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The clinical nursing effect of empowerment-based continuing nursing combined with pulmonary rehabilitation for chronic obstructive pulmonary disease

Qianqian Wang[1*], Hui Tang[1] and Min Zhang[1]

Abstract

Objective Patients with chronic obstructive pulmonary disease (COPD) often lack continuous care after discharge, with limited disease knowledge, poor self-care ability, and low self-efficacy. These factors hinder pulmonary rehabilitation (PR) and negatively impact quality of life. Strengthening out-of-hospital nursing support and respiratory rehabilitation training is therefore essential. This study aims to assess the clinical value of empowerment-based continuing nursing combined with PR in the nursing management of COPD.

Methods A retrospective study was conducted involving 60 COPD patients treated at our hospital from October 2023 to October 2024. The patients were randomly assigned to either a control group (routine nursing) or an observation group (empowerment-based continuing nursing combined with PR). Pulmonary function was assessed using forced expiratory volume in one second (FEV1) and the FEV1/forced vital capacity (FVC) ratio, both before and after the intervention. Dyspnea was evaluated using the COPD Assessment Test (CAT), while exercise capacity was measured by the 6-minute walking distance (6MWD). Psychological well-being was assessed through the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS). The St. George's Respiratory Questionnaire (SGRQ) was used to evaluate quality of life (QoL), and patient satisfaction was also assessed.

Results After the intervention, improvements were observed in both groups, with the observation group showing greater improvements compared to the control group ($Ps < 0.05$). Specifically, SAS and SDS scores, dyspnea indices, and SGRQ scores were lower, while FEV1, FEV1/FVC, and 6MWD were higher in the observation group compared to the control group ($Ps < 0.05$). Additionally, patient satisfaction with nursing was higher in the observation group compared to the control group ($P < 0.05$).

Conclusion Empowerment-based continuing nursing combined with PR improves pulmonary function and QoL while alleviating anxiety and depression in COPD patients. Furthermore, it enhances patient satisfaction with the nursing provided.

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Keywords Empowerment-based continuing nursing, Pulmonary rehabilitation, Chronic obstructive pulmonary disease, Pulmonary function, Quality of life, Self-management

Introduction

Chronic obstructive pulmonary disease (COPD) is a heterogeneous condition characterized by chronic respiratory symptoms, including dyspnea and cough, resulting from abnormalities in the airways and/or alveoli. These abnormalities lead to persistent and often progressive airflow obstruction [1]. The primary environmental risk factor for COPD is cigarette smoking, although occupational exposures to organic and inorganic dusts and chemical agents also contribute to the disease. Additionally, air pollution, genetic factors such as mutations in SERPINA1, childhood asthma, and socioeconomic factors like poverty are recognized as significant risk factors for COPD [2]. Due to the chronic and complex nature of COPD, effective management requires a comprehensive, patient-centered approach that extends beyond pharmacological nursing.

Health empowerment, a core principle of patient-centered nursing, empowers individuals to take an active role in managing their health and enhancing their quality of life. It is increasingly recognized as a new paradigm in health-care, shifting the focus from compliance to active participation in health decision-making [3]. From the perspective of Roger's integrality theory, empowerment is a dynamic process that emphasizes engaging in purposeful self-transformation and utilizing personal resources for improved well-being [4]. In health-care settings, empowerment fosters a collaborative provider-patient relationship, replacing the traditional compliance model and enhancing patient autonomy in decision-making [5].

The World Health Organization has highlighted the importance of continuity of nursing in primary healthcare to optimize the management of non-communicable diseases, including diabetes and hypertension [6]. Ensuring continuity of nursing enhances the provider-patient relationship, fostering mutual trust and shared nursing goals. This results in improved patient adherence to medical recommendations and better overall health outcomes [7]. Prior studies have shown that post-discharge follow-up nursing, including patient education and continuous nursing support, can reduce hospital readmission rates, particularly in patients with heart failure [8]. By integrating patient education, personalized nursing plans, and continuous support, empowerment-based continuing nursing holds promising value in COPD management.

Pulmonary rehabilitation (PR) is a multifaceted nursing that includes a comprehensive patient assessment followed by tailored therapies, such as exercise training, patient education, and behavior modification. PR aims to improve the physical and psychological well-being of individuals with chronic respiratory diseases, promoting long-term adherence to health-enhancing behaviors [9]. Meta-analyses have demonstrated that initiating PR following COPD exacerbations is associated with improved survival rates and a lower risk of mortality within one year [10]. Moreover, early PR initiation after an acute exacerbation leads to faster recovery in physical performance compared to rehabilitation that begins later during the stable phase of the disease [11].

