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Original Article

Effect of personalized care on stress response and quality of life in patients with coronary heart disease after PCI

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Abstract: Objective: This study aimed to explore the effects of personalized care on stress responses and quality of life in patients with coronary heart disease after the percutaneous coronary intervention (PCI). Methods: We randomly assigned 146 patients with coronary heart disease who underwent PCI in our hospital to receive either routine nursing intervention (69 patients, the control group) or personalized care combined with routine nursing intervention (77 patients, the study group). The changes in systolic blood pressure, diastolic blood pressure, and heart rate of patients after nursing intervention were observed and recorded, as well as the adverse reactions after PCI. The anxiety and depression of the two groups before and after nursing intervention were assessed by Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS), angina pectoris by the Seattle Angina Questionnaire (SAQ), self-care ability by the Exercise of Self-care Agency (ESCA) scale, and quality of life by the Chinese Cardiovascular Quality of Life Questionnaire (CCQQ). Results: The systolic blood pressure, diastolic blood pressure, and heart rate were markedly lower in the study group than in the control group ($P<0.05$). The SAS and SDS scores after personalized care were markedly lower as compared with those after routine nursing intervention ($P<0.05$). The SAQ, ESCA, and CCQQ scores after nursing intervention were significantly higher than those in the control group ($P<0.05$). The total adverse reactions were less frequent in the study group than in the control group ($P<0.05$). Conclusion: Personalized nursing is effective for patients with coronary heart disease after PCI. It can improve the blood pressure and heart rate of patients, control the psychological stress response, relieve the anxiety and depression, and reduce the degree of angina pectoris. Meanwhile, it leads to better self-care ability and quality of life, and higher satisfaction of care.

Keywords: Personalized care, PCI, coronary heart disease, stress response, quality of life

Introduction

Coronary heart disease is one of the leading causes of death in developing countries, and a major factor responsible for disease and disability [1]. The existing treatment for coronary heart disease mainly depends on percutaneous coronary intervention (PCI) [2, 3]. PCI treatment has good outcomes, fast recovery, little trauma, and reduced perioperative complications, but its risks are high [4]. With limited knowledge of PCI surgery, most patients face negative emotions and psychological stress which induce the stress response [5-7]. A former study stated that nursing is crucial in both the independent and collaborative contexts of PCI treatment [8]. Therefore, professional nursing before the implementation of clinical surgery is essential [9].

Advancements in medical standards motivate the needs and expectations of most patients for better nursing quality beyond routine nursing intervention. Bai et al [13] insisted that nursing staff should be equipped with better PCI preoperative nursing knowledge and professional nursing ability. Personalized care, a patient-centered active service model [14], pays attention to the perioperative physical and mental experiences of each patient, provides targeted dietary guidance, respects the needs of patients and manages care to meet them [15]. Besides more comprehensive health care, personalized care offers targeted care

for patients according to their sex, personality, age, family and social relations [16]. The higher levels of care of nursing staff not only increases work efficiency but also improves the patient's clinical outcomes [17]. A previous study [18] held that clinical care for emergency PCI could reduce postoperative complications and improve patient satisfaction.

So far, few studies have reported on personalized care after PCI in patients with coronary heart disease. This study adopted personalized care for patients with coronary heart disease after PCI, in an attempt to explore the effect of personalized care on postoperative stress response and quality of life of patients and to provide a suitable nursing intervention for patients with coronary heart disease after PCI.

Materials and methods

Basic information

A total of 146 patients with coronary heart disease undergoing PCI from February 2016 to April 2017 who were admitted to the Cardiology Department of our hospital were collected and divided into the study group (77 cases) and the control group (69 cases). The study group was comprised of 45 males and 32 females who were aged from 45 to 71 years (average age of 58.37±4.16 years), with a duration of disease ranging from 1 to 9 years (average disease duration of 4.33±1.08 years). The control group was comprised of 40 males and 29 females who were aged from 42 to 69 years (average age of 58.14±5.69 years), with a duration of disease ranging from 1 to 10 years (average disease duration of 4.28±1.13 years).

Inclusion and exclusion criteria

Inclusion criteria: patients diagnosed with coronary heart disease by coronary angiography [19]; patients whose vital signs were stable; patients with complete medical data; patients in line with PCI indications; patients with an expected survival of ≥1 year. Approval for this study was obtained from the Ethics Committee of our hospital. All subjects and their family members signed the written informed consent. Exclusion criteria: those with either arrhythmia, orthopedic disease, acute myocardial infarction, speech and hearing dysfunction, cognitive impairment, dysfunction of the body, mental illness, or a family history of mental illness.

