Original Article
Clinical study on the early systemic nursing care intervention in patients with severe pulmonary infection

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Abstract: Objective: To explore the clinical value of early systematic nursing care intervention in patients with severe pulmonary infection. Methods: 100 severe patients treated in our hospital from March 2019 to April 2020 were selected. According to the principle of random distribution, they were divided into a control group (50 patients) and an intervention group (50 patients). The control group was given routine nursing intervention, and the intervention group was given early systematic care intervention. We analyzed the infection rate, mortality rate, quality of life, and complication incidence after intervention. Results: The intervention group had significantly lower pulmonary infection rate and mortality rate as compared to the control group [10% vs 42%, 2% vs 20%, X^2 = 13.31, 8.27, P<0.01]; the intervention group had better quality of life such as emotional conditional score, physical condition score, pain rating score and cognitive ability in comparison to the control group [(85.09 ± 16.33) vs (46.68 ± 14.01), (82.64 ± 16.82) vs (43.25 ± 13.71), (81.05 ± 12.95) vs (42.16 ± 13.56), (89.54 ± 17.56) vs (43.35 ± 14.03), t = 12.62, 12.84, 14.67, 14.53, P<0.001). The incidence of complications in the intervention group (6%) was significantly lower than 34% in the control group (x^2 = 12.25, P<0.001). After intervention, FEV1, FVC, FEV1/FVC and 6-min walking distance of the intervention group were better than those of the control group (t = 4.77, 5.44, 4.39, 3.65, P<0.001). Conclusion: Early systematic care intervention in severe patients in clinical care has a positive effect in reducing the pulmonary infection rate and mortality rate and improving the quality of life.

Keywords: Early systematic care intervention, severe, pulmonary infection, clinical study

Introduction

Generally, severe patients need to be treated in the intensive care unit (ICU), and most patients need to receive invasive treatment, which makes patients prone to have more complications in the course of treatment, and pulmonary infection is one of the common complications [1-3]. Severe patients often need to be treated in ICU due to the treatment methods. In the course of treatment, the immunity of patients will decrease, and the functions of their various tissues and organs will also be affected, which increases the infection rate of patients. Once severe patients develop the pulmonary infection, it is very easy to aggravate the original disease and other complications. If the treatment is not timely, it will cause a serious threat to the life of patients [4-6].

Early systemic care intervention is a nursing care method that strengthens and improves all aspects of care based on the conventional nursing care. In the early systemic care intervention, we must conduct aseptic operation throughout the entire care process, namely, we must sterilize the medical equipment involved in the process of nursing care and treatment and strictly monitor the vital signs of patients. If there is abnormal phenomena, patients must be promptly treated [7]. In addition, in the early systemic nursing care intervention, there are strict requirements on the physiology, psychology and respiratory tract detection of patients, thereby reducing the occurrence of complications such as pulmonary infection and the like. This study aimed to explore the clinical value of early systemic care intervention in patients with severe pulmonary infection and provide severe

patients with important references in clinical nursing care.

Materials and methods

General materials

This study included 100 severe patients in our hospital from March 2019 to April 2020. There were 47 cases of chronic bronchitis with acute infection, 35 cases of lobar pneumonia, 10 cases of bronchitis, and 8 cases of acute bronchitis, including 29 cases with acute cerebrovascular disease and 21 cases with lung tumors, 15 cases of liver and kidney insufficiency, 7 cases of acute myocardial infarction. According to the principle of random distribution, they were equally divided into a control group and an intervention group. The control group consisted of 28 males and 22 females with ages from 35 to 76 years, and an average age of 57.58 ± 6.23 years. The intervention group consisted of 29 males and 21 females with ages from 36 to 77 years, and an average age of 57.85 ± 6.42 years. There was no significant difference in general clinical data such as age between the two groups ($P>0.05$), and they were comparable.

Inclusion/exclusion criteria

Inclusion criteria: (1) Severe patients; (2) Patients without pulmonary infection through clinical testing before nursing care; (3) This study was approved by the ethics committee, and patients and their families were informed of the treatment and signed a consent letter.

Exclusion criteria: (1) Patients with major organ failure such as heart, kidney, liver, etc.; (2) Patients during breastfeeding or pregnancy; (3) Patients with severe behavior, organization, or cognitive disabilities.