The combination of empowerment-based continuing nursing and PR offers a holistic approach to COPD management. While individual studies have demonstrated the benefits of both nursing, the clinical value of their combined application remains insufficiently explored. This study aims to assess the effectiveness of integrated nursing approach in improving pulmonary function, exercise capacity, quality of life (QoL), and psychological well-being in COPD patients.

Materials and methods

Ethics statement

Ethical approval for the study was granted by the ethics committee of Fuyang Normal University Affiliated Funan Hospital (Funan County People's Hospital) and in accordance with the Declaration of Helsinki, and informed consent was obtained from all participants.

Subjects of study

The study subjects were selected from COPD patients admitted to the Department of Respiratory Medicine at Fuyang Normal University Affiliated Funan Hospital between October 2023 and October 2024. All patients met the diagnostic criteria for COPD as outlined in the 2021 revision of the Global Strategy for the Diagnosis, Management, and Prevention of COPD (GOLD). All patients were in a stable phase of their disease (During this stage of the disease course, the patient's symptoms are relatively stable or mild. Symptoms such as cough, sputum production, and shortness of breath tend to stabilize or remain mild, with the condition essentially returning to its state before acute exacerbation), and patients with complete clinical data. The exclusion criteria included: patients with other severe cardiovascular or pulmonary diseases, autoimmune diseases, or malignancies; those with motor function impairments; individuals with severe mental disorders or cognitive dysfunction; those who had participated in other clinical trials within the past three months; and patients unable to cooperate in completing respiratory rehabilitation or continuous nursing. A total of 60 COPD patients were enrolled, with

30 patients in the observation group (empowerment-based continuing nursing combined with PR) and 30 patients in the control group (routine nursing).

Nursing and rehabilitation methods

The control group received routine nursing care. Patients were educated on the pathogenesis of COPD, treatment methods, and precautions. During the nursing intervention period, the patients' condition was closely monitored to promptly detect any abnormalities and implement symptomatic treatment measures as needed. Vital signs were regularly checked and recorded, and patients were encouraged and reminded to cooperate with treatment and adhere to prescribed medications. A diet rich in vitamins and protein was provided to meet energy and nutritional needs. Patients were guided to perform abdominal breathing and pursed-lip breathing exercises (10–15 min per session, 2–3 times per day), and encouraged to engage in physical exercise. Unhealthy lifestyle habits (such as smoking and alcohol consumption) were addressed and corrected. Emotional changes in patients were observed, and psychological counseling was provided when necessary. Upon discharge, standard discharge guidance was given. After discharge, follow-up was conducted by phone once every two weeks to address any problems encountered during home care. Continuous nursing care was provided for a total of three months.

The observation group received empowerment-based continuing nursing combined with PR, in addition to the standard nursing provided to the control group.

Phase 1: During the patient's hospitalization, communication and interaction with the patient were strengthened. Experienced medical experts delivered health education lectures covering basic COPD knowledge, medication regimens, symptom recognition, and lifestyle adjustment recommendations. Physical and pulmonary function assessments were conducted. Open-ended questions were used to identify patients' personality traits and psychological needs, followed by the formulation of individualized training plans. PowerPoint presentations, live demonstrations, and other methods were used to explain COPD-related knowledge and PR techniques, addressing patient questions in a patient-centered manner.

Phase 2: During hospitalization and after discharge, patients were placed at the center of nursing, encouraged to express their attitudes and views toward PR, and provided with positive guidance. Short-term goals (e.g., 30 min of exercise per day within 2 weeks) and long-term goals (e.g., significant improvement in dyspnea symptoms after 3 months) were set collaboratively with patients and their families, with material rewards for achieving these goals.

Phase 3: During hospitalization and after discharge, respiratory training was conducted using a professional respiratory trainer (manufacturer: Philips Respironics, USA). The training included pursed lip breathing and abdominal breathing. Pursed lip breathing, by exhaling slowly while pursing the lips, increases airway resistance and prolongs exhalation, which helps to reduce residual volume and improve ventilation. Abdominal breathing deepens the breath and lower the diaphragm, increasing chest volume and lung capacity. Training sessions lasted 30 min, twice daily, for 3 months. Concurrent aerobic exercises such as walking and jogging were recommended based on patients' physical condition and interests. Aerobic exercises improve cardiopulmonary function, increase overall endurance, and promote metabolism. Patients were required to perform aerobic exercises three times per week, 30 min per session. Exercise intensity and duration were adjusted based on patient tolerance to ensure safety and efficacy. Patients were asked to record their exercise time, intensity, and respiratory status daily and provide feedback to doctors for timely adjustments to their training plans.

