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Original Article

The clinical efficacy of evidence-based nursing in elderly patients with chronic obstructive pulmonary disease combined with heart failure

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Abstract: Objective: To evaluate the clinical outcomes and quality of life resulting from evidence-based nursing (EBN) in elderly patients with chronic obstructive pulmonary disease (COPD) and heart failure. Methods: 120 elderly patients with COPD and heart failure (EPCH) who were admitted to our hospital were randomly divided into a control group (CG) and an intervention group (IG) according to the principle of randomized control. The CG (n=60) received routine care, and the IG (n=60) underwent EBN. All were cared for over a period of 12 weeks and followed up for 3 months. The clinical treatment effect, compliance behavior, incidence of disease-related adverse events (DRAE), and nursing satisfaction during the follow-up period were compared, and the changes in lung function, exercise tolerance, quality of life, and self-efficacy were observed before the intervention and at 12 weeks after the intervention. Results: The total effective rate and nursing satisfaction of the IG (95.00%, 96.67%) were higher than they were in the CG (81.67%, 83.33%). The incidence of DRAE in the IG (3.33%) during the follow-up period was lower than it was in the CG (13.33%). Compared with the CG, the compliance behavior of the IG was significantly improved (P<0.05). The forced vital capacity (FVC), the first forced expiratory volume (FEV1)/FVC, and the 6-min walking distance (WD6) in the IG were higher than they were in the CG after 12 weeks of care, and the scores of the Minnesota Living with HA Questionnaire (MLWHFQ) and the European Heart Failure Self-care Behavior Scale (EHFScBS) in the IG were lower than they were in the CG (P<0.05). Conclusion: In elderly patients with COPD combined with heart failure, EBN can promote clinical efficacy and improve compliance, lung function, and quality of life, improve self-efficacy, reduce DRAE, and establish good relationships between patients and nurses.

Keywords: Chronic obstructive pulmonary disease (COPD), heart failure, evidence-based nursing (EBN), quality of life, lung function, self-efficacy

Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic progressive respiratory disease with a high incidence and a long course. Its main clinical feature is persistent airflow limitation, and patients often have airway hyperresponsiveness, which adversely affects their quality of life [1]. Elderly patients often have many cardiovascular diseases such as coronary heart disease, hypertension, and valvular heart disease. As these diseases progress, they can result in heart failure, causing an insufficient perfusion of tissues and organs and systemic circulation or pulmonary circulation. This aggravates the condition, reduces the quality of sleep, limits physical activity, and increases the difficulty of clinical care [2, 3].

Therefore, it is especially important to supplement the standard and scientific nursing measures during the treatment of EPCH to reduce the disease and improve the patients' quality of life. Evidence-based nursing (EBN) is a new care model first used by the Canadian scholar Guyatt in 1991. Under the premise of meeting the needs and wishes of patients, the specific conditions, clinical experience, and evidence-based basis are combined to develop targeted nursing measures, which can make the nursing work available [4]. In view of this, this study explores the effect of EBN on the clinical treat-

ment and quality of life of EPCH from the perspective of its clinical application, which is reported as follows.

Material and methods

General information

120 EPCH patients who were admitted to our hospital from February 2017 to September 2018 were included in the study, including 76 males and 44 females, aged 62-86 years, with a COPD duration of 3-10 years. According to the cardiac function classification of the New York Heart Disease Association (NYHA), there were 37 cases with grade II, 60 cases with grade III, and 23 cases with grade IV. According to the principle of randomized control, the patients were divided into a control group (CG) and an intervention group (IG), with 60 cases each. This study was approved by the Ethics Committee of the First People's Hospital of Wenling.

