Original Article
Application of evidence-based nursing in patients with acute myocardial infarction complicated with heart failure

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Abstract: Objective: To explore the application of evidence-based nursing (EBN) in patients with acute myocardial infarction (AMI) complicated with heart failure. Methods: A total of 76 patients with acute myocardial infarction complicated with heart failure after Percutaneous Transluminal Coronary Intervention (PCI) were admitted to the Department of Cardiology of our hospital from April 2018 to October 2019 and randomly divided into the control group and the experimental group, with 38 patients in each group. The control group received routine nursing and the experimental group received EBN nursing. Self-rating Anxiety Scale (SAS), Self-rating Depression Scale (SDS) scores, quality of life, long-term treatment efficacy, and nursing satisfaction in the two groups before and after nursing were compared and analyzed. Results: In terms of SAS and SDS, the experimental group after nursing had remarkably lower scores than the control group (t=6.468, 4.025, all P < 0.001). The quality-of-life scores of patients in both groups after nursing were better, and the increase in the experimental group was more evident (all P < 0.05). Left Ventricular Ejection Fraction (LVEF) in the experimental group was significantly higher compared with the control group (t=2.480, P < 0.05), while Left Ventricular Diastolic Diameter (LVDd) and Brain Natriuretic Peptide (BNP) were significantly lower (t=3.824, 12.241, all P < 0.001). Considering the total nursing satisfaction, the experimental group demonstrated a higher satisfaction rate (P < 0.05). Conclusion: EBN is beneficial for patients with AMI complicated with heart failure, and it is worth being popularized in clinical nursing.

Keywords: Evidence-based nursing, acute myocardial infarction, complications, heart failure, nursing effect

Introduction

Acute myocardial infarction (AMI) is a relatively common cardiovascular disease seen in clinical practice, mostly in middle-aged and elderly people. Because It is caused by coronary arteries and an interruption of blood flow, which creates avascular necrosis of the local myocardium. The major manifestations are retrosternal pain, shock, and arrhythmia, etc. [1-3]. AMI causes many complications, of which heart failure is one of the most common. AMI combined with heart failure is frequently seen in the clinic. According to recent studies, there are about 8 million people who die of myocardial infarction in the world every year, and 30% of them suffer from myocardial infarction and heart failure [4-6]. Population aging is a major

global demographic trend, the incidence of AMI is also on the rise. Therefore, AMI combined with heart failure is a field of study with high practical value. Since conventional nursing cannot achieve satisfactory recovery results, it is urgent to explore more effective nursing methods. Evidence-based medicine (EBM) refers to a therapeutic method that strictly follows evidence when making medical decisions [7]. Evidence-based nursing (EBN) means that nursing staff, based on their experience and research work, pay attention to undesirable conditions that may occur during the treatment of patient, and formulate corresponding nursing measures in advance through clinical nursing experience and literature review, and implement them in clinical nursing work [8, 9]. Compared with conventional nursing, EBN starts

Table 1. Comparison of general information between the two groups

Index	control group (n=38)	experimental group (n=38)	χ^2/t	P
Gender			1.256	0.965
male	24	22		
females	14	16		
age ($\bar{x} \pm s$, *year*)	59.16±5.77	58.74±5.32	2.547	0.789
myocardial infarction types			2.996	0.879
inferior wall myocardial infarction	17	14		
anterior wall infarction	10	12		
anteriorseptal myocardial infarction	7	6		
direct posterior wall infarction	3	4		
non-Q wave infarction	1	2		
Killip classification			2.374	0.874
grade II	15	13		
grade III	5	6		
grade IV	18	19		

from reality, summarizes the undesirable situations that may occur, and combines clinical experience with modern Internet technology, in order to not only meet the needs of patients but also open up new ideas for contemporary clinical care. So, we conducted this study to explore the application of EBN in patients with AMI combined with heart failure by analyzing the relevant indexes.

Materials and methods

General information

A total of 76 patients who developed AMI that was complicated with heart failure after PCI from April 2018 to October 2019 were selected. All patients were randomized into a control group or an experimental group, with 38 patients in each group. As shown in **Table 1**, there was no significant difference between the general information in both groups.

