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Original Article

Evidence-based nursing improves clinical outcome and quality of life in elderly patients with COPD complicated with heart failure

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Abstract: Objective: This study aimed to evaluate the clinical outcome and quality of life of EBN in elderly patients with COPD and heart failure (short for EPCH). Methods: 136 EPCH admitted to our hospital from March 2015 to January 2018 were randomly divided into group A and group B, with 68 in each group. Group A patients were given routine care. Group B patients were given routine nursing combined with evidence-based nursing measures. The following scoring systems were used for both groups before and after nursing care. The anxiety and depression of the two groups were measured using the Hamilton Anxiety Scale (HAMA) scale and Hamilton Depression Scale (HAMD). The COPD assessment scale (CAT) was used to observe improvement in patients' quality of life. The pulmonary function, cardiac function, exercise tolerance and nursing satisfaction were evaluated. Results: The HAMA score, HAMD score and CAT score of both groups were significantly lower than those before the treatment (P<0.01). The HAMA, HAMD and CAT scores of group A were lower than those of group B post-treatment (P<0.01). After nursing, the vital capacity (FVC), first-second forced end-expiratory volume/FVC (FEV1/FVC), left ventricular ejection fraction (LVEF) and 6 min-walking distances (6MWD) of both groups were significantly higher than those before the treatment (P<0.05), and left ventricular end diastolic diameter (LVDED) was decreased (P<0.05). After treatment, FVC, FEV1/FVC, and 6MWD in group A were higher than those in group B (P<0.05), and LVDED was lower (P<0.05). The satisfaction of group A was higher than that in group B (P<0.05). Conclusion: EBN intervention can improve the cardiac and pulmonary functions and quality of life of EPCH, which alleviated their adverse emotions and improved nursing satisfaction.

Keywords: Chronic obstructive pulmonary disease (COPD), heart failure, evidence-based nursing (EBN)

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a common respiratory disease. According to WHO statistics, COPD affects 210 million people worldwide, which is the main cause of death in 5% of all chronic diseases [1]. In the United States, COPD re-admission rates can reach 20%. In Canada, the cost of hospitalization for acute exacerbations of COPD can reach $14,266 [2]. It is estimated that COPD will become one of the third major causes of human death in 2030 [3]. The onset time of COPD is long and it is easy to recurrent. With the development of the disease, complications such as pulmonary heart disease and heart failure may occur, which may have a serious impact on lung function [4]. COPD can cause slow and irreversible decline in lung function, which is the main cause of the decline in the patient's ability to work, and has a serious impact on the patient's ability to live [5]. Patients with COPD and heart failure (PCH) are prone to negative emotions such as anxiety and depression, which may affect treatment compliance to a certain extent and aggravate the subjective feelings of patients, such as difficulty in breathing [6]. They need timely symptomatic treatment, and the quality of nursing intervention will also affect the treatment effect and prognosis recovery [7]. Therefore, a good nursing intervention model is of great significance for PCH.

With the development of medical standards, the routine nursing intervention model is difficult to meet the needs of clinical care.

Therefore, it is necessary to improve the quality of care and the mode of nursing intervention [8]. EBN is a new type of scientific nursing intervention mode, which combines practical research results, patients' specific conditions and clinical experience together to develop individualized and targeted nursing intervention mode for patients [9]. EBN intervention not only improves the work efficiency of care workers, but also improves the patient's clinical outcomes. Its nursing value has been confirmed, and it has been widely used in many diseases, and the effect is ideal [10]. For example, in the study of Meng et al [11], the implementation of EBN can effectively prevent the occurrence of ventilator-associated pneumonia, reduce the inflammatory response of patients and improve the quality of clinical care. In addition, Kang et al. [12] reported that EBN can reduce the prevalence of vagal reflex in perioperative orthopedic trauma patients to some extent, which improved vagal tone and reduced the concentration of TNF- and il-6. However, there have been few previous studies on the application of EBN in EPCH, and whether EBN can promote the rehabilitation of patients has not been demonstrated.

In this study, the EBN intervention model was performed on EPCH to explore the effect of this nursing model in patients, which aimed to provide a feasible clinical nursing program for EPCH.

Materials and methods

General information

136 EPCH admitted to our hospital from March 2015 to January 2018 were randomly divided into group A and group B, with 68 patients in each group. Group A was offered routine nursing whereas group B received routine nursing measures combined with EBN intervention. The study plan was submitted to the hospital ethics committee for review and was implemented after approval. All subjects and their guardians signed the fully informed consent.

