

The Effect of O2O Education Combined with Peer Education Management Model in Patients with Chronic Obstructive Pulmonary Disease

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Abstract: *Objective:* To explore the effect of online-to-offline (O2O) education combined with the peer education management model in patients with chronic obstructive pulmonary disease (COPD). *Methods:* Using convenience sampling, 72 patients with COPD who were hospitalized in the respiratory medicine department of a tertiary-level hospital from March to December 2021 were selected as study subjects. Randomized grouping was carried out using the random number table method, the control group was given routine COPD health education in the department, and the intervention group applied O2O trinity health management combined with peer education on the basis of routine care. After 6 months of follow-up after discharge, the two groups were observed and compared for changes in pulmonary function, depression status, self-care ability, and quality of life. *Results:* At 3 and 6 months after the intervention, the lung function indexes and depression status of the two groups of patients improved significantly, and the improvement effect was more significant in the intervention group ($P < 0.05$); after the intervention, the self-care ability scores of the patients in the intervention group were significantly higher than those of the control group ($P < 0.05$); the quality-of-life scores of the two groups of patients decreased at 3 months after discharge, in which the quality-of-life scores in the intervention group was significantly lower than that of the control group ($P < 0.05$). *Conclusion:* O2O education combined with the peer education management model can effectively improve the lung function of patients with COPD, depression, self-care ability, and quality of life.

Keywords: Online-to-offline education; Chronic obstructive pulmonary disease; Self-care ability; Quality of life

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common chronic respiratory disease in respiratory medicine, with high lethality and morbidity^[1], and ranks first in the economic burden of disease among residents in China^[2]. Scientific and reasonable health education^[2] can delay the progression of lung function damage in stable patients, alleviate dyspnea symptoms, reduce the number of acute exacerbations, improve patients' daily life and self-care ability^[3], and enhance the quality of life. 2017 Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) guidelines^[4] pointed out that by strengthening health education for

patients with COPD, the level of patients' knowledge of COPD can be improved, prompting changes in patients' behaviors, so that the conditions of COPD patients can be better controlled. In the construction of a healthy China, actively preventing the progression of chronic diseases, improving the outcome of chronic diseases, and improving the quality of life of elderly patients have become the primary issues in the health management of the elderly. In order to achieve good COPD patient management, our hospital has built a combined online-to-offline (O2O) health education model for COPD patients with doctors, nurses, and patients, as well as combined peer education among patients to improve patient compliance, enhance lung function, and improve quality of life.

2. General information and methods

2.1. General information

A convenience sampling method was used to select 72 cases of patients with chronic obstructive pulmonary disease in the respiratory department of a tertiary-level hospital in Shaanxi Province from March to December 2021. Inclusion criteria included COPD diagnosis was in accordance with the Guidelines for Primary Diagnosis and Treatment of Chronic Obstructive Pulmonary Disease (2018) [5]; patients who did not participate in other chronic obstructive pulmonary health education; patients who had no difficulty in communication; patients who could use smartphones; and patients who voluntarily participated in this study. Exclusion criteria were patients who had other malignant tumors and severe cardiovascular diseases; patients who were bedridden for a long period of time and could not take care of themselves; and patients who withdrew during the study period without any reason. In order to avoid interference between groups, the groupings were made according to the order of admission, with 36 patients from March to July 2021 as the control group and 36 patients from August to December 2021 as the intervention group. All study subjects signed an informed consent form and participated in this study voluntarily.

2.2. Research methods

The patients in the control group implemented routine COPD health education in the department as follows.

- (1) Pulmonary function rehabilitation exercise: Patients are taught to do lip-contracting abdominal breathing during hospitalization, and patients are led to do respiratory rehabilitation exercises in the morning every day.
- (2) Medication guidance, daily life and psychological care, and health education on home oxygen use.
- (3) The patients were followed up by telephone in the first week, the second week, the fourth week, the second month, and the sixth month after discharge.

