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Original Article

Effects of an emergency nursing pathway on the complications and clinical prognosis of patients with acute myocardial infarction

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Abstract: Objective: To explore the effects of emergency nursing on the complications and clinical prognosis of patients with acute myocardial infarction. Methods: A total of 146 patients admitted at Wuhan Fourth Hospital, Puai Hospital, Tongji Medical College, Huazhong University of Science and Technology from June 2016 to June 2018 were selected for the present prospective study. These patients were separated into the observation group (n=73) and control group (n=73) following a random number table method. Then, patients in the control group received routine emergency nursing processes, and the observation group received a new emergency nursing pathway of treatment (a series of nursing measures including reception, condition assessment, emergency treatment and improved transfer handover were completed within a specific time). The emergency related indications, clinical prognosis related indicators, the occurrence of complications, uncertainty and anxiety in the core family members, and nursing satisfaction at discharge were compared between the two groups. Results: The observation group had much shorter emergency response time, average door-to-balloon time and pain relief time than the control group (all P<0.05). Besides, the hospitalization time, mortality and recurrence rate of myocardial infarction in the observation group were all markedly lower than those in the control group (all P<0.05). The observation group had an obviously lower total complication rate than the control group (all P<0.05). Besides, the observation group had much lower scores of each dimension and total score of core family members' uncertainty of disease, and much lower score of self-rating anxiety scale (SAS) than the control group (all P<0.05). What is more, the nursing satisfaction of the core family members in the observation group was evidently higher than that in the control group (all P<0.05). Conclusion: Emergency nursing pathway care has significant effects in the treatment of patients with acute myocardial infarction. It can significantly reduce the mortality and complication rates and improve the clinical prognosis and satisfaction of patients, and as such it is worthy of clinical promotion and application.

Keywords: Emergency nursing pathway, acute myocardial infarction, core family members, satisfaction

Introduction

Acute myocardial infarction (AMI) is a common disease of the human cardiovascular system; it is characterized by myocardial ischemia, hypoxia and necrosis. AMI is caused by sudden interruption of the myocardial blood supply, which is commonly induced by coronary artery occlusion [1-3]. With the rapid development of economy, the morbidity of AMI is also increasing annually under the influence of urbanization, population aging and the unhealthy modern lifestyle. China has 500,000 new cases of AMI every year, which brings an enormous economic burden [4, 5]. The typical clinical symptoms of AMI are persistent post sternal compression pain with the characteristic of rapid onset and rapid deterioration. The mortality rate of AMI can be as high as 20% without reperfusion treatment within 12 hours after onset, thus seriously threatening the safety of patients [6]. Timely, scientific and effective nursing measures play an important role in the treatment of AMI and improving the prognosis of patients [7]. Our new emergency nursing treatment pathway aims to implement first-aid measures according to the characteristics of individual patients in a standard time following a stan-

dardized process, so as to shorten the time for patients to receive the necessary first aid, diagnosis and treatment, and improve the rescue efficiency of patients [8].

Although the application of an acute nursing path in rescuing patients with AMI had been reported in multi-national studies, there are very few similar studies about the effects of an acute nursing path on the uncertainty and anxiety of core family members until now [9]. Therefore, this study aimed to discuss the rescue effects of an emergency nursing path in patients with AMI, and focused on the impact of this nursing intervention mode on the complications, clinical prognosis, uncertainty and anxiety of the core family members (the accompanying family members of the patients), so as to provide guidance for clinical nursing of AMI.

Materials and methods

General materials

A total of 146 patients admitted in the Emergency Department of Wuhan Fourth Hospital, Puai Hospital, Tongji Medical College, Huazhong University of Science and Technology, from June 2016 to June 2018 were selected for prospective study. These patients were separated into the observation group (n=73) and control group (n=73) following a random number table method. The general information of the two groups is shown in the result section. This study was approved by the medical Ethics Committee of Wuhan Fourth Hospital, Puai Hospital, Tongji Medical College, Huazhong University of Science and Technology.

Inclusion criteria: In line with the clinical diagnostic criteria for AMI [10]; the patients and their families both agreed to participate in the study and signed the informed consent; Patients were accompanied by family members; and The core family members of patients had primary school education or above, and normal cognitive function. Exclusion criteria: Patients with no signs of life at the time of admission to the Emergency Department; Patients or their families had mental illness; Patients or their families had cognitive dysfunction; Patients without family members accompany them; or Patients whose family members could not communicate smoothly.

