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Application of Pulmonary Rehabilitation Nursing Intervention in Patients with Stable Chronic Obstructive Pulmonary Disease and Evaluation of Nursing Satisfaction

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Abstract: *Objective*: To explore the application effect of pulmonary rehabilitation nursing intervention in patients with stable chronic obstructive pulmonary disease (COPD) and evaluate its impact on nursing satisfaction. *Methods*: A total of 120 patients with stable COPD admitted to our hospital from February 2023 to February 2025 were selected and divided into a control group and an observation group according to the order of admission, with 60 cases in each group. The control group received routine nursing care, while the observation group received systematic pulmonary rehabilitation nursing intervention on this basis. Pulmonary function indicators, 6-minute walk test (6MWT) distance, COPD Assessment Test (CAT) scores, incidence of acute exacerbations, and nursing satisfaction were compared between the two groups after nursing. *Results*: After nursing, the FEV1, FVC, and FEV1/FVC in the observation group were significantly higher than those in the control group, the 6MWT distance significantly increased, and the CAT scores significantly decreased, with statistically significant differences ($p < 0.05$). The incidence of acute exacerbations in the observation group was lower than that in the control group, and the nursing satisfaction score was higher ($p < 0.05$). *Conclusion*: Pulmonary rehabilitation nursing intervention can effectively improve pulmonary function, exercise tolerance, and symptom control in patients with stable COPD, and significantly enhance nursing satisfaction, making it worthy of further clinical promotion.

Keywords: Chronic Obstructive Pulmonary Disease (COPD); Pulmonary rehabilitation; Nursing intervention; Lung function; Satisfaction

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory condition that, while preventable and treatable, is difficult to fully reverse. It is primarily characterized by airflow limitation, airway inflammation, and structural damage to lung tissue [1]. In recent years, with the rising trend of population aging and the presence of risk factors such as smoking and environmental exposure, COPD has become a significant public health concern

both in China and globally. Epidemiological surveys indicate that over 13% of individuals aged 40 and above in China suffer from COPD, with the disease's mortality and disability rates showing an upward trend year by year. Despite advancements in pharmacological treatments, patients in actual disease management are still affected by factors such as decreased exercise capacity, weakened respiratory muscles, and a high risk of exacerbation. The stable phase of COPD represents a critical stage in disease management. Although patients experience relatively stable symptoms during this phase, their lung function continues to decline, often accompanied by physical inactivity, emotional distress, and limitations in daily activities [2]. Prolonged inactivity and unhealthy lifestyles can trap patients in a vicious cycle of "reduced activity—worsening dyspnea—further reduced activity". Therefore, relying solely on pharmacological treatments is insufficient to fully meet the core needs of long-term management of chronic diseases, highlighting the increasing clinical importance of systematic and sustained management measures. In recent years, the application of the concept of pulmonary rehabilitation in the management of respiratory diseases has gradually attracted widespread attention [3]. As a comprehensive treatment model, pulmonary rehabilitation encompasses multiple dimensions, including respiratory training, exercise regimen formulation, nutritional and psychological support, self-management education, and behavioral interventions. International guidelines generally consider pulmonary rehabilitation as one of the important intervention strategies to improve the quality of life of patients with chronic obstructive pulmonary disease (COPD) and effectively reduce the risk of acute exacerbations. Numerous studies have indicated that pulmonary rehabilitation not only enhances respiratory muscle strength, improves exercise tolerance, and enhances gas exchange efficiency in patients, but also alleviates negative emotions such as anxiety and depression to a certain extent. Implementing pulmonary rehabilitation care for patients in the stable phase of COPD can effectively establish a foundation for future continuous management. The nursing team plays a central and leading role in the implementation of pulmonary rehabilitation. Nurses are not only responsible for implementing specific training programs but also for assessing patient conditions, monitoring health indicators, and providing health education and behavioral guidance [4]. Therefore, developing standardized and systematic pulmonary rehabilitation nursing intervention plans holds significant value in optimizing the comprehensive management of COPD. Although some primary healthcare institutions have gradually incorporated pulmonary rehabilitation nursing into clinical practice, issues such as incomplete specific measures, inadequate follow-up, and difficulty in sustained implementation persist, resulting in suboptimal rehabilitation outcomes. Further research is still needed to establish a clinically feasible, easily implementable, and patient-compliant nursing intervention plan based on routine care.

Based on this, this study selected 120 patients with stable COPD admitted to the respiratory department of our hospital from February 2023 to February 2025 as the research subjects. By applying the concept of pulmonary rehabilitation to practical nursing work, a multidimensional comprehensive nursing plan was established, encompassing respiratory function training, exercise plan formulation, lifestyle guidance, psychological management, and self-management education. The nursing effects of this plan were compared with those of conventional nursing. The study focused on analyzing the effects and impacts of this model on patients' pulmonary function, exercise tolerance, symptom improvement, incidence of acute exacerbations, and nursing satisfaction, aiming to provide a referenceable management model for the nursing management of patients with stable COPD.

