Original Article
The influence of nursing based on time management concepts on the efficiency and prognosis of emergency treatment performed for ICU patients with severe heart failure

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Abstract: Objective: To investigate the influence of nursing based on time management concepts for the efficiency and prognosis of emergency treatment performed for ICU patients with severe heart failure. Methods: This prospective randomized controlled study was conducted in 96 patients diagnosed with severe heart failure in the emergency center. These patients were randomly allocated to a control group (n=48) or an experimental group (n=48). For the control group, patients received routine nursing. Patients in the experimental group were treated with nursing based on a time management concept. In order to compare the influence of nursing on the effect of emergency treatment, total efficiency, life quality before and after nursing, and length of stay in ICU were analyzed. Complications, total hospitalization time, and self-confidence in rehabilitation were compared to find out factors influencing self-confidence in rehabilitation and evaluate prognosis. Results: The effect of emergency treatment, complications, total hospitalization time, and self-confidence in rehabilitation in the experimental group were significantly better than those in the control group (P<0.05). Self-confidence in rehabilitation was positively correlated to both mastery of relevant knowledge and nursing satisfaction. Meanwhile, there was a negative correlation between self-confidence in rehabilitation and patients' negative emotion (P<0.05). Conclusion: Nursing based on time management concepts can significantly improve the efficiency of emergency treatment performed for ICU patients with severe heart failure. As a result, length of stay in ICU was shortened, and recovery was promoted.

Keywords: Time management, ICU nursing, emergency nursing for patients with severe heart failure

Introduction

As an intensive care unit (ICU) care is specially developed for patients with major diseases, and as such ICU nursing is significantly different from general nursing. The workload of nursing staff and condition of the patients are the two major differences [1]. For nursing staff in the ICU, requirements like basic skills, professional quality, time management, and an efficiency plan, are higher than those in general ward [2].

Severe heart failure is a disease accompanied with dangerous conditions, severe symptoms, and high mortality rate. Therefore, patients with severe heart failure are commonly observed in the ICU [3]. In 2016, the principle of timely treatment, which stressed the key position of early therapy in the treatment of severe heart failure, was put forward [4]. For patients with severe heart failure, emergency treatment should be carried out in time. Nursing staff are the primary members of the medical emergency team. An efficient nursing strategy coupled with a refined process contributes to effective treatment [5]. Therefore, routine nursing should be modified to promote patients' recovery and improve their life quality. The novel strategy, which takes the time sequence of emergency treatment as the axis and is based on time management concepts, provides targeted nursing according to the patients' clinical needs at different time periods. Here, the influence of nursing based on time management concepts for the efficiency and prognosis of emergency treatment performed for ICU patients with severe heart failure was analyzed.
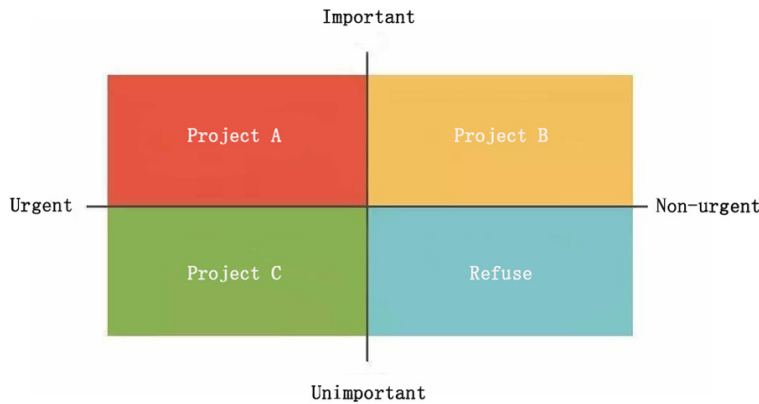
Figure 1. ABC time management diagram.

Materials and methods

General information

A prospective randomized controlled study was performed in 96 patients diagnosed with severe heart failure in The First People's Hospital of Wenlin between June 2017 and July 2019. These patients were divided into the control group or the experimental group (48 patients for each group). In the control group, there were 28 males and 20 females; these patients were between 57 and 81 years old, and the average age was 65.2±4.5 years old; 25 and 23 patients had grade II and III cardiac function, respectively. In the experimental group, there were 27 males and 21 females; these patients were between 56 and 80 years old, and the average age was 64.8±5.1 years old; 22 and 26 patients had grade II and III cardiac function, separately. There were no significant differences concerning basic data, like age and gender between the two groups (P>0.05).