Inclusion and exclusion criteria

(1) Inclusion criteria: patients with COPD meeting the diagnostic criteria in the COPD Guidelines for Diagnosis and Treatment [5]; patients who met the diagnostic criteria in the Chinese Heart Failure Diagnosis and Treatment Guide 2014 [6], and who were clearly diagnosed based on ECG and chest X-ray films; NYHA patients with grade II-IV cardiac function; patients over 60 years old; those who were informed of the study and signed the consent form. (2) Exclusion criteria: patients with a hematopoietic system, a blood system, a circulatory system, or coagulopathy; patients with a previous history of heart transplantation and intervention; patients with constrictive pericarditis, restrictive cardiomyopathy, limb dyskinesia, or cognitive impairment; patients with impaired vital organs (brain, liver, kidney, *etc*.); patients with severe mental illness, a malignant tumor, or severe arrhythmia; patients with poor coordination and no follow-up.

Methods

All patients received routine treatment after admission, *i.e.* correction of water and electrolyte disorders, glucocorticoids, nutritional support, maintenance of acid-base balance, expectoration, and asthma.

CP: patients in the CG received routine care, including rational guidance medication, blood pressure measurement, respiratory care, condition monitoring and basic care.

IG: patients in the IG underwent EBN, and the specific measures were as follows: (1) form an evidence-based team. The members include one attending doctor, one head nurse (team leader), one statistician, two nursing researchers, and four responsible nurses. The head nurse concentrates on the practical operation ability and knowledge of the team members, and fully evaluates the lung function, exercise tolerance and cardiac function level of all patients, and puts forward relevant nursing difficulties and problems in combination with past case data and patient specific conditions. (2) Evidence-based support. Key words were entered into databases such as China Knowledge Network, Wanfang Database, and *Weipu Journal* to consult and retrieve relevant literature, and the authenticity and reliability of the literature were evaluated according to the patients' actual conditions and demands as well as the existing conditions of the hospital. After discussion by experts, the best evidence-based evidence was selected. (3) Evidence-based practice. ① Cognitive behavior intervention. According to the patient's education level, age and understanding ability, targeted health education will be provided to the patients by distributing propaganda and educational materials, conducting knowledge lectures, developing publicity boards, role-playing and other forms. The mental health status of patients was evaluated through observation and chat. The specific pathogenesis, treatment methods, matters needing attention and prevention of the disease were explained to the patients in simple and amiable language to make them have a clearer understanding of the disease. Smokers were advised to give up smoking, and patients were provided with comprehensive health education, including drug knowledge, diet knowledge, psychological knowledge, health knowledge, *etc*., to comfort and encourage patients, and actively guide patients to learn from each other and exchange treatment experience, so that they can face the disease with a positive and optimistic attitude. ② The respiratory tract was kept open. The medical staff helped the patient to take a semi-recumbent position or a sitting position, which was warm and soft, and

Table 1. Comparison of the two groups' general data

Group	Male/Female	Age (years)	Duration of COPD (year)	NYHA heart function classification		
				Level II	Level III	Level IV
Control group (n=60)	39/21	72.41±3.25	6.41±1.32	20	29	11
Intervention group (n=60)	37/23	73.12±3.17	6.36±1.24	18	30	12
$\chi^2/Z/t$	0.144	1.211	0.214		1.767	
P	0.705	0.228	0.830		0.077	

Table 2. Comparison of the clinical therapeutic effects between the two groups n (%)

Group	Markedly effective	Effective	Ineffective	Total effective rate
Control group (n=60)	19 (31.67)	30 (50.00)	11 (18.33)	49 (81.67)
Intervention group (n=60)	34 (56.67)	23 (38.33)	3 (5.00)	57 (95.00)
χ^2				5.175
P				0.023

Note: total effective = cased of markedly effective + cases of effective.