2. Materials and methods

2.1. General information

A total of 120 patients with stable COPD admitted to the respiratory department of our hospital from February 2023 to February 2025 were selected. They were divided into a control group and an observation group according

to the order of admission, with 60 cases in each group. There were no statistically significant differences in general information such as gender, age, and disease duration between the two groups ($p > 0.05$), indicating comparability.

2.1.1. Inclusion criteria

(1) Meeting the diagnostic criteria of the "Guidelines for the Diagnosis and Treatment of Chronic Obstructive Pulmonary Disease" [5];
(2) Being in a stable phase without significant exacerbation manifestations;
(3) Aged between 40 and 80 years;
(4) Having communication ability and being able to cooperate with training;
(5) Signing an informed consent form.

2.1.2. Exclusion criteria

(1) Severe cardiovascular and cerebrovascular diseases or musculoskeletal system diseases affecting exercise training;
(2) Cognitive impairment or mental illness;
(3) Concurrent severe infection or acute exacerbation;
(4) Malignant tumors or individuals with a short life expectancy.

2.2. Methods

2.2.1. Control group

Standard care: This includes basic disease observation, timely medication administration, guidance on the use of inhalation devices, dietary health education, and basic respiratory training (such as abdominal breathing).

2.2.2. Observation group

Pulmonary rehabilitation nursing intervention: A systematic pulmonary rehabilitation program was implemented on the basis of standard care:

(1) Respiratory training
Slow deep breathing, pursed-lip breathing; Expiratory muscle training; Percussion for sputum clearance, postural drainage; Twice daily, 20–30 minutes each session.
(2) Exercise training
Individualized exercise prescriptions; Walking training, upper limb lifting training, lower limb endurance training; Gradually increase intensity, 30–40 minutes per session, at least 5 sessions per week.
(3) Health management and education
Identification of exacerbating symptoms; Guidance on medication adherence; Proper use of oxygen therapy and inhalation devices; Education on smoking cessation and environmental management
(4) Psychological support
Emotional assessment; Relaxation training; Provision of disease management counseling
(5) Behavioral intervention and follow-up
Establishment of rehabilitation records; Weekly follow-up for 3 months

2.3. Observation indicators

(1) Pulmonary function indicators

FEV1, FVC, FEV1/FVC;

(2) 6-minute walk test (6MWT) distance;

(3) CAT score (symptom control);

(4) Incidence of acute exacerbations;

(5) Nursing satisfaction (self-developed scale, total score of 100 points).

2.4. Statistical methods

Our hospital utilized SPSS 26.0 statistical analysis software for data processing. Measurement data were expressed as mean ± standard deviation ($\overline{x} \pm s$). Independent sample *t*-tests were used for comparisons between groups, while paired *t*-tests were employed for comparisons within groups. Count data were presented as case numbers and percentages, with χ^2 tests used for comparisons between groups. A *p*-value of less than 0.05 was considered statistically significant.

3. Results

3.1. Comparison of pulmonary function indicators before and after nursing care between the two groups

After nursing care, the FEV1, FVC, and FEV1/FVC values in the observation group were significantly higher than those in the control group, with statistically significant differences ($p < 0.05$), as shown in **Table 1**.

Table 1. Comparison of pulmonary function indicators before and after nursing care between the two groups ($\overline{x} \pm s$)

Group / Indicator	FEV1 (L)		FVC (L)		FEV1/FVC (%)	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Observation group (n = 60)	1.21 ± 0.17	1.45 ± 0.18	2.52 ± 0.23	2.72 ± 0.25	47.8 ± 5.4	53.5 ± 4.9
Control group (n = 60)	1.20 ± 0.16	1.29 ± 0.17	2.50 ± 0.21	2.57 ± 0.22	47.5 ± 5.2	50.4 ± 5.0
t-value	0.424	4.822	0.484	3.125	0.356	3.975
p-value	0.676	< 0.001	0.632	0.003	0.720	< 0.001

3.2. Comparison of 6-minute walk test (6MWT) distances between the two groups

After nursing care, the 6MWT distance in the observation group was significantly greater than that in the control group, indicating a more significant improvement in exercise tolerance ($p < 0.05$). See **Table 2**.

Table 2. Comparison of 6MWT distances between the two groups ($\overline{x} \pm s$)

Group / Indicator	6MWT (m)
Observation group (n = 60)	365.11 ± 52.25
Control group (n = 60)	428.34 ± 55.19
t-value	6.16
p-value	< 0.05

3.3. Comparison of changes in CAT scores between the two groups

The decrease in CAT scores in the observation group was greater than that in the control group, suggesting a better effect on symptom control ($p < 0.05$). See **Table 3**.