Inclusion criteria: Patients were diagnosed with severe heart failure; patients with New York Heart Association (NYHA) classification of grade II to IV cardiac function, and dyspnea under resting state [6]; patients' left ventricular cavity was normal in size; patients without familiar hereditary psychiatric disorders, and with good communication ability; vital signs such as blood pressure dynamics, blood pressure, and heart rate were instable, and met the criteria of severe heart failure.

Exclusion criteria: Patients with severely impaired heart, liver, kidney and other organs; patients with psychiatric or communication disorders; patients who suffered from serious infection before this study; patients with tumor; and patients with immune system disorders.

Informed consent was signed by all enrolled patients. This study was approved by the Ethics Committee of The First People's Hospital of Wenlin.

Methods

According to each patient's circumstance, emergency treatment, including condition observation, medication care, oxygen therapy, and mechanical ventilation care, were performed. Thereafter, patients in the control group received routine nursing. Meanwhile, patients in the experimental group were treated with nursing based on time management concepts. As illustrated in **Figure 1**, ABC time management was applied in the development of nursing based on time management concepts. Tasks to be performed immediately were class A, such as the rescue of patients in critical condition, the treatment of the emergency in the ward, the evaluation of newly admitted patients, and emergent therapy and care; Routine tasks were class B, including nursing like various implants, drainage tubes, and injections, life care, and health education; Emergent tasks needed to be analyzed and classified in time were class C [7]. Rescue medication and answering phone were representative tasks of class C. A senior nurse was responsible for the reasonable assignment of tasks to each member of the team. He or she paid attention to the dynamic inter-transformation of ABC tasks. Appropriate adjustments are done according to the changes every 15 minutes. The efficiency of time management was assessed by the head nurse. Corresponding optimization was carried out [8]. To be specific, the procedures were as follow.

Emergency nursing: Time management of condition observations. During the process of emergency treatment, patients' vital signs were closely monitored, and their limb performance and facial expression were observed with the guidance of predictive thinking. In addition, changes in indicators such as heart rate, blood pressure, and respiratory frequency were monitored in real time to evaluate patients' condition. It was immediately reported when patients' heart rate and respiratory rate had ch-

anged significantly within a short time. Moreover, effective rescue was taken. In order to prevent aggravated conditions induced by patients' stress responses, invasive operation was avoided. Every 15 minutes, room temperature and humidity were appropriately adjusted based on patients' body surface temperature, resulting in improved physical comfort, reduced risk of vasospasm caused by temperature fluctuation, and increased blood supply to the brain.

Post-emergency nursing: Timely management of diet, sleep, and medication. Time management of diet: Patients were instructed to have dinner. It was also suggested that dinner time should be controlled within 17:00-17:30. Because eating dinner late at night could make a large amount of blood accumulated in gastrointestinal tract, increasing the risk of insufficient blood supply to the brain. At 7 am, 9 am, 12 am, 2 pm, 4 pm, 7 pm, and 9 pm, patients were instructed to increase the amount of water intake to promote intestinal peristalsis, and reduce the incidence of constipation; Time management of sleep: Patients were instructed to ensure an 8-hour sleep and to go to sleep at 9 pm. For patients with severe insomnia, they were suggested to take sleeping pills 1 hour before bed; Time management of medication: Patients were instructed to take relevant drugs at 10 am or 6 pm. In addition, dosage of drugs at each time point was strictly supervised.

Outcome measures

Changes of life quality and efficiency of nursing were the two main indicators. Quality of life assessment scale, which was made by medical staff in The First People's Hospital of Wenlin, was applied to evaluate the life quality of patients in the two groups before and after nursing. The score ranged from 0 to 100 points. The higher the score is, the better the recovery. Total efficiency of emergency nursing in both groups was observed. Complications, length of stay in ICU, and total hospitalization time in the two groups were recorded. Factors influencing self-confidence in rehabilitation were analyzed through questionnaires made for the evaluation of self-confidence in rehabilitation.

Evaluation indicators

The efficiency of emergency nursing was divided into three levels, including clearly effective, effective, and fine. Clearly effective: symptoms disappeared and vital signs like breathing frequency were restored. Effective: symptoms and vital signs like breathing frequency were significantly improved. Fine: the above criteria were not met. Total effective rate = (number of clearly effective patients + number of effective patients)/total number of patients * 100.00% [9].

Self-confidence in rehabilitation was evaluated using the self-confidence in rehabilitation questionnaire developed by medical staff in The First People's Hospital of Wenlin. The evaluation was categorized into excellent, good, fine, and poor. The self-confidence in rehabilitation between the two groups was compared according to good and excellent rate [10]. Excellent and good rate = (excellent cases + good cases)/ total cases in each group * 100.00%.

Incidence of complications = number of patients with complications/total number of patients * 100.00%.