Inclusion and exclusion criteria

Inclusion criteria: patients who met the diagnostic criteria for COPD [13]; patients who met the New York Heart Association (NYHA) [14] Center for Functional Classification II-III; patients aged 65 years or older; patients with complete clinical data; patients with functional limbs.

Exclusion criteria: patients who were unable to cooperate with nursing intervention; patients with acute heart failure caused by acute myocarditis; patients who died during care; newly developed patients with acute myocardial infarction within 1 month; patients with severe hepatic and renal insufficiency, severe cerebrovascular diseases, pneumonia, pulmonary hypertension, bronchial asthma, tuberculosis, congenital heart disease, or malignant tumors; patients with mental illness or disturbance of consciousness.

Nursing method

Both groups were given diuretic, low-flow oxygen, tube expansion, asthma-preventing, expectorant, anti-infection and other basic symptomatic treatment. Group B received routine nursing combined with EBN intervention. The patient's vital signs were observed, blood pressure, pulse, body temperature, etc. were measured, and the patient's condition was closely observed. Persistent oxygen inhalation was given daily, and the oxygen flow rate was 2-4 L/min. Medical staff ensured the environment of the ward and ward was quiet, clean and tidy. Patients were advised to change sheets regularly. Patients were monitored for medication, and if there were changes in heart rhythm or gastrointestinal symptoms during treatment, the ECG was promptly reviewed, electrolytes were examined, and effective symptomatic treatment was given.

On the basis of routine care, group A was given EBN intervention. The specific measures were as follows: The EBN team was established, including a head nurse, a physician, an imaging physician, and three responsible nurses. The head nurse served as the team leader and conducted relevant knowledge and skills training for the team members to evaluate the patient's vital signs, physical condition, heart function, lung function and exercise tolerance, and developed an individualized care plan. Health education: Targeted health education is implemented according to patients' education degree and age combined with the degree of understanding of the disease. The causes, treatment methods and prognosis of COPD complicated with heart failure were explained in easy-to-

understand language. Rational drug use was informed to the patients, and the effects and possible adverse reactions of the drugs were explained. Psychological care: Medical staff actively communicated with patients and their families to establish a harmonious atmosphere. Medical staff can understand patients' inner activities, offer targeted comfort, guidance and encouragement. Successful cases were given to establish the patient's treatment confidence. Diet nursing: The diet was low in fat, high in protein and easy to digest. The patients ate more frequent, smaller meals. For those with severe heart failure, the water was controlled, and foods rich in potassium and fiber were eaten reasonably. It was forbidden to eat spicy and stimulating foods. Functional exercise: the patient was instructed to master breathing exercises such as lip-reducing, abdominal breathing, diaphragmatic lip respiration and other respiratory functions. Appropriate endurance exercise was designed to increase lung capacity, improve myocardial and respiratory muscle function and activity endurance. Prevention of cross-infection: the ward was regularly sterilized by air to keep the air fresh and the ward was strengthened. Guidance for discharge: The medical staff guided the patient to exercise functionally after discharge, maintain a happy mood and adequate sleep, and properly carry out physical activity to avoid overwork. The patients were instructed to develop healthy eating habit and see a doctor if they were unwell. Both groups received 12 weeks of nursing during hospitalization and were followed up for 2 months after discharge.

Measurement outcomes

HAMA [15] and HAMD [16] were used to evaluate the anxiety and depression of the two groups at the time of admission and after 12 weeks of nursing. There were 7 items in each scale, with a total score of 21 points. There were four points in each project, 0-3 points for each. The higher the score, the more serious the patient's anxiety and depression.

The lung function of both groups at the time of admission and after 12 weeks after nursing, including FVC and FEV1/FVC, was measured using MINATO AS-507 lung function meter (Shanghai Hanfei Medical Devices Co., Ltd., China). The Sonos 7500 Ultrasound Diagnostic Instrument (Shanghai Philips Investment Co., Ltd., China) was used to detect the cardiac function of the two groups. The indicators included LVEF and LVDED. The inspection process was carried out in strict accordance with the instruction manual of the instrument. The exercise tolerance of the two groups was evaluated using the 6MWD method [17]. The patient made a quick round trip for 6 minutes with oxygen within a straight-line distance of 30 m, and the walking distance was recorded. If patients developed chest pain, pallor, paleness, and dyspnea during the course of the trial, the trial was discontinued.