Nursing methods

Patients in the control group received routine nursing intervention after PCI. The specific ways were as follows. The nursing staff informed patients of the exact operation time and gave a basic health education overview before and after the operation. After the operation, the staff directed patients to prevent complications such as bleeding and infection and gave guidance on diet and exercise.

Patients in the study group received personalized care besides the routine nursing intervention for the control group. (1) Cognitive education: targeted health education was conducted according to the cognitive ability, the disease, the doubts about the treatment method, and the living and eating habits of each patient. Also, patients were informed of disease-related knowledge, the importance and advantages of treatment, key points of surgery coordination, and considerations after the operation. (2) Psychological care: nursing staff gave active care for patients to establish mutual trust and cooperation. For patients undergoing mood swings, anxiety, and depression, a motivational interview was assigned to encourage patients to express the inner feelings and to overcome bad emotions and psychological barriers, so that patients could be optimistic about receiving the postoperative care. (3) Heart-sports care: to promote the recovery of cardiac function, each patient was given a customized exercise plan for recovery and self-care according to their physical condition. The nursing staff guided patients to do active or passive movements including knee bends and body flexion with a stepwise ramp-up in time and intensity of training. When patients recovered to a normal life, walking, stairs-climbing, bicycling, and other daily exercises were also required. The exercise intensity was under the strict control of the nursing staff. The exercise was stopped immediately if symptoms such as palpitation, dyspnea, and angina occurred. (4) Care for complications: the heart rate and blood pressure of patients were monitored regularly by the nursing staff, and the puncture site was under observation to check if complications such as blood exudation, wound infection, and hemato-

ma occurred. Also, the nursing staff gave patients and their families instructions for postoperative recovery. (5) Dietary care: patients were required to drink a large amount of water after the operation. Besides, digestible food high in vitamins and high protein was recommended to supplement the body's nutrition without burdening the stomach. Dietary guidance combined with sports care could facilitate the recovery of the body.

Outcome measures

(1) The changes in systolic blood pressure, diastolic blood pressure, and heart rate of patients after nursing intervention were recorded, as well as the adverse reactions after PCI. (2) Psychological stress response was measured. The anxiety and depression before and after the nursing intervention were graded according to the SAS and SDS. In the SAS, a higher score suggests a higher degree of anxiety: a 50-70 score out of 100 indicated mild anxiety; a 71-90 score out of 100 indicated moderate anxiety; scores higher than 90 indicated severe anxiety. In the SDS, a higher score suggests a higher degree of depression: a 50-70 score out of 100 indicated mild depression; a 71-90 score out of 100 indicated moderate depression; scores higher than 90 indicated severe depression. (3) The SAQ consists of 19 items that measure 5 dimensions of coronary artery disease, including angina frequency, treatment satisfaction, physical limitation, disease perception, and angina stability. SAQ is a 100-point scale, with higher scores denoting better body functions. (4) The ESCA scale measures self-care ability in four dimensions: self-esteem, value of health priorities, self-care responsibility, and self-care skills. A higher score indicates a stronger ability for self-care. (5) The CCQQ is comprised of 24 items that measure 6 dimensions of quality of life of cardiovascular patients. Patients performed self-scoring according to their situation.

Statistical analysis

All data were statistically analyzed by SPSS 20.0 (IBM Corp, Armonk, NY, USA) and visualized by GraphPad Prism 7. The count data were indicated by [n (%)] and its comparison between the two groups was analyzed by the chi-square test. The measurement data were indicated by mean ± standard deviation ($\bar{x}$ ± sd) and its comparison between the two groups was analyzed by the t-test. The paired t-test was used for comparison between after the nursing and before the nursing within the group. $P<0.05$ indicates a statistical significance.

Results

Basic information

No significant difference was detected between the two groups in sex, age, BIM, duration of disease, place of residence, ethnicity, educational background, smoking, drinking, diabetes, hypertension, type of coronary heart disease, and job history before nursing ($P>0.05$). More details are shown in **Table 1**.