Inclusion/exclusion criteria

Inclusion criteria: ① Patients who were diagnosed with AMI with different degrees of heart failure by clinical diagnosis of coronary angiography, electrocardiogram, and myocardial enzyme spectrum. ② All patients received emergency PCI. ③ Enrollment time was within 24 hours after the onset of AMI. ④ Patients were younger than 78 years and had good treatment compliance. ⑤ Approval by the hospital ethics committee [10], and the patients and

their families were informed of this study and volunteered to participate.

Exclusion criteria: ① Patients intolerant to PCI treatment. ② With congenital heart disease or primary cardiomyopathy. ③ With severe heart valve disease or other diseases that cause the cardiac ejection fraction (EF) to be inaccurately assessed. ④ With other major organ or functional diseases, such as liver and kidney dysfunction, malignant tumors, and autoimmune diseases, etc. ⑤ With a pacemaker implanter.

Methods

After admission, both groups of patients underwent PCI, combined with corresponding medical treatment. The control group received routine care for AMI, including ECG monitoring, regular inspecting, and informing patients and their families of related diseases and hospitalization precautions [11].

The experimental group received EBN. The specific nursing steps were as follows. ① Establishment of an evidence team in the cardiology department, with the chief physician and head nurse as the core, to conduct training for medical staff such as experience summaries, document retrieval, empirical screening, and nursing intervention [12, 13]. ② Through observing the clinical manifestations, treatment effects and psychological state of the patient, scoring of the quality-of-life and negative mood of the patient, then determined the evidence-based

problem based on the score. ③ Nursing staff conducted an empirical screening of solutions to the identified evidence-based problems based on their experience and the results of relevant document retrieval. ④ Implementation of specific care for patients based on EBN theory. Nurses took the initiative to introduce themselves to patients and their families when the patients were admitted to the hospital, informed them of the nurse's responsibilities, and left a cordial and warm first impression on the patients.

The inpatient ward environment was kept clean and tidy, the windows were open for ventilation, appropriate indoor temperature and humidity were maintained, the patient's vital signs were monitored, and it was ensured that patients enjoy a comfortable resting environment. Patient were instructed to stay in bed, and close attention was paid to the patient's nasal catheter oxygen intake and the changes in physiological indicators such as heart rate, blood oxygen, and blood pressure. If abnormal indicators were detected, they were reported to the responsible doctor in time. Easy-to-understand language was used to introduce disease-related knowledge to patients, and to guide patients face to face squarely about the disease. Psychological care was carried out for patients, attention was given to the patient's psychological changes, patients were guided when they had negative emotions such as tension, anxiety, depression, etc. Patients were encouraged and were helped to increase their confidence in overcoming the disease. Life care was implemented for patients, they were instructed to take a healthy diet low in sodium, low in calories, high in protein, high in vitamins, that was light and easy to digest. Patients and their families were informed about medication precautions [14, 15].

Outcome measures

SAS and SDS score of the two groups of patients before and after nursing were compared and analyzed. The lower the SAS and SDS scores, indicated a better mental state of the patient.

The emotional index, health index, and life satisfaction scores of the two groups of patients before and after nursing were compared and analyzed. The score is in direct proportion with the quality-of-life.

The life satisfaction of the two groups of patients was compared in the time before nursing, one week after nursing and one month after nursing. Higher scores meant more satisfaction towards life.

The long-term (one year later) efficacy of the two groups of patients was compared, including LVEF, LVDd, and BNP.

The nursing satisfaction was graded into three levels, that is, very satisfied, satisfied, and dissatisfied. Total satisfaction = (very satisfied number + satisfied number)/total number × 100%.

Statistical methods

All analyses were carried out using SPSS, version 20, and figure illustration was done with GraphPad Prism, version 8. Measurement data was expressed as ($\bar{x}$ ± sd) and tested by t-test. Counting data was expressed as (n, %) and tested by chi-squared test. A *P* value of < 0.05 indicated a significant difference.

Results

Comparison of general information between the two groups

They general data such as gender ratio, age, type of myocardial infarction, and Killip grade were not significantly different between groups (P > 0.05, **Table 1**).

SAS and SDS scores before and after nursing

We detected no statistical difference in SAS and SDS scores in the two groups before nursing (P > 0.05). While compared to the control group, the SAS and SDS scores of the experimental group patients after nursing were impressively lower, with statistical significance (P < 0.001), see **Table 2**.