The quality of life of the two groups was assessed by the COPD Assessment Scale (CAT) [18] before and 2 months after nursing. There were eight aspects, including cough, expectoration, asthma, outdoor activities, indoor activities, chest tightness, sleep and energy. Each dimension was 0-5 points. From 0 to very heavy, there were 6 levels, with a total score of 0-40. The higher the CAT score, the worse the quality of life.

At the time of discharge, the hospital's self-made nursing satisfaction questionnaire was used to evaluate the satisfaction of the two groups, including nursing attitude, health education, and communication skills. A score of <60 was dissatisfied, a score of 60-80 was basically satisfied, and a score of > 81 was satisfied ((cases of satisfied + cases of basically satisfied)/total number of cases × 100%= nursing satisfaction).

Statistical method

The data involved in this study are mainly analyzed and statistically analyzed by SPSS18.0 (Shanghai Yiyun Information and Technology Co., Ltd., China) software. The count data was represented by [n (%)]. The chi-square test was used to compare the count data between groups, and the measurement data were expressed as mean ± standard deviation (x±sd). t-test was used to compare the measurement data between groups. Paired t test was used for comparison before nursing care and after. $P<0.05$ was considered statistically significant.

Result

General information

In group A, there were 40 males and 28 females, aged 66-82 years, with an average

Table 1. General information of Group A and Group B ($\bar{x}$±sd)/[n (%)]

Category	Group A (n=68)	Group B (n=68)	t/χ^2 value	*P* value
Gender			1.139	0.286
Male	40 (58.82)	46 (67.65)		
Female	28 (41.18)	22 (32.35)		
Age	70.6±4.8	71.1±4.5	0.627	0.532
Course of disease (year)	17.2±4.9	16.7±4.3	0.632	0.528
BMI (kg/m^2)	22.29±3.91	21.84±4.07	0.658	0.512
History of smoking			0.472	0.492
Yes	34 (50.00)	30 (44.12)		
No	34 (50.00)	38 (55.88)		
Drinking history			0.121	0.728
Yes	29 (42.65)	27 (39.71)		
No	39 (57.35)	41 (60.29)		
History of hypertension			0.234	0.628
Yes	11 (16.18)	9 (13.24)		
No	57 (83.82)	59 (86.76)		
History of diabetes			0.366	0.545
Yes	5 (7.35)	7 (10.29)		
No	63 (92.65)	61 (89.71)		
NYHA classification			0.736	0.391
II	32 (47.06)	37 (54.41)		
III	36 (52.94)	31 (45.59)		
Degree of pulmonary ventilatory dysfunction			0.485	0.785
Mild	25 (36.76)	27 (39.71)		
Moderate	30 (44.12)	31 (45.59)		
Severe	13 (19.12)	10 (14.70)		
Educational level			1.379	0.710
Primary school	8 (11.76)	6 (8.82)		
Middle school	19 (27.94)	18 (26.48)		
High school	23 (33.83)	20 (29.41)		
The University	18 (26.47)	24 (35.29)		
Place of residence			0.034	0.854
City	46 (67.65)	47 (69.12)		
Rural	22 (32.35)	21 (30.88)		
WBC ($\times 10^9/L$)	8.36±0.97	8.27±1.02	0.527	0.599
RBC ($\times 10^{12}/L$)	4.27±0.83	4.31±0.94	0.263	0.793
PLT ($\times 10^9/L$)	185.16±30.28	194.37±32.59	1.707	0.090
Systolic pressure (mmHg)	121.69±12.37	125.15±12.82	1.602	0.112
Diastolic blood pressure (mmHg)	68.67±11.52	70.49±12.68	0.876	0.383

age of (70.6±4.8) years. In group B, there were 46 males and 22 females, aged 66-83 years, with an average age of (71.1±4.5) years. Group A had no significant difference in general clinical data from group B (P>0.05), including gender, age, disease duration, body mass index (BMI), smoking history, drinking history, history of hypertension, history of diabetes, NYHA classification, degree of pulmonary dysfunction, education, place of residence, white blood cell count (WBC), red blood cell count (RBC), platelet count (PLT), systolic blood pressure, and diastolic blood pressure (**Table 1**).