Methods

Patients in the control group received resuscitation treatment according to routine nursing procedures: The emergency doctors visited patients within 10-15 min according to routine procedures after receiving the emergency call. Then, patients were transferred to the Emergency Department and the Emergency Room, in turn. Oxygen inhalation and medication were given according to the doctor's advice, electrocardiogram (ECG) and blood oxygen saturation monitoring were carried out, a venous channel was established, and corresponding treatment was implemented after diagnosis.

Patients in the observation group received rescue work according to our new emergency nursing pathway care: (1) the emergency doctors visited patients within 5 minutes after receiving the emergency call. (2) In the process of rushing to the scene, the family members were guided on the family nursing skills through telephone: such as guidance for the family members to place the patients in the appropriate position and stabilize the emotions of family members and patients. (3) Rescue measures were carried out immediately after arriving at the scene: oxygen inhalation was given through a mask and patients' pupils and mental state were observed closely; 0.5 mg nitroglycerin was given under the tongue and patients' vital signs were monitored closely; any tension or fear of patients was soothed to purposefully avoid emotional agitation and increase the heart burden. (4) During the transfer process, further detailed conditions about the patients were inquired about through communicating with family members, and emergency materials were prepared through communicating with related departments. (5) The following tasks were completed within 10 minutes after the patients arriving at the emergency department: 1) first of all, the conditions of the patients were assessed by nursing staff and first-aid measures were given in the shortest time possible. Then, registration and check in for the patients was performed. 2) The patient was positioned to lay in bed and rest, and they inhaled oxygen (3-5 L/min). 3) ECG monitoring, blood oxygen saturation monitoring and venous access were completed within 5 minutes. 4) Blood samples were collected for routine detect blood work, such as coagulation function, blood glucose, and myocardial enzymes, etc. 5) Nitroglycerin

was administered with intravenous perfusion to the patients whose chest pain was still not relieved after sublingual nitroglycerin. 6) Defibrillation or cardioversion were prepared. 7) Preventive measures for falling our of bed for patients with irritability were strengthened. 8) The medical staff in the catheter room were informed to make preparations for patients with AMI, accompanied by indications for interventional operation. 9) Thrombolytic drugs were prepared for patients who need thrombolysis. 10) The vital signs and complications of the patients were closely monitored after rescue. (6) The following items were completed within 30 minutes after the patients arrived at the Emergency Department: medication was given according to the doctor's advice, patients received thrombolytic therapy or were escorted to the cardiac catheterization room. (7) In the process of emergency treatment, health education and psychological support was given to patients and their families: with an explanation of disease knowledge and specific conditions to patients and their families, comfort was patiently give to patients as well as targeted psychological counseling. (8) The patients were guided to have a reasonable diet after operation, the occurrence of limb bleeding and subcutaneous hematoma in the operative limb was observed closely, and the heart rate and blood pressure of patients was be closely monitored by medical staff.

Outcome measures

Emergency related indexes of the two groups were compared, including the emergency response time (the time from receiving a call for help to the arrival of the ambulance), average door-to-balloon time (the average time from entering the emergency department to starting percutaneous coronary intervention for patients with AMI undergoing emergency percutaneous coronary intervention) and the pain relief time (from chest pain to pain relief). (2) Clinical prognostic indicators of the two groups were compared, including length of stay (from admission to discharge), mortality during hospitalization and 2-year recurrence rate of myocardial infarction. (3) Complications such as heart failure, arrhythmia, shock and chest pain were compared between the two groups. If multiple complications occurred in the same patient, the total incidence rate was calculated with the following formula: the total incidence = cases of complications/total number of cases * 100%. (4) One core family member of each patient was selected after the rescue for assessment using a scale developed by Mishel [11]. The content validity of the scale was 0.87, Cronbach's α coefficient was 0.89, and the total score was 150 points. The higher the score was, the higher the uncertainty level of family member about the disease was. The scores of each dimension and total score of uncertainty of core family members of the two groups were compared separately, including lack of information, complexity, uncertainty and unpredictability. (5) One core family member of each patient was selected for the assessment of anxiety using the self-rating anxiety scale (SAS) [12]. SAS score ≥50 indicated anxiety and depression, and the degree was increased with the increase of SAS score. (6) One core family member of each patient was selected to fill in the self-made satisfaction survey scale to evaluate nursing satisfaction. The satisfaction was graded into satisfied (score 90-100), basically satisfied (score 60-89), dissatisfied (score <60). Satisfaction = cases of (satisfied + basically satisfied) cases/total cases * 100%.

