# Original Article
# Effect of individualized nursing intervention after percutaneous coronary intervention

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**Abstract:** Objective: To explore the effect of individualized nursing intervention after percutaneous coronary intervention (PCI). Methods: A total of 200 patients undergoing PCI were enrolled and divided into experimental group and control group according to the random number table, with 100 patients in each group. Individualized nursing was carried out on patients in the experimental group, and routine cardiovascular medicine nursing on patients in the control group. The patients were followed up for 6 months. The self-rating depression scale (SDS) score, Ricker sedation-agitation score (SAS), Pittsburgh sleep quality index (PSQI), Karnofsky performance status (KPS) score, incidence of complications and nursing satisfaction of patients in the two groups were observed and compared among the 1st day, 3rd and 6th months after operation. The clinical efficacy was evaluated. Results: The SDS, SAS and PSQI scores of patients in the experimental group were significantly lower than those in the control group on the 1st day and 3rd month after operation (all P<0.05), while there were no significant differences between the two groups on the 6th month after operation (all P>0.05). The KPS score and nursing satisfaction of patients in the experimental group were significantly higher than those in the control group (P=0.014, P=0.002). The incidence of complications of patients in the experimental group was lower than that in the control group (all P<0.05). Conclusion: Individualized nursing, as a feasible intervention, is more conducive to the rehabilitation of patients undergoing PCI and the improvement of their anxiety, sleep quality and quality of life, as well as the reduction of postoperative complications.

**Keywords:** Coronary heart disease, percutaneous coronary intervention, individualized nursing, anxiety

## Introduction

Coronary atherosclerotic heart disease is developed when lipids accumulated for a long time congests on the vessel wall of the coronary artery and gradually forms lipid streaks and plaques, thereby blocking the vascular lumen and leading to vascular stenosis [1, 2]. Coronary atherosclerotic heart disease is often clinically characterized by angina pectoris, myocardial infarction and other symptoms [3, 4]. In developed countries, coronary heart disease (CHD) has a very high incidence and mortality in epidemiology, while in developing countries, the two of CHD also increase with economic progress. It has been reported that the mortality of CHD among urban residents in China was 94.96/100,000 people in 2009 and 154.45/100,000 people in 2017, and the mortality in males was higher than that in females [1, 5].

The postoperative nursing of CHD includes psychological comfort, which helps to relieve anxiety and tension, and avoid sympathetic excitation; health education for patients: having a bland diet and drinking more water to promote the excretion of contrast agents; nursing of daily life such as body cleaning and oral nursing after the operative limb at rest; changes in unhealthy lifetyles [6]; and regularly taking antihypertensive drugs for hypertension patients [7].

Percutaneous transluminal coronary angioplasty is a new diagnostic and therapeutic technique for CHD in recent years [8]. Under the guidance of X-ray, through vascular puncture on the body surface, the catheter is sent to the lesion site for the convenience of diagnosing and treating cardiovascular diseases [9, 10]. However, interventional treatment, as a traumatic operation of risk, will inevitably has a

great impact on patients' psychology and physiology, including negative emotions and poor prognosis [11]. A large number of studies have focused on the quality of life, complications and nursing satisfaction of patients after percutaneous coronary intervention (PCI). This study is innovative in the exploration of patients' negative emotions, i.e., to explore whether they have an impact on the prognosis of the patients. Therefore, in this study, the self-rating depression scale (SDS), Ricker sedation-agitation score (SAS) and Pittsburgh sleep quality index (PSQI) scores of patients after PCI were studied through individualized nursing, and the clinical efficacy of individualized nursing intervention in patients undergoing PCI was explored.

### Materials and methods

*Clinical data and grouping*

This study was approved by the Ethics Committee of The Central Hospital of Wuhan. A total of 200 patients undergoing PCI from January 2016 to December 2017 were enrolled and divided into the experimental group and the control group according to the random number table, with 100 patients in each group. Individualized nursing was carried out on patients in the experimental group, and routine cardiovascular medicine nursing on patients in the control group. The average age of patients in the experimental group was (59.4±10.9) years old, and that of patients in the control group was (58.2±11.7) years old. All patients and their families signed an informed consent form.

Inclusion criteria: Patients met the diagnostic criteria for CHD. Among them, patients undergoing PCI should meet the indications specified in The Chinese Guidelines for Percutaneous Coronary Intervention in 2016 [12].