Better emotions after ENV

The HAMA and HAMD scores in both groups showed no significant difference before treat-

Table 2. Comparison of HAMA and HAMD scores between Group A and Group B ($\bar{x}\pm sd$)

Group	n	HAMA score		t value	*P* value	HAMD score		t value	*P* value
		Before treatment	After nursing			Before treatment	After nursing		
Group A	68	16.59±1.58	13.29±1.53	12.370	<0.001	14.26±1.48	10.31±1.67	14.600	<0.001
Group B	68	16.28±1.24	14.02±1.08	11.330	<0.001	14.09±1.25	13.44±1.52	2.724	0.007
t value	-	1.273	3.214	-	-	0.724	11.430	-	-
P value	-	0.205	0.002	-	-	0.471	<0.001	-	-

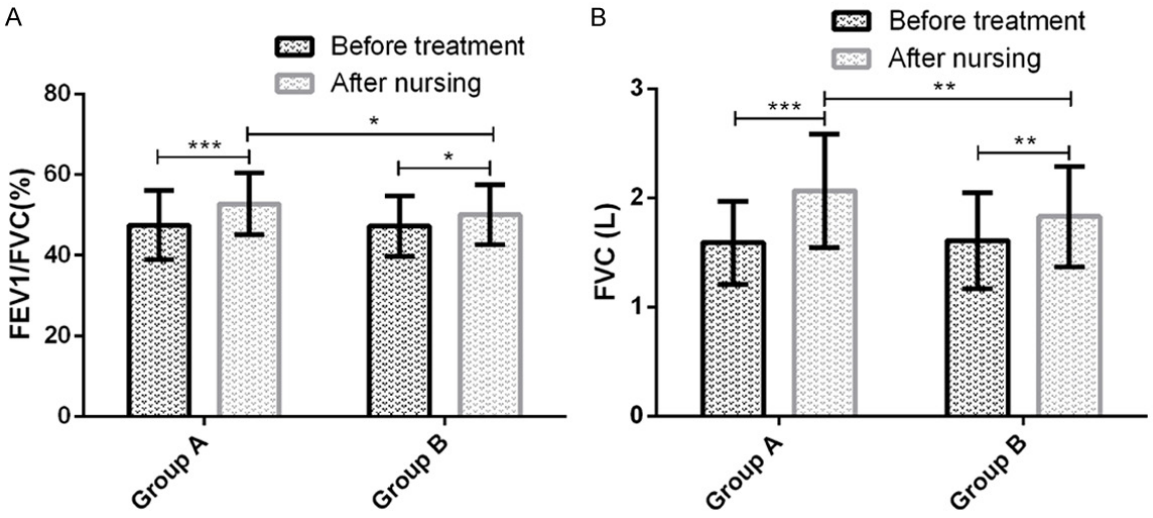

Figure 1. Comparison of HAMA scores and HAMD scores between groups A and B. Comparison of HAMA scores between group A and group B (A); Comparison of HAMD scores between group A and group B (B). Note: **P<0.01; ***P<0.001.

Table 3. Comparison of results of lung function related indicators in group A and group B ($\bar{x}\pm sd$)

Group	n	FEV1/FVC (%)		t value	*P* value	FVC (L)		t value	*P* value
		Before treatment	After nursing			Before treatment	After nursing		
Group A	68	47.53±8.61	52.79±7.66	3.764	<0.001	1.59±0.38	2.07±0.52	6.146	<0.001
Group B	68	47.25±7.53	50.13±7.45	2.242	0.027	1.61±0.44	1.83±0.46	2.850	0.005
t value	-	0.840	2.053	-	-	0.284	2.851	-	-
P value	-	0.202	0.042	-	-	0.777	0.005	-	-

ment (P>0.05). After treatment, the HAMA score and HAMD score of group A and group B were lower than those before treatment (P<0.01). After treatment, the HAMA score and HAMD score of group A were lower than those of group B (P<0.01) (**Table 2**; **Figure 1**).

Pulmonary function improved after ENV

There was no difference in FEV1/FVC and FVC between group A and group B before treatment (P>0.05). Compared with pre-treatment, FEV1/FVC and FVC in group A and group B were significantly increased (P<0.05). After treatment, FEV1/FVC and FVC in group A were higher than those in group B (P<0.05) (**Table 3**; **Figure 2**).