the clothes were loose to avoid restricting breathing movement. For those whose respiratory secretions were thick and increased, measures to reduce sputum can be implemented to promote drainage. ③ Reasonable oxygen therapy. Patients should be informed of the importance and necessity of continuous low-flow oxygen inhalation before oxygen therapy to improve their compliance. The low-flow rate of the nasal cannula was set to 1.5-2 L/min for inhalation and oxygen supply, and the concentration was set to 25%-30%. High-flow oxygen inhalation measures were performed about 2 min before and after breathing in. The nasal cannula patency and oxygen leaks were checked, and the nasal cannula was replaced regularly to maintain the appropriate temperature and humidity of oxygen (37°C, 80%). ④ Exercise tolerance and breathing function exercise. If the heart and lung functions can be tolerated, the patient will be instructed to exercise appropriately, such as Qigong, Taiji, *etc*., or individualized endurance trainings. The intensity was controlled at 60%, 20-30 min each time and 3-4 times per week. By playing a video or viewing live demonstrations, the patient can master the breathing function exercises such as diaphragmatic lip retraction, lip retraction, and abdominal breathing to improve lung capacity. ⑤ Liquid intake and volume were closely monitored at 24 h. The patient's fluid intake and volume were measured and recorded daily, and the abdominal circumference was increased for those with ascites. For those who used diuretics and cardiotonic drugs, urine volume, heart rate and blood pressure should be closely monitored. In the case of gastrointestinal symptoms and an abnormal heart rate, the electrocardiogram should be checked regularly. ⑥ Diet nursing. The diet should be low in fat and sodium, high in protein and easy to digest. Patients should pay attention to the amount of protein and sugar, eat a small amount of animal fat, appropriate hairtail, shells, and other seafood, as well as food rich in potassium, dietary fiber and vegetables, fruits, and so on.

Measurement outcomes

(1) Clinical therapeutic effect. Markedly effective means that the patient's NYHA cardiac function improved > level 3, and most of the clinical symptoms disappeared after 12 weeks of nursing. Effective means that NYHA heart function was improved for 1-2 levels and the clinical symptoms were improved. Ineffective means that NYHA's cardiac function and clinical symptoms were not improved or the condition was aggravated. (2) Lung functions and exercise tolerance. Forced vital capacity (FVC) and first forced expiratory volume (FEV1) were measured using a pulmonary function test, and the FEV1/FVC values were calculated, and the 6-min walking distance (WD6) was recorded before and after 12 weeks of care. (3) After 12 weeks of nursing, the patients' compliance status in six aspects was statistically analyzed by the self-designed Compliance Behavior Questionnaire (sCBQ), including reasonable diet, proper exercise, regular return visits, drug taking, abstinence from tobacco and alcohol, and

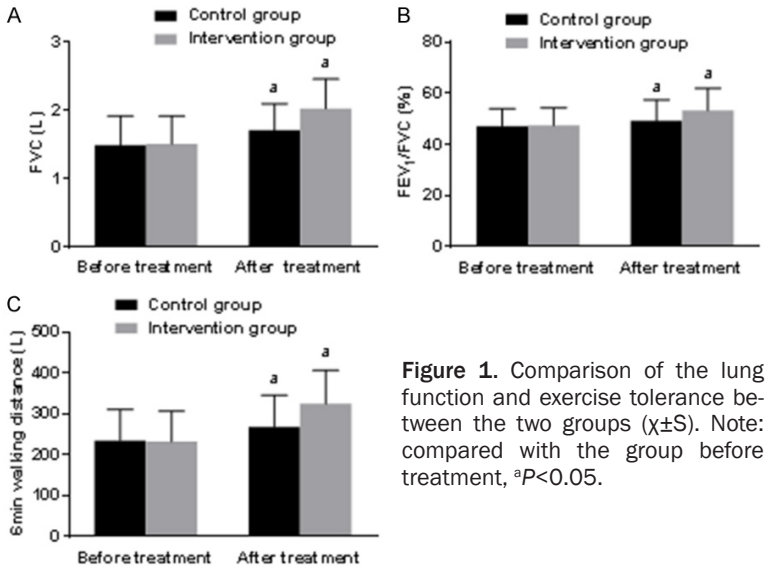

Figure 1. Comparison of the lung function and exercise tolerance between the two groups (χ±S). Note: compared with the group before treatment, [a]$P<0.05$.