Method

The control group was given routine care intervention. Nursing staffs closely monitored the electrocardiograph (ECG) condition of patients, and measured their body temperature, heart rate, blood pressure and other vital signs every day. If there was an abnormal condition such as fever, redness, etc., nursing staffs reported to the attending physician in time and took corresponding measures. Nursing staffs did daily rounds and inquired patients' physical feelings. Especially at night, nursing staffs paid close attention to the conditions of patients, and checked the fixation of various catheters used to patients every day. If there was any looseness, the catheters must be replaced and refixed, and the whole care process should be performed under aseptic conditions. Nursing staffs tidied bed sheets of patients every day, kept wards clean and quiet and helped patients keep personal hygiene, especially the care of urethra and oral cavity. In the process of nursing care, it was necessary to observe in case of patients had bedsores and other diseases. If so, it must be treated in time.

The intervention group was given early systemic nursing care intervention on the basis of conventional nursing care intervention. Specific procedures were as follows. (1) Strictly monitor vital signs. Nursing staffs strictly measured the blood pressure, pulse, body temperature, breathing, oxygen saturation, etc. If there was abnormal condition, nursing staffs conducted the measures such as oxygen inhalation, sputum excretion, etc. and contacted an attending physician in time. (2) Ensure smooth breathing. Nursing staffs encouraged patients with clear consciousness to excrete sputum actively, and to drink more water; they used ventilator and sputum aspirator to ensure patients with unclear consciousness or poor ability of sputum excretion smoothly breathed, and patients with respiratory failure were treated with oxygen therapy and blood gas analysis. (3) Reasonably take antibiotics. If patients had been suspected for pulmonary infections, nursing staffs selected effective antibiotics for patients by means of bacteria culture and drug susceptibility tests. (4) Take aseptic operation. Nursing staffs strictly followed the principle of aseptic operation throughout the whole care process, and disinfection was done to ensure the sterility of medical equipment. (5) Take oral intervention. For patients who were able to eat on their own, nursing staffs provided regular oral nursing care. For patients with nasal feeding, they conducted sputum suction before eating. (6) Take psychological intervention. Nursing staffs communicated with patients in timely on the premise of ensuring a comfortable environment in the ward. According to the mental state of patients, nursing staffs helped patients relieve their negative emotion. And they also

Table 1. Analysis of the pulmonary infection and mortality

Groups	Numbers	Pulmonary infection		Mortality	
		n	Proportion	n	Proportion
Control group	50	21	42%	10	20%
Intervention group	50	5	10%	1	2%
X^2			13.31		8.27
P			0.00		0.00

instructed patients and their families in health-related knowledge to promote the recovery of patients.

Evaluation indexes

The pulmonary infection rate, mortality and complication rate of patients in the two groups were statistically analyzed. Three months after discharge, the quality of life of patients in the two groups such as emotion, physical condition, physical pain, and cognitive ability scores were statistically analyzed. The higher the score, the better the patients' various conditions.

Pulmonary function indexes and 6-min walking distance of the two groups of patients were counted before and after intervention. Pulmonary function indexes included forced expiratory volume in the first second (FEV1), forced vital capacity (FVC), and FEV1/FVC.

Statistical processing

Software SPSS20.0 was used to process and analyze all the data in this study. $\bar{x} \pm sd$ represented measurement data that were conducted with t test. [n (%)] represented the enumeration data that were conducted with X^2 test. P<0.05 indicated that there was a statistically significant difference. Excel software was applied to draw statistical figures.

Results

Analysis of the pulmonary infection rate and mortality rate

After intervention, 26 patients had lung infections, 21 in the control group, 5 in the intervention group; 11 deaths, 10 in the control group, and 1 in the intervention group. The pulmonary infection rate and mortality of the intervention group were significantly lower than those of the

control group (X^2 = 13.31, 8.27, P<0.01). See **Table 1**.

Analysis of the quality of life

The quality of life of patients in the intervention group such as mental state, physical condition, physical pain, and cognitive ability scores were significantly better than those of the control group (t = 12.62, 12.84, 14.67, 14.53, P<0.001). See **Figure 1A-D**.

Analysis of the incidence of complications

The intervention group had significantly lower incidence of complications as compared to the control group (X^2 = 12.25, P<0.001). See **Table 2**.

Comparison of lung function indexes between the two groups of patients

Before intervention, there was no significant difference in lung function indexes between the two groups of patients; after intervention, FEV1, FVC, FEV1/FVC and 6-min walking distance of the intervention group were better than those of the control group (t = 4.77, 5.44, 4.39, 3.65, P<0.001). See **Table 3**.

Discussion

Today, ICU is one of the main places where patients are prone to pulmonary infection [8]. Since most patients in the ICU are critically ill, middle-aged and elderly, they are extremely susceptible to pathological changes, natural aging and other factors. Then the functions of various tissues and organs are greatly reduced, and serve patients are prone to infection due to their low immunity. In addition, there are more medical staffs in ICU who treat and care for patients, and more medical instruments, and most patients need to receive invasive treatment, which greatly increases the probability of patients with pulmonary infections [9, 10].