Cardiac function improved after ENV

There was no difference in LVEF, LVDED and 6MWD between group A and group B before treatment (P>0.05). After treatment, LVEF and

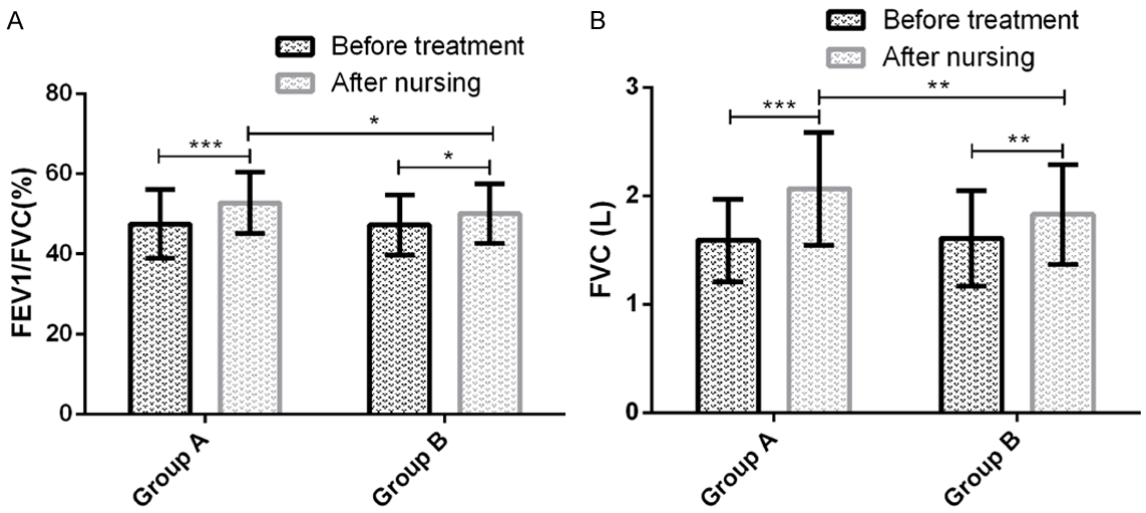

Figure 2. Comparison of lung function related indicators in group A and group B. Comparison of FEV1/FVC results between group A and group B (A); Comparison of FVC results between group A and group B (B). Note: *P<0.05; **P<0.01; ***P<0.001.

6MWD of group A and group B were higher than those before treatment (P<0.05), but LVDED was decreased (P<0.05). After treatment, the LVEF and 6MWD of group A were higher than those of group B (P<0.01), and LVDED was decreased (P<0.05) (**Table 4**; **Figure 3**).

Higher care satisfaction after ENV

In group A, 50 patients (73.53%) were satisfied, 15 patients (22.06%) were basically satisfied, 3 patients (4.41%) were unsatisfied after nursing, and nursing satisfaction was 95.59%. In group B, 37 patients (54.41%) were satisfied, 18 patients (26.47%) were basically satisfied, 13 patients (19.12%) were dissatisfied after nursing, and nursing satisfaction was 95.59%. Group A had higher satisfaction rate than group B (P<0.05) (**Table 5**).

Higher quality of life results after ENV

The CAT scores of group A and group B were (24.26±2.67) and (24.03±2.52) before treatment, and (19.04±1.53) and (21.29±1.74) after nursing respectively. There was no difference in CAT scores between group A and group B before treatment (P>0.05). After treatment, the CAT scores of group A and group B were lower than those before treatment (P<0.05), and the CAT score of group A was lower than that of group B (P<0.05) (**Figure 4**).

Discussion

COPD is a common respiratory disease with an overall incidence of 8.2% in people over 40 years of age. The main symptoms are shortness of breath, difficulty in breathing, cough, sputum, etc. The condition often persists and is prone to acute attack [19]. Most EPCHs are more serious and have the characteristics of disability and high mortality, causing serious medical burdens for patients and families [20]. In order to prevent further development of PCH, in addition to the active treatment of symptomatic treatment, appropriate nursing programs are also important for the prognosis of patients [21].