Comparison of clinical physiological indicators

Patients from the two groups were not significantly different in systolic blood pressure, diastolic blood pressure, and heart rate before the nursing intervention ($P>0.05$). In both of the two groups, the systolic blood pressure, diastolic blood pressure, and heart rate of patients were lower after the nursing intervention than before the nursing intervention ($P<0.05$). After the nursing intervention, the systolic blood pressure, diastolic blood pressure, and heart rate were markedly lower in the study group than in the control group ($P<0.05$). More details are shown in **Table 2**.

Comparison of psychological stress responses

Patients from the two groups were not significantly different in SAS and SDS scores before the nursing intervention ($P>0.05$). The post-intervention SAS and SDS scores of patients from the two groups were lower than before the nursing intervention ($P<0.05$). After nursing intervention, the SAS and SDS scores of patients from the study group were significantly lower than those of the control group ($P<0.05$). See **Figure 1**.

Comparison of SAQ scores

Patients from the two groups were not significantly different in the SAQ score before the nursing intervention ($P>0.05$). The SAQ scores of patients from the two groups were higher after the nursing intervention than before the nursing intervention ($P<0.05$). After nursing

Table 1. Comparison of basic information [n (%)] ($\bar{x}$ ± sd)

Factors	Study group (n=77)	Control group (n=69)	t/χ^2	P
Sex			0.003	0.954
Male	45 (58.44)	40 (57.97)		
Female	32 (41.56)	29 (42.03)		
Age (year)	58.37±4.16	58.14±5.69	0.281	0.779
BMI (kg/m^2)	23.4±3.7	22.6±3.4	1.355	0.178
During of disease (year)	4.33±1.08	4.28±1.13	0.273	0.785
Place of residence			2.914	0.088
Urban area	36 (46.75)	42 (60.87)		
Rural area	41 (53.25)	27 (39.13)		
Ethnicity			0.007	0.934
Han nationality	43 (55.84)	39 (56.52)		
Minority nationality	34 (44.16)	30 (43.48)		
Educational background			0.004	0.949
≥high school	35 (45.45)	31 (44.93)		
<high school	42 (54.55)	38 (55.07)		
Smoking			2.546	0.111
Yes	55 (71.43)	57 (82.61)		
No	22 (28.57)	12 (17.39)		
Drinking			2.106	0.147
Yes	52 (67.53)	54 (78.26)		
No	25 (32.47)	15 (21.74)		
Diabetes			0.131	0.718
Yes	48 (62.34)	45 (65.22)		
No	29 (37.66)	24 (34.78)		
Hypertension			0.280	0.597
Yes	64 (83.12)	55 (79.71)		
No	13 (16.88)	14 (20.29)		
Type of coronary heart disease			2.016	0.365
Angina pectoris	27 (35.06)	17 (24.64)		
Old myocardial infarction	28 (36.36)	31 (44.93)		
Acute myocardial infarction	22 (28.57)	21 (30.43)		
Job history			0.004	0.949
Yes	35 (45.45)	31 (44.93)		
No	42 (54.55)	38 (55.07)		

Table 2. Clinical physiology index ($\bar{x}$ ± sd)

Group	n	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)		Heart rate (beat/min)	
		Before the intervention	After the intervention	Before the intervention	After the intervention	Before the intervention	After the intervention
Study group	77	134.2±14.8	117.7±15.2	82.1±4.8	70.8±4.9	88.1±12.4	70.2±11.8
Control group	69	135.1±14.9	125.2±15.6	82.4±4.9	80.2±5.1	87.8±12.2	86.1±11.9
T	-	0.366	2.940	0.373	11.350	0.147	8.096
P	-	0.715	0.004	0.709	<0.001	0.883	<0.001

intervention, the SAQ scores of patients from the study group were significantly higher than those of the control group (P<0.05). See **Figure 2**.