Quality-of-life scores before and after care

With regard to the emotional index scores, health index scores, and satisfaction scores, both groups were better after nursing as compared to those prior to nursing, and the improvement of patients in the experimental group after nursing was more notable, with a statistical difference (P < 0.05), see **Table 3**, respectively.

Table 2. Comparison of SAS and SDS scores between the two groups ($\bar{x} \pm sd$)

Groups	n	SAS		SDS	
		Before nursing	After nursing	Before nursing	After nursing
Experimental group	38	47.32±5.33	36.46±4.14*	50.62±4.82	41.33±4.35*
Control group	38	46.94±5.24	42.86±4.48*	50.14±5.08	45.45±4.57*
t		0.313	6.468	0.423	4.025
P		0.755	< 0.001	0.674	< 0.001

Note: *means compared that before nursing within the group, P < 0.001.

Table 3. Comparison of emotional index scores and health index scores between the two groups of patients before and after nursing (point, $\bar{x} \pm sd$)

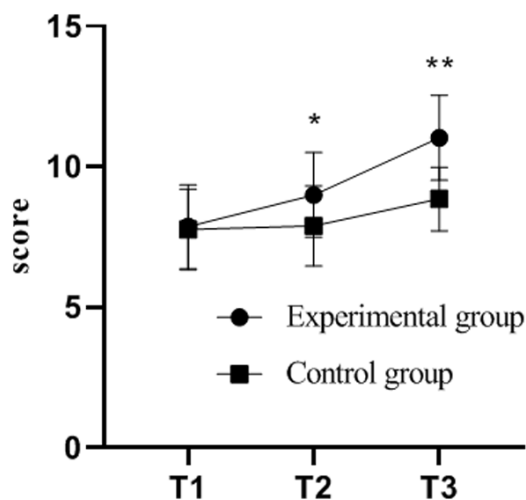| Group	emotional index scores		t	P	health index scores		t	P
	before nursing	after nursing			before nursing	after nursing		
experimental group	4.52±1.34	8.57±1.88	10.814	< 0.001	6.62±1.83	10.47±2.32	8.032	< 0.05
control group	4.38±1.79	7.03±1.53	6.937	< 0.001	7.05±1.87	8.04±2.33	2.043	< 0.05
t	1.365	3.916			1.374	4.556		
P	0.965	< 0.001			0.981	< 0.05		

Figure 1. Comparison of life satisfaction scores between the two groups of patients before and after nursing ($\bar{x} \pm sd$). Note: The abscissa represents T1 (before nursing), T2 (after 1 week of nursing), and T3 (after 1 month of nursing), and the ordinate represents the life satisfaction score (points). The life satisfaction scores of patients in the experimental group before nursing, one week after nursing, and one month after nursing were (6.81±2.11), (7.93±2.13), and (9.96±2.14) respectively. The life satisfaction scores of patients in the control group before nursing, one week after nursing, and one month after nursing were (6.75±2.03), (6.89±2.01), and (8.05±1.60) points, respectively. Indicates that there is a significant difference in the life satisfaction scores of the two groups of patients at T2 (t=2.189, P < 0.05). ** Indicates that there is a significant difference in life satisfaction scores at T3 between the two groups (t=4.406, P < 0.05).

Life satisfaction at different times

We observed no significant difference in the life satisfaction scores of the two groups before nursing (P > 0.05). The life satisfaction scores of the experimental group 1 week after nursing and 1 month after nursing showed higher level compared to the control group (P < 0.05), see **Figure 1** for details.

Long-term efficacy

When considering the long-term efficacy, the LVEF of the experimental group was much higher than that of the control group (P < 0.05); while the LVDd was remarkably lower than that of the control group (P < 0.001). The BNP of the experimental group was markedly lower (P < 0.001). See **Table 4** for details.

Nursing satisfaction

Concerning the total nursing satisfaction, the experimental group exhibited a notably higher rate compared with the control group [97.37% (37/38) vs 81.58% (31/38)] (P < 0.05). See **Table 5**.