Exclusion criteria: The contraindications of patients undergoing PCI who were enrolled in this study met the contraindications specified in The Chinese Guidelines for Percutaneous Coronary Intervention in 2016; patients with severe liver, lung or spleen failure; patients with severe heart failure and infarction; patients with severe organ injury; patients complicated with malignant tumors; patients with severe amentia; those who did not cooperate; pregnant women.

*Nursing methods*

*Routine nursing for patients in the control group:* General health education before operation and close monitoring of patients' vital signs after operation were carried out. Patients were asked to take medicine according to the doctor's advice, and given simple living guidance and post-discharge follow-up.

*Nursing methods of patients in the experimental group:* Individualized health education was carried out before operation. Nursing personnel communicated with patients to establish good nurse-patient relationship. They educated the patients on the methods, objectives, precautions, postoperative daily activities and training, and provided timely solutions according to the specific conditions of each patient and the problems that may be encountered during the operation. After being evaluated for the understanding of the disease, patients with low understanding and negative emotions were given professional and systematic explanations in order to alleviate their preoperative anxiety.

Intraoperative nursing: Changes in the patient's body temperature were closely monitored. If the temperature was low, heat preservation nursing with a hot-air fan was performed until the temperature was higher than 37.5°C. Heat preservation was done in advance before intraoperative infusion or rinsing of the fluid to keep it close to the patient's body temperature, and the distal extremities were covered with quilts in order to maintain a good blood circulation.

Treatment of postoperative complications: After the operation, the patient was reminded not to exercise strenuously. The patient's condition should be carefully observed, such as whether the belt was too tight, whether the wound was bleeding or not, and whether all parts of the body could move freely. A 25% magnesium sulfate solution could be used by nursing personnel for local hydropathic compress to relieve the pain of patients with swelling.

Postoperative dietary nursing: After the operation, the patient was thirsty and the drinking water was immediately dipped with a cotton swab to moisten the mouth. Six hours after the operation, a fluid diet was given, followed by a semi-fluid diet and a general diet, with a gradual transition.

Psychological nursing: To strengthen the nurse-patient communication, the nurses listened to the patients one to one and encouraged them to bravely raise their own anxiety and problems. The patients' concerns were lifted and their confidence in treatment was established according to their occupations, education levels, social experience and other individualized psychological problems.

*Investigation tools*

*SAS:* The SAS developed by Zung, a Chinese professor (1971), was used in this study. It is a clinical evaluation tool for patients' subjective symptoms. It's suitable for adults with negative emotions to be investigated whether they have an anxiety or depression tendency in the early stage. Psychological counseling is needed for patients with such a tendency. A 4-level score is used in the SAS to evaluate the frequency of symptoms. The standards are as follows: "1" means no or very little time with anxiety; "2" means sometimes with anxiety; "3" means most of the time with anxiety; "4" means most or all of the time with anxiety. The higher the score is, the higher the anxiety level is [13].

*SDS:* One of the scales recommended by the U.S. Department of Education and Health for psychopharmacological research was used in this study. The total scores are the main statistical indicator. Specifically, the standard score <50 points: no depression; 50 and <60 points: minor to mild depression; ≥60 and <70 points: moderate to severe depression; ≥70 points: severe depression. The threshold for depression assessment is 50 points, and the higher the score is, the more obvious the depression tendency is [14].

*PSQI:* PSQI was used to evaluate the sleep quality of the subjects in the last month. It is composed of 19 self-evaluation items and 5 other people-evaluation items, of which the 19th self-evaluation item and 5 other people-evaluation items did not participate in scoring. Introduction for 18 self-evaluation items participating in scoring: Eighteen items consist of 7 components, and each component is scored based on the 0-3 level. The cumulative scores of each component are the total score of PSQI that ranges from 0 to 21. The higher the score is, the worse the sleep quality is [15].

*Karnofsky performance status (KPS) score*

According to the KPS, the lower the score is, the worse the life is. KPS is mainly used to evaluate the patient's tolerance to treatment. The score in this study was used to evaluate the degree of tolerance to interventional treatment in patients with cardiovascular diseases who were undergoing interventional treatment. A score lower than 60 points is generally considered as low tolerance and the interventional treatment cannot be implemented [16].