Table 3. Comparison of CAT scores between the two groups ($\overline{x} \pm s$)

Group / Indicator	CAT score (points)
Observation group (n = 60)	17.22 ± 4.18
Control group (n = 60)	11.15 ± 3.94
t-value	8.17
p-value	< 0.05

3.4. Comparison of acute exacerbation incidence and nursing satisfaction between the two groups

The incidence of acute exacerbation in the observation group was significantly lower than that in the control group, and nursing satisfaction was notably higher ($p < 0.05$). See **Table 4**.

Table 4. Comparison of acute exacerbation incidence and nursing satisfaction between the two groups (n, %)

Group	Acute exacerbation [n (%)]	Nursing satisfaction (points)
Control group (n = 60)	15 (25.00%)	83.52 ± 6.11
Observation group (n = 60)	6 (10.00%)	92.16 ± 5.35
Statistic (χ^2/t)	4.97	7.68
p-value	0.041	< 0.001

4. Discussion

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory disease characterized by slow progression, long duration, and significant variability in clinical presentation. Its main clinical features include irreversible airflow limitation, persistent airway inflammation, and recurrent acute exacerbations [6]. Although patients in the stable phase do not experience significant worsening of symptoms, their condition continues to progress, and lung function gradually declines, continuously reducing their quality of life. Therefore, disease management during the stable phase is a critical stage for delaying disease progression and reducing the incidence of acute exacerbations. This study constructed a comprehensive nursing intervention model based on the concept of pulmonary rehabilitation and validated its effectiveness in managing stable COPD. Firstly, this study confirmed that pulmonary rehabilitation nursing has a significant effect on improving lung function. After nursing, FEV1, FVC, and FEV1/FVC in the observation group significantly improved, consistent with previous research findings [7]. Lip-pursing breathing, abdominal breathing, and respiratory muscle training in pulmonary rehabilitation can enhance diaphragmatic strength and chest wall compliance, improving ventilation efficiency. Combined with reasonable exercise training, it can further promote alveolar ventilation-perfusion matching, thereby improving lung function indicators. Secondly, improving exercise tolerance is an important goal of pulmonary rehabilitation. In this study, the 6-Minute Walk Test (6MWT) results in the observation group were significantly better than those in the control

group, indicating that systematic training can effectively improve exercise capacity [8]. Walking training and upper and lower limb strength training can enhance the function of peripheral muscle groups, break the vicious cycle of "inactivity—physical decline—dyspnea" and restore patients' endurance and physical fitness. Exercise training can also improve cardiopulmonary adaptability, enhance oxygen utilization efficiency, and promote overall physical activity from multiple aspects. In terms of symptom control, this study showed a significant decrease in the CAT scores of the observation group, suggesting that pulmonary rehabilitation nursing has a good regulatory effect on chronic symptoms such as cough, wheezing, and chest tightness. This is closely related to improved airway patency through respiratory training, enhanced endurance through exercise training, and improved self-management skills through health education. Additionally, techniques such as sputum expectoration training and postural drainage can reduce the accumulation of secretions and lower the risk of infection, thereby improving the sensation of dyspnea. Acute exacerbations are the primary cause of disease deterioration in COPD patients and an important indicator affecting prognosis and hospital visits [9]. This study showed that the incidence of acute exacerbations during the intervention period was significantly lower in the observation group than in the control group. The educational content in pulmonary rehabilitation helps patients identify exacerbation signals early, improve medication adherence, and avoid triggering factors. Combined with exercise-enhanced immune function, this significantly reduces the risk of exacerbations. Furthermore, a systematic follow-up mechanism allows for timely adjustment of intervention strategies when patients experience symptom fluctuations, further reducing the occurrence of acute exacerbations. Nursing satisfaction is an important indicator for evaluating the quality of nursing services. The results of this study show that compared with the control group, patients in the observation group had significantly higher nursing satisfaction. Pulmonary rehabilitation nursing emphasizes personalized and continuous management, enabling patients to experience noticeable relief of symptoms and improvement in quality of life. Additionally, nursing staff provide patients with greater emotional support by offering psychological support, health education, and guidance, thereby enhancing their trust in the nursing team [10]. A comprehensive analysis reveals that pulmonary rehabilitation nursing intervention offers multidimensional advantages, primarily through mechanisms such as improving respiratory function, enhancing exercise capacity, reducing psychological stress, boosting self-management abilities, and optimizing doctor-patient communication, ultimately enhancing patients' nursing experience. However, this study still has certain limitations due to factors such as single-center data, a small sample size, and a relatively short follow-up period, making it difficult to evaluate long-term effects. Subsequent research could explore digital or home-based interventions and increase the sample size and follow-up duration to more comprehensively assess the role and impact of pulmonary rehabilitation nursing in the long-term management of chronic obstructive pulmonary disease (COPD).

5. Conclusion

In summary, pulmonary rehabilitation nursing intervention can improve lung function, increase exercise tolerance, reduce the incidence of acute exacerbations, alleviate symptoms, and enhance nursing satisfaction in patients with stable COPD, demonstrating a positive effect. This nursing model holds significant clinical value and is worthy of widespread promotion and application.

Disclosure statement

The author declares no conflict of interest.

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