EBN is a nursing intervention model based on clinical practice and evidence. It can carry out evidence-based nursing strategies according to the reasons of inadequate nursing, and develop an individualized nursing model for patients, which has standardized and scientific characteristics [22]. EPCH has a longer course and is prone to recurrent attacks. Under the long-term mental and therapeutic economic pressure, patients will have different levels of negative emotions, which may increase cardiac load, and was not conducive to patient recovery [23]. Nursing care was performed on PCH, including health education, psychology, diet, and functional exercise. The results showed that after treatment, the adverse emotions of group A

Table 4. Comparison of results related to cardiac function in group A and group B ($\bar{x}\pm sd$)

Group	n	LVEF (%)		t value	*P* value	LVDED (mm)		t value	*P* value	6 m walking distance (m)		t value	*P* value
		Before treatment	After nursing			Before treatment	After nursing			Before treatment	After nursing		
Group A	68	41.69±6.75	48.91±6.47	6.368	<0.001	57.76±5.43	53.65±5.12	4.541	<0.001	224.67±68.25	321.49±58.19	8.902	<0.001
Group B	68	42.08±6.31	44.28±6.42	2.015	0.046	58.11±6.04	55.73±5.46	2.410	0.017	231.71±71.52	270.46±44.38	3.796	<0.001
t value	-	0.348	4.189	-	-	0.355	2.292	-	-	0.587	5.750	-	-
P value	-	0.728	<0.001	-	-	0.723	0.024	-	-	0.558	<0.001	-	-

