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Effect of E-Coach on Disease Management and Lung Function in Elderly COPD Patients

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Abstract: *To investigate the impact of the Internet Health Coach (E-Coach) nursing model on disease management and lung function in elderly patients with chronic obstructive pulmonary disease (COPD), a total of 98 COPD patients who visited our hospital from January 2021 to January 2022 were selected. They were randomly divided into observation and control groups, with 49 patients in each group. The control group received routine continuous care, while the observation group was provided with the E-Coach nursing model for a constant intervention period of 3 months. The study compared the disease management ability, lung function, and self-efficacy levels of the two groups. One year after discharge, the study also compared the frequency of acute exacerbations and quality of life between the two groups. After the nursing intervention, the health knowledge level, self-care skills, self-care responsibility, and self-concept self-care ability (ESCA) scores were all higher than before the intervention, and the observation group scored significantly higher than the control group (P<0.05). After the nursing intervention, the forced vital capacity (FVC), first-second forced expiratory volume (FEV1), and maximum voluntary ventilation (MVV) scores were all higher than before the intervention, and the observation group scored significantly higher than the control group (P<0.05). After the nursing intervention, the self-efficacy scores for disease information, exercise, symptom management, and dietary management were all higher than before the intervention, and the observation group scored significantly higher than the control group (P<0.05). One year after discharge, the World Health Organization Quality of Life Index (WHOQOL-100 score) for both groups was higher than before the intervention, and the observation group scored significantly higher than the control group (P <0.05), the number of acute attacks and readmission in the observation group was lower than that in the control group (P <0.05). E-coach nursing mode can improve the disease management ability and lung function level of elderly COPD patients, reduce the number of COPD acute attacks, and improve the quality of life.*

Keywords: *Internet Health Coach Care, Chronic Obstructive Pulmonary Disease, Lung Function, Disease Self-Management Ability, Quality of Life*

1. Introduction

Chronic obstructive pulmonary disease (chronic obstructive pulmonary disease, COPD) is a chronic bronchitis or emphysema with airflow obstruction characteristics. Airflow limitation develops progressively and has a high mortality and disability rate. Patients in the acute phase are clinically manifested by cough, wheezing, and dyspnea, which are more common in the elderly population[1-2]. Some patients often have adverse emotions due to the lack of knowledge about the disease, which affects the prognosis and recovery of patients. Moreover, elderly patients have relatively poor compliance and self-management ability after discharge, which is easy to leads to disease aggravation and recurrence, which not only affects the level of lung function of patients but also affects the quality of life of patients and aggravates the economic burden of families[3-4]. Therefore, selecting appropriate nursing intervention methods to promote healthy behaviors among patients is of great significance. The Internet Health Coach (E-Counselor) nursing model integrates and optimizes health coaching techniques with Internet platforms, creating a chronic disease management model that extends from hospitals to homes. This model, implemented by doctors and nurses, is centered on patient needs and focuses on behavior change. It encourages patients to set personal goals and discover their own potential, fostering healthy behaviors. Currently, this model has achieved significant success in managing hypertension[5-6]. However, there are relatively few reports on the application of COPD patients. Therefore, this study aims to explore the application effect of the E-Coach nursing mode on elderly COPD patients.

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1.1 General information

A total of 98 COPD patients who visited our hospital from January 2021 to January 2022 were selected. Inclusion criteria: in accordance with the diagnostic guidelines of COPD[7]. All patients underwent symptomatic treatment and entered the rehabilitation phase. The hospital's ethics committee approved the study, and both the patients and their families provided informed consent. Exclusion criteria included liver and kidney dysfunction, concurrent malignant tumors, autoimmune diseases, and a history of mental illness. A total of 98 patients were randomly divided into an observation group and a control group, with 49 patients in each group. The male patients numbered 32, and the female patients numbered 17, their average age was 50.47±2.64 years, ranging from 45 to 56 years old, the average duration of the disease was 5.39±0.67 years, ranging from 4 to 7 years. In the control group, there were 30 male patients and 19 female patients, their average age was 50.55±2.53 years, ranging from 45 to 56 years old, the average duration of the disease was 5.46±0.57 years, ranging from 4 to 7 years. There were no significant differences in gender, age, or disease duration between the two groups (P> 0.05).