Phase 4: After discharge, follow-up was conducted through telephone calls or WeChat messages once a week for 3 months. Follow-up content included monitoring symptoms, medication guidance, and lifestyle advice. The nursing team inquired about changes in symptoms, monitored vital signs such as respiratory rate and oxygen saturation, and responded promptly to any changes. Medication guidance ensured patients adhered to prescribed regimens, addressing any questions regarding medication use to avoid misuse or abuse. Lifestyle advice focused on diet, exercise, and mental health, tailored to the patient's individual condition. Positive reinforcement was provided for good behavior, encouraging patients to continue their efforts. Continuous nursing care was provided for a total of three months.

Evaluation indicators

Clinical data for both groups were collected through the case inquiry system, including general information such as gender, age, smoking history, and disease course, as well as clinical comorbidities (including hypertension and diabetes).

The following indicators were measured before the intervention and after 3 months of intervention:

Pulmonary function: Forced expiratory volume in one second (FEV1) and FEV1/forced vital capacity (FEV1/FVC) were measured using a German Jaeger imported pulmonary function testing device (model: MasterScreen PFT System). Patients were instructed to perform maximal forced exhalation following the given instructions. To ensure accuracy, each patient underwent the test three times, with at least a 10-minute interval between

each measurement. The best recorded value was selected, and a final report was generated [12, 13].

Respiratory function: The COPD Assessment Test (CAT) [14] was adopted to evaluate respiratory function. This scale, developed by Jones et al. [15], consists of eight questions assessing cough, phlegm, chest tightness, breathlessness during activities, activity limitations at home, confidence in leaving home, sleep, and energy levels. Each item is rated using a Likert scale ranging from 0 to 5, with a total score of 40 points. The severity classification is as follows: 0–10 points (mild), 11–20 points (moderate), 21–30 points (severe), and 31–40 points (very severe). The questionnaire demonstrates high internal consistency, with a Cronbach's alpha of 0.890.

Exercise function: The 6-minute walk distance (6MWD) is widely used to assess exercise capacity by measuring the distance a patient can walk within 6 min, providing an evaluation of their overall cardiopulmonary function. This test is simple to administer, does not require complex equipment, and is applicable in various conditions, including cardiac and pulmonary diseases [16, 17]. Therefore, the 6MWD was employed to assess exercise capacity. Patients walked as fast as possible for 6 min on a flat surface, and the total distance walked was recorded.

Psychological state: The Self-Rating Anxiety Scale (SAS) [18] and Self-Rating Depression Scale (SDS) [19] were implemented to assess anxiety and depression. The SAS was developed by Chinese-American professor Zung in 1971 and has a Cronbach's alpha coefficient of 0.759, indicating good internal consistency. The scale consists of 20 items, each rated using a 4-point Likert scale. SAS scores were categorized as: 0–8 (no anxiety), 9–21 (occasional anxiety), 22–32 (mild anxiety), 33–44 (moderate anxiety), and 45–60 (severe anxiety). The SDS was developed by Chinese-American professor Zung in 1965 and has a Cronbach's alpha coefficient of 0.841, indicating good internal consistency. The scale consists of 20 items, each rated using a 4-point Likert scale. The raw score ranges from 20 to 80 and is converted to a standard score by multiplying the raw score by 1.25 and rounding to the nearest integer, resulting in a standard score range of 25 to 100. The reference upper limit for the standard score is 53 points. The classification of depression severity based on the standard total score is as follows: < 53 points indicates no depression, 53–62 points indicate mild depression, 63–72 points indicate moderate depression, and > 72 points indicate severe depression.

QoL: The St. George's Respiratory Questionnaire (SGRQ) [20] was utilized to evaluate QoL. The SGRQ is a specialized tool for assessing the quality of life in COPD patients, developed by Jones and Forde. It covers three domains: respiratory symptoms, activity limitation, and disease impact, comprising a total of 50 questions, evaluated using a Likert scale ranging from 0 to 5. Patients selected options based on their condition, and the total score and the scores for each dimension were calculated. The scores were computed using a weighted average method, and the total score was scaled to 100 points. Higher scores indicate greater impact on life. The questionnaire has a Cronbach's alpha coefficient of 0.840.

