

# Effect of Anticipatory Nursing on Psychological Status and Quality of Life in Patients with Chronic Obstructive Pulmonary Disease: A Quasi-Experimental Study

Xingyi Hu, Li Wen, Caili Zhang

Department of Pneumoconiology and Respiratory and Critical Care Medicine, West China School of Public Health and West China Fourth Hospital, Sichuan University, Chengdu, Sichuan, 610000, People's Republic of China

Correspondence: Caili Zhang, Department of Pneumoconiology and Respiratory and Critical Care Medicine, West China School of Public Health and West China Fourth Hospital, Sichuan University, No. 18, Section 3, Renmin South Road, Wuhou District, Chengdu, Sichuan, 610000, People's Republic of China, Email zhang85445@163.com

**Background:** Chronic obstructive pulmonary disease (COPD) is frequently accompanied by psychological distress, delayed symptom resolution, and poor quality of life (QoL). Anticipatory nursing interventions may offer a proactive strategy to address these multifaceted challenges, yet their clinical efficacy remains insufficiently established, particularly in resource-constrained settings where holistic care is often lacking.

**Methods:** This quasi-experimental study with historical controls included 369 COPD patients admitted between January 2023 and December 2024. Patients were divided into a control group (n = 186) receiving routine nursing care and an intervention group (n = 183) receiving structured, multidisciplinary anticipatory nursing interventions over a six-month period. The protocol comprised individualized care plans, proactive complication prevention, psychological support, and management of respiratory, circulatory, nutritional, and sleep needs. Outcomes included psychological status (SAS, SDS), symptom resolution time, QoL (GQOLI-74), and complications.

**Results:** All enrolled patients completed the study. Baseline demographic, clinical, and socioeconomic characteristics showed no significant differences between groups. Compared with routine care, anticipatory nursing significantly reduced post-intervention SAS and SDS scores (both  $p < 0.001$ ), shortened symptom resolution times for dyspnea, cough, wheezing, and chest tightness (all  $p < 0.001$ ), and improved all QoL domains ( $p < 0.001$ ). The total complication rate was significantly lower in the intervention group (12.02% vs 33.33%,  $\chi^2 = 23.83$ ,  $p < 0.001$ ).

**Conclusion:** Structured anticipatory nursing significantly improves psychological well-being, accelerates symptom resolution, enhances quality of life, and reduces complications in COPD patients. These findings support integrating proactive, holistic nursing strategies into standard COPD care, offering a viable model for improving outcomes even in settings with limited resources.

**Keywords:** chronic obstructive pulmonary disease, anticipatory nursing, psychological status, quality of life, symptom resolution, complication prevention

## Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive and irreversible respiratory disorder characterized by persistent airflow limitation, abnormal inflammatory responses in the airways, and systemic manifestations. It is currently a leading cause of morbidity and mortality worldwide, with the World Health Organization projecting it to become the third leading cause of death globally by 2030. The disease imposes a substantial burden not only in terms of healthcare costs and utilization but also in terms of patients' physical, psychological, and social well-being.<sup>1,2</sup> Patients with COPD often experience a range of debilitating symptoms, including dyspnea, chronic cough, fatigue, and reduced exercise

tolerance, which can severely impair their daily functioning and overall quality of life (QoL). Moreover, the chronic and progressive nature of the disease, along with frequent acute exacerbations, contributes to psychological distress, including anxiety, depression, and emotional instability. Studies have shown that psychological disorders are highly prevalent among individuals with COPD, with reported rates of anxiety and depression ranging between 20% and 60%. These comorbid psychological conditions are associated with poorer disease control, higher hospitalization rates, reduced treatment adherence, and increased mortality, thereby highlighting the urgent need for comprehensive care models that integrate both physical and psychosocial support.<sup>3–5</sup>