O2O Trinity Health Management implemented in the intervention group were as follows.

- (1) Establishment of the O2O health management team: The team consisted of a chief respiratory physician, a respiratory chronic disease manager, and a master's degree student (the head nurse, i.e. the researcher herself).
- (2) Establishment of patient information files: After the first comprehensive assessment by the chief physician, the respiratory chronic disease manager entered the patient's basic information after admission, knowledge of the disease, medication, use of pulmonary rehabilitation, self-quality-of-life management, pulmonary function tests, and other data into the database, and invited the patient into the microblogging group.
- (3) Health management during hospitalization: Starting from the first day after the patient was admitted to the group, the respiratory chronic disease manager conducted face-to-face and one-to-one personal health guidance until the patient mastered it before being discharged from the hospital. It included

seven health education modules:

- (a) Disease guidance: COPD common causes, clinical manifestations, treatment and prognosis, predisposing factors, complications, etc.
- (b) Lung function rehabilitation guidance: Lip-contraction breathing, abdominal breathing, methods to effectively cough sputum, breathing exercises (can be lip-contraction and limb movement combined), long-term home oxygen therapy (use, purpose, necessity, and precautions).
- (c) Aerobic exercise: Upper extremity exercise (chest expansion exercise, stretching exercise, arm lifting), muscle strength training (high leg lifting), playing tai chi, jogging, walking, etc. These were done according to the patient's own situation, in order to avoid shortness of breath and dyspnea, and choose the appropriate way of exercise for the patient.
- (d) Drug guidance: The use of inhalation medication, precautions for the use of the medication, the role of medication and side effects, the site model exercise and guidance were provided.
- (e) Dietary guidance: Patients were guided to eat fresh vegetables and fruits, easy-to-digest food, high protein and high vitamin food, eat small meals as well as avoid high carbohydrate and high-calorie diets.
- (f) Psychological guidance: This included listening to the patient's complaints, encouraging the patient to speak out about their confusion, reducing their anxiety and depression, and maintaining a positive and optimistic mindset.
- (g) Self-management guidance: It included preventing respiratory infections, avoiding inhaling polluted and irritating gases, changing bad habits, establishing a positive mindset, cultivating life interests, and carrying out regular reviews.

Under the joint guidance of all medical and nursing staff, a COPD health education manual was developed and distributed to patients before discharge.

- (4) Online education: Online health education is conducted through the WeChat platform and mobile phone. The COPD health education was turned into graphics. Pulmonary rehabilitation exercise video, inhaler use explanation video, aerobic exercise explanation video, and other disease-related knowledge were regularly provided once a week on Mondays; before every Thursday, patients sent their management status to the group, and the administrator served as the group administrator to supervise each patient and answer any disease problems encountered by the patients at any time; the chief physician was always available to answer the questions and provide guidance when necessary.
- (5) Offline education: This was carried out through patient education sessions and follow-up visits to the respiratory chronic disease clinic. (a) Patient education sessions: For patients with unsatisfactory home self-health management, offline health education sessions were carried out once a month and offline face-to-face health education lectures were carried out for the WeChat group of patients encountering more problems and patients with poor adherence and behavioral habits. (b) Respiratory chronic disease outpatient clinic: From Monday to Friday, the respiratory chronic disease manager provided one-on-one health guidance for the patients in the respiratory chronic disease outpatient clinic.
- (6) Peer support education: After 2 weeks of intervention, the respiratory chronic disease manager selected the patient who had good self-management as a peer educator in the WeChat group and offline education based on the patient's self-management situation, adopted the self-management matching of strong and weak and old and new, to achieve the interactive communication between the manager and the patient, patient and patient, and patient and nurse. Under the guidance of the peer educator, fellow patients were motivated and encouraged to exchange ideas in the WeChat group and communicate the

problems encountered in self-management, and at the same time, they also urged the peer educators themselves to carry out self-health management, and the patients encouraged each other and built confidence.