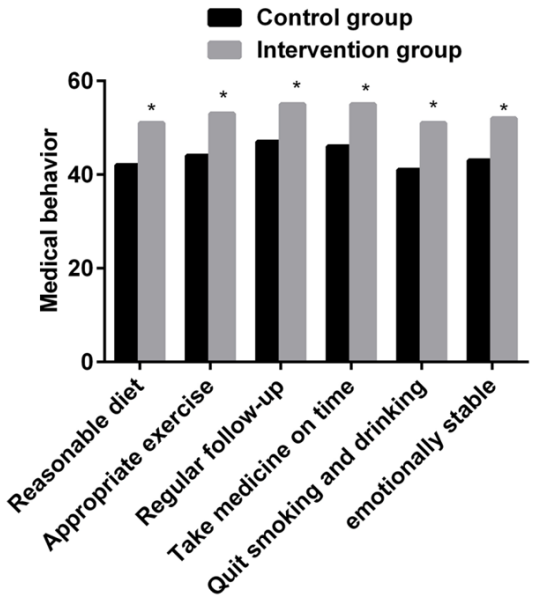

Figure 2. Comparison of the compliance behaviors between the two groups after 12 weeks of care n (%). Note: compared with the group before treatment, [a]$P<0.05$.

emotional stability. The Cronbach's coefficient was 0.784 and the retest reliability was 0.792. (4) Living quality and self-protection ability. The patient's living quality and self-care behavior were evaluated using the Minnesota Living with HA Questionnaire (MLWHFQ) [7] and the European Heart Failure Self-Care Behavior Scale (EHFScBS) [8] before and after 12 weeks of care. The maximum possible score of the MLWHFQ is 100 points, and the quality of life is proportional to the score. The maximum possible score of the EHFScBS is 60 points, and the self-protection ability is inversely proportional to the score. (5) Disease-related adverse events (DRAE). After 3 months of follow-up, the incidences of myocardial infarction, angina pectoris, and respiratory infection were counted. (6) Nursing satisfaction. At the time of discharge, the self-designed nursing satisfaction questionnaire of the hospital was issued to the patients from the aspects of nursing quality, nursing attitude, health education and communication skills. Satisfaction included very satisfied, generally satisfied and dissatisfied. The Cronbach's α of the questionnaire was 0.801 and the test-retest reliability was 0.812. The full score of satisfaction is 100 points, of which ≥80 points indicates very satisfied, 60-79 points indicates generally satisfied, and ≤59 indicates dissatisfied.

Statistical analysis

The data analysis was performed using SPSS 21.0 statistical software. The measurement data were expressed as (*χ±S) with a *t* test. The count data were expressed as a percentage, with an χ^2 test. $P<0.05$ was considered statistically significant.

Results

Comparison of the clinical data

The basic data of the two groups were in accordance with a normal distribution, and the differences were not statistically significant, indicating they were comparable (**Table 1**).

EBN can improve the clinical treatment effect of EPCH

The total effective rate of clinical treatment in the IG (95.00%) was higher than it was in the CG (81.67%) ($P<0.05$). It is suggested that EBN can significantly improve the clinical efficacy of EPCH (**Table 2**).

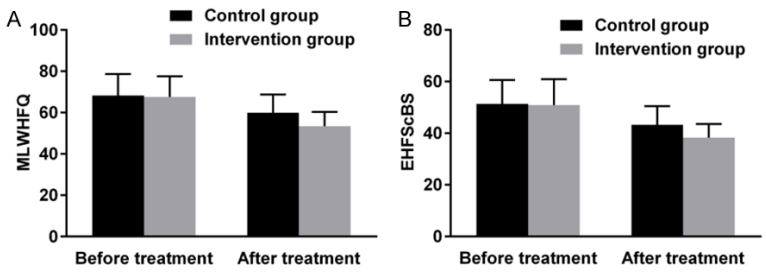

Figure 3. Comparison of the two groups in their MLWHFQ and EHFScBS scores.