*Patient satisfaction*

Patient satisfaction was investigeated by questionnaire, which was divided into 90-100 points for very satisfied, 80-90 points for satisfied, and 80 points or less for dissatisfied. The survey was conducted one day before discharge, and all questionnaires were collected. The percentage of satisfaction = (very satisfied + satisfied) number/(very satisfied + satisfied + dissatisfied) number.

*Research contents*

Main outcome measures: SDS, SAS and PSQI scores on the 1st day, 3rd and 6th months after operation.

Secondary outcome measures: general information of patients, KPS score, nursing satisfaction and postoperative complications.

*Statistical methods*

SPSS17.0 software was used for the analysis of the data. All the count data were expressed as number of cases/percentage (n/%) and chi-square test was used. All the measurement data were expressed as mean ± standard deviation ($\bar{x}$ ± sd). t test was used for comparison at the same time point between groups, repeated measurements for comparison at different time points between groups. When P<0.05, the difference is statistically significant.

**Results**

*Comparison of general information*

There were no statistically significant differences in gender ratio, age and basic diseases between the two groups (all P>0.05). See **Table 1**.

**Table 1.** Comparison of general information between the two groups

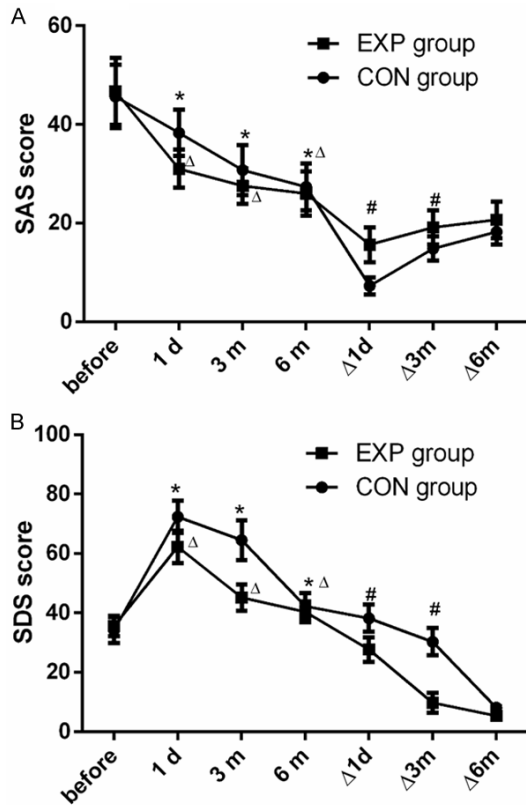|  | Control group (n=100) | Experimental group (n=100) | t/$\chi^2$ | P |
|---|---|---|---|---|
| Male/female | 51/49 | 48/52 | 0.180 | 0.671 |
| Age (years old) | 58.2±11.7 | 59.4±10.9 | 0.750 | 0.454 |
| Hypertension | 45 (45.0%) | 40 (40.0%) | 0.512 | 0.474 |
| Diabetes | 35 (35.0%) | 30 (30.0%) | 0.570 | 0.450 |
| Hyperlipemia | 45 (45.0%) | 40 (40.0%) | 0.512 | 0.474 |



**Figure 1.** Comparison of postoperative anxiety score between two groups. SAS, Ricker sedation-agitation score; SDS, self-rating depression scale score. Before, before operation; 1 d, the first day after operation; 3 m, the 3 months after operation; 6 m, the 6 months after operation. Δ1d, Δ3m, Δ6m mean the difference between the two groups in the first day, 3 months, 6 months after operation, respectively. *: P<0.05, comparison of the control group before and after operation; Δ: P<0.05, comparison of the experimental group before and after operation; #: P<0.05, comparison of two groups at the same time point.

*Comparison of postoperative SAS and SDS scores*

The SAS score of patients in the control group and the experimental group on the 1st day, 3rd and 6 months after operation was significantly lower than that before operation, and the SDS score of patients in the control group and the experimental group on the 1st day, 3rd and 6 months after operation was significantly higher than that before operation, with statistically significant differences (all P<0.05). There were significant differences in the SAS and SDS scores between the experimental group and the control group on the 1st day and 3rd month after operation (all P<0.05), but no statistically significant differences on the 6th month after operation (P>0.05). See **Figure 1**.