In recent years, there has been a growing emphasis on the role of anticipatory nursing interventions (ANIs) in the management of chronic diseases. ANIs refer to proactive, patient-centered nursing strategies that anticipate potential complications, provide tailored health education, and offer psychological support before the onset or escalation of symptoms. In the context of COPD, anticipatory interventions aim to improve symptom recognition, enhance self-management capabilities, reduce psychological burden, and promote better health-related quality of life.<sup>6</sup> The theoretical framework of ANIs is primarily grounded in Orem's Self-Care Deficit Theory, which posits that nurses identify and address self-care deficits arising from universal, developmental, or health deviation requisites through anticipatory interventions that promote patient independence and prevent complications in chronic conditions like COPD.<sup>7</sup> This is complemented by the Middle-Range Theory of Self-Care of Chronic Illness, which structures self-care into maintenance (such as adherence to therapies), monitoring (such as vigilant symptom tracking), and management (such as timely response to changes) phases, enabling proactive nursing to empower patients and avert exacerbations.<sup>8</sup> Additionally, partnership-based nursing frameworks tailored to COPD emphasize collaborative relationships, patient empowerment, and holistic proactive care involving multidisciplinary teams to optimize outcomes.<sup>5</sup> Such interventions typically include structured education on disease knowledge, breathing techniques, medication adherence, lifestyle modification, early recognition of exacerbation symptoms, and psychological counseling.<sup>9</sup> While pharmacological management remains the cornerstone of COPD treatment, evidence increasingly supports the adjunctive value of nursing-led psychosocial interventions in optimizing patient outcomes. However, existing studies evaluating the impact of anticipatory nursing care on psychological health and QoL in COPD patients remain limited in scope and quality. Most have focused narrowly on either anxiety or depression without comprehensive assessment of overall psychological status or quality of life metrics.<sup>10,11</sup>

Therefore, this study aims to evaluate the effectiveness of anticipatory nursing interventions on psychological status and quality of life among patients with COPD. By implementing a structured nursing care protocol tailored to the anticipatory needs of COPD patients, this research seeks to provide empirical evidence on whether such interventions can alleviate psychological distress and enhance QoL.

## Methods

### Study Design

This quasi-experimental study with historical controls was conducted at West China School of Public Health and West China Fourth Hospital, Sichuan University and included patients diagnosed with COPD who were admitted between January 2023 and December 2024. A total of 369 eligible patients were enrolled and divided into two groups based on the nursing care model received during their hospitalization. Patients admitted from January 2023 to December 2023 (n = 186) received routine nursing care and served as the historical control group. In contrast, patients admitted from January 2024 to December 2024 (n = 183) received structured anticipatory nursing interventions and were assigned to the intervention group. The nursing intervention for both groups was administered during hospitalization and continued for a standardized six-month follow-up period after discharge to ensure consistent exposure length. The length of hospital stay was recorded for all patients to assess potential differences and was included in the analysis of confounders. All aspects of the study were conducted in accordance with the ethical standards set forth in the Declaration of Helsinki. Prior to data collection, the study protocol was reviewed and approved by the institutional medical ethics committee. Written informed consent was obtained from all participants prior to their inclusion in the study.

## Inclusion and Exclusion Criteria

Inclusion criteria:

- 1) A confirmed clinical diagnosis of COPD in accordance with the Global Initiative for Chronic Obstructive Lung Disease (GOLD) diagnostic criteria;
- 2) Age  $\geq$  60 years;
- 3) Stable disease phase without evidence of acute exacerbation within the past four weeks;
- 4) Ability to communicate effectively and complete psychological and quality of life assessments independently or with minimal assistance;
- 5) Provided informed consent to participate in the study.

Exclusion criteria:

- 1) Any acute exacerbation of COPD present at the time of screening for enrollment;
- 2) History of severe psychiatric disorders or current use of antipsychotic medications;
- 3) Coexistence of other severe chronic diseases that may significantly affect psychological status or quality of life (eg, advanced malignancy, end-stage renal disease, decompensated heart failure);
- 4) Documented cognitive impairment, dementia, or neurological conditions limiting the ability to understand and comply with the study protocol.

## Nursing Intervention Protocol

### Control Group

Patients in the control group received routine nursing care in accordance with standard hospital protocols. This included general clinical monitoring, documentation of disease progression, maintenance of medical equipment and catheters, medication administration guidance (such as low-molecular-weight heparin if prescribed by physicians), health education, and standard oxygen therapy as needed. Glucose control for diabetic patients was managed per routine clinical practice based on physician orders. However, these interventions were not part of a structured, proactive protocol and were applied reactively without systematic anticipatory planning or multidisciplinary coordination. Throughout the hospitalization period, nursing staff closely followed up on patients' treatment regimens and therapeutic responses. Additionally, attention was paid to patients' daily activities and sleep quality. After discharge, routine nursing support was continued for six months.