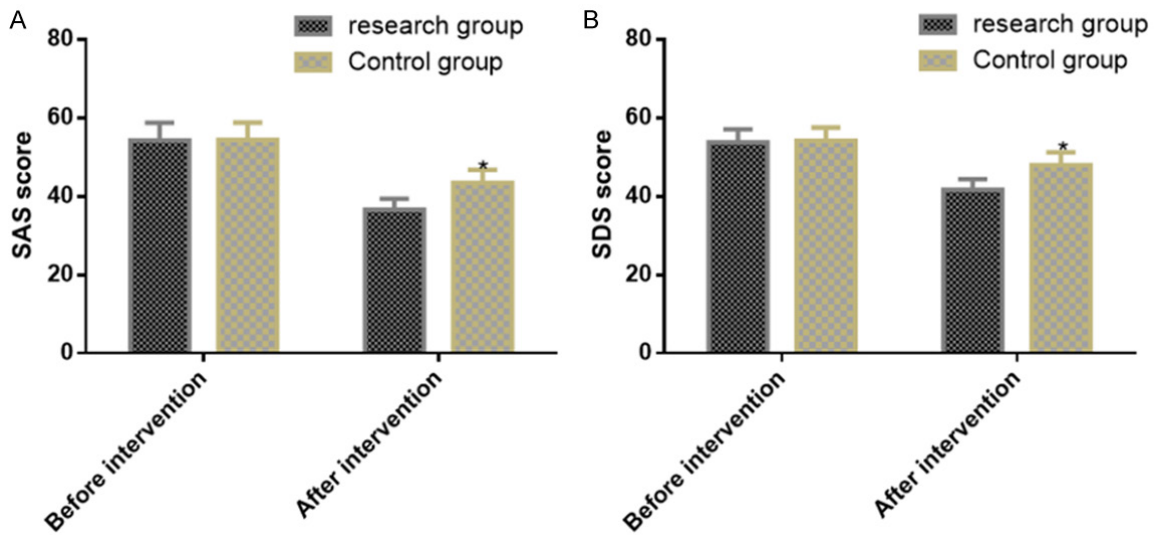

Figure 1. Comparison of psychological stress responses. Patients from the two groups were not significantly different in SAS (A) and SDS (B) scores before the nursing intervention (P>0.05). The SAS and SDS scores of patients from the two groups were lower after the nursing intervention than before the nursing intervention (P<0.05). After the nursing intervention, the SAS and SDS scores of patients from the study group were significantly lower than those of the control group (P<0.05). Note: *P<0.05 when compared with the control group after the nursing intervention.

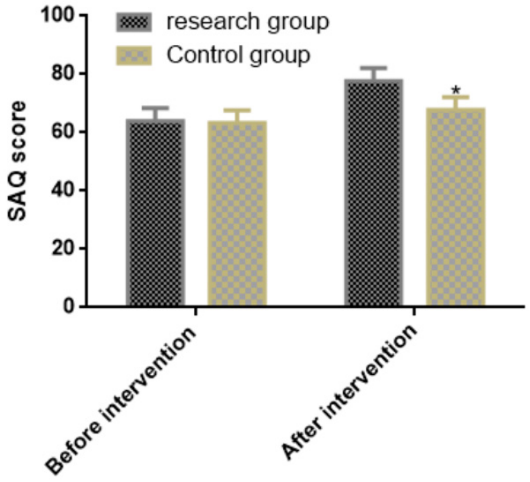

Figure 2. Comparison of SAQ scores. Patients from the two groups were not significantly different in the SAQ score before the nursing intervention (P>0.05). The SAQ scores of patients from the two groups were higher after the nursing intervention than before the nursing intervention (P<0.05). After the nursing intervention, the SAQ scores of patients from the study group were significantly higher than those of the control group (P<0.05). Note: *P<0.05 when compared with the control group after the nursing intervention.

Comparison of ESCA scores

The two groups of patients were different in post-intervention ESCA scores (P<0.05). After nursing intervention, patients from the study group had higher scores in self-esteem, value of health priorities, self-care responsibility, and self-care skills than patients from the control group (P<0.05). More details are shown in **Table 3**.

Comparison of adverse reactions

The comparison of total adverse reactions after nursing intervention between the two groups showed significant differences (P<0.05). The study group had a total incidence of adverse reactions of 11.90%, markedly lower than that in the control group (30.95%) (P< 0.05). More details are shown in **Table 4**.

Comparison of CCQQ scores

Patients from the two groups were not significantly different in the CCQQ score before the nursing intervention (P>0.05). The CCQQ scores of patients from the two groups were higher after nursing intervention than before nursing intervention (P<0.05). After nursing intervention, the CCQQ scores of patients from the study group were remarkably higher than those of the control group (P<0.05). More details are shown in **Table 5**.

