for units to organize, learn relevant knowledge, and read professional literature.

In conclusion, application of evidence-based nursing in patients with CHD can help alleviate bad moods and pain, as well as improve physical function levels, daily living abilities, quality of life levels, and nursing satisfaction scores.

Disclosure of conflict of interest

None.

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