*Comparison of PSQI*

The PSQI score of patients in the control group on the 1st day, 3rd and 6th months after operation was significantly lower than that before operation (all P<0.05). There were significant differences in the PSQI score of patients in the experimental group between after operation (1st day, 3rd and 6th months, respectively) and before operation (all P<0.05). The PSQI score of patients in the experimental group was significantly lower than that in the control group on the 1st day and 3rd month after operation, with a statistically significant difference (both P< 0.05), but no statistically significant difference was found on the 6th month after operation (P>0.05). See **Figure 2**.

*KPS score*

The KPS score of patients in the experimental group was significantly higher than that in the control group on the 1st day and 3rd month after operation, with a statistically significant difference (both P<0.05). There was no significant difference between the two groups on the 6th month after operation (P>0.05). The KPS score of patients in the experimental group on the 1st day and 3rd month after operation was significantly higher than that before operation, with a statistically significant difference (both P<0.05). There was a significant difference in the control group between the 1st day, 3rd and 6th months after operation and before operation. See **Figure 3**.

*Comparison of satisfaction between two groups of patients*

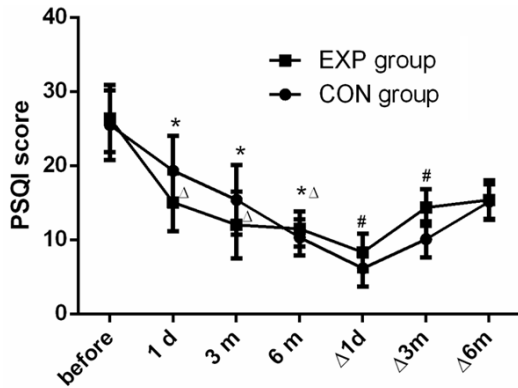The postoperative satisfaction of patients in the experimental group was significantly higher

**Figure 2.** Comparison of PSQI between two groups. PSQI, pittsburgh sleep quality index. Before, before operation; 1 d, the first day after operation; 3 m, the 3 months after operation; 6 m, the 6 months after operation. Δ1d, Δ3m, Δ6m mean the difference between the two groups in the first day, 3 months, 6 months after operation, respectively. *: P<0.05, comparison of the control group before and after operation; Δ: P<0.05, comparison of the experimental group before and after operation; #: P<0.05, comparison of two groups at the same time point.
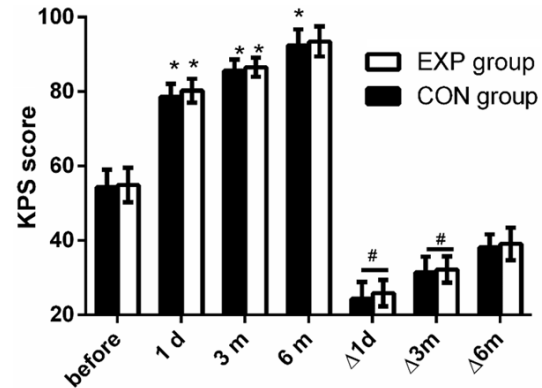


**Figure 3.** Comparison of KPS score between two groups. KPS, Karnofsky performance status. Before, before operation; 1d, the first day after operation; 3m, the 3 months after operation; 6m, the 6 months after operation. Δ1d, Δ3m, Δ6m mean the difference between the two groups in the first day, 3 months, 6 months after operation, respectively. *: P<0.05, comparison of the same group before and after operation; #: P<0.05, comparison of two groups at the same time point.

than that in the control group, with a statistically significant difference (P<0.05). See **Table 2**.

*Comparison of postoperative complications*

The postoperative complications of patients in the experimental group were significantly less than those in the control group (P<0.05). See **Table 3**.

**Discussion**

At present, CHD is mainly treated with drug treatment, interventional treatment and operative treatment [17]. Interventional treatment is less traumatic and highly acceptable to patients [18]. The success of the operation is not only related to the doctor's level of skills, but also closely correlated with the patient's cooperation and postoperative nursing. In the study by Lelakowski, patients without individualized nursing after PCI had a significantly higher probability of developing malignant arrhythmia and a significantly higher mortality [19]. Individualized nursing after PCI is gradually developed with the vigorous development of cardiovascular intervention technology in recent years. Individualized nursing intervention refers to choosing a targeted nursing model based on the difference of individual needs [20]. This

study also confirmed the effectiveness of individualized nursing, which alleviates patients' negative emotions, increases their cooperation awareness and enhances their confidence in operation, as well as significantly improves their postoperative recovery. Therefore, individualized nursing intervention can improve the prognosis of patients.