Statistical analysis

SPSS 20.0 was used for data analysis. The enumeration data were expressed as n/%, and was compared using the chi square test. The measurement data in accordance with a normal distribution were expressed as mean ± standard deviation ($\bar{x}$ ± sd), and independent t test was used for comparison between groups. The measurement data that did not conform to a normal distribution were expressed by median and quartile distance, and the rank sum test was used for comparison between groups. $P<0.05$ indicated that difference was statistically significant.

Results

There were 23 deaths in total among the 146 patients with AMI, including 7 deaths in the observation group (4 cardiac shock, 2 cardiac arrest, 1 rupture of ventricular aneurysm), and 16 deaths in the control group (7 cardiac shock, 5 cardiac arrest, 2 ventricular aneurysm rupture and 2 ischemic stroke). The deaths in the two groups were not included in the statistics of the average door-to-balloon time, pain relief

Table 1. Comparison of general baseline data (n, $\bar{x} \pm sd$)

Index	Observation group (n=73)	Control group (n=73)	χ^2/t	P
Age (year)	62.5±5.9	63.6±5.8	1.162	0.247
Body mass index (kg/m^2)	25.76±2.69	26.23±2.87	1.021	0.309
Gender			1.791	0.181
Male	30	33		
Female	43	40		
Underlying diseases				
Hypertension	20	17	1.243	0.231
Hyperlipidemia	22	20	1.342	0.124
Diabetes	24	27	0.978	0.340
Nephropathy	8	9	0.657	0.649
Hyperuricemia	9	7	0.546	0.250
Sleep apnea syndrome	9	11	0.768	0.351
Obesity	10	14	0.898	0.272
Location of myocardial infarction			0.890	0.827
Anterior wall	26	30		
Inferior wall	20	18		
Anteroseptal	11	8		
Extensive anterior wall	16	17		
Bad living habits				
Smoking	15	18	0.654	0.723
Drinking	20	23	0.879	0.247
Lack of exercise	35	38	1.435	0.230
Insufficient sleep	28	31	2.546	0.125
Fatty food	27	23	2.112	0.240
Core family members Gender			0.113	0.737
Male	31	29		
Female	42	44		
Age of core family members (year)	34.9±11.4	38.4±15.0	1.601	0.112
Education level of core family members			0.700	0.704
Junior high school and below	5	7		
High school or technical secondary school	27	23		
College and above	41	43		
Distance between the onset place and the hospital (km)	8.54±6.45	8.78±6.98	7.869	0.156
Traffic conditions at the time of onset			3.243	0.253
In rush hour	34	31		
Not in rush hour	39	42		

time, hospitalization time and recurrence rate of myocardial infarction.

Comparison of general baseline data

No significant differences existed in age, gender, body mass index, underlying diseases, myocardial infarction site, bad living habits, data of core family members (including age, gender and education level), distance between the onset place and the hospital, and whether it was in the peak traffic period at the time of onset between the two groups (P>0.05). Thus, the two groups were comparable. See **Table 1**.

Comparison of emergency related indexes

The observation group had much shorter emergency response time, average door-to-balloon time and pain relief time than the control group (all P<0.001). See the **Table 2**.

Table 2. Comparison of emergency related indexes (n, $\bar{x} \pm sd$)

Index	Observation group		Control group		t	P
	n	($\bar{x} \pm sd$)	n	($\bar{x} \pm sd$)		
Emergency response time (min)	73	39.98±9.32	73	55.27±14.38	7.624	0.000
Average door-to-balloon time (min)	66	66.89±15.89	57	103.08±30.89	8.953	0.000
Pain relief time (min)	66	60.11±3.56	57	81.67±2.08	44.854	0.000

Table 3. Comparison of clinical prognostic indexes (n, $\bar{x} \pm sd$)

Groups	Hospitalization time (d)		Mortality		Recurrence rate	
	n	$\bar{x} \pm sd$	n	$\bar{x} \pm sd$	n	$\bar{x} \pm sd$
Observation group	66	9.4±1.9	73	7 (9.59)	66	9 (13.64)
Control group	57	15.7±2.5	73	16 (21.92)	57	19 (33.33)
t		17.142		4.180		6.650
P		0.000		0.041		0.032

Table 4. Comparison of complications (n, %)

Groups	Heart failure	Arrhythmia	Shock	Complication rate
Observation group (n=73)	2 (2.74)	3 (4.11)	1 (1.37)	6 (8.22)
Control group (n=73)	9 (12.33)	10 (13.70)	5 (6.85)	24 (32.88)
χ^2	4.820	4.140	4.190	22.240
P	0.028	0.042	0.041	0.000

Table 5. Comparison of uncertainty scores of core family members ($\bar{x} \pm sd$)

Groups	Lack of information	Complexity	Uncertainty	Unpredictability	Total score
Observation group (n=73)	12.65±1.09	16.45±1.84	30.15±3.08	8.89±0.76	72.15±3.58
Control group (n=73)	15.16±1.89	19.07±2.89	35.70±5.07	9.78±1.34	81.48±6.34
t	9.829	6.534	7.993	4.936	10.949
P	0.000	0.000	0.000	0.000	0.000

Comparison of clinical prognostic indexes

The hospitalization time, mortality during hospitalization and recurrence rate of myocardial infarction in the observation group were all markedly lower than those in the control group (all P<0.05). See the **Table 3**.

Comparison of complications

There were 2 cases of heart failure, 3 cases of arrhythmia and 1 case of shock in the observation group, with the total complication rate of 8.22%. At the same time, there were 9 cases of heart failure, 10 cases of arrhythmia and 5 cases of shock in the control group, with the total complication rate of 32.88%. Thus, the observation group had much lower total complication rate than the control group (P<0.001). See **Table 4**.

Comparison of uncertainty scores of core family members

Core family members in the observation group had much lower scores of each dimension and total score of uncertainty than the core family members in the control group (all P<0.001). See **Table 5**.

Comparison of anxiety of core family members

The core family members in the observation group had much lower SAS scores than the core family members in the control group (P<0.001). See **Figure 1**.

Comparison of nursing satisfaction of core family members

There were 35 cases of satisfaction, 34 cases of basic satisfaction and 4 cases of dissatisfac-

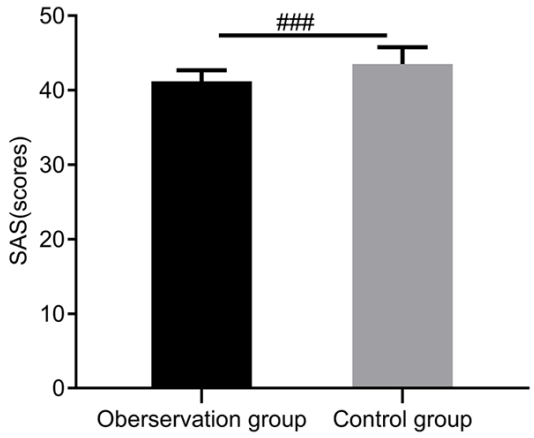

Figure 1. Comparison of anxiety of core family members. Compared with the control group, ###P<0.001.

tion in the core family members of the observation group during hospitalization, with the satisfaction rate of 94.52%. There were 21 cases of satisfaction, 39 cases of basic satisfaction and 13 cases of dissatisfaction in the core family members of the observation group during hospitalization, with the satisfaction rate of 82.19%. Thus, the nursing satisfaction of the core family members in the observation group was memorably higher than that in the control group (P<0.05). See **Table 6**.

Discussion

Compared with conventional nursing, emergency nursing pathway care is a new emerging nursing mode with unique advantages. Through combining the characteristics of specific diseases, and formulating a targeted, sequential and timely nursing plan in advance, emergency nursing pathway care adopts more reasonable and scientific measures, so as to effectively reduce the risk of complications and improve the clinical prognosis of patients. Studies have shown that bad habits such as overeating, smoking and excessive drinking, overwork, emotional excitement, strenuous exercise, sudden changes in weather and environment, excessive defecation can all induce the occurrence of AMI [13, 14]. AMI is a critical and severe disease seen in the clinic, and it is easy to induce local myocardial cell necrosis. Therefore, earlier implementation of perfusion treatment is more beneficial to save the dying myocardium. By comparing the effects of routine nursing and emergency nursing path in rescuing patients with AMI, Zhao et al. found that the emergency rescue time, average door-to-balloon time, qualification rate of door-to-balloon time and other indicators of patients rescued through emergency nursing path were all much better than those through conventional nursing methods. Thus, it is considered that emergency nursing path can effectively improve the rescue effect of patients [15]. In our present study, patients in the observation group and the control group received the emergency nursing path and the conventional nursing mode, respectively. The results showed that the emergency response time, average door-to-balloon time and pain relief time of the observation group were all much shorter than those of the control group, indicating that the emergency nursing path significantly improved the rescue efficiency. The reason may be due to the reduction of the retention time in every related link of the rescue, thus largely improving the success rate of the treatment.

Without timely rescue, AMI is often complicated with arrhythmia, heart failure, cardiogenic shock and other serious complications, further resulting in poor clinical prognosis [16]. Our present study found that the length of stay, mortality during hospitalization, recurrence rate of myocardial infarction and the incidence of total complications in the observation group were all much lower than those in the control group. The above results indicate that the clinical prognosis of patients rescued through the emergency nursing path is much better than that of patients received routine nursing. Our results were also consistent with the research results of Yu and Wu et al., which showed that emergency nursing pathway care could effectively reduce the recurrence rate of myocardial infarction and the incidence of complications [17, 18].

Mishel et al., pointed out that uncertainty of disease referred to the uncertainty of symptoms, diagnosis, treatment and prognosis about the disease, which was mainly results from the vague cognitions of the disease, and the unpredictability, uncertainty, complexity and lack of disease information [11]. An uncertainty score >75 indicates that the research subject has a high level uncertainty about the disease. In our study, the uncertainty score of family members in the control group was at a high level (81.48±6.34 points), which was basically similar to the results of Cypress et al. [19].

Table 6. Comparison of nursing satisfaction of core family members (n (%)

Groups	Satisfied	Basically satisfied	Dissatisfied	Satisfaction
Observation group (n=73)	35 (47.95)	34 (46.58)	4 (5.48)	69 (94.52)
Control group (n=73)	21 (28.77)	39 (53.42)	13 (17.81)	60 (82.19)
χ^2		8.610		5.390
P		0.014		0.020

The reason may be that patients with AMI are in a life threating condition, and their families are commonly uncertain about the disease because they have a lack of relevant information about the patient's disease. The results of our study showed that in general, the family members of patients had the lowest score in the unpredictability dimension, which indicated that the family members had a clear understanding about the physical condition, course of disease and final outcome of patients with AMI. The score of uncertainty dimension was the highest among the four dimensions, which indicated that the family members were confused about the rapid changes of the condition and the treatment effects. Uncertainty about the disease easily leads to anxiety, depression and other negative emotions of the patients and their family members [20, 21]. Negative emotions will affect the relationship between doctors and patients if not relieved in time, further affect the clinical prognosis of patients. In our study, the uncertainty score and SAS score of family members in the observation group were significantly lower than those in the control group, indicating that emergency nursing path can effectively reduce the uncertainty and anxiety of patients' family members. The reasons may be due to the emphasis on psychological counseling of patients and their families during the emergency nursing, and interpretative statement about first-aid knowledge related to myocardial infarction and successful rescue cases. The emergency nursing helps to calm the tension of patients and their families, reduces the fear of patients and their families, and enhances their confidence in conquering the disease.

Finally, we also investigated the nursing satisfaction of the accompanying core family members of the two groups during hospitalization. The results showed that the nursing satisfaction of the family members in the observation group was significantly higher than that of the control group, which may be due to the fact that the emergency nursing pathway shortened the rescue time, improved patient satisfaction and reduced the risk of medical disputes. However, we have not conducted further psychological counseling for patients with myocardial infarction after discharge. At the same time, the clinical path of rescuing patients with AMI needs to be further improved in the later stages, and more study with a larger sample size is needed to further confirm the feasibility and importance of emergency nursing intervention mode in patients with AMI.

To sum up, the application of emergency nursing in the treatment of patients with AMI significantly reduced the mortality and complication rate, improved the clinical prognosis, and enhanced satisfaction of patients. Thus, the emergency nursing has significant treatment effects and is worthy of clinical promotion and application.

Disclosure of conflict of interest

None.

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