According to relevant studies, the probability and mortality of pulmonary infection in severe patients are about 65% and 20%, respectively [11-13]. It is also common for severe patients to have other complications due to pulmonary infections, and about 50% patients with severe pulmonary infections experience deterioration
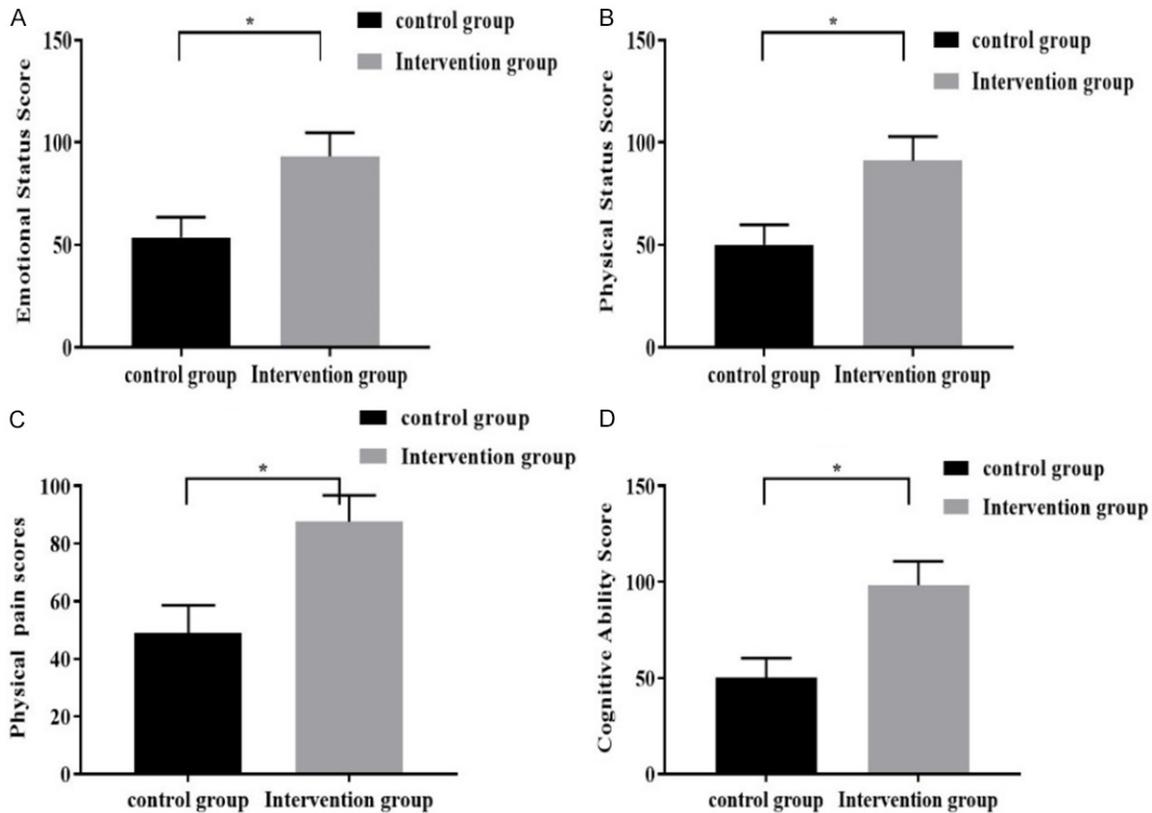
Figure 1. Analysis of the mental state scores. Note: A. The X-axis represents the control group and the intervention group, and the Y-axis represents the mental state score; The mental state scores of the control group and the intervention group were 46.68 ± 14.01 and 85.09 ± 16.33 respectively; * indicated that the mental state score of the intervention group was significantly higher than that of the control group (t = 12.62, P<0.001). B. The X-axis represents the control group and intervention group, and the Y-axis represents the physical condition score. The physical condition scores of the control group and the intervention group were 43.25 ± 13.71 and 82.64 ± 16.82 respectively; * indicated that the physical condition score of the intervention group was significantly higher than that of the control group (t = 12.84, P<0.001). C. The X-axis represents the control group and the intervention group, and the Y-axis represents the body pain score. The pain score of the control group was 42.16 ± 13.56, and the pain score of the intervention group was 81.05 ± 12.95. * indicates that the pain score of the intervention group was significantly higher than that of the control group (t = 14.67, P<0.001). D. The X-axis represents the control group and the intervention group, and the Y-axis represents the cognitive ability score. The cognitive ability scores of the control group were 43.35 ± 14.03 and 89.54 ± 17.56 respectively; * indicated that the cognitive ability score of the intervention group was significantly higher than that of the control group (t = 14.53, P<0.001).

