

## Original Article

# The efficacy of evidence-based nursing for patients with myocardial infarction complicated by heart failure

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**Abstract:** Objective: To explore the efficacy of evidence-based nursing for patients with myocardial infarction complicated by heart failure. Methods: A total of 108 patients with myocardial infarction complicated by heart failure were selected and divided into a control group and an observation group according to a random number table. The patients in the control group were given routine nursing interventions, but the patients in the observation group were given routine nursing care plus evidence-based nursing. The length of stay, the rate of effective treatment, the time to ST segment resolution, the incidence of adverse cardiovascular events, the patients' quality of life and patient satisfaction with the nursing care were compared between the two groups. Results: The length of stay, the rate of effective treatment, the SF-36 (36-item short-form health survey) scores, and the satisfaction with nursing care in the observation group were significantly higher than they were in the control group. The patients in the observation group had observably earlier ST-segment resolutions and a lower incidence of cardiovascular adverse events than the patients in the control group did (all  $P < 0.05$ ). Conclusion: Evidence-based nursing has good clinical practicability in the nursing care of patients with myocardial infarction complicated by heart failure. It also shortens the patients' length of stay and improves their post-treatment quality of life and level of patient satisfaction. In general, it is worth being popularized in clinical practice.

**Keywords:** Myocardial infarction, heart failure, evidence-based nursing, quality of life, satisfaction with nursing care

## Introduction

Coronary artery disease develops when the major blood vessels that supply the heart with blood become atherosclerotic, which can lead to a mechanical obstruction or a spasm of the coronary arteries, further causing myocardial ischemia or infarction, resulting in chest pain, chest tightness, heart failure, or other clinical manifestations [1]. Acute myocardial infarction (AMI) is one of the leading causes of death and disability, with about 3 million new cases every year [2, 3]. Acute heart failure after AMI is one of the most critical conditions seen in the Department of Cardiology, and it is characterized by a sudden onset and high fatality. Its incidence and mortality rates are 32.4% and 21.6% respectively, so it has been studied extensively in modern medicine [4]. In China, AMI is a major

diseases threatening public health, accounting for 25% of all cardiovascular diseases [5].

At present, comprehensive treatments, including medications, are mainly used to treat myocardial infarction complicated by heart failure, and studies have shown that effective nursing care can improve the clinical efficacy of such treatments [6]. Evidence-based nursing, a new type of nursing model, is "patient-oriented" and provides targeted nursing interventions according to the specific condition of each patient, so as to improve the outcomes of patient care [7, 8]. Therefore, this study applies evidence-based nursing to the nursing care of patients with myocardial infarction complicated by heart failure, in order to provide a reference for improving the overall level of diagnosis and treatment of coronary heart disease.

## Materials and methods

### Patients

A total of 108 patients with ST-segment elevation myocardial infarction complicated by heart failure treated in the Department of Coronary Care Unit at Affiliated Hospital of Nantong University from July 2017 to September 2018 were selected. They were divided into a control group and an observation group according to a random number table, with 54 cases in each group. The patients in both groups were informed of the study and signed the consent forms. The study was approved by the Ethics Committee of Affiliated Hospital of Nantong University.

### Inclusion criteria

Patients who met the diagnostic criteria for acute myocardial infarction (i.e. a clinical history of ischemic chest pain; dynamic electrocardiogram (ECG) changes; dynamic changes in the concentration of serum markers for myocardial necrosis) [9]; patients who met the diagnostic criteria for acute heart failure (i.e. a sudden onset of dyspnea or the sudden exacerbation of dyspnea; moist rales were heard on bilateral lungs; interstitial pulmonary edema or alveolar pulmonary edema were noted on a chest X-ray; the severity of the heart failure was between Killip classes II and III [9, 10]); NT-proBNP (N-terminal pro-brain natriuretic peptide) >1500 ng/L; patients who were between 26 and 80 years old; patients who had AMI for the first time.

### Exclusion criteria

Patients who had a history of myocardial infarction; patients with cardiogenic shock, disturbance of consciousness, or severe arrhythmia; patients who had a history of coronary artery bypass grafting or percutaneous transluminal coronary angioplasty; patients who had valvular or macrovascular diseases and needed surgical treatments.

### Methods

**Treatment:** All the patients received stent implantation according to their own degree of atherosclerosis after admission. After each operation, the patients were transferred to the coronary care unit (CCU) and received percuta-

neous coronary intervention (PCI) monitoring. Those with stable conditions were transferred to the general ward and continued to receive oxygen therapy, positive inotropic agents, nitrate esters, diuretics, aspirin, and clopidogrel, as well as treatments to reduce the heart rate and regulate lipids.