### Intervention Group

Patients in the intervention group received structured anticipatory nursing interventions designed to proactively address potential complications and optimize overall recovery through a multidisciplinary team approach. The intervention lasted for six months and consisted of the following components:

- 1) Establishment of a Specialized Nursing Team: A multidisciplinary nursing team was formed, composed of four senior physicians (associate chief physicians or above) and eight experienced registered nurses with extensive clinical experience in managing patients with COPD and comorbidities such as pulmonary embolism (PE). All team members received standardized training in anticipatory care protocols. Regular team discussions were held to formulate and revise individualized intervention plans based on patient response, ensuring that medical decisions (eg, pharmacological interventions) were made collaboratively, with physicians providing prescriptions and nurses leading implementation and monitoring.
- 2) Comprehensive Admission Assessment: Upon hospital admission, each patient underwent a multidimensional evaluation covering physiological, psychological, and social domains. This assessment served as the basis for developing a personalized and diversified nursing care plan tailored to the patient's clinical condition, mental health status, and care needs.

- 3) **Pharmacological Anticipatory Intervention:** As part of the multidisciplinary protocol, physicians on the team assessed the risk of pulmonary embolism and prescribed low-molecular-weight heparin (LMWH) subcutaneously at a dose of 0.1 mL/kg once daily for 7 to 14 days for eligible patients, following clinical guidelines. Nurses administered the LMWH and closely monitored platelet counts. If a reduction in platelet count below 50% or signs of severe bleeding occurred, anticoagulant therapy was discontinued immediately in consultation with physicians, and appropriate measures were taken.
- 4) **Prevention of Hemorheological Complications:** Patients were encouraged to perform passive and active limb exercises in bed to improve peripheral circulation. When clinically appropriate, they were guided to ambulate as early as possible to prevent deep vein thrombosis, with nurses providing education and support. Breathing exercises were incorporated to enhance pulmonary function. Patients were advised to maintain adequate hydration, with a recommended daily fluid intake of approximately 1500 mL. Diabetic patients received targeted guidance from the team to maintain optimal glycemic control through diet, medication, and monitoring, minimizing the risk of increased blood viscosity.
- 5) **Respiratory and Circulatory Support:** Controlled oxygen therapy was systematically provided based on arterial blood gas results to avoid respiratory center suppression, with nurses adjusting flow rates under physician guidance. During mechanical ventilation, airway secretions were cleared using sterile techniques by nurses. Head positioning was carefully maintained to prevent airway obstruction. Humidification of the respiratory tract was enhanced to reduce the need for tracheotomy, thereby minimizing bleeding risks during thrombolytic therapy, all within the multidisciplinary care plan.
- 6) **Nutritional and Sleep Management:** Individualized dietary plans were developed by the team based on each patient's nutritional status and comorbid conditions. Patients were encouraged to consume a balanced diet rich in vitamins, high-quality protein, and fresh fruits and vegetables. Intake of spicy, greasy, or highly stimulating foods was strictly discouraged. Sleep hygiene was addressed through tailored interventions to promote rest and recovery, with nurses conducting regular assessments and adjustments.

## Outcome Measures

All outcome measures were assessed at two time points: at baseline (prior to the initiation of nursing interventions) and after the six-month intervention period. Data collection was performed by trained research nurses who were blinded to the group assignment to minimize bias. Baseline data collection included comprehensive assessment of demographic characteristics (age, gender, education level, marital status), clinical parameters (BMI, smoking history, COPD duration), disease severity indicators (FEV1% predicted, CAT score, GOLD grade), comorbidities, and social circumstances using standardized case report forms. The specific procedures for each outcome are detailed below.

**Psychological Status Assessment:** The psychological status of patients in both groups was evaluated using two validated self-reported instruments: the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS). Each scale consists of 20 items, rated on a 4-point Likert scale. Scores are standardized to a 100-point scale, with higher scores indicating more severe symptoms of anxiety or depression, respectively. The SAS is designed to assess the subjective experience of anxiety, while the SDS evaluates depressive symptomatology. Patients completed these scales independently or with minimal assistance in a quiet environment during their hospital stay at baseline and via structured telephone interviews at the six-month follow-up to ensure consistent data collection. Research nurses provided standardized instructions and verified the completeness of responses.