Statistical analysis

All data were analyzed using SPSS statistical software version 22.0. The measurement data were calculated as mean ± standard deviation ($\bar{x}$ ± SD). Independent sample t test was used for inter-group comparison, while paired t-test was applied for before-after comparison within the same group. The enumeration data were expressed as number/percentage (n/%); comparison was conducted with chi-square test. The influence of length of stay in ICU, total hospitalization time, and complications in self-confidence in rehabilitation were analyzed using Pearson correlation analysis. The difference was statistically significant when *P* value was less than 0.05.

Results

Basic data

As shown in **Table 1**, there were no significant differences concerning age, gender, classification of cardiac function, duration of the disease, causes, and comorbidities between the two groups (all P>0.05).

Efficiency of emergency nursing

As displayed in **Table 2**, total efficiency in the experimental group was significantly higher than that in the control group (97.92% vs 79.17%, P<0.05).

Table 1. Comparison of basic data

Group	Control group (n=48)	Experimental group (n=48)	χ^2 value	P value
Age (years)	65.2±4.5	64.8±5.2	2.321	0.076
Gender (n)			3.142	0.061
Male	28	27		
Female	20	21		
Classification of cardiac function				
Grade II	25	22	2.323	0.068
Grade III	23	26	3.234	0.058
Causes				
Inflammatory factors	15	16	2.123	0.925
Severe arrhythmia	21	22	2.084	0.879
Drug effects	9	8	2.675	0.712
Other causes	3	2	2.871	0.976
Comorbidities				
Hypertension	31	32	2.754	0.936
Diabetes	11	11	2.315	1.000
Other diseases	6	5	2.653	0.988

Table 2. Comparison of emergency treatment efficiency (n)

Group	Clearly effective	Effective	Fine	Clearly effective and effective
Experimental group (n=48)	21	17	10	38 (79.17%)
Control group (n=48)	27	20	1	47 (97.92%)
χ^2 value		63.875		54.543
P value		0.000		0.002

Table 3. Comparison of life quality before and after nursing ($\overline{x} \pm s$)

Group	Score of life quality before intervention	Score of life quality after intervention	t value	P value
Experimental group (n=48)	34.34±5.34	85.35±5.37	14.463	0.000
Control group (n=48)	35.34±5.24	74.25±5.42	12.752	0.001
t value	3.343	12.174		
P value	0.132	0.005		

Table 4. Comparison of length of stay in ICU and total hospitalization time

Group	Length of stay in ICU (d)	Total hospitalization time (d)
Experimental group (n=48)	16.5±4.6	31.3±1.6
Control group (n=48)	9.3±2.2	22.8±2.2
t value	12.354	13.657
P value	0.000	0.000

Life quality before and after nursing

Compared with the control group, life quality in the experimental group after nursing was significantly better (P<0.05, **Table 3**).

Length of stay in ICU and total hospitalization time

Length of stay in ICU and total hospitalization time in the experimental group were significant-

Table 5. Comparison of complications (n, %)

Group	Respiratory tract infection	Electrolyte disorders	Others	Complications
Experimental group (n=48)	7 (14.58)	1 (2.08)	3 (6.25)	11 (22.92)
Control group (n=48)	3 (6.25)	0 (0.00)	1 (2.08)	4 (8.33)
χ^2 value	14.342	12.321	16.312	68.351
P value	0.045	0.047	0.021	0.000

Table 6. Comparison of self-confidence in rehabilitation (n, %)

Group	Excellent	Good	Fine	Poor	Excellent and good rate
Experimental group (n=48)	11 (22.92)	17 (35.42)	9 (18.75)	11 (22.92)	28 (58.33)
Control group (n=48)	21 (43.75)	16 (33.33)	8 (16.67)	3 (6.25)	37 (77.08)
χ^2 value		62.564			56.141
P value		0.001			0.000

Table 7. Pearson correlation analysis of factors influencing self-confidence in rehabilitation (r value, *P* value)

Project	Mastery of relevant knowledge	Negative emotions	Nursing satisfaction
Self-confidence in rehabilitation	0.332 (0.007)	-0.412 (0.003)	0.205 (0.006)

Table 8. Pearson correlation analysis of factors influencing prognosis (r value, *P* value)

Project	Mastery of relevant knowledge	Negative emotions	Nursing satisfaction
Length of stay in ICU	-0.015 (0.321)	0.691 (0.000)	0.133 (0.338)
Total hospitalization time	-0.132 (0.000)	0.431 (0.002)	0.501 (0.100)
Complications	-0.232 (0.007)	0.802 (0.008)	-0.211 (0.015)

ly decreased when compared with those in the control group (both P<0.05, **Table 4**).