**Routine nursing care:** Routine nursing care, including oxygen therapy, bed rest and ECG monitoring (ECGs were recorded once an hour) was given to the patients after they returned to the general ward. Nurses visited patients every half hour and informed the doctors immediately if there were any abnormalities.

**Evidence-based nursing:** The observation group received routine nursing care and evidence-based nursing care. A special team for implementing the evidence-based care plans for the patients was established. The team consisted of a head nurse, a chief physician, nurses specializing in caring for patients with cardiovascular diseases, a nursing supervisor and a nurse in charge of routine nursing work. All the team members received professional training to master the know-how of evidence-based nursing. The evidence-based care plans for the patients were finally formulated by the chief physician and cardiovascular specialist nurse after meticulously reviewing the most current, relevant research available on this disease (i.e. the risk factors and treatments for myocardial infarction complicated by heart failure; the physiological and pathological characteristics of this disease; the priority of nursing care). The patients' needs and preferences were also taken into consideration. The specific evidence-based care plan was as follows.

First, counseling services were provided to the patients to relieve their negative emotions such as anxiety and irritability, which inevitably occurred as a result of the discomfort caused by myocardial infarction and the severity of this disease. Nurses maintained effective communication with patients, and offered targeted and personalized nursing care to each patient according to his/her educational background, work background, and knowledge of this disease, so as to provide emotional support and help them overcome negative thoughts and actively receive treatment.

Second, emphasis was placed on the correct use of medications. Nurses gave a detailed

description of the pharmacological effects, efficacy, usage and dosage, and the incidence of adverse reactions of the drugs on the patients before administering them according to a doctor's instructions. In case of an adverse drug event, doctors were immediately notified and timely symptomatic treatments were given.

Third, an optimal diet and exercise plan was worked out for the patients. The patients were encouraged to eat light and include foods that are liquid, high in cellulose and digestible in their diet. The patients gradually switched to a low-fat diet when their conditions became more stable. Patients with diabetes were instructed to eat frequent, small meals and eat easily digestible foods to actively control their blood glucose levels. Although absolute bed rest was recommended for patients with coronary heart disease, lying in bed for too long can increase the risk of pressure injury. Therefore, nursing intervention was administered to change patients' lying posture according to each patient's specific condition.

Lastly, measures were taken to help patients with their defecation. Bedpans were used to allow patients to defecate without leaving bed and laxatives were given to patients with constipation to reduce the potential risk of myocardial ischemia caused by defecation.

### *Observation indexes*

*Twenty-four hour dynamic ECG monitoring:* Twenty-four hour dynamic ECG monitoring was performed immediately after the percutaneous coronary intervention (PCI). Based on the ECG readings before PCI, the degree of ST-segment resolution was calculated. The time needed to complete the ST segment resolution ( $\geq 50\%$ ) was recorded [11, 12].

*Clinical efficacy rate:* The efficacy of the treatment was evaluated one week after hospital discharge and was divided into three categories. Marked effect: the clinical symptoms disappeared completely after treatment; effective treatment: the clinical symptoms were significantly relieved after treatment and the severity of heart failure was reduced to Killip class I; ineffective treatment: the clinical symptoms remained basically unchanged. Total efficacy rate = the rate of marked effect + the rate of effective treatment.

*Adverse cardiac events and length of stay:* The incidence of adverse cardiac events during the hospitalization was compared between the two groups. Adverse cardiac events mainly include malignant arrhythmias such as ventricular tachycardia and ventricular fibrillation, and cardiogenic shock. At the same time, the length of the hospital stays of the two groups was compared.

*Scores of quality of life:* The 36-item short-form health survey (SF-36) was used to assess the patients' quality of life one day before their hospital discharge [13]. The SF-36 questionnaire comprises 8 subscales: general health, physical role, social functioning, emotional role, physical functioning, bodily pain, mental health, vitality. Higher scores indicated a better quality of life.

*Satisfaction with nursing care:* A self-designed questionnaire was used to evaluate patient satisfaction with nursing care. The questionnaire consists of 25 items and covers 3 aspects of nursing care: the nursing staffs' attitudes, the quality of the nursing care, and expertise of the nursing staff. Each item was scored on a 1-4 range, and higher scores meant higher satisfaction levels.