Discussion

AMI is frequently seen in middle-aged and elderly people, and is often accompanied by heart failure complications. Therefore, the

Table 4. Comparison of long-term efficacy between the two groups ($\bar{x} \pm sd$)

Groups	N	LVEF (%)	LVDd (mm)	BNP (pg/mL)
Experimental group	38	49.58±7.32	49.68±7.20	831.47±56.82
Control group	38	45.55±6.84	56.43±8.16	1731.24±449.53
t		2.480	3.824	12.241
P		< 0.05	< 0.001	< 0.001

Table 5. Comparison of satisfaction

Groups	n	very satisfied	Satisfied	dissatisfied	total satisfaction
Experimental group	38	33 (86.84)	4 (10.53)	1 (2.63)	37 (97.37)
Control group	38	11 (28.95)	20 (52.63)	7 (18.42)	31 (81.58)
X^2					5.029
P					0.025

treatment of AMI plus heart failure is of critical significance [16-18]. Clinically, PCI is usually performed for patients with AMI, while patients with AMI plus heart failure often have a strong sense of pain. This will easily bring greater psychological pressure, cause tension, anxiety, depression, and other negative emotions. Accumulating evidence has shown that the implementation of comprehensive care for patients can effectively alleviate patients' negative mood and improve patient's quality of life [19-21]. As a result, it is of critical importance to explore new nursing models and provide more effective clinical care for patients with AMI plus heart failure. EBN provides high-quality care to patients based on scientific evidence. It has a positive role in improving the quality of life of patients, alleviating negative emotions, and promoting long-term treatment outcomes [22]. To undertake a such study as to investigate the effectiveness of EBN in AMI combined with heart failure seems imperative given not only its potential for improving nursing work but also because of its implication to the improved outcomes.

It is relevant that in this study that the experimental group had lower SAS and SDS scores after nursing care. This indicates that the implementation of EBN can effectively relieve the anxiety and depression of the patients and improve the psychological state of the patients. What's more, the improvement of the emotional index, health index, and life satisfaction of the experimental group was remarkably better, suggesting that psychological care and life care in the EBN model have a positive

impact on the patients' attitude toward life. BNP evaluates the effect of heart failure treatment. If BNP decreases to less than 50% the original level after treatment, it is considered as effective. What is critical to note is that the LVEF of the experimental group is higher, LVDd and BNP are lower, suggesting that the experimental group is much closer to the normal level. This means that the implementation of EBN contributes to the long-term treatment efficacy. Of note, the present results show that the experimental group demonstrated a higher total satisfaction with nursing care. This affirms the EBN model from the subjective perspective of the patients is in line with the results concluded by Xi-Mei L [23]. This fully demonstrates that EBN can not only improve the patient's condition, but is also recognized by majority of patients. Despite this study revealing that after evidence-based nursing intervention, the SAS and SDS scores of the experimental group were significantly lower than those of the control group, and the improvement of the quality of life scores and various indicators were better than that of the control group, it is a retrospective study, and selection bias can not be ruled out. In the future, it will be necessary to expand the trial and conduct a prospective study to obtain more reliable clinical data.

In summary, EBN is applicable in the nursing of patients with AMI plus heart failure, and it is worthy of promotion in clinical nursing.

Disclosure of conflict of interest

None.

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References

[1] Limandri BJ. Evidence-based prescribing in mental health nursing. J Psychosoc Nurs Ment Health Serv 2019; 57: 9-13.

[2] Harwood L, Wilson B, Pye D and Stroud N. Evidence-based reviews: trends in nephrology nursing. Nephrol Nurs J 2019; 46: 249-259.

[3] Lopez V and Cleary M. Integrating evidence-based practice in the nursing curriculum. Issues Ment Health Nurs 2019; 40: 365-368.

[4] Yancey NR. Evidence-based practice in nursing for teaching-learning: but is it really nursing? Nurs Sci Q 2019; 32: 25-28.

[5] Labrague LJ, McEnroe-Pettite D, Tsaras K, D'Souza MS, Fronda DC, Mirafuentes EC, Al Yahyei A and Graham MM. Predictors of evidence-based practice knowledge, skills, and attitudes among nursing students. Nurs Forum 2019; 54: 238-245.

[6] Korhonen A, Vuori A, Lukkari A, Laitinen A, Perälä M, Koskela T and Pölkki T. Increasing nursing students' knowledge of evidence-based hand-hygiene: a quasi-experimental study. Nurse Educ Pract 2019; 35: 104-110.