1.2 Nursing methods

The control group was given routine continuous care, and before discharge, they were instructed to use drugs reasonably, maintain healthy behavior and life, provide telephone consultation services, and provide routine diet and drug health education.

The observation group adopted the E-Coach nursing model. (1) A specialized team was formed, led by the head nurse and comprising 2 specialized nurses, 3 responsible nurses, and 2 respiratory medicine attending physicians, all with at least 5 years of experience. (2) The implementation involved E-Coach management based on relevant literature and books. The specialized nurses were the implementers, while other E-Coach members provided assistance in formulating the 8 steps of health education. Contact: After enrollment, the team proactively engaged with patients to establish connections, collect clinical data, and develop nursing plans. Observation: Based on patients' health needs, the nursing staff provided continuous and personalized online health education. Clinical physicians also conducted online assessments and provided guidance based on patients' dietary and nutritional status. Reinforcement: The team promptly addressed patients' daily issues, conducting weekly online follow-ups in the first month after enrollment, and biweekly follow-ups in the second and third months. The content primarily included medication guidance, lifestyle advice, and encouragement for patients to follow their health education plans. Clarification: When patients experienced acute COPD attacks or reduced medication adherence, the nursing staff provided appropriate interventions, guiding patients on correct medication use, monitoring their condition, and advising them to seek medical help. They also assisted patients in analyzing the causes and promoting the implementation of their health plans. Assistance: The nursing staff assessed patients' disease levels and needs, and adjusted the care plan when necessary mobilized resources, invited a team of rehabilitation experts and pharmacists to develop and track the effectiveness of the plan. Encourage family members to participate, helping to monitor the patient and provide behavioral motivation. During each follow-up visit, use positive praise to encourage the patient, helping them build confidence in early rehabilitation. Educate by creating COPD-related educational videos and health tips, providing guidance and support for COPD management and care. Guide patients to adopt healthier behaviors, strengthen their health beliefs, and encourage them to share their experiences and insights on COPD management, thereby enhancing their internal motivation and sense of purpose. Both groups continued to intervene for 3 months.

1.3 Observation indicators

1.3.1 Comparison of disease management ability between the two groups

The self-care ability measurement scale (exercise of self-care agency scale, ESCA) was used before and after nursing[8]. The patient's disease management ability was assessed, including self-care skills (12 items), self-care responsibility (8 items), self-concept (9 items) and health knowledge level (14 items), a total of 43 items, each with a score of 0~4 points, and the total score was 172 points. The higher the score, the stronger the self-care ability.

1.3.2 Comparison of lung function levels between the two groups

The lung function of patients was tested by St-75 pulmonary function instrument (Fukuda Industries Co., LTD., Japan) before and after nursing, and the changes of forced vital capacity (FVC), forced expiratory volume in the first second (FEV1) and maximum voluntary ventilation (MVV) were recorded,

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and the percentage of FVC, FEV1 and MVV to the predicted value was measured respectively.

1.3.3 Comparison of self-efficacy levels between the two groups

The self-efficacy scale (GSES) was used before and after nursing[9]. The patient's self-efficacy was assessed by using a 4-point scale with a total score of 10 to 40 points, including disease information, exercise scale, symptom management, and diet management. The higher the total score, the higher the self-efficacy level.

1.3.4 Comparison of the number of acute attacks and quality of life between the two groups

One year after discharge, no cases were lost to follow-up. The number of acute attacks and quality of life after discharge were compared between the two groups. The World Health Organization Quality of Life Measurement Scale (WHOQOL-100) was used [10]The quality of life was evaluated, including physical and mental health, social relations, and the health of the surrounding environment, with a total of 24 items, each with four questions, each with a score of 1 to 5 points. The higher the score, the better the quality of life.