### *Statistical methods*

SPSS 20.0 statistical software was used to analyze the data. The measurement data were expressed as the mean  $\pm$  standard deviation ( $\bar{x} \pm sd$ ). A paired *t*-test was used to compare the data within the groups. An independent *t*-test was used to compare the data between groups. An  $\chi^2$  test was used to compare the enumeration data.  $P < 0.05$  meant the difference was statistically significant.

## **Results**

### *Comparison of the general information between the two groups*

There were no statistically significant differences in terms of age, sex, smoking history, diabetes, or hypertension between the two groups (all  $P > 0.05$ , **Table 1**).

### *Comparison of the length of stay between the two groups*

The lengths of the hospital stays in the observation group were shorter than they were in the

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

Category	Observation group (n=54)	Control group (n=54)	t/ $\chi^2$	P
Age (years)	76.5±11.3	74.3±9.9	1.076	0.284
Sex (male/female)	32/22	28/26	0.337	0.561
Smoking history	16	14	0.046	0.830
Diabetes	14	17	0.181	0.671
Hypertension	23	19	0.351	0.554
Killip class			0.149	0.700
II	24	27		
III	30	27		

incidence of adverse events in patients with myocardial infarction during hospitalization. See **Table 3**.

*Comparison of the ST segment resolution time between the two groups*

The observation group had earlier ST segment resolutions than the control group, suggesting that evidence-based nursing can shorten the time of ST segment resolution and accelerate the patients' recovery.

See **Figure 2**.

*Comparison of the SF-36 scores between the two groups*

The SF-36 scores of the observation group were higher than those of the control group, showing that evidence-based nursing can improve patients' quality of life. See **Table 4**.

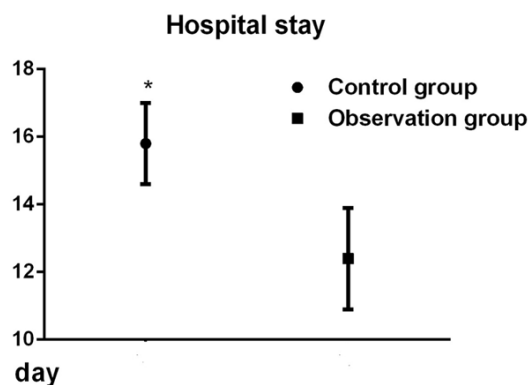
*Comparison of the overall satisfaction with nursing care between the two groups*

The observation group had higher satisfaction levels than the control group, showing that evidence-based nursing can increase patient satisfaction and promote a good relationship between nurses and patients. See **Table 5**.

**Discussion**

With the rapid development of society and medicine, the current clinical nursing model has gradually changed from "treatment-centered" (passive care) to "patient-centered" (active care). In addition, modern nursing pays special attention to patients' mental state and quality of life after treatment [14, 15]. The sudden onset of acute myocardial infarction, the sense of impending doom caused by myocardial ischemia, and damage caused to the respiratory system by heart failure contribute to negative emotions such as fear, anxiety, and irritability [16-18].

Evidence-based nursing mainly applies direct and effective clinical experience to nursing practice and switches from passive care to active care, which can improve patients' negative moods in time, make patients more cooperative during treatment, and ultimately



**Figure 1.** Comparison of the length of stay between the two groups. \*indicates comparison of the length of stay between the observation group and the control group, P<0.05.

control group, indicating that evidence-based nursing can improve the recovery of patients with myocardial infarction and reduce their lengths of stay in hospitals. See **Figure 1**.

*Comparison of the efficacy of treatment between the two groups*

The rate of effective treatment of the observation group was higher than it was in the control group (90.74% vs. 70.37%), illustrating that evidence-based nursing can improve the efficacy of treatments. See **Table 2**.

*Comparison of the incidence of adverse cardiac events during hospital stays between the two groups*

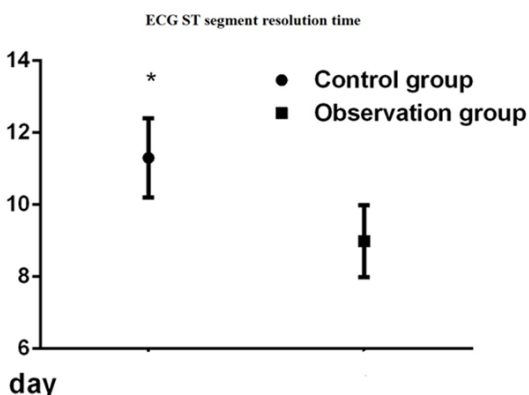
The incidence of adverse cardiac events in the control group was higher than it was in the observation group (20.37% vs. 5.56%), proving that evidence-based nursing can reduce the