Discussion

PCI is a conventional treatment for coronary heart disease [20]. It brings a marked response,

Table 3. Comparison of ESCA score ($\bar{x}$ ± sd)

Group	n	Self-esteem	Value of health priorities	Self-care responsibility	Self-care skills
Study group	77	28.11±2.42	48.20±3.11	27.22±2.78	30.23±3.16
Control group	69	22.12±2.43	42.17±3.14	20.08±2.75	23.21±3.11
T	-	14.900	11.640	15.570	13.500
P	-	<0.001	<0.001	<0.001	<0.001

Table 4. Comparison of adverse reactions [n (%)]

Events	Study group (n=77)	Control group (n=69)	χ^2	P
Arrhythmia	2 (2.60)	4 (5.80)	0.945	0.331
Vasospasm	1 (1.30)	3 (4.35)	1.270	0.259
Angina pectoris	2 (2.60)	4 (5.80)	0.945	0.331
Myocardial infarction	0 (0.00)	2 (2.90)	2.263	0.133
Total incidence of adverse reactions	5 (11.90)	13 (30.95)	4.525	0.033

but also a risk of coronary in-stent restenosis and serious complications [21], which threaten the prognosis and quality of life of patients after the operation [22]. So health care staff focus on improving the quality of life in patients with coronary heart disease and relieving the stress response after PCI [23].

This study conducted personalized care for patients with coronary heart disease who underwent PCI and found that nursing intervention resulted in great improvements in patients. The care was customized for each patient [24]. The study by Li M et al [25] discovered short door-to-balloon time, fewer complications after surgery, and improved satisfaction among patients receiving nursing intervention after PCI. Whalley B et al [26] concluded that psychological intervention could reduce the depression and anxiety of patients undergoing PCI. Personalized cognitive training after PCI in elderly patients with coronary heart disease can improve cognitive and cardiac function of patients, and relieve anxiety and depression. In this study, the improvement of blood pressure and heart rate in the study group was significantly greater than that in the control group after the nursing intervention, indicating that targeted psychological education could strengthen patients' understanding and cognition of PCI surgery. After the nursing intervention, patients from the study group had markedly lower SAS and SDS scores than those from the control group, indicating that personalized nursing can not only enhance patients' knowledge of PCI, and can control the psychological stress response to relieve anxiety and depression. The SAQ score after the nursing intervention of patients from the study group was markedly lower than that of the control group, indicating that the heart-sports care facilitates the recovery of cardiac function and reduces the degree of angina pectoris. Patients from the study group had significantly higher ESCA scores and lower incidence of adverse reactions than patients from the control group, suggesting that personalized nursing can effectively enhance the patient's self-care ability and standardize their health management. Also, personalized care helps correct bad living habits, reduce the risk of adverse cardiovascular events, eliminate risk factors, and guide health behavior to facilitate postoperative recovery. The CCQQ score of patients from the study group after the nursing intervention was significantly higher than that of the control group, indicating that personalized care can effectively strengthen the patient's awareness of the disease, improve the satisfaction of nursing, and enhance the quality of life.

By performing personalized nursing on patients with coronary heart disease after PCI, this study proved that personalized nursing could improve postoperative stress responses and quality of life of patients. This study is subject to certain limitations, such as the small number of research subjects and the absence of prognostic analysis, which leads to a possible bias in the results. We will design more studies to address these problems.

Table 5. Comparison of CCQQ score ($\bar{x}$ ± sd)

		Physical functioning		Illness		Medical functioning		Living functioning		Social mental functioning		Work functioning	
		Before the intervention	After the intervention	Before the intervention	After the intervention	Before the intervention	After the intervention	Before the intervention	After the intervention	Before the intervention	After the intervention	Before the intervention	After the intervention
Study group	77	6.42±3.74	16.44±3.89	11.27±3.01	17.23±3.14	3.18±1.18	5.49±1.16	5.27±1.32	9.72±1.41	13.19±4.53	20.26±4.51	2.22±1.34	6.18±1.32
Control group	69	6.39±3.78	10.34±3.82	11.98±3.04	12.01±3.06	3.16±1.13	4.26±1.17	5.29±1.34	6.32±1.38	13.73±4.51	14.25±5.54	2.12±1.39	3.76±1.41
t	-	0.048	9.540	1.416	10.150	0.104	6.370	0.091	14.690	0.721	7.218	0.442	10.710
P	-	0.962	<0.001	0.159	<0.001	0.917	<0.001	0.928	<0.001	0.472	<0.001	0.659	<0.001

In summary, personalized care is effective for patients with coronary heart disease after PCI. It can improve the blood pressure and heart rate of patients, control the psychological stress response, relieve the anxiety and depression, and reduce the degree of angina pectoris. Meanwhile, it leads to better self-care ability and quality of life, and higher satisfaction of care.

Disclosure of conflict of interest

None.

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