[7] Hasanpoor E, Belete YS, Janati A, Hajebrahimi S and Haghgoshayie E. Nursing managers' perspectives on the facilitators and barriers to implementation of evidence-based management. Worldviews Evid Based Nurs 2019; 16: 255-262.

[8] Storey S, Wagnes L, LaMothe J, Pittman J, Cohee A and Newhouse R. Building evidence-based nursing practice capacity in a large statewide health system a multimodal approach. J Nurs Adm 2019; 49: 208-214.

[9] Kesten K, White KA, Heitzler ET, Chaplin LT and Bondmass MD. Perceived evidence-based practice competency acquisition in graduate nursing students: impact of intentional course design. J Contin Educ Nurs 2019; 50: 79-86.

[10] Labrague LJ, McEnroe-Petitte D, D'Souza MS, Cecily HSJ, Fronda DC, Edet OB, Ibebuike JE, Venkatesan L, Almazan JU, Al Amri M, Mirafuentes EC, Cayaban ARR, Al Yahyaei A and Bin Jumah JA. A multicountry study on nursing students' self-perceived competence and barriers to evidence-based practice. Worldviews Evid Based Nurs 2019; 16: 236-246.

[11] Karlsson A, Lindeborg P, Gunningberg L and Jangland E. Evidence-based nursing-How is it understood by bedside nurses? A phenomenographic study in surgical settings. J Nurs Manag 2019; 27: 1216-1223.

[12] Tumala RB and Alshehri AS. Perceptions of competence about evidence-based practice among Saudi baccalaureate nursing students: a cross-sectional survey. Nurs Sci Q 2019; 32: 101-105.

[13] Ju QY, Huang LH, Zhao XH, Xing MY, Shao LW, Zhang MY and Shao RY. Development of evidence-based nursing-sensitive quality indicators for emergency nursing: a Delphi study. J Clin Nurs 2018; 27: 3008-3019.

[14] Beanlands H, McCay E, Fredericks S, Newman K, Rose D, Mina ES, Martin LS, Schwind J, Sidani S, Aiello A and Wang A. Decreasing stress and supporting emotional well-being among senior nursing students: a pilot test of an evidence-based intervention. Nurse Educ Today 2019; 76: 222-227.

[15] Herron EK and Strunk JA. Engagement with community partners to promote and enhance the transition of evidence-based nursing from the classroom to clinical practice. Worldviews Evid Based Nurs 2019; 16: 249-250.

[16] Twycross A and Smith J. Have you seen the evidence-based nursing blog? Evidence-based nursing blogs: highlighting contemporary issues in nursing. Evid Based Nurs 2017; 20: 29-32.

[17] Simonetti V, Comparcini D, Miniscalco D, Tirabassi R, Giovanni RD and Cicolini G. Assessing nursing students' knowledge of evidence-based guidelines on the management of peripheral venous catheters: a multicentre cross-sectional study. Nurse Educ Today 2019; 73: 77-82.

[18] Harvey G, Gifford W, Cummings G, Kelly J, Kislov R, Kitson A, Pettersson L, Wallin L, Wilson P and Ehrenberg A. Mobilising evidence to improve nursing practice: a qualitative study of leadership roles and processes in four countries. Int J Nurs Stud 2019; 90: 21-30.

[19] White-Williams C, Rossi LP, Bittner VA, Driscoll A, Durant RW, Granger BB, Graven LJ, Kitko L, Newlin K and Shirey M; American Heart Association Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; and Council on Epidemiology and Prevention. Addressing social determinants of health in the care of patients with heart failure: a scientific statement from the American Heart Association. Circulation 2020; 141: e841-e863.

[20] Smith SMS, Chaudhary K and Blackstock F. Concordant evidence-based interventions in cardiac and pulmonary rehabilitation guidelines. J Cardiopulm Rehabil Prev 2019; 39: 9-18.

[21] Yan WJ, Yang SZ, Chen L and Yang JJ. Analgesia in acute ischemic chest pain. Coron Artery Dis 2020; 31: 556-564.

[22] Rusu M, Constantinescu T and Jurcut R. The story of a stone heart-another side of cardiooncology. Int Med 2019; 16: 73-75.

[23] Liu XM. Application effect of evidence-based nursing in 88 patients with acute myocardial infarction complicated with heart failure. Chinese J Mod Drug App 2018; 12: 172-173.