EBN helps improve lung function and exercise tolerance

The FVC, FEV1/FVC, and WD6 values in the pre-treatment IG were similar to those of in the IG ($P>0.05$). The FVC, FEV1/FVC and WD6 values were higher in the IG than they were in the CG after 12 weeks of care ($P<0.05$). It is suggested that EBN can be more beneficial to the recovery of lung function in EPCH (**Figure 1**).

EBN can improve patients' compliance behavior

After 12 weeks of nursing in the IG, reasonable diet, appropriate exercise, regular follow-up, on-time medication, abstinence from tobacco and alcohol, and emotional stability were higher than they were in the CG ($P<0.05$). It is suggested that EBN can be more conducive than EPCH to rationally arrange the diet, an appropriate increase in exercise, and regular follow-up and other improvements in compliance with medical behavior (**Figure 2**).

EBN is conducive to the improvement of the patients' living quality and the improvement of their self-care ability

The MLWHFQ and EHFScBS scores in the IG before treatment were similar to those in the IG ($P>0.05$). The MLWHFQ and EHFScBS scores in the IG were lower than they were in the CG after 12 weeks of care ($P<0.05$). It is suggested that EBN can improve the quality of life and the self-care ability of EPCH (**Figure 3**).

EBN helps prevent the occurrence of DRAE

The incidence of DRAE was lower in the IG than it was in the CG ($P<0.05$). It is suggested that EBN can reduce the incidence of myocardial infarction, angina pectoris, and respiratory infection in EPCH (**Table 3**).

EBN can improve nursing satisfaction

In the CG, 22 cases were very satisfied, 28 cases were generally satisfied, and 10 cases were dissatisfied, for a total satisfaction rate of 83.33% (50/60). In the IG, 37 cases were very satisfied, 21 cases were generally satisfied, and 2 were dissatisfied, for a total satisfaction rate of 96.67% (58/60). The nursing satisfaction in the IG was higher than it was in the CG ($\chi^2=5.926$, $P=0.002$). It is suggested that EBN can significantly improve the nursing satisfaction of EPCH and the relationships between nurses and patients (**Figure 4**).

Discussion

Heart failure refers to myocardial damage caused by inflammation, hemodynamic overload, a rapid heart rate, myocardial infarction, *etc.*, and is the end stage of many cardiovascular diseases [9, 10]. At present, EPCH is often treated with oxygen therapy, nebulization, and glucocorticoids. These can improve the lung ventilation and respiratory functions of patients to a certain extent, but because the elderly patients have weaker organs, a lower compliance behavior, and lack the relevant knowledge and skills of the nursing staff, the clinical treatment effect often fails to meet expectations [11, 12]. Therefore, determining how to improve patients' compliance, compatibility, and their living quality has gradually attracted clinical attention.

With the development of medical treatment, patients' requirements for the quality of nursing are also rising. The guiding ideology of EBN is to follow the patient-centered concept of care, with evidence of high credibility and valuable scientific research, and to extend the field of medicine to the field of nursing with a nursing procedure as the framework. It provides patients with humanized and standardized nursing services to meet their psychological, physiological, spiritual, cultural and social needs, thereby stabilizing the disease and accelerating the rehabilitation process [13-15]. The

Table 3. Comparison of the DRAE incidence rates between the two groups during follow-up (n)

Group	Myocardial infarction	Angina pectoris	Respiratory infection	Total
The control group (n=60)	3 (5.00)	2 (3.33)	3 (5.00)	8 (13.33)
The intervention group (n=60)	1 (1.67)	0 (0.00)	1 (1.67)	2 (3.33)
χ^2				3.927
P				0.048