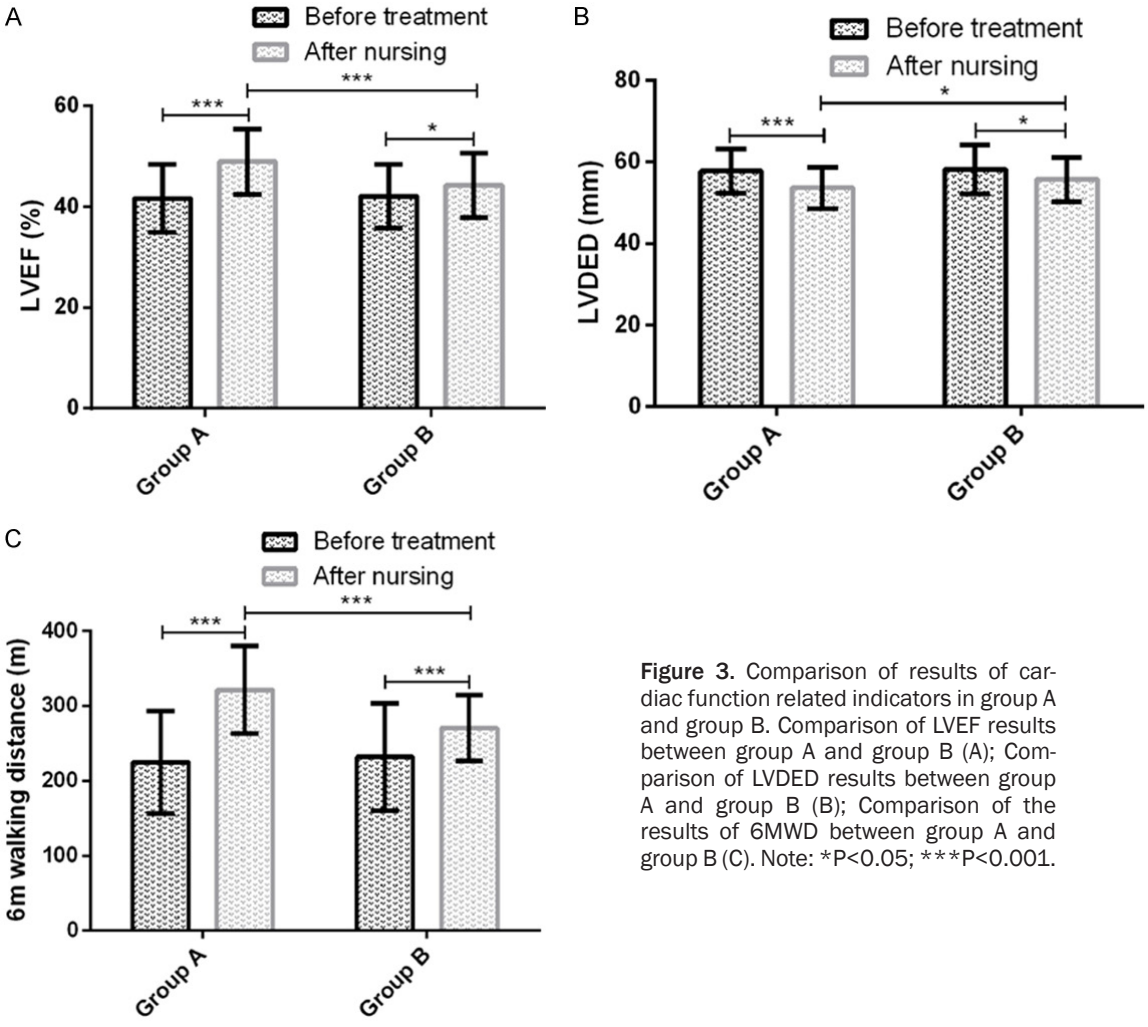

Figure 3. Comparison of results of cardiac function related indicators in group A and group B. Comparison of LVEF results between group A and group B (A); Comparison of LVDED results between group A and group B (B); Comparison of the results of 6MWD between group A and group B (C). Note: *P<0.05; ***P<0.001.

Table 5. Comparison of nursing satisfaction results between Group A and Group B [n (%)]

Group	n	Satisfaction	Basic satisfaction	Not satisfied	Satisfaction (%)
Group A	68	50 (73.53)	15 (22.06)	3 (4.41)	95.59
Group B	68	37 (54.41)	18 (26.47)	13 (19.12)	80.88
χ^2 value	-	-	-	-	7.083
P value	-	-	-	-	0.008

and group B were improved, as well as the cardiopulmonary function. This suggested that the implementation of EBN intervention on PCH can alleviate the patient's bad psychology and improve their clinical symptoms. In a report by Pumar et al. [24], anxiety and depression were a common psychological phenomenon in patients with COPD. Negative emotions, such as anxiety and depression, of patients with COPD was associated with increased length of hospital stay, mortality, exacerbation rate, as well as decreased quality of life [24]. This may be because the patient maintains a happy mood and can avoid the burden of emotional fluctuations on the patient's heart [25], and through a series of professional functional training, the patient's lung function and limb mobility can be improved. Further studies showed that after treatment, the CAT scores of group A and group B were lower than those before treatment, and the CAT score of group A was lower than that of group B after nursing. This suggested that EBN intervention can significantly improve the quality of life of patients. In the study by Mewes et al. [26], psychological factors such as disease cognition, attribution, and internal control sources were closely related to disability and quality of life. These factors should be considered when designing a treatment plan for

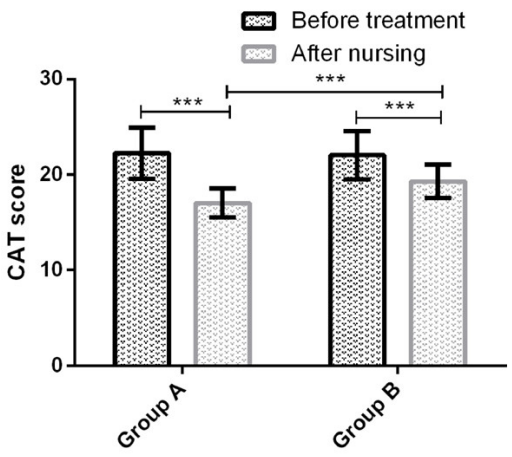

Figure 4. Comparison of CAT scores for Group A and Group B. Note: ***P<0.001.

patients with COPD, and appropriate interventions should be provided to improve disease awareness and self-management skills. This may be because after a series of interventions, patients can actively respond to treatment, alleviate their bad mood, and improve the clinical treatment effect, which have significant benefits for patients' quality of life. Finally, the patient's nursing satisfaction was investigated. The results showed that the satisfaction of group A was significantly higher than that of group B. This indicated that EBN intervention can improve the patient's satisfaction, and the patient's recognition of EBN intervention was high, which provided a strong basis for the follow-up popularization of EBN intervention in EPCH.

This study confirmed that EBN intervention had significant benefits for EPCH, but there were still some shortcomings in the study. The incidence of complications during hospitalization was not observed, and it was not known whether this mode of care can affect the patient's long-term quality of life. These shortcomings need to be further supplemented in future to further testify the conclusions of this study. In summary, EBN intervention can improve the cardiac and pulmonary function and quality of life of EPCH, which alleviated their adverse emotions and improved nursing satisfaction.

Disclosure of conflict of interest

None.

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