Nursing satisfaction: After 3 months of intervention, the Newcastle Satisfaction with Nursing Scales score was used to evaluate patient satisfaction based on 19 items, including safety management, professional abilities, technical skills, and communication attitude. The scale uses a Likert 1–5 scoring method, with a full score ranging from 19 to 95. A score of ≥ 77 indicates 'very satisfied', 58–76 'satisfied', 39–57 'generally satisfied', and ≤ 38 'dissatisfied'. Overall satisfaction was calculated as the sum of the very satisfied and satisfied rates.

Statistical analysis

Data analysis was performed using SPSS 21.0 software (IBM, New York, USA). Categorical data were expressed as rates or percentages, with comparisons made using the Chi-square test. Measurement data were expressed as mean ± standard deviation ($\bar{x} \pm s$). Paired-sample *t*-tests were used for within-group comparisons, and independent-sample *t*-tests were used for between-group comparisons. A *P*-value of < 0.05 (two-tailed) was considered statistically significant.

Results

Clinical data

In the observation group, there were 20 males and 10 females, with an average age of 59.83 ± 8.53 years and an average disease duration of 6.58 ± 1.36 years. Regarding smoking history, 20 patients had a history of smoking, while 10 did not. Additionally, 15 patients had diabetes, and 19 had hypertension. In the control group, there were 16 males and 14 females, with an average age of 59.53 ± 6.72 years and an average disease duration of 6.63 ± 1.53 years. In terms of smoking history, 17 patients had a smoking history, while 13 did not. Furthermore, 18 patients had diabetes, and 22 had hypertension. There were no statistically significant differences (*Ps* > 0.05) between the two groups in terms of age, gender, disease duration, smoking history, or comorbidities, ensuring comparability.

Pulmonary function

Before the intervention, no significant differences in pulmonary function were observed between the two groups (*Ps* > 0.05). After the intervention, the observation group showed improvement in pulmonary function (*Ps* < 0.05), whereas the control group showed no change. The

Table 1 Comparison of pulmonary function between the two groups ($\bar{x} \pm s$)

Group ($n=60$)	FEV1 (L)		FEV1/FVC (L/s)	
	Before nursing	After nursing	Before nursing	After nursing
Control group ($n=30$)	61.36 ± 19.92	58.97 ± 10.30	55.03 ± 20.17	52.79 ± 8.55
Observation group ($n=30$)	62.54 ± 21.58	70.84 ± 16.81*	54.53 ± 20.95	64.12 ± 13.86*
t	0.257	3.296	1.52	3.814
P	0.797	0.002	0.137	0.001

Note: Compared with pre-nursing values in the same group, *$P<0.05$

Table 2 Comparison of respiratory and exercise functions between the two groups ($\bar{x} \pm s$)

Group ($n=60$)	CAT (score)		6-minute walk distance (m)	
	Before nursing	After nursing	Before nursing	After nursing
Control group ($n=30$)	25.30 ± 3.47	25.10 ± 2.50	305.70 ± 52.79	319.41 ± 25.31
Observation group ($n=30$)	26.30 ± 3.47	20.30 ± 3.47*	301.77 ± 54.44	412.86 ± 32.41*
t	1.610	6.441	0.281	12.449
P	0.250	0.001	0.779	0.001

Note: Compared with pre-nursing values in the same group, *$P<0.05$

Table 3 Comparison of SAS and SDS scores between the two groups ($\bar{x} \pm s$)

Group ($n=60$)	SAS		SDS	
	Before nursing	After nursing	Before nursing	After nursing
Control group ($n=30$)	46.43 ± 2.33	40.03 ± 7.62*	60.67 ± 6.24	50.47 ± 6.67*
Observation group ($n=30$)	40.37 ± 7.28	30.37 ± 7.62*	61.30 ± 6.59	44.30 ± 6.67*
t	4.350	5.026	0.382	3.604
P	0.705	0.001	0.704	0.001

Note: Compared with pre-nursing values in the same group, *$P<0.05$

observation group's pulmonary function was better than the control group ($Ps<0.05$) (Table 1).

Respiratory function

Before the intervention, no significant differences in CAT scores were found between the two groups ($P>0.05$). After the intervention, the observation group showed reduction in CAT scores ($P<0.05$), while the control group showed no change. The observation group's CAT scores were lower than those of the control group ($P<0.05$) (Table 2).