**Symptom Relief Time:** The duration required for symptomatic improvement was recorded for each patient. Key clinical symptoms monitored included dyspnea, coughing, wheezing, and chest tightness. Symptom relief was defined as the time (in days) from initiation of nursing intervention to the first documented reduction in severity of each respective symptom, as assessed by attending physicians through standardized clinical observation protocols. Physicians documenting symptom relief were unaware of the patient's group assignment to ensure objectivity. Data were collected daily during hospitalization through direct patient examination and chart reviews, and after discharge through weekly telephone follow-ups using a standardized symptom diary. Any uncertainties in symptom assessment were resolved through consensus discussions among the clinical team.

**Quality of Life Evaluation:** Quality of life (QoL) was assessed using the Generic Quality of Life Inventory-74 (GQOLI-74), a comprehensive tool that evaluates four domains: physical functioning, psychological well-being, social functioning, and material life conditions. Each domain has a maximum score of 100, with higher scores indicating better perceived quality of life. The questionnaire was administered face-to-face by research nurses at baseline during hospital admission and at the six-month follow-up via mailed surveys with prepaid return envelopes or telephone interviews for non-respondents. To maintain data quality, nurses received training on neutral question delivery and checked for missing items before finalizing records.

**Incidence of Complications:** The occurrence of clinical complications during the study period was recorded and compared between the two groups. Monitored complications included lower respiratory tract infections, pulmonary hypertension, cardiac insufficiency, and pulmonary embolism. Complications were identified through multiple sources: regular medical record reviews, patient self-reports during scheduled follow-up visits, and laboratory or imaging tests as clinically indicated. All potential complications were adjudicated by two independent physicians blinded to group allocation, with disagreements resolved by a third senior clinician. The incidence rate was calculated as the proportion of patients experiencing at least one of the specified complications during the entire six-month follow-up period, from intervention initiation to study completion.

## Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics version 28.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was evaluated for normality. Data conforming to a normal distribution were reported as mean  $\pm$  standard deviation (SD), while non-normally distributed variables were summarized using medians and interquartile ranges. Group comparisons for continuous data were performed using the independent samples *t*-test or Mann–Whitney *U*-test, depending on data distribution. Categorical variables were expressed as counts and percentages, and analyzed using either the chi-square test or Fisher's exact test, as appropriate. To address potential confounders, including length of hospital stay and baseline demographic and clinical characteristics, we assessed group comparability at baseline and found no significant differences, as reported in the results. A *P*-value  $< 0.05$  (two-sided) was regarded as indicative of statistical significance.

## Results

### Baseline Characteristics

All 369 enrolled patients completed the six-month follow-up period, with no dropouts reported. Thus, all participants were included in the final analysis. To assess the comparability of the two groups at baseline, key demographic, clinical, and socioeconomic characteristics were compared. As shown in [Table 1](#), there were no statistically significant differences between the intervention group and the control group in terms of age, gender, body mass index (BMI), smoking history, COPD duration, post-bronchodilator forced expiratory volume in 1 second percent predicted (FEV1% predicted), COPD Assessment Test (CAT) score, COPD severity graded according to GOLD criteria, or the prevalence of common comorbidities such as hypertension and diabetes. Socioeconomic factors including education level and marital status were also comparable between groups. The length of hospital stay during the initial admission and the proportion of patients requiring non-invasive ventilation during hospitalization showed no significant differences. These comprehensive findings indicate that the groups were well-matched at baseline across demographic, clinical severity, and social domains, thereby strengthening the inference that any observed outcome differences were primarily attributable to the anticipatory nursing intervention rather than pre-existing group disparities.

### Psychological Outcomes Following Nursing Care

To evaluate the psychological effects of anticipatory nursing interventions on patients with COPD, changes in anxiety and depression levels were assessed using the SAS and the SDS, respectively. At baseline, there were no statistically significant differences between the observation group and the control group in terms of SAS and SDS scores ( $p = 0.328$  and  $p = 0.129$ , respectively), indicating comparable levels of psychological distress prior to intervention. Following

