Analysis of Critical Care for Chronic Obstructive Pulmonary Disease Complicated by Respiratory Failure

Dandan Yang, Shuo Yuan, Min Zheng

Affiliated Hospital of Hebei University, Baoding, Hebei, China

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Abstract: Objective: To investigate the impact of intensive care on the clinical outcomes of patients with chronic obstructive pulmonary disease (COPD) complicated by respiratory failure. Methods: A total of 100 patients with COPD complicated by respiratory failure, admitted to a hospital from January 2022 to January 2023, were randomly divided into an observation group and a control group, with 50 patients in each group. The control group received routine nursing care, while the observation group received intensive care in addition to routine nursing. The incidence of adverse reactions, blood gas parameters, and nursing outcomes were evaluated. Results: The incidence of adverse reactions in the observation group was significantly lower than that in the control group ($P<0.05$). Improvements in blood gas parameters ($PaCO_2$, PaO_2, SaO_2) were superior in the observation group, with statistically significant differences ($P<0.05$). Furthermore, patient adherence in the observation group was markedly enhanced. Conclusion: Intensive care reduces the incidence of adverse reactions, improves blood gas parameters, enhances patient adherence, and significantly improves the clinical prognosis of patients with COPD complicated by respiratory failure. It holds considerable clinical value for application.

***Keywords*:** respiratory failure; chronic obstructive pulmonary disease; adverse reactions

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) and the Role of Intensive CareChronic obstructive pulmonary disease (COPD), characterized by persistent airflow limitation, is a chronic inflammatory disease and a major global public health issue due to its high mortality and disability rates. In recent years, the application of intensive care in critical illness management has gained increasing attention. Studies have shown that comprehensive interventions — such as respiratory support, psychological care, nutritional management, and complication prevention—can significantly improve patients' quality of life and clinical outcomes.This study aims to evaluate the clinical value of systematic intensive care interventions in patients with COPD complicated by respiratory failure, focusing on its effectiveness in improving disease conditions and optimizing treatment outcomes.

2. Materials and Methods

2.1 General Information

This study included 100 patients diagnosed with chronic obstructive pulmonary disease (COPD) complicated by respiratory failure, admitted to our hospital between January 2022 and January 2023. Patients were randomly assigned to either the observation group or the control group using a random number table, with 50 patients in each group.In the observation group, there were 26 males and 24 females, aged 25 to 78 years, with an average age of 53.1±4.353.1 \pm 4.3 years. In the control group, there were 30 males and 20 females, aged 24 to 77 years, with an average age of 52.8±4.652.8 \pm 4.6 years. All patients met the diagnostic criteria for COPD complicated by respiratory failure and had no severe liver or kidney dysfunction, malignant tumors, or other severe comorbidities.There were no statistically significant differences between the two groups in terms of gender, age, or disease duration ($P>0.05$), indicating comparability.This study was approved by the hospital's ethics committee, and informed consent was obtained from all patients and their families.

2.2 Methods

Control Group: The control group received routine nursing care, which primarily included basic monitoring of vital signs, oxygen therapy management, and general nursing measures. Nurses monitored patients' blood pressure, heart rate, respiratory rate, and blood oxygen saturation daily to ensure stable vital signs. For patients on oxygen therapy, the nursing staff adjusted oxygen concentration and flow according to medical orders, ensuring adequate oxygen support while preventing carbon dioxide retention due to excessive oxygen intake. Routine care also involved assisting patients in regularly changing

their positions to prevent pressure ulcers caused by prolonged bed rest. Nurses facilitated sputum drainage by clearing secretions and guiding patients to perform effective coughing as necessary, aiding in airway clearance. Dietary management was emphasized, with patients provided high-protein, easily digestible meals to avoid increasing their respiratory burden. Communication between nursing staff and patients was maintained to understand their complaints and needs, ensuring timely resolution of problems encountered during care.