Complications

As displayed in **Table 5**, complications in the experimental group was significantly lower than that in the control group (P<0.05).

Self-confidence in rehabilitation

Compared with the control group, excellent and good rate of self-confidence in rehabilitation in the experimental group after nursing was significantly higher (77.08% vs 58.33%, P<0.05, **Table 6**).

Correlation analysis between self-confidence in rehabilitation and related factors

As shown in **Tables 7** and **8**, mastery of relevant knowledge, negative emotions, and nursing satisfaction were factors influencing self-confidence in rehabilitation. The mastery of relevant knowledge was weakly negatively correlated to

both total hospitalization time and complications. Negative emotions were strongly positively correlated to length of stay in ICU and complications, and moderately positively correlated to total hospitalization time. There was a weak negative correlation between nursing satisfaction and complications.

Discussion

Nursing staff play an important role in the comprehensive emergency treatment of patients in ICU. They are not only responsible for health education and psychological counseling before emergency treatment, but also in charge of nursing like medication, ventilation, and oxygen inhalation during the emergency treatment [11-13]. ICU nursing is complicated with items, trivial content, and tight time. ICU nursing of patients with severe heart failure is a representative example [14]. In order to provide patients with better nursing and treatment efficiency, it is quite necessary to regulate the ICU nursing of patients with severe heart failure based on

time management concepts [15]. To be specific, time management refers to a series of control tasks performed to improve the utilization and efficiency of time [16].

Time, quality, and cost are the three elements changed in the novel ICU nursing model. Among them, time is the most important element. Timely adjustments in ICU nursing are based on time management concepts that exist in modern management styles [17, 18]. Nursing staff in the ICU must complete tasks, including but not limited to condition observations, basic care, life care, and psychological care, within a finite amount of time. In addition, there are many unpredictable factors and emergencies in ICU nursing. Therefore, time management is essential in ICU nursing [19]. In this study, total efficiency in the experimental group was significantly higher than that in the control group. It indicates that nursing based on time management concepts meets patients' needs and improves their enthusiasm, resulting in better treatment efficiency.

Kong et al reported that ICU nursing, which is not only of clear practical characteristics, but also team cooperation, is relatively complicated. Therefore, medical staff should consider it a high priority when applying nursing based on time management concepts. Analysis with multiple perspectives, such as work plan, professional quality, and coordination should be performed. In the study reported by Kong et al, life quality of stoke patients receiving nursing based on time management concepts was better than patients treated with routine nursing (P<0.05). The result suggests that nursing based on time management concepts has better efficiency, resulting in improved life quality, fastened recovery, and shortened length of stay in ICU and total hospitalization time [20, 21]. Here, length of stay in ICU and total hospitalization time in the experimental group were significantly shorter than those in the control group. In other words, nursing based on time management concepts can improve treatment efficiency.

In this study, complications in the experimental group were significantly lower than that in the control group. It is confirmed that nursing based on time management concepts can improve the quality of ICU nursing. Meanwhile, it can strengthen physical fitness and minimize complications, reducing the risk of exacerba-

ted conditions. The excellent and good rate of self-confidence in rehabilitation in the experimental group was significantly higher than that in the control group. The analysis of factors influencing self-confidence in rehabilitation showed that it was moderately and weakly positively correlated to mastery of relevant knowledge and nursing satisfaction, respectively. At the same time, it was negative correlated to negative emotions. The result confirms that patients' self-confidence in rehabilitation treatment is influenced by factors such as psychological emotions and awareness of the disease. It is of great significance to improve patients' confidence in rehabilitation through increasing health education activities. Mastery of relevant knowledge was weakly negatively correlated to both total hospitalization time and complications. Simultaneously, negative emotions were strongly positively correlated to length of stay in ICU and complications, and moderately positively correlated to total hospitalization time. There was a weak negative correlation between nursing satisfaction and complications, suggesting that nursing strategy like psychological counseling plays an important role in prognosis. These results are consistent with those reported by Lang et al [22].

Inclusion criteria were made in this study to classify patients with severe heart failure. However, there is no etiology analysis for patients with severe heart failure. Subsequent studies, which will be conducted in patients with classified severe heart failure, will be carried out for extended research. As for ICU nursing, there is a deficiency in prospective and ambulatory care of patients with severe heart failure under changing conditions. It will be the focus of our work in subsequent training of ICU nursing.

In summary, nursing based on time management concepts can clearly improve emergency treatment efficiency of patients with severe heart failure. In addition, the novel ICU nursing helps to improve self-confidence in rehabilitation.

Disclosure of conflict of interest

None.

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