**Table 1** Comparison of Baseline Characteristics Between Groups (Mean  $\pm$  SD or n (%))

Characteristic	Intervention Group (n=183)	Control Group (n=186)	t/ $\chi^2$ value	p value
Age (years)	69.1 $\pm$ 5.0	68.5 $\pm$ 5.2	1.12	0.264
Gender (Male)	106 (57.9%)	112 (60.2%)	0.18	0.674
BMI (kg/m <sup>2</sup> )	23.5 $\pm$ 3.1	23.8 $\pm$ 3.3	0.91	0.363
Smoking History (Pack-years)	42.5 $\pm$ 10.8	41.8 $\pm$ 11.2	0.63	0.529
COPD Duration (years)	8.2 $\pm$ 2.5	7.9 $\pm$ 2.7	1.13	0.259
FEV1% Predicted	55.3 $\pm$ 8.9	56.1 $\pm$ 9.2	0.86	0.390
CAT Score	18.5 $\pm$ 3.2	18.2 $\pm$ 3.4	0.89	0.374
GOLD Grade			1.05	0.789
II	125 (68.3%)	122 (65.6%)		
III	58 (31.7%)	64 (34.4%)		
Comorbidities				
Hypertension	85 (46.4%)	91 (48.9%)	0.24	0.624
Diabetes Mellitus	42 (23.0%)	38 (20.4%)	0.37	0.544
Education Level			1.32	0.517
Primary or below	78 (42.6%)	85 (45.7%)		
Secondary	72 (39.3%)	74 (39.8%)		
Tertiary	33 (18.0%)	27 (14.5%)		
Marital Status (Married)	134 (73.2%)	132 (71.0%)	0.22	0.639
Required Non-invasive Ventilation	25 (13.7%)	28 (15.1%)	0.16	0.689
Length of Hospital Stay (days)	7.9 $\pm$ 2.2	8.1 $\pm$ 2.4	0.92	0.358

nursing care, significant improvements were observed in both anxiety and depression scores in the observation group compared to the control group. Specifically, the mean post-nursing SAS score was significantly lower in the observation group than in the control group ( $t = 10.64$ ,  $p < 0.001$ ), indicating a greater reduction in anxiety symptoms. Similarly, the mean SDS score after intervention was also markedly reduced in the observation group compared to the control group ( $t = 24.23$ ,  $p < 0.001$ ), reflecting a superior alleviation of depressive symptoms (Table 2).

## Comparison of Symptom Resolution Time Between Groups

Patients who received anticipatory nursing interventions exhibited significantly shorter symptom resolution times across all measured symptoms compared to those who received routine care. Specifically, the duration of dyspnea, cough, wheezing, and chest tightness was markedly reduced in the observation group, with mean resolution times approximately one-third to one-half of those observed in the control group. Statistical analysis confirmed that the differences in symptom resolution time between the two groups were significant (all  $p < 0.001$ ), with corresponding t-values of 16.20 for dyspnea, 10.77 for cough, 9.89 for wheezing, and 14.93 for chest tightness (Table 3).

**Table 2** Comparison of Psychological Status Between Two Groups Before and After Nursing Intervention (Mean  $\pm$  SD)

Variable	Intervention Group (n=183)	Control Group (n=186)	t value	p value
SAS Score				
Pre-nursing	47.58 $\pm$ 4.68	48.08 $\pm$ 4.83	1.010	0.328
Post-nursing	36.23 $\pm$ 3.46	39.93 $\pm$ 3.22	10.64	<0.001
SDS Score				
Pre-nursing	57.00 $\pm$ 5.76	56.10 $\pm$ 5.61	1.521	0.129
Post-nursing	40.52 $\pm$ 2.40	46.35 $\pm$ 2.22	24.23	<0.001

**Abbreviations:** SAS, Self-Rating Anxiety Scale; SDS, Self-Rating Depression Scale.

**Table 3** Comparison of Symptom Resolution Time Between Groups (days, Mean  $\pm$  SD)

Symptom	Intervention Group (n=183)	Control Group (n=186)	t value	p value
Dyspnea	1.34 $\pm$ 1.51	4.82 $\pm$ 2.49	16.20	<0.001
Cough	1.24 $\pm$ 1.91	3.22 $\pm$ 1.61	10.77	<0.001
Wheezing	1.77 $\pm$ 2.20	4.12 $\pm$ 2.36	9.890	<0.001
Chest tightness	1.80 $\pm$ 1.30	3.90 $\pm$ 1.40	14.93	<0.001

## Quality of Life Outcomes Following Nursing Care

To evaluate the impact of anticipatory nursing interventions on patient-reported outcomes, QoL was assessed across four domains—physical function, physiological function, social function, and material life—before and after the intervention period in both groups. At baseline, there were no statistically significant differences between the observation and control groups in any of the four QoL dimensions (all  $p > 0.05$ ), indicating comparability in functional and psychosocial status prior to nursing intervention. Following six months of intervention, patients in the observation group demonstrated significantly greater improvements in all four dimensions of QoL compared to those in the control group. Post-intervention scores for physical function, physiological function, social function, and material life were all markedly higher in the observation group, with corresponding t-values ranging from 5.346 to 7.026, and all p-values  $< 0.001$  (Table 4).