Table 2. Analysis of the incidence of complications

Group	Numbers	Infection	Subcutaneous emphysema	Take off tube	Catheter occlusion	Incidence of complications
Control group	50	8	0	4	5	34% (17/50)
Intervention group	50	2	0	1	0	6% (3/50)
X^2						12.25
P						0.00

and even death [14, 15]. Since the current clinical symptoms of pulmonary infections are not obvious, especially in serve patients, it is very easy for medical staffs to confuse pulmonary infections with other related symptoms, and thus the infection cannot be detected and treated in time. Therefore, in clinical practice, the prevention of pulmonary infection is one of

Table 3. Comparison of lung function indexes before and after intervention between the two groups

group	Numbers	FEV1 (L)		FEV1 (L)		FEV1/FVC (%)		6 min walking distance (m)	
		before intervention	after intervention	before intervention	after intervention	before intervention	after intervention	before intervention	after intervention
Control group	50	2.54 ± 0.53	2.65 ± 0.43	1.46 ± 0.44	1.51 ± 0.67	61.55 ± 0.18	62.77 ± 0.33	277.6 ± 23.4	289.4 ± 34.7
Intervention group	50	2.53 ± 0.48	2.97 ± 0.39	1.47 ± 0.46	1.69 ± 0.64	61.54 ± 0.20	66.55 ± 0.24	276.5 ± 23.9	308.9 ± 26.5
t		2.58	4.77	3.12	5.44	5.63	4.39	5.41	3.65
P		>0.05	0.00	>0.05	0.00	>0.05	0.00	>0.05	0.00

the key points in the treatment and nursing care of serve patients.

Klingström [16] and others discovered that the focus of preventing pulmonary infections in serve patients was to strengthen the detection and nursing care of susceptible persons, cut off the route of infection, and block the source of infection. Early systemic nursing care intervention was a strengthened mode on the basis of conventional nursing care. In the early systemic care intervention, we strictly sterilized all the treatment instruments and equipment used in the process of treatment and nursing care and conducted aseptic operation [17]. Nursing staffs must closely observe whether patients' urinary tube and drainage tube were contaminated and falling off. And if so, we replace and disinfect them regularly. In the early systemic nursing care intervention, nursing staffs strictly detected the vital signs of patients. When patients developed clinical symptoms such as rapid heartbeat, dyspnea, etc., nursing staffs quickly assessed if patients had sputum blocking, etc., then they helped patients expectorate and take oxygen in the first time and notified the attending physician. In the early systemic nursing care intervention, nursing staffs observed if the breathing of patients was smooth, especially for patients with low vital capacity or poor pulmonary breathing capacity, who were extremely prone to pulmonary infections, so it was particularly important to strengthen the care and testing of the respiratory tract [18]. In the early systemic nursing care intervention, for patients with suspicion or pulmonary infections, nursing staffs used sputum experiments to select appropriate antibiotics according to the specific conditions, so as to control the conditions of patients in time. Nursing staffs helped adjust the mental state of patients in the process of care, conducted effective psychological counseling for patients, communicated with patients and their families in time, and established confidence in treatment. The aim of this study was to explore the clinical value of early systemic care intervention in patients with severe pulmonary infection. The results showed that the intervention group had significantly lower pulmonary infection rate, mortality and complication rate as compared to the control group. Similar to the study of Donnelly [19] and others, this study proved that early systemic nursing

care interventions prevented ICU patients from the occurrence of pulmonary infections and complications, which fully showed that early systemic care intervention had a positive effect on reducing the pulmonary infection, mortality and complications in severe patients. Early systemic nursing care intervention can improve the ventilation effect of patients, delay the decline of lung function, and significantly improve the lung function indicators of elderly critically ill patients. We found that after intervention, FEV1, FVC and FEV1/FVC of the intervention group were better than those of the control group (P<0.001); The 6-min walking distance of the two groups of patients was significantly improved, suggesting that the application of early systemic nursing care intervention can significantly improve the lung function of elderly patients, exercise tolerance and the quality of the patient's prognosis. It is similar to the result of the StrnadKyle [20], in which they pointed out that early systemic nursing care intervention had a positive effect on improving the quality of life of patients. In this study, we analyzed the quality of life of patients in the two groups after three months of discharge. The result discovered that the intervention group had significantly better quality of life of patients such as mental state, physical condition, physical pain, and cognitive ability scores as compared to the control group, which further proved that early systemic care intervention played a positive role in improving the quality of life of severe patients.

In summary, the early systemic nursing care intervention in the clinical care of serve patients has a positive effect on reducing the pulmonary infection rate and mortality of patients and improving the quality of life.

Disclosure of conflict of interest

None.

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