2.3. Effectiveness evaluation index

The data of the patients in both groups were collected by the researcher himself and the respiratory health manager. Patients were assessed for pulmonary function, psychological status, self-care ability, and quality of life before receiving the intervention and 3 and 6 months after receiving the intervention, respectively. The scales were collected using a uniform guideline for interpretation.

- (1) Lung function testing: Lung function testing was performed in the lung function monitoring room using a lung function tester, including forced expiratory volume in the first second (FEV1), and the ratio of forced expiratory volume in the first second to forced vital capacity (FEV1/FVC).
- (2) Psychological status assessment: The Self-Depression Scale (SDS) was used^[6], which had good reliability and validity. The scale consisted of 20 items and was scored on a 4-point scale from 1 to 4. The SDS standard score was <53 for no depression, 53–62 for mild depression, 63–72 for moderate depression, and ≥73 for severe depression. The higher the score, the more severe the patient's depression.
- (3) Self-care ability: The Exercise of Self-Care Agency Scale (ESCA) designed by American scholars Kearney and Fleischer was used, which was translated into Chinese by Chinese scholars in 2000^[7]. The scale had good reliability and validity. It mainly included four evaluation dimensions, including self-care skills, self-care responsibility, self-concept, and health knowledge level, with a total of 43 entries, and the higher the score, the stronger the self-care ability.
- (4) Quality of life assessment: The COPD assessment test (CAT) scale was used to assess the quality of life of COPD patients. The scores ranged from 0 to 40, and the higher the score, the more severe the patient's symptoms.

2.4. Statistical analysis

SPSS21.0 software was used for data analysis. The count data were described by frequency and composition ratio, and the measurement data were described by mean ± standard deviation (SD); the comparison between two groups of measurement data was performed by two independent samples *t*-test, and the comparison between two groups of count data was performed by χ^2 test, etc., and the test level was $\alpha = 0.05$.

Patients who met the requirements were strictly selected and informed consent was obtained. In order to reduce the loss of sample size, the intervention process often asks patients according to the educational methods, their own physical and mental feelings, their confidence, and the benefits; and to share the successful experience to encourage patients. Investigators received study, training, and assessment, and were qualified, in accordance with the unified standards of implementation. All information was obtained from the hospital ethics committee and was to be kept confidential.

3. Results

3.1. Comparison of patients' general information

A total of 72 cases of patients with chronic obstructive pulmonary disease were included, and the differences in the general information of the two groups of patients, age, gender, cultural level, marital status, mode of residence, mode of payment for medical care, time of diagnosis of chronic obstructive pulmonary disease, and

their knowledge of the disease were not statistically significant ($P > 0.05$).

3.2. Comparative results of patients' lung function before and after receiving O2O education combined with peer education management mode intervention

Before the intervention, there was no statistically significant difference between the lung function indexes of first-second forced expiratory volume (FEV1) and the ratio of first-second forced expiratory volume to forced vital capacity (FEV1/FVC) of the two groups of patients ($P > 0.05$). The lung function indexes of both the control group and the intervention group improved after three months of intervention, which indicated that nursing care helped to improve the lung function of the patients, and at the same time, the lung function indexes of the patients in the intervention group improved more significantly than those of the control group ($P < 0.05$); after 6 months of intervention, the lung function indexes of the control group decreased compared with those at 3 months, and the intervention group had higher lung function indexes compared with those before intervention and at 3 months, and the difference was statistically significant ($P < 0.05$). This study can improve the first-second forced expiratory volume and the ratio of the first-second forced expiratory volume to the forced vital capacity in patients with chronic obstructive pulmonary disease, and improve the lung function effectively. The results are shown in **Table 1**.