As a traumatic operation, PCI causes stress, tension, panic, anxiety and other negative emotions. In the study by Jing et al., the negative emotions of patients after PCI were common, and certain intervention for alleviating them could effectively improve the prognosis of patients [21]. The results of this experiment showed that the postoperative anxiety tendency of patients with individualized nursing was significantly lower than that in the control group, better illustrating that adequate information and professional psychological counseling can better prevent the occurrence and development of the postoperative anxiety tendency. The investigation of patients' postoperative satisfaction also proves that individualized nursing can significantly improve patients' satisfaction.

PSQI, which is used to evaluate patients' sleep quality, is suitable for patients with sleep and mental disorders in the recent month [22]. In the study by Bellini, PSQI was used to evaluate

**Table 2.** Comparisons of patients' satisfaction between the two groups

|  | Control group (n=100) | Experimental group (n=100) | χ² | P |
|---|---|---|---|---|
| Very satisfied | 28 | 16 |  |  |
| Satisfied | 42 | 72 |  |  |
| Dissatisfied | 30 | 12 |  |  |
| Satisfaction percentage (%) | 70.0 | 88.0 | 9.765 | 0.002 |

**Table 3.** Comparison of postoperative complications between the two groups

|  | Control group (n=100) | Experimental group (n=100) | χ² | P |
|---|---|---|---|---|
| Arrhythmia (n/%) | 20 (20.0) | 10 (10.0) | 3.922 | 0.048 |
| Vagal reflex (n/%) | 13 (13.0) | 5 (5.0) | 3.907 | 0.048 |
| Hemorrhage/hematoma (n/%) | 9 (9.0) | 2 (3.0) | 4.714 | 0.030 |
| Pseudoaneurysm (n/%) | 10 (10.0) | 2 (2.0) | 5.674 | 0.017 |
| Postoperative urinary retention (n/%) | 8 (8.0) | 1 (1.0) | 5.701 | 0.017 |

the patients with irritable bowel syndrome and obvious sleep disorder, which could effectively reflect the reliability, validity and reactivity of sleep quality [23]. The scale was used in this experiment to reflect the sleep status of patients after PCI with individualized nursing intervention. The PSQI score of patients after individualized nursing was significantly lower than that in the control group on the 1st day and 3rd month after operation. The possible reason is that the patients' anxiety is relieved after individualized nursing, so they sleep smoothly and are not easy to wake up. Their sleep quality is obviously improved.

Approximately 6% of the patients have negative emotions before operation. Excessive anxiety leads to an increase in catecholamine and adrenocortical secretion in the body. As a result, the sensitivity to infection increases, wound healing slows down, and the procoagulation mechanism in the body exceeds the fibrinolytic mechanism, leading to hypercoagulability. Finally, cardiovascular events are increased, and the operative effect and prognosis are affected [24, 25]. To relieve the anxiety of the patients, their coagulation function will be obviously improved. The experimental group in this study relieved the anxiety of the patients through individualized nursing, so the incidence of bleeding/hematoma and pseudoaneurysm in the experimental group was significantly lower than that in the control group.

Quality of life is an indicator that combines physical, psychological and social factors. Pa-

tients are always in a state of stress such as anxiety during the perioperative period of cardiovascular disease intervention, which aggravates cardiovascular events [26]. This study found that the KPS score of patients with different nursing was improved on the 1st day, 3rd and 6th months after operation. This may be because individualized nursing improves patients' negative emotions, increases their confidence and alleviates their psychological stress, and the KPS score is improved.

There are still limitations in this paper. The number of patients is small and the follow-up time is short. It is not ruled out that there would be a significant difference in the postoperative clinical efficacy between the two groups under the condition of large sample and long-term follow-up. In addition, a larger selection bias may occur without random and double blind, thereby affecting the reliability of the results.

To sum up, individualized nursing is more conducive to the rehabilitation of patients undergoing PCI and the improvement of their anxiety, sleep quality and quality of life as well as the reduction of postoperative complications. It is a feasible intervention.

### Disclosure of conflict of interest

None.

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