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Adherence of Chronic Obstruction Pulmonary **Disease: A Randomized Controlled Trial** 



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# The Effect of an Educational Program on Treatment Adherence of Chronic Obstruction Pulmonary Disease: A Randomized Controlled Trial

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# Abstract

**Purpose**: this study evaluates the effectiveness of a health education intervention program on treatment adherence of COPD outpatients.

**Methodology**: This randomized controlled trial was conducted in 2022 with 90 COPD outpatient people. Self-management education was developed on the basis of the Theory of Planned Behavior. Medication adherence was assessed using Test of Adherence to Inhalers (TAI-10), and the practice checklist of breathing exercises, respectively.

**Findings:** At beginning, there were no significant differences between-group regarding participants' medication adherence. After 3 months' intervention, the rates showed a significant increasing for treatment adherence in intervention group (P < 0.05).

**Unique contribution to theory, practice, and policy (recommendations):** Health education interventions have proven effective in increasing treatment adherence of outpatients with COPD. So, an intervention program should be conduct on a larger scale to improve treatment adherence for COPD patients in the future.

Keywords: Copd, Treatment Adherence, Health Education Intervention



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### **INTRODUCTION**

Globally, there are about 3 million deaths annually due to chronic obstructive pulmonary disease (COPD) [1]. The frequency of COPD is increasing due to smoking in developing countries, an aging population, and environmental factors. The frequency increases by 2060, with about 5.4 million COPD-related deaths [1]. In Vietnam, the prevalence of COPD is estimated at 6.7%, the highest in Southeast Asia. Of these, more than half of those infected have experienced at least one severe episode [2]. Currently, it is not possible to completely cured of COPD, but early treatment and adherence to the medical staff's instructions can reduce symptoms, slow down lung damage, and improve patients' quality of life [1].

Treatment adherence is defined as the active and voluntary cooperation between the patient and healthcare providers in taking the prescribed medication (including the duration, dose, and frequency of administration), following a reasonable diet, and/or changing a healthy lifestyle in accordance with their disease [2]. However, improving the quality of life of COPD patients requires patients to commit to treatment over a long time period. Numerous studies have shown that long-term adherence to chronic disease is suboptimal in real-world settings, and it is estimated that only 50% of patients respond to correct adherence [3]. Non-adherence to treatment has significant impacts in terms of increased hospitalization and exacerbation rates, decreased quality of life, increased number of emergency visits, increased number of days off work due to COPD, and increased morbidity and mortality rate as well as cause many complications for patients [1]. Evaluating adherence remains a challenge in the clinical assessment of patients. In clinical research, the use of different adherence assessment methods will vield different results. Currently, measuring adherence is a challenge in the clinical assessment of patients and in clinical trial studies conducted by healthcare professionals. This challenge may be due to lack of consistency in the methodology for assessing compliance in studies of COPD, therefore, the use of different compliance assessment methods will give different results.

There were many interventions that can help patients adhere to medication, such as educational interventions to improve knowledge about the disease, beliefs about medications, and support for medication reminder monitoring devices on smartphone applications. Specifically, research by Ibrahim and El-Maksoud (2021) to evaluate the effectiveness of educational programs on knowledge and self-management of COPD patients shows that there were clear differences related to reduce symptoms such as cough, sputum production and shortness of breath after intervention [4]. Besides, Gregoriano and colleagues (2018) found that an intervention program with daily medication alarms and support phone calls increased treatment adherence with metered-dose inhalers ( $82 \pm 14\%$ ) compared to the control group ( $60 \pm 30\%$ ), with (p <0.001) [5].

However, most medications used for COPD are inhaled, and inhaled medications have different effects on the assessment of adherence than oral medications [1]. Additionally,

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intervention research focusing on promoting treatment adherence including adherence to inhaled medications and adherence to respiratory rehabilitation through breathing exercises is still limited. Therefore, we conducted the study with aims to evaluate the effectiveness of a health education intervention program on treatment adherence of COPD outpatients.

# **METHODS**

# **Research design**

A pilot randomized controlled trial was conducted from March to December 2022.

# **Participants and Setting**

Patients participating in the study were taken from respiratory outpatient clinics at Da Nang city, Vietnam. Selection criteria include patients who were treated with inhaled medications at home in the stable phase and do not have an exacerbation requiring hospitalization for at least 3 months; can speak, read and understand Vietnamese; owned and used a mobile phone frequently, and voluntarily agree to participate in the study.

Excluded criteria for any patients if they had a history of bronchial