## Incidence of Complications Between Groups

To further evaluate the clinical safety and effectiveness of anticipatory nursing interventions, the incidence of common complications was compared between the observation and control groups. The complications assessed included LRTI, PH, CI, and PE, with total incidence calculated as the proportion of patients who experienced at least one complication during the study period. Overall, the observation group exhibited a significantly lower total complication rate (12.02%) compared to the control group (33.33%), and the difference was statistically significant ( $\chi^2 = 23.83$ ,  $p < 0.001$ ). While specific rates of individual complications varied, notable reductions were observed in LRTI, PH, and CI in the observation group relative to the control group. Notably, no cases of PE occurred in the observation group, whereas five cases were reported in the control group (Table 5).

## Discussion

The present study demonstrated that anticipatory nursing interventions produced significant psychological and clinical benefits for patients with COPD. Notably, patients in the intervention group experienced marked reductions in anxiety and depression: post-intervention scores on the SAS and SDS were significantly lower than pre-intervention and lower than control patients. This indicates that a proactive nursing approach effectively addresses the emotional burden associated with COPD. Such psychological improvement is likely mediated by anticipatory education, counseling, and support, which empower patients and mitigate fear of symptoms.<sup>12,13</sup> These findings align with prior reports that

**Table 4** Comparison of Quality of Life Scores Between Groups Before and After Nursing Intervention (Mean  $\pm$  SD)

Dimension	Time Point	Observation Group	Control Group	t value	P value
Physical Function	Pre-nursing	80.07 $\pm$ 7.28	78.87 $\pm$ 7.13	1.600	0.111
	Post-nursing	93.01 $\pm$ 9.16	88.12 $\pm$ 8.40	5.346	<0.001
Physiological Function	Pre-nursing	80.13 $\pm$ 7.43	78.94 $\pm$ 7.62	1.519	0.130
	Post-nursing	94.61 $\pm$ 9.89	88.51 $\pm$ 9.62	6.006	<0.001
Social Function	Pre-nursing	76.46 $\pm$ 7.62	75.92 $\pm$ 7.75	0.675	0.500
	Post-nursing	96.91 $\pm$ 9.59	90.27 $\pm$ 9.16	6.802	<0.001
Material Life	Pre-nursing	79.28 $\pm$ 7.30	78.89 $\pm$ 7.92	0.492	0.623
	Post-nursing	92.79 $\pm$ 9.04	86.25 $\pm$ 8.84	7.026	<0.001

**Table 5** Comparison of Complication Incidence Between Groups [n (%)]

Complication	Intervention Group (n=183)	Control Group (n=186)	$\chi^2$ value	p value
Lower Respiratory Tract Infection	9 (4.92%)	28 (15.05%)	11.27	<0.001
Pulmonary Hypertension	9 (4.92%)	14 (7.53%)	1.06	0.303
Cardiac Insufficiency	4 (2.19%)	14 (7.53%)	5.88	0.015
Pulmonary Embolism	0 (0.00%)	5 (2.69%)	5.01	0.025
Total Incidence	22 (12.02%)	62 (33.33%)	23.83	<0.001

**Note:** The p-value for Pulmonary Embolism was calculated using Fisher's exact test due to the low expected cell count.

intensive nurse-led care can significantly decrease anxiety and depressive symptoms in COPD. In parallel, the intervention group exhibited faster resolution of clinical symptoms. Key respiratory symptoms (eg dyspnea, cough, and sputum production) resolved in a shorter time compared to controls. This accelerated recovery suggests that anticipatory nursing care enhances clinical management and patient engagement. By providing early instructions for symptom monitoring and timely administration of therapies, nurses can prevent symptom escalation and promote rapid relief. Although direct evidence on symptom resolution time is scarce, our finding of shortened symptom duration is consistent with the broader principle that comprehensive care and self-management support reduce exacerbation burden in COPD. Indeed, previous work has shown that patient education and close follow-up can reduce hospitalizations and exacerbation-days, which likely reflects quicker symptom control.<sup>14,15</sup>