Exercise function

Before the intervention, no significant differences in 6MWD were observed between the two groups ($P>0.05$). After the intervention, the observation group showed increase in 6MWD ($P<0.05$), while the control group showed no change. The observation group's 6MWD was longer than the control group ($P<0.05$) (Table 2).

Psychological state

Before the intervention, no significant differences in SAS and SDS scores were observed between the two groups ($Ps>0.05$). After the intervention, both groups showed reduction in SAS and SDS scores ($Ps<0.05$), with the observation group showing lower scores than the control group ($Ps<0.05$) (Table 3).

QoL

Before the intervention, no significant differences in each dimension of SGRQ scores were found between the two groups ($Ps>0.05$). After the intervention, the control group showed improvement in the activity limitation and respiratory symptom dimensions ($Ps<0.05$), while the disease impact dimension showed no change. The observation group showed improvement in all dimensions, with lower disease impact and activity limitation scores compared to the control group ($Ps<0.05$) (Table 4).

Nursing satisfaction

After the intervention, the observation group had higher satisfaction with nursing than the control group ($P<0.05$) (Table 5).

Discussion

COPD is a common condition characterized by irreversible airflow obstruction and persistent inflammation, which can be triggered by various environmental factors, including but not limited to cigarette smoke [21]. The results of this study highlight the benefits of combining empowerment-based continuing nursing with PR for COPD management. Our findings demonstrate that this integrated approach not only improves pulmonary function but also enhances exercise capacity, psychological well-being, and overall QoL in COPD patients.

Table 4 Comparison of SGRQ scores before and after nursing in both groups ($\bar{x} \pm s$)

Group ($n=60$)	Disease impact		Activity limitations		Respiratory symptoms	
	Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
Control group ($n=30$)	51.47 ± 2.90	47.00 ± 2.85	50.30 ± 2.51	44.37 ± 2.70*	51.33 ± 2.31	44.13 ± 2.50*
Observation group ($n=30$)	52.13 ± 2.80	40.00 ± 2.85*	50.30 ± 2.72	38.47 ± 2.70*	51.03 ± 2.86	38.90 ± 2.50*
t	0.906	10.592	0.905	8.427	0.447	8.273
P	0.369	0.001	0.987	0.001	0.656	0.001

Note: Compared with pre-nursing values in the same group, *$P<0.05$

Table 5 Comparison of nursing satisfaction between the two groups [n (%)]

Group ($n=60$)	Very satisfied	Satisfied	Generally satisfied	Dissatisfied	Overall satisfaction
Control group ($n=30$)	10 (33.33)	6 (20.00)	10 (33.33)	4 (13.34)	16 (53.33)
Observation group ($n=30$)	18 (60.00)	10 (33.33)	2 (6.67)	0 (0.00)	28 (93.33)
X^2 value	4.354				
P	0.002				

A key finding from this study is the improvement in pulmonary function. The observation group demonstrated more substantial increases in FEV1 and the FEV1/FVC ratio, which are critical indicators of lung function. This improvement may be attributed to several elements of our intervention, including personalized respiratory training, structured discharge education, and regular post-discharge follow-up, which reinforced patients' adherence to rehabilitation exercises and medication. Previous research has shown that PR enhances physical capacity, reduces dyspnea, and alleviates fatigue in COPD patients [22]. Integrating empowerment-based nursing into the rehabilitation process may have improved patients' understanding of their condition and increased their confidence in symptom management, contributing to better compliance with nursing and enhanced clinical outcomes. Additionally, continuity of nursing has been associated with improved medication adherence and nursing outcomes [23]. A study on hypertension patients found that greater relational continuity of nursing, particularly through regular visits from general practitioners, facilitated better achievement of blood pressure control [24]. Empowerment-based approaches have been revealed to play a crucial role in blood pressure reduction by enhancing health literacy [25].

Regarding exercise tolerance, the observation group showed greater improvements in the 6MWD, a key measure of functional capacity. This improvement likely results from the combined effects of PR exercises and personalized support. Previous study confirms that PR improves exercise capacity and QoL in COPD patients [26]. Exercise has been shown to enhance mitochondrial function, restore vasculature, and release myokines that improve cardiovascular health, all of which contribute to better functional performance [27]. Exercise training has proven effective in other chronic respiratory conditions, providing clinically meaningful benefits, particularly for patients with milder disease [28]. The empowerment-based self-care program proved to be more cost-effective than the conventional educational approach, delivering clinically significant improvements in symptom perception, self-care management, and health-related QoL in patients with heart failure [29].