Table 1. Comparison of lung function between the two groups of patients before and after intervention (mean \pm SD)

Items	Groups	Pre-intervention	3 months	6 months
FEV1 (L)	Control group	1.19 \pm 0.14	1.42 \pm 0.18	1.30 \pm 0.19
	Intervention group	1.16 \pm 0.15	1.72 \pm 0.16	1.98 \pm 0.17
	<i>t</i>	0.441	4.812	8.948
	<i>P</i>	0.902	0.000	0.000
FEV1/FVC (%)	Control group	56.38 \pm 4.25	64.30 \pm 4.76	62.45 \pm 4.78
	Intervention group	55.35 \pm 3.89	69.41 \pm 4.98	72.56 \pm 5.11
	<i>t</i>	0.123	5.450	7.658
	<i>P</i>	0.904	0.000	0.000

3.3. Comparative results of patients' depression status before and after receiving O2O education combined with peer education management mode intervention

The depression scores of the patients in the intervention group 6 months after the intervention were lower than those after 3 months, and the difference was statistically significant ($P < 0.05$); the depression scores 3 months and 6 months after the intervention were lower than those before the intervention, and the difference was statistically significant ($P < 0.05$). The scores of the control group were significantly higher than those of the intervention group 3 and 6 months after intervention, and the difference was statistically significant ($P < 0.05$). The depression scores of the control group were not statistically significant when compared at different intervention points ($P > 0.05$). It indicates that this study can significantly reduce the depression level of patients with chronic obstructive pulmonary disease (**Table 2**).

Table 2. Comparison of depression scores between the two groups of patients before and after intervention (mean \pm SD)

Groups	Pre-intervention	3 months	6 months
Intervention group	59.94 \pm 9.41	53.11 \pm 8.69	48.49 \pm 8.47
Control group	60.49 \pm 9.13	56.23 \pm 9.06	57.63 \pm 8.99
<i>t</i>	0.507	-2.183	-6.87
<i>P</i>	0.479	0.033	0.000

3.4. Comparative results of patients' self-care ability before and after receiving O2O education combined with peer education management mode intervention

After 3 and 6 months of intervention, the score of the intervention group was significantly higher than that of the control group, and the difference was statistically significant ($P < 0.05$), as presented in **Table 3**.

Table 3. Comparison of the self-care ability scores of the two groups of patients before and after intervention (mean \pm SD)

Groups	Pre-intervention	3 months	6 months
Intervention group	9.81 \pm 1.65	11.81 \pm 1.82	13.98 \pm 1.76
Control group	9.99 \pm 2.01	10.47 \pm 1.67	10.01 \pm 2.08
<i>t</i>	0.257	2.273	7.223
<i>P</i>	0.798	0.026	0.000

3.5. Comparative results of patients' quality of life before and after receiving O2O education combined with peer education management mode intervention

Before the intervention, there was no significant difference in the quality of life between the two groups of patients ($P > 0.05$). 3 and 6 months after the intervention, the quality of life of patients in the intervention group was significantly better than that of the control group, and the difference was statistically significant ($P < 0.05$), as shown in **Table 4**.

Table 4. Comparison of quality-of-life scores before and after intervention between the two groups of patients (mean \pm SD)

Groups	Pre-intervention	3 months	6 months
Intervention group	25.15 \pm 6.24	20.03 \pm 5.16	15.67 \pm 4.33
Control group	24.30 \pm 5.98	22.17 \pm 5.25	21.55 \pm 4.76
<i>t</i>	0.414	2.123	9.43
<i>P</i>	0.679	0.03	0.00

4. Discussion

As a leading cause of morbidity and mortality worldwide, COPD poses a huge and growing economic and social burden^[8]. Some studies have shown that more than 1 million patients die of COPD each year in China, with a disability rate of more than 5 million^[9]. COPD is also a multi-system disease, and the emergence of comorbidities also poses a great challenge to treatment. Anxiety and depression are some of the common

psychiatric system comorbidities in COPD ^[10]. The issue of how to formulate reasonable and effective therapeutic measures to reduce the incidence of comorbidity has become a research priority in the next decade. The global burden of COPD has become the focus of research ^[11], and COPD has obvious geographical variability, it is closely related to smoking, passive smoking, dust, medical history, and other environments, which suggests the importance of the roles played by clinical care workers in the work of the patient's health education, as well as urging the patient to develop good living habits ^[12].