QoL outcomes were markedly improved by anticipatory nursing as well. After the intervention, scores in all measured domains – physical, psychological, social, and material – were significantly higher in the treatment group. This suggests a holistic benefit of anticipatory care on daily functioning and well-being. For example, improved physical domain scores likely reflect better symptom control and functional capacity, while gains in social and material domains may reflect enhanced social support and coping. These improvements imply that anticipatory nursing interventions addressed not only symptoms but also broader determinants of QoL. It is worth noting that some systematic analyses have reported mixed results on QoL; one recent meta-analysis found no significant QoL change after general nursing interventions. The current findings diverge from that by showing clear QoL gains, which may be attributed to the anticipatory, comprehensive nature of the intervention applied in our study. Specifically, our anticipatory nursing interventions were designed to proactively address both physical and psychosocial needs through structured education, symptom monitoring, and psychological support, which likely contributed to the observed improvements across all QoL domains (physical, psychological, social, and material). In contrast, the meta-analysis by Dou et al primarily evaluated general nursing interventions that often lacked the proactive, tailored components central to our approach.<sup>11</sup> For instance, our intervention incorporated individualized counseling and early exacerbation detection, which align with evidence suggesting that personalized, nurse-led programs enhance QoL by improving self-efficacy and coping strategies.<sup>16</sup> Additionally, differences in QoL measurement tools may explain discrepancies, as our study utilized a multidimensional QoL scale that captured a broader range of domains compared to some studies in the meta-analysis, which often relied on generic or less comprehensive instruments.<sup>17</sup> Furthermore, the intensity and duration of our intervention, which included regular follow-ups and multidisciplinary collaboration, may have amplified its impact compared to the shorter or less structured interventions in prior analyses.<sup>18</sup> These factors collectively suggest that the anticipatory and holistic nature of our intervention, combined with robust measurement approaches, accounts for the significant QoL improvements observed in our study relative to the mixed results reported elsewhere. Finally, the incidence of complications was significantly lower in the intervention group. Fewer patients in the anticipatory care arm developed adverse events (eg respiratory failure, infection, or other COPD-related complications) compared to controls.<sup>19</sup> This outcome underscores the practical impact of proactive nursing: by anticipating patient needs, optimizing preventive measures, and ensuring adherence to therapy, nurses can avert complications. This result is consistent with prior reports that enhanced nursing support reduces adverse outcomes in COPD. For instance, an ICU study found that patient-oriented informative and supportive nursing care led to fewer complications and improved clinical parameters.<sup>20</sup>

The observed benefits of anticipatory nursing in this study are largely consistent with existing evidence on comprehensive nursing care in COPD. For psychological outcomes, multiple prior studies have reported that structured nursing interventions yield significant reductions in anxiety and depression. A recent meta-analysis of nursing care in COPD found that such interventions produced significant decreases in anxiety and depression scores, mirroring our SAS/SDS results. In one randomized trial combining physical rehabilitation with psychosocial support, patients receiving the enhanced nursing program showed greater improvement in anxiety and depression than those with routine care. These parallels suggest that anticipatory nursing – which includes counseling and mental health support – is effective at alleviating the common affective disorders in COPD. Improvements in clinical and functional outcomes have also been documented elsewhere.<sup>21,22</sup> For example, nurse-led pulmonary rehabilitation and care coordination are known to increase exercise capacity and decrease dyspnea, supporting our findings of quicker symptom resolution. The present results extend this by demonstrating faster symptomatic improvement, possibly reflecting more rapid attainment of functional gains. Moreover, previous reviews note that comprehensive nursing (including patient education and follow-up) often leads to fewer COPD exacerbations and hospital admissions. The lower complication rate in our intervention group is in line with those reports, indicating that anticipatory planning can reduce acute setbacks in COPD. Quality-of-life findings show both agreement and discrepancy with past work.<sup>23,24</sup> Several investigations report that targeted nursing interventions can enhance QoL in COPD patients. For instance, a systematic review noted that nurse-led management programs were highly effective in improving patient quality of life and emotional state. These consistent improvements across multiple QoL domains suggest that attentive nursing can help patients adapt to their illness. However, as mentioned, the meta-analysis by Dou et al found no statistically significant QoL gains in pooled data. This divergence may reflect differences in intervention content or intensity. It is possible that the anticipatory interventions in our study were more comprehensive or better tailored to patient needs than the average intervention in other trials. Alternatively, variations in QoL measurement tools could account for discrepancies.<sup>25</sup>