Psychologically, the empowerment-based nursing model reduced anxiety and depression levels, as assessed by the SAS and SDS. Comorbid anxiety or depression in COPD patients is associated with more frequent exacerbations, higher rehospitalization rates, and increased mortality [30]. The empowerment approach, which encourages patients to participate in health decisions and set achievable goals, may have alleviated these negative emotions. Continuing nursing also fosters deeper understanding between health-care providers and patients, allowing for more tailored medical advice in subsequent consultations [6]. Additionally, PR has been shown to benefit psychological outcomes, further supporting the mental health benefits of this combined approach [26]. An empowerment-based approach significantly improved symptom perception and self-care management in patients with heart failure, leading to clinically meaningful outcomes [29]. Moreover, a systematic review has indicated that patient empowerment is inversely associated with anxiety and depression levels, highlighting its potential in improving psychological well-being in chronic disease management [31].

The improvements in QoL, as measured by the SGRQ, further emphasize the efficacy of the integrated nursing model. The observation group showed improvements across all SGRQ dimensions, while the control group demonstrated only limited progress. Previous study has found that breathing exercises complement exercise training, improving dyspnea and QoL in patients with idiopathic pulmonary fibrosis [32]. Self-management nursing, including exacerbation action plans, have also

been linked to improved QoL and reduced hospital admissions [33]. Cheng et al. have supported the effectiveness of an empowerment-based intervention program for patients with poorly controlled type 2 diabetes, demonstrating its ability to enhance empowerment levels and perceived QoL while alleviating diabetes-related distress [34].

Finally, the observation group reported higher satisfaction with nursing. This finding suggests that empowerment-based continuing nursing, which integrates regular communication, individualized nursing plans, and active patient involvement, may lead to greater satisfaction with the nursing process. Satisfied patients are more likely to adhere to nursing regimens, further contributing to positive health outcomes [35]. Studies indicate that continuing nursing improves outcomes and satisfaction in patients with stomas compared to routine nursing [36]. A high level of continuity of nursing has been associated with better medication adherence and increased patient satisfaction [6]. A nursing intervention focused on behavioral change and grounded in empowerment theory significantly improves QoL, alleviates negative emotions, enhances treatment adherence, and increases nursing satisfaction in patients with brain metastases [37].

While traditional pulmonary rehabilitation programs are widely recognized for improving exercise capacity and symptom control in COPD patients, they are typically delivered in-person and focus primarily on short-term, therapist-led interventions [9, 38]. These programs usually include structured physical and respiratory exercises, airway clearance techniques, inhalation therapy, and relaxation sessions—most of which are supervised and limited to the rehabilitation setting. However, such models often lack components that promote sustained behavior change, self-management, and psychological adaptation. In contrast, the empowerment-based approach adopted in this study shifts the focus from passive participation to active engagement by fostering patient autonomy, self-efficacy, and emotional well-being. Through tailored education, psychosocial support, and continuous follow-up, this method encourages long-term health behavior changes and a more holistic recovery process [5, 39]. By addressing both physical and psychosocial domains, the empowerment model may serve as a valuable complement or alternative to traditional pulmonary rehabilitation, particularly for improving long-term adherence and quality of life in COPD patients.

In conclusion, our study supports the clinical value of combining empowerment-based continuing nursing with PR to optimize COPD management and improve patient outcomes. This integrated approach not only improves pulmonary function and exercise capacity but also alleviates psychological distress, enhances QoL, and increases patient satisfaction. This study extends the application of empowerment-based continuing nursing to patients with COPD, a population for which such interventions have rarely been explored. The findings provide preliminary evidence supporting its potential benefits and highlight a novel direction for COPD care. However, limitations such as a small sample size, short follow-up period, reliance on self-reported data, and single-center design may affect generalizability, warranting longer-term studies across diverse populations and healthcare settings.

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Q. W. contributed to study design; H. T. contributed to manuscript editing; M. Z. and Q. W. contributed to experimental studies; H. T. and Q. W. contributed to data analysis. All authors read and approved the final manuscript.

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Data availability
The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
Ethical approval for the study was granted by the ethics committee of Fuyang Normal University Affiliated Funan Hospital (Funan County People's Hospital) and in accordance with the Declaration of Helsinki, and informed consent was obtained from all participants.

Consent to publish
Not applicable.

Competing interests
The authors declare no competing interests.

Clinical trial number
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