Observation Group: The observation group received intensive care interventions, which encompassed psychological care, behavioral care, non-invasive ventilation care, complication management, and discharge guidance. Psychological Care:Nurses engaged in active communication and attentive listening to understand the patients' psychological state, alleviating anxiety, fear, and depression caused by the severity of the illness. They provided detailed explanations of disease-related knowledge and treatment plans to patients and their families, boosting their confidence in treatment and improving adherence. Behavioral Care:Based on the patients' condition, individualized position management plans were formulated, assisting patients in regularly changing positions to promote lung ventilation and sputum drainage, thereby reducing the risk of hypostatic pneumonia. Nurses guided patients in appropriate respiratory exercises to gradually restore lung function. Non-Invasive Ventilation Care:Strict adherence to medical orders was followed in adjusting the parameters of non-invasive ventilation according to the patients' condition to ensure effective ventilation. Nurses closely monitored mask fit and regularly assessed skin integrity to prevent pressure ulcers caused by prolonged use.Complication Management:Intensive monitoring of patients' overall condition was conducted, including blood gas analysis, acid-base balance, and infection markers, to promptly identify and manage complications such as carbon dioxide retention, ventilator-associated pneumonia, or upper gastrointestinal bleeding. For patients at high risk of infection, strict aseptic techniques were implemented, and airway management was reinforced to minimize the risk of iatrogenic infections. Discharge Guidance: As a critical aspect of intensive care, discharge education included systematic instructions for patients and their families on daily precautions, proper medication use, and the importance of follow-up visits. Individualized rehabilitation training suggestions were provided to help patients continue improving lung function at home and prevent disease recurrence. Through comprehensive intensive care interventions, the observation group received more refined disease management, which improved clinical outcomes and enhanced overall quality of life.

2.3 Statistical Methods

The experimental data in this study were analyzed using SPSS 22.00 statistical software. A t-test was employed for comparisons, with a significance level of $P<0.05$ indicating statistically significant differences.

3. Results

3.1 Comparison of Adverse Reactions

As shown in Table 1, the incidence of adverse reactions in the control group, which received routine nursing care, was 20%, while that in the observation group, which received intensive care, was 8%. The difference was statistically significant ($P<0.05$).

Table 1. Comparison of adverse effects in the two groups

Group	n	Ventilator-Associated Pneumonia n(%)	Ventilator Dependence n(%)	Sputum Drainage Obstruction n(%)	Incidence of Adverse Reactions n(%)
Control Group	n=50	3	3	4	10（20%）
Observation Group	n=50	2	1	1	4（8%）
X^2			5.524		
P			<0.05		

3.2 Comparison of Blood Gas Parameters

As shown in Table 2, the observation group demonstrated significantly better improvement in arterial carbon dioxide partial pressure ($PaCO_2$), arterial oxygen partial pressure (PaO_2), and oxygen saturation (SaO_2) compared to the control group ($P<0.05$). These differences were statistically significant.

Table 2. Comparison of blood gas indexes in the two groups

Group	n	$PaCO_2$	PaO_2	SaO_2
Control Group	n=50	39.56±2.15	84.36±4.54	88.65±3.32
Observation Group	n=50	33.53±2.32	92.36±4.32	95.36±3.32
t		8.175	11.254	12.365
P		<0.05	<0.05	<0.05

4. Discussion

The study demonstrates that intensive care provides significant advantages in managing patients with chronic obstructive pulmonary disease (COPD) complicated by respiratory failure. Compared to routine nursing care, intensive care effectively reduces the incidence of adverse reactions, improves blood gas parameters, and enhances patient adherence to treatment. Through comprehensive psychological care, behavioral care, non-invasive ventilation care, complication management, and discharge guidance, intensive care enables refined and personalized management of the patients' condition. These interventions contribute to improved clinical outcomes and a higher quality of life for patients. The findings provide scientific evidence for optimizing nursing protocols for patients with COPD complicated by respiratory failure and highlight the broad application prospects of intensive care in critical illness management.

References

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