These results have clear implications for COPD management. The demonstrated benefits of anticipatory nursing suggest that such interventions should be integrated into routine care for COPD patients. As COPD represents a chronic non-communicable disease (NCD) necessitating lifelong management, patient education and empowerment emerge as essential pillars of effective care, fostering self-management and reducing disease burden. This is especially pertinent for low- and middle-income settings striving to improve patient outcomes without substantial new infrastructure, as the model leverages and enhances existing nursing roles. By proactively educating patients, anticipating complications, and providing ongoing support, nurses can meaningfully improve patient well-being and potentially reduce healthcare utilization. To maximize these benefits, anticipatory nursing should be embedded within multidisciplinary interventions, which have been shown to optimize outcomes through holistic assessment and coordinated care involving respiratory specialists, physiotherapists, and educators.<sup>26</sup> This approach aligns with established patient pathways, such as those outlined in the UK's National Institute for Health and Care Excellence (NICE) guidelines, which recommend integrated multidisciplinary teams for COPD diagnosis, treatment, and self-management education, including exacerbation action plans and pulmonary rehabilitation to empower patients and minimize hospital admissions.<sup>27</sup> Comparative implementation of such pathways could guide adaptation in diverse settings, emphasizing nurse-led components like ours to enhance accessibility and equity in NCD management.<sup>28,29</sup> In practice, implementing anticipatory nursing protocols (for example, systematic symptom monitoring plans, early counseling sessions, and discharge planning) may lead to better adherence, faster recovery, and fewer readmissions. Consequently, healthcare teams should consider training and resource allocation to support anticipatory nursing, as it appears to confer tangible improvements in patient outcomes and quality of life. This study has several notable strengths. It employed standardized and validated instruments (SAS, SDS, and a multidimensional QoL scale) to assess outcomes, which enhances the reliability of the findings. The explicit focus on and detailed assessment of psychological status, a component often missing in routine COPD care in many regions, is a particular strength that underscores the holistic nature of our intervention. The comprehensive measurement of both psychological status and diverse QoL domains provides a broad view of patient well-being. The comparative design with a contemporaneous control group allowed direct assessment of the intervention's impact. Moreover, the consistent pattern of improvement across multiple endpoints (anxiety, depression, symptom resolution, QoL, complications) adds credibility to the observed effects.

Several limitations must also be acknowledged. First, the study's retrospective design limits causal inference. Although an association between the intervention and better outcomes is clear, a prospective randomized trial would more definitively establish effectiveness. Second, the sample was drawn from a single center (or limited settings), which may affect generalizability. Patient characteristics and healthcare context could differ elsewhere, so results should be extrapolated with caution. Third, while validated scales were used, it is unclear whether the specific QoL instrument fully captures all relevant domains for COPD (especially the "material" domain, which may vary by context). Additionally, data on long-term follow-up were not addressed; it is unknown if improvements persist over time. Finally, although baseline characteristics were similar between groups, unmeasured confounding factors (eg variations in disease severity or comorbidities) could influence results. Future research should address these limitations by using larger, multicenter cohorts and prospective designs. Nevertheless, given the robust positive outcomes observed and the use of established assessment tools, the study provides convincing evidence that anticipatory nursing interventions can enhance psychological status and quality of life in COPD.

## Conclusions

Anticipatory nursing interventions significantly improved psychological well-being, accelerated symptom resolution, enhanced quality of life across multiple domains, and reduced complication rates in patients with chronic obstructive pulmonary disease over a six-month period. The comprehensive baseline assessment confirmed that these benefits were achieved in a cohort well-characterized in terms of socio-economic factors and disease severity, supporting the robustness of the findings. Upon completion of the structured six-month intervention, key elements of the anticipatory nursing protocol, particularly the educational and self-management components, are intended to be integrated into patients' long-term chronic disease management plans to sustain the observed benefits. These findings support the integration of structured, proactive nursing strategies into standard COPD care to optimize clinical outcomes and promote holistic patient recovery.

## Human Ethics and Consent to Participate Declarations

This study was approved by the Ethics Committee of West China School of Public Health and West China Fourth Hospital, Sichuan University. Informed consent was obtained from all the participants. All methods were carried out in accordance with Declaration of Helsinki.

## Data Sharing Statement

The experimental data used to support the findings of this study are available from the corresponding author upon request.

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## Disclosure

The authors declared that they have no conflicts of interest regarding this work.

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