4.1. O2O with peer education management mode is conducive to improving patients' lung function

The results of this study showed that patients' lung function indexes of FEV1 and the ratio of FEV1/FVC were significantly improved after 3 and 6 months of intervention, and the effect of the intervention was significantly better than that of the control group ($P < 0.05$). Studies have shown that poor lung function increases the number of acute exacerbations as well as hospitalization and mortality rates in patients with COPD ^[13,14], and the quality of life of patients is also seriously affected by poor lung function. In this study, the O2O health management combined with the peer education management model was implemented. During hospitalization, COPD patients were taught to manage the common seven modules of problems according to the patient's condition, and the patient's correct and rhythmic breathing pattern was rebuilt through the trinity of doctors, nurses, and patients through face-to-face sessions. Meanwhile, after discharge from the hospital, the chronic disease manager regularly guided and supervised the patient's behaviors through WeChat and phone calls, and the patient's pulmonary function was improved with more active participation in their own disease management. It also improved patient motivation, respiratory function exercise compliance, and lung function.

4.2. O2O with peer education management mode is conducive to improving patients' self-care ability, quality of life, and depression

The O2O model has changed the previous one-way management mode, allowing patients to actively participate in the management and improving patient motivation. The trinity of doctors, nurses, and patients will make patients skilled in COPD health management through face-to-face health education during hospitalization. When patients are discharged from the hospital, they join the WeChat group, and the health administrator regularly pushes health management knowledge in the WeChat group every week and urges patients to send their health management status to the group on a weekly basis. Additionally, the administrator provides feedback and supervision, and the medical and nursing patients interact, so that the intervention changes from passive to active, and the health management is more reasonable, efficient, and convenient ^[15]. Moreover, the WeChat group is equivalent to a small group, and patients will observe and compare with each other to learn others' behaviors, which will invariably play a supervisory role in health management. This intervention applies peer education, administrators use self-management of matching strong and weak and old and new, once the members have withdrawn behavior, peers will give encouragement and support. For patients with less-than-ideal intervention behaviors, the monthly chronic disease clinic and health administrators will be focused and targeted to give guidance to truly achieve the combination of online and offline. The intervention has changed the patients' bad habits, improved their compliance, and enhanced their self-care ability. As the patients' conditions enhance, their self-care ability, quality of life, and depressive state will also improve. This is also consistent with the results of this study, after 3 months and 6 months of intervention, the patients' self-care ability, quality of life, and depression were significantly improved, and the effect of the intervention group was significantly better than that of the control group ($P < 0.05$), which is also consistent with the results of related studies ^[7,10]. The self-care ability and quality of life of the patients in the control group at 6 months of

intervention were slightly worse than the effect after 3 months, which may be related to the reduction of routine health education by medical staff and the decrease of patients' self-compliance during the period from 3 to 6 months after intervention in the control group.

5. Conclusion

The course of chronic obstructive pulmonary disease is long, and the condition is prone to recurrent episodes, correct disease self-management is crucial for the control of the condition of chronic obstructive pulmonary disease and delays the development of complications. O2O health education model not only teaches patients a good way of self-management offline, but also provides weekly continuation of the management online to play a role in monitoring and supervising; at the same time, peer education encourages the exchange of feelings and symptoms, daily life, and health management experience between peers through the WeChat group, which improves patients' awareness and interest in participation and enhances their confidence in overcoming the disease^[16].

Due to time constraints, this study only conducted the intervention for 6 months and did not observe the long-term effects. This study was only conducted on patients with chronic obstructive pulmonary disease in our tertiary hospital in Shaanxi Province, so it has some limitations. In the future, it is hoped that the geographical study scope and intervention time will be increased, and the intervention effects of the O2O health education model and peer education will be studied in depth.

Disclosure statement

The authors declare no conflict of interest.

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