1.4 Statistical treatment

SPSS 22.0 statistical software was used to sort and analyze the clinical data of elderly COPD patients included in this study. The measurement data that met the normal distribution and homogeneity of variance were used ($\bar{x} \pm s$) indicating that the independent two-sample t-test is used to compare the differences between the two groups before and after nursing with two nursing methods, and the rate is used to express the count data, and χ^2 is used. The test showed that $P<0.05$ was statistically significant.

2. Results

2.1 Comparison of disease management ability between the two groups

There was no significant difference in the scores of health knowledge, self-care skills, self-care responsibility, and self-concept between the two groups before nursing ($P>0.05$). After nursing, the scores of health knowledge, self-care skills, self-care responsibility, and self-concept were all higher than that before nursing, and the observation group was higher than the control group ($P<0.05$), as shown in Table 1.

Table 1 Comparison of disease management ability between the two groups ($\bar{x} \pm s$)

group	Example	Knowledge of health (points)		Self-care skills (sub)		Self-protective responsibility (points)		Self-concept (sub)	
		Before care	After the care	Before care	After the care	Before care	After the care	Before care	After the care
observation group	49	31.26±5.24	41.25±6.35*	26.37±4.58	38.47±5.28*	18.45±3.58	32.16±5.12*	21.46±5.48	36.47±6.39*
control group	49	30.47±5.16	37.59±6.28*	25.44±4.16	34.39±5.14*	18.14±3.69	26.49±5.32*	20.15±5.23	30.46±6.17*
t	-	0.704	2.687	0.985	3.63	0.395	5.035	1.133	4.436
P	-	0.483	0.008	0.327	<0.001	0.693	<0.001	0.26	<0.001

Note: Compared with pre-care,*P<0.05

2.2 Comparison of lung function levels between the two groups

There was no significant difference in FVC, FEV1 and MVV between the two groups before nursing ($P>0.05$). After nursing, FVC, FEV1 and MVV in both groups were higher than that before nursing, and the observation group was higher than the control group ($P<0.05$), as shown in Table 2.

Table 2 Comparison of lung function levels between the two groups ($\bar{x} \pm s$)

group	Examples	FVC(%)		FEV1(%)		MVV(%)	
		Before care	After the care	Before care	After the care	Before care	After the care
observation group	49	68.84±6.78	89.32±8.94	64.67±6.52	82.27±8.03	53.62±5.33	64.49±6.51
contrast	49	68.76±6.05	80.15±8.33	64.83±6.51	74.49±7.52	53.74±5.64	58.85±5.96
t	-	0.057	4.863	0.113	4.583	0.101	4.141
P	-	0.954	<0.001	0.911	<0.001	0.921	0.001

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2.3 Comparison of self-efficacy levels between the two groups

After nursing, the GSES scores of disease information, exercise, symptom management, and diet management in both groups were higher than those before nursing, and the observation group was higher than the control group (P<0.05), as shown in Table 3.

Table 3 Comparison of GSES scores between the two groups of patients ($\bar{x} \pm s$)

group	Example	Disease information (sub)		Physical exercise (divided)		Symptom management (sub)		Dietary management (sub)	
		Before care	After the care	Before care	After the care	Before care	After the care	Before care	After the care
observation group	49	2.17±1.05	6.57±1.24*	3.54±1.16	7.85±1.56*	2.47±1.20*	7.42±2.23*	3.58±1.26*	8.01±1.08*
control group	49	2.07±1.01	4.28±1.11*	3.26±1.12	5.29±1.31*	2.17±1.16*	5.71±1.25*	3.36±1.18*	6.43±2.17*
t	-	0.499	10.017	1.264	9.148	1.309	4.869	0.927	4.972
P	-	0.618	<0.001	0.209	<0.001	0.194	<0.001	0.355	<0.001

Note: Compared with pre-care,*P<0.05

2.4 Follow-up 1 year after discharge, and comparison of acute attack, readmission, and quality of life between the two groups

One year after discharge, the WHOQOL-100 scores of both groups were higher than those before nursing, and the observation group was higher than the control group (P<0.05). The number of acute attacks and readmission in the observation group was lower than that in the control group (P<0.05), as shown in Table 4.

Table 4 Comparison of acute attack, readmission and quality of life between the two groups after 1 year follow-up ($\bar{x} \pm s$)

group	Example	WHOQOL-100 (points)		Number of acute cases	Number of readmissions
		Before care	One year after discharge		
observation group	49	40.65±9.98	83.45±8.89*	9(18.37)	3(6.12)
control group	49	40.98±9.66	75.32±8.34*	18(36.73)	10(20.41)
χ^2/t	-	0.167	4.668	4.141	4.346
P	-	0.868	<0.001	0.042	0.037

Note: Compared with pre-care,*$P<0.05$

3. Discussion

In recent years, with the continuous change in people's lifestyles, the incidence of COPD has been increasing year by year. COPD has the characteristics of long course, low disease awareness, and low control rate. Because most patients are elderly, they still need long-term care after discharge[11]. The E-Coach nursing model is fundamentally a continuous care approach. In the context of the Internet as a platform, it enables healthcare providers to offer comprehensive health education to patients, simplifying and enhancing communication between healthcare providers and patients, and addressing patient needs. This model is highly feasible and urgent, especially in today's aging population, aligning well with the long-term development of modern medical care.

This study found that the E-Coach nursing model improved COPD patients' health knowledge, self-care skills, self-care responsibility, and self-concept scores compared to pre-nursing levels, with the observation group showing higher improvements than the control group. This suggests that the E-Coach nursing model can enhance the disease management capabilities of elderly COPD patients. The reason for this improvement is that elderly COPD patients are still in the recovery phase after discharge, with their physical functions not fully restored, which affects their self-management abilities in daily life. This was found by researchers including An Li[12-13]. The relationship between the health behaviors of COPD patients and disease control is closely linked. Traditional clinical nursing methods often fail to effectively monitor patients, making it difficult to control their diseases and improve their disease management skills. After forming specialized teams, nursing staff collaborate in multidisciplinary efforts to develop personalized health education plans for patients, continuously reinforce these plans, and provide timely encouragement and supervision. Good communication between medical staff and patients can help patients develop good adherence to medical advice, promoting recovery and health care. After doctors diagnose and treat the disease, nurses actively support patients in their recovery, helping them understand

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their health status after discharge and providing health guidance and assistance. This not only enhances patients' knowledge and skills in disease control but also boosts their confidence in treatment.

In this study, after nursing, the FVC, FEV1, and MVV of both groups were higher than that before nursing, and the observation group was higher than the control group. FVC, FEV1, and MVV are common indicators to evaluate the level of patients' lung function[14]. The results of this study indicate that the clinical application of the E-Coach nursing model is beneficial for improving patients' lung function. The reasons for this are as follows: the integrated health management by medical and nursing staff, which includes daily behavioral interventions, medication guidance, health education, and functional exercises, continues to benefit patients even after discharge. This enhances patients' knowledge and awareness regarding COPD treatment, encourages them to change unhealthy lifestyles, addresses negative emotions, and boosts their confidence in overcoming the disease, all of which contribute to the improvement and recovery of lung function.

The results of this study showed that after nursing, the GSES scores of disease information, exercise, symptom management, and diet management in both groups were higher than that before nursing, and the observation group was higher than the control group, suggesting that the application of E-Coach nursing mode can improve patients self-efficacy level, as previously proposed by Zhao Xiaolei et al[9,15]. A high level of self-efficacy positively influences individual behavior. In this study, nursing staff consistently focused on patient health, emphasizing the importance of patient enlightenment and education. Through the integration of medical and nursing services and ongoing collaboration with patients, the initiative to engage patients in COPD disease management was fully mobilized, leading to the development of good health habits, which improved chronic disease management outcomes. One year after discharge, both groups showed higher WHOQOL-100 scores compared to before the nursing intervention, with the observation group scoring higher than the control group. The observation group also had fewer acute exacerbations and rehospitalizations compared to the control group, indicating that the E-Coach nursing model is effective in controlling COPD acute exacerbations and improving patients' quality of life, demonstrating excellent health education outcomes, making it worthy of application and promotion.

In conclusion, the E-Coach care model can improve the disease management ability and lung function level of elderly COPD patients, reduce the number of COPD acute attacks, and improve the quality of life.

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