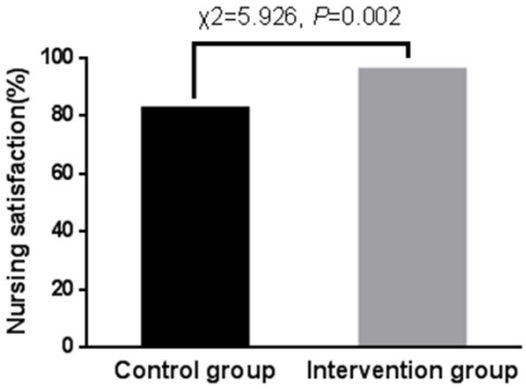

Figure 4. Comparison of the two groups in terms of nursing satisfaction. It can be seen from **Figure 4** that EBN significantly improved nursing satisfaction.

results of this study showed that the total effective rates of clinical treatment and FVC, FEV1/FVC, and WD6 values in the IG after 12 weeks of care were higher than they were in the CG, and the compliance behavior was also better. It can be seen that EBN can promote the improvement of lung and heart functions in EPCH as well as exercise tolerance. The reason is that routine care is often a spoon-feeding education mode, which often neglects the improvement of patients' cognitive behavior and fails to fundamentally correct patients' wrong thinking and reduce their treatment compliance [16]. In EBN, through active communication with patients, medical staff can patiently explain the relevant guidance of diseases and treatments to patients and their families so that they understand the importance of treatment and care. Patients face the disease with a positive and optimistic attitude, which to some extent improves their compliance behavior and reduces the work difficulty of medical staff [17-19]. Targeted health education is carried out on patients through a variety of forms such as lectures on knowledge and the dissemination of mission materials. This can encourage patients to have a clearer understanding of the disease and their own situations, *etc*., reduce their negative emotions and avoid exacerbating the condition due to men-tal stress and over-excitement. The patient selects the appropriate position and keeps the respiratory tract open at all times. If necessary, the thinning sputum can be used to promote drainage and avoid the obstruction of the respiratory tract. Medical staff should encourage patients to properly perform individualized endurance exercises, *etc*., which can promote cardiac function recovery, improve lung capacity and exercise tolerance. At the same time, a reasonable control of the temperature and humidity of the oxygen can prevent cold or dry oxygen from irritating the respiratory mucosa [20, 21]. EPCH involves many basic diseases. The living quality of the patients is generally low and they often face the treatment negatively due to its long course and the duration of the disease and the tendency to recurrent attacks, as well as the influence of factors such as sleep quality, family pressure, and long-term treatment [22]. In this study, the MLWHFQ and EHFScBS scores of the IG were lower than they were in the CG after 12 weeks of care. During the follow-up period, only one case of myocardial infarction and one case of respiratory infection occurred, and the total satisfaction was 96.67%. It can be seen that the implementation of EBN during the treatment of such patients can improve their living quality and self-management behavior, reduce the risk of adverse events, improve prognosis, and generate a high patient acceptance rate. The EBN team analyzes the problems that arise in clinical care work, and develops and implements care plans based on a patient's actual conditions, scientific research results, and hospital conditions. These can circumvent the blindness of routine care, optimize workflow, and improve work efficiency [22, 23]. Through psychological, physical, social and other comprehensive care, the patients can be actively involved in their treatment. In the process of nursing, a patient's self-responsibility and participation are emphasized, and self-management awareness is established to maximize the initiative, thereby improving self-care ability and living quality. In addition, nursing

staff can improve mutual trust and reduce medical disputes by establishing good relationships with patients [24, 25]. However, the content of this study can be improved. In future research, it is necessary to extend the follow-up time, expand the sample size, and conduct a multi-center, randomized controlled prospective study to further explore the clinical application and social and economic benefits of EBN.

In summary, EPCH patients who undergo EBN can experience clinical efficacy and improved compliance, lung functions, and quality of life, an improved self-efficacy, reduced DRAE, and can establish good relationships between patients and nurses.

Disclosure of conflict of interest

None.

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