**Table 2.** Comparison of the treatment efficacy between the two groups (n, %)

Group	Marked effect	Effective	Ineffective
Control group	21 (38.89%)	17 (31.48%)	16 (29.63%)
Observation group	25 (46.30%)	24 (44.44%)	5 (9.26%)
$\chi^2$	5.911		
P	0.015		

**Table 3.** Comparison of the incidence of adverse cardiac events between the two groups (n, %)

Group	Malignant arrhythmia	Cardiogenic shock	Sinus arrhythmia	Total
Control group	5 (9.26%)	3 (5.56%)	3 (5.56%)	11 (20.38%)
Observation group	1 (1.85%)	1 (1.85%)	1 (1.85%)	3 (5.55%)
$\chi^2$	5.252			
P	0.022			



**Figure 2.** Comparison of the ST segment resolution time between the two groups. \* indicates comparison of the ST segment resolution time between the observation group and the control group,  $P < 0.05$ .

improve the treatment efficiency. This study showed that the observation group had significantly shorter hospital stays than the control group, which is consistent with the results of previous studies [19].

Clinical efficacy is an important prognostic determinant. Evidence-based nursing improves the clinical efficacy of treatment through the constant monitoring of vital signs and nursing interventions to improve medication adherence. The results of our study showed that the rate of effective treatment of the observation group was higher than it was in the control group, which verified the results of previous research [20]. In addition, with evidence-based

nursing, nursing staff can react promptly to any change in the patients' condition. For example, effective first aid was provided to a patients the moment his or her face turned pale or if there were sudden ECG changes. Our study found that the incidence of adverse reactions in the observation group was lower than it was in the control group, which is similar to the results of previous studies [21].

Post-treatment quality of life is the most important factor affecting the evaluation of the prognoses. The patients who received evidence-based nursing

had lighter psychological burdens and could actively cooperate with the medical treatment, thus achieving desirable outcomes. In addition, evidence-based nursing encourages patients to start functional exercises early, which promotes patient recovery and improves their quality of life. The results of our study demonstrated that the quality of life scores in the observation group were higher than those in the control group, which confirmed that evidence-based nursing can significantly improve patients' quality of life. These results are consistent with the findings of previous research [22].

Patient satisfaction with nursing care is an important indicator for the evaluation of nurses' competence and performance. Evidence-based medicine improves the overall quality of nursing care by actively providing health care for patients, treating the whole person and stressing a healthy diet. Evidence-based nursing also makes effective communication with patients possible, reduces misunderstandings, and helps nurses bond with patients. Our study showed that patients in the observation group had significantly higher levels of satisfaction than those in the control group. These results are consistent with the findings of other studies [23].

In conclusion, this study showed that evidence-based nursing can shorten hospital stays, improve clinical efficacy, reduce the incidence of adverse events, and improve patients' quali-

**Table 4.** Comparison of SF-36 scores between the two groups

Group	Observation group	Control group	t	P
General health	66.34±3.21	72.54±2.13	11.827	<0.001
Physical role	74.51±6.34	80.12±4.19	5.425	<0.001
Social functioning	65.16±2.39	71.34±2.17	3.468	<0.001
Emotional role	61.65±5.42	70.38±4.46	9.140	<0.001
Physical functioning	68.76±3.24	76.38±2.99	12.701	<0.001
Mental health	71.36±7.43	78.79±8.11	5.687	<0.001
Vitality	70.07±7.73	77.80±8.21	5.037	<0.001
Bodily pain	61.48±8.91	69.43±7.41	5.041	<0.001

**Table 5.** Comparison of overall satisfaction with nursing care between the two groups

Group	Attitudes of nursing staff	Quality of nursing care	Expertise of nursing staff
Observation group	94.38±4.23	94.19±4.97	94.15±3.48
Control group	91.81±5.47	91.55±5.18	92.22±3.09
t	2.731	2.702	3.047
P	0.007	0.008	0.003

ty of life as well as patient satisfaction with nursing care. However, this was a single-center study and the sample size was small. The superiority of evidence-based nursing is yet to be further confirmed by a multi-center, large-sample, prospective randomized controlled study.

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**Disclosure of conflict of interest**

None.

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