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Analysis of the Impact of Pre-hospital Emergency Rescue Mode on the Prognosis of Patients with Acute Heart Failure

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Abstract: The emergency department is the first stop for inpatients in almost all departments of a hospital, and it treats patients with relatively critical conditions. Among them, acute heart failure is a relatively serious type of coronary heart disease, often caused by atherosclerosis. Acute heart failure requires initial diagnosis, initial treatment, and thrombolytic therapy in pre-hospital care. After a rapid assessment and emergency treatment of the patient's condition, they are transferred to the cardiac care unit (CCU) for subsequent in-depth treatment. Patients with acute heart failure are very prone to situations such as death due to the condition during the transfer to the emergency department. If the treatment methods of medical staff are incorrect, the treatment is not timely, and the transfer operation efficiency is low during the pre-hospital rescue and transfer process, it will lead to the delay of the patient's condition treatment.

Keywords: Pre-hospital emergency rescue mode; Acute heart failure; Prognosis impact analysis

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1. Introduction

The transfer time of patients in the hospital is very short, only a few minutes. However, patients with acute heart failure are very prone to aggravated conditions, rapid changes in their condition, which may lead to their death or worsening of their condition. Moreover, clinical medical research has proved that the mortality rate of patients with myocardial infarction who are transferred to other hospitals within the hospital is about 10% higher than that of ordinary patients [1]. Therefore, the work quality requirements for medical staff in clinical practice are extremely high. Exploring a more standardized and complete in-hospital transfer process for patients with acute heart failure after admission and optimizing the work quality of each link are of great significance for saving the lives and health of patients with myocardial infarction. Improving the safe transfer efficiency of patients with acute heart failure in the hospital is of great significance for achieving the goal of curing the patients' diseases [2]. Therefore, this paper analyzes the severity of the disease in patients with acute heart failure, understands the importance of

emergency treatment for patients with acute heart failure, analyzes the pre-hospital emergency treatment model and application measures, and studies the impact of the pre-hospital emergency treatment model on the prognosis of patients with acute heart failure, providing a reference for the clinical adoption of pre-hospital emergency treatment measures for patients with acute heart failure.

2. The dangers of acute heart failure and the importance of first aid

2.1. Risks of acute heart failure

Heart failure is a serious clinical syndrome that is rather dangerous. It is characterized by a decline in the heart's pumping function and an inability to meet the blood and oxygen demands of various tissues and organs in the body. The symptoms of heart failure are diverse, and the severity is closely related to the progression of heart failure [3]. The main symptoms of patients with acute heart failure are as follows: when left heart failure occurs, the congestion in the lungs increases, leading to shortness of breath. Initially, it may only appear after activity or physical exertion. As the disease progresses, it can develop into shortness of breath at rest, and even cause nocturnal paroxysmal shortness of breath and sitting breathing. Severe pulmonary congestion may lead to coughing. The phlegm is mostly white and foamy, sometimes with blood streaks. In severe cases, pink foamy phlegm can be coughed up. Due to the decline in the heart's pumping function and insufficient blood supply to all tissues and organs throughout the body, the patient feels weak and powerless. Physical examination can reveal moist rales in both lungs, which is one of the main signs of left heart failure. When right heart failure occurs, the systemic circulation is congested. The first manifestation is edema of the lower extremities, which gradually spreads upward throughout the body, and even pleural effusion and ascites may appear. Long-term gastrointestinal congestion can cause symptoms such as loss of appetite, abdominal distension, nausea, vomiting, constipation, and upper abdominal pain. During physical examination, distension of the jugular vein can be found, which is an important sign of right heart failure [4]. When left heart failure and right heart failure coexist, patients may present with the symptoms of both the aforementioned left heart failure and right heart failure at the same time. Heart failure is a serious heart disease, and it is extremely dangerous. The quality of life of patients with heart failure declines significantly, and the prognosis is poor with a relatively high mortality rate. When left heart failure is severe, patients may develop acute pulmonary edema, presenting symptoms such as severe breathing difficulties and coughing up pink, foamy sputum. At this point, the condition is critical, and immediate rescue treatment is required. Patients with heart failure may suffer from insufficient blood supply to various tissues and organs throughout the body, which may lead to multiple organ failure, such as renal failure and liver failure, further aggravating the condition. Patients with severe heart failure may experience cardiogenic shock, which is characterized by excessive night sweats, low blood pressure, dizziness, apathy, and confusion. At this point, emergency treatment is required [5].

The symptoms of heart failure are diverse and severe, posing a serious threat to the lives of patients. Therefore, once symptoms of heart failure occur, one should seek medical attention promptly and receive standardized treatment to slow down the progression of the disease and improve the quality of life. Meanwhile, strengthening the prevention of heart failure and actively controlling risk factors such as hypertension and diabetes are of great significance for reducing the incidence and mortality of heart failure.

2.2. The importance of emergency treatment for acute heart failure

The condition of patients with acute heart failure is relatively serious and unstable. During the pre-hospital rescue

and transfer process, it is very easy for the condition to deteriorate. If the patient's condition is not accurately evaluated during the transfer process, the related risks are not evaluated and analyzed, the relevant equipment and instruments are not fully prepared, and the correct pretreatment methods are not adopted for the patient. This will lead to adverse events for the patient during the transfer process [6]. When the safety issue during the pre-hospital rescue and transfer process is a matter of great concern in clinical practice nowadays, it is necessary to analyze various risks in the pre-hospital rescue and transfer process, make adequate preparations for instruments and materials, equip with experienced professional physicians and nurses, adopt professional pretreatment methods for patients, do a good job in the preparatory work before the event, and control the quality during the pre-hospital rescue and transfer process before the event. Furthermore, quality improvement work should be done well to enhance the quality of pre-hospital rescue and transfer, and reduce the mortality rate of patients [7].

3. Pre-hospital emergency rescue models and measures

3.1. Overview of pre-hospital emergency rescue models

Pre-hospital emergency care refers to the emergency treatment of critically ill patients outside the hospital. In a broad sense, pre-hospital emergency care refers to the emergency rescue carried out on the spot by medical staff or witnesses when the patient falls ill. In a narrow sense, pre-hospital emergency care refers to professional emergency institutions composed of communication equipment, transportation tools, and basic medical elements. Medical activities such as on-site rescue and in-transit monitoring are carried out before the patient arrives at the hospital [8]. Pre-hospital emergency care includes the treatment of critically ill patients outside medical institutions, emergency medical rescue for public emergencies, and medical support for major events, etc. It is an important part of China's emergency medical service system and public health security system. The pre-hospital emergency care system covers institutions engaged in pre-hospital emergency care, relevant pre-hospital legislation, network construction, personnel training, discipline construction, etc. The construction of the pre-hospital emergency care system in the country started later than that in foreign countries. From 1980 to 1987, the state issued documents such as "Opinions on Strengthening Urban Emergency Rescue Work" and "Notice on Using '120' as the Telephone Number of Emergency Rescue Centers (Stations) across the Country", marking the official start of its construction [9]. With the continuous development of the economy and society, the concept of putting life first has been deeply rooted in people's hearts. The construction of the pre-hospital emergency medical system has received increasing attention. In 2020, nine ministries and commissions, including the National Health Commission, jointly issued the "Guiding Opinions on Further Improving Pre-hospital Medical Emergency Services", putting forward requirements for how localities can build a pre-hospital emergency medical system that is fast in response, reasonably laid out, and interconnected in information. With the legislation of pre-hospital emergency care, the standardization, scientificity, and rationality of the pre-hospital emergency care model have received extensive attention from all sectors of society [10]. At present, the commonly adopted pre-hospital emergency rescue models in clinical practice include the methods of transfer first and then treatment, and treatment first and then transfer.

3.2. Application measures of pre-hospital emergency care in patients with acute heart failure

For patients with acute heart failure, the best pre-hospital emergency rescue model is to treat first and then transfer.

3.3. Research subjects

In this study, 102 patients with acute heart failure admitted to the hospital from January 2024 to December 2024 were selected as the research subjects of this trial. According to the computer random grouping method, they were divided into the experimental group and the control group, with 51 cases in each group. The two groups of patients were treated with the pre-hospital emergency rescue mode and the mode of operation first, and then emergency rescue, respectively. According to the statistical results of the data, among the patients in the experimental group, there were 27 males and 24 females. The age ranged from 55 to 78 years, with an average of 61.21 ± 1.21 years. The course of hypertension ranged from 1 to 15 years, with an average of 7.62 ± 1.02 years. Among the patients in the control group, there were 26 males and 25 females. The age ranged from 56 to 80, with an average of 61.21 ± 1.21 years. The course of hypertension ranged from 2 to 20 years, with an average of 8.01 ± 1.13 years. Inclusion criteria: (1) Meeting the diagnostic criteria for acute heart failure; (2) All are aware of this experimental research; (3) Age 55–80 years old, gender not limited; (4) Serum trimethylamine oxide level >18.5umol/L; Exclusion criteria: (1) Poor compliance; (2) Severe congenital genetic metabolic diseases, fatal circulatory system diseases, severe neurological abnormalities, respiratory system malformations; (3) Patients lacking clinical data; (4) Those with chronic diseases that make the clinical treatment plan complex; (5) Follow-up failure; (6) Those who quit automatically halfway. All patients signed the informed consent form upon learning the content and methods of the trial study. This experimental study has also been approved by the hospital's ethics committee.

3.4. Research methods: Control group

Adopt the treatment mode of operation first and then rescue.

3.5. Research methods: Experimental group

Adopt the treatment mode of treating first and then transferring.

3.5.1. Be well-prepared for rescue

After receiving the doctor's order, the nursing staff informed the hospital's logistics department to get it done. The work of unblocking the passage, developing a green channel for the patient, informing the ward where the patient is located to make preparations for rescue, and notifying the patient's family of the relevant matters [11].

3.5.2. Preliminary assessment

Before the transfer, a preliminary assessment of the patient's disease condition should be conducted, and relevant records should be kept. Respiratory system assessment: Evaluate the patient's respiratory rate, respiratory rhythm, oxygenation status, airway patency, risk factors hindering the patient's breathing, suitable ventilation methods for the patient, and the situation of asphyxia caused by aspiration in the patient [12]. Circulatory system assessment: Evaluate the patient's blood pressure, central venous pressure, urine output, heart rate, and other conditions; Central nervous system assessment: Examine and evaluate the patient's consciousness and pupil condition; Psychological condition assessment: Evaluate whether the patient has negative psychological emotions such as tension, anxiety, and restlessness.

3.5.3. Pretreatment

Ensure the patient's breathing is unobstructed. At the same time, ensure that the catheter is fixed, the patient inhales sufficient oxygen, and ensure smooth intravenous administration. Secondly, emergency drug treatment

should be given to the patients. During the pre-hospital emergency treatment, emergency drugs should be given according to the specific conditions of the patients to alleviate the symptoms of heart failure [13]. Nitroglycerin can be given to the patients to help dilate the coronary arteries and reduce the myocardial oxygen consumption of the patients. Administer diuretics to the patients to reduce the burden on their hearts; Administer thrombolytic agents or antiplatelet drugs to the patients to prevent the occurrence of thrombosis.

3.5.4. Psychological care

Patients with acute heart failure may experience chest pain and shortness of breath due to sudden breathing difficulties, which can easily lead to psychological conditions such as tension, fear, and a sense of impending death in them [14]. As medical staff, one should always maintain composure and confidence. Through proficient nursing skills, help patients relieve their anxiety. Provide patients with sufficient security through language, eye contact, and actions, keeping them in the best condition to smoothly get through the acute stage of the disease.

3.5.5. Prepare the rescue equipment

Medical staff should prepare all kinds of equipment and drugs for the rescue process, mainly including oxygen, portable ventilators, suction devices, defibrillation instruments, rescue boxes, and other supplies.

3.5.6. Allocation of medical staff

During the escort and transfer period, it is required to be accompanied by a professional physician and a professional nurse with more than three years of experience [15].

3.5.7. Preparation of treatment plan

During the transfer process, a contingency plan for possible emergencies should be made. Under the monitoring of an electrocardiogram monitor, the patient's electrocardiogram, heart rate, consciousness, breathing, blood pressure, and other conditions should be monitored throughout the process [16]. The patient should be placed in a comfortable flat position, avoiding force and pushing the cart steadily. During the transfer process, electrocardiograms were used to conduct electrocardiogram tests on the patients to evaluate their heart rhythm and the degree of myocardial injury. Once ventricular arrhythmia occurred, emergency treatment was immediately given to the patients, including anti-arrhythmic drugs and electrical cardioversion treatment.

3.5.8. Preparation for handover work

Nursing staff should do a good job in the handover with the ward, cooperate with the ward to carry out relevant nursing work, and ensure that patients pass through the bed smoothly. After admission, clinicians provide further treatment for patients based on their conditions, such as coronary intervention surgery or thrombolytic therapy [17]. During the patient's hospitalization, electrocardiogram monitoring, blood oxygen monitoring, and hemodynamic monitoring were continuously carried out, and appropriate drugs and supportive treatments were given.

3.6. Results

In this experiment, the pre-hospital emergency rescue mode was implemented for the patients. The results showed that the hospital stay of the patients in the experimental group was 9.89 ± 2.75 days, which was significantly lower than that of the control group (11.32 ± 3.78 days], $P < 0.05$; The time for the coagulation indicators in the observation group to return to normal was 2.19 ± 1.78 days, which was shorter than that in the control group (3.72

± 2.01 days), $P < 0.05$; The time for inflammatory indicators to return to normal was 2.45 ± 1.78 days, which was shorter than that of the control group (4.02 ± 1.32), $P < 0.05$.

4. Research on the impact of pre-hospital emergency rescue mode on the prognosis of patients with acute heart failure

"First transfer then treatment" and "first treatment then transfer" are two different pre-hospital emergency rescue models. The emergency rescue method of "first treatment then transfer" requires medical staff to immediately provide first aid and treatment to the patient on the spot, giving the patient oxygen, anticoagulant therapy, vasodilator treatment, etc., and then transfer the patient to the hospital [18]. This pre-hospital emergency rescue model is of great significance for patients with acute heart failure. It enables timely and necessary measures to be taken to save the patients' lives. Active treatment with diuresis and hemodynamic support for patients with acute heart failure can reduce the burden on the patients' hearts, decrease the area of damaged myocardial cells, improve the survival rate of patients, and enhance prognosis. In Xi Xiaoliang's research, 86 patients with acute myocardial infarction complicated with acute left heart failure who were diagnosed and treated in the hospital from June 2019 to June 2020 were selected for analysis and randomly divided into two groups [19]. The control group received emergency treatment by the measure of transfer first and then treatment; The research group adopted the measure of treating first and then transferring for emergency treatment. Analyze the clinical effects of the two groups after their respective first aid measures and the survival rates after 30 days. Result: The total effective rate of clinical treatment in the study group was significantly higher than that in the control group ($P < 0.05$), and the total effective rate of survival in the study group was also significantly different from that in the control group ($P < 0.05$). There were significant differences in clinical evaluation indicators between the two groups. It can be seen from this that treating first and then transferring can significantly improve the treatment effect in the clinical treatment of patients with acute myocardial infarction complicated with acute left heart failure, thereby maximizing the survival rate of patients. It is worthy of promotion and application in clinical emergency rescue. In Dong Junchan's research, it is advocated to adopt the pre-hospital emergency rescue model for patients with acute heart failure, taking measures such as positioning the patients, maintaining breathing, monitoring their condition and physical signs, opening intravenous access, providing psychological intervention, and contacting the hospital [20]. The results showed that in the observation group with intervention, 0 cases died during transportation, and the survival rate was 43 cases (100%), while in the control group, 4 cases died during transportation (9.30%), and the survival rate was 39 cases (90.70%). The difference was statistically significant ($\chi^2=4.195$, $P < 0.05$). The total effective rate of treatment in the observation group was 97.67%, which was higher than 84.62% in the control group ($P < 0.05$). It can be seen that the pre-hospital emergency rescue model of treating first and then transferring can improve the prognosis. In Jin Zhijian's research, a total of 77 patients with acute myocardial infarction complicated with acute left heart failure who were treated by the center and cooperative hospitals from February 2017 to January 2019 were selected and divided into the control group (37 cases) and the observation group (40 cases) according to the different methods adopted in pre-hospital emergency treatment [21]. Patients in the control group were sent to the hospital by their families and then received emergency treatment, while patients in the observation group were first treated on the spot by emergency personnel. The patient's brief medical history, electrocardiogram, and vital sign data were transmitted to the cardiologist of the cooperative hospital. The professional cardiologist guided the treatment and emergency rescue. The emergency rescue effects of the two methods on the patient were

observed and compared. The results after different treatments showed that in terms of the effective rate of first aid and the overall survival rate, the observation group was higher than the control group, and the differences between each result were statistically significant ($P < 0.05$). There was no statistically significant difference in blood pressure between the two groups of patients after emergency treatment ($P > 0.05$). In terms of indicators such as heart rate and respiration, the observation group was lower than the control group. In terms of the incidence of complications, the observation group was lower than the control group. The differences among all the results were statistically significant ($P < 0.05$). It can be seen that the research results confirm that when rescuing patients with acute myocardial infarction complicated with acute left heart failure, first implementing corresponding rescue measures for the patients and then sending them to the hospital for corresponding treatment can significantly improve the patients' breathing, heart rate and other indicators, enhance the emergency treatment effect and survival rate, with remarkable results and high promotion value.

It can be seen from this that the pre-hospital emergency rescue model of treating first and then transferring can improve the therapeutic effect and prognosis of patients with acute heart failure.

5. Conclusion

In conclusion, the pre-hospital emergency treatment measures and key points of care for patients with acute heart failure are summarized. Firstly, the respiratory system function, central nervous system function, circulatory system function, and psychological status of the patients are evaluated. Furthermore, based on the assessment results, in the process of emergency care, it is also necessary to implement emergency care in combination with the patient's condition. Through systematic, scientific, and reasonable care methods, emergency care for the patient's disease is provided to ensure the patient's life and health during the transfer. This can build a better and more harmonious nurse-patient relationship, thus enabling the patient to receive higher-quality care services and avoid the death of the patient. It can be seen that the improved transfer method is more conducive to helping improve the safety of pre-hospital rescue and transfer for patients with acute heart failure, and can be promoted and applied in pre-hospital rescue.

Disclosure statement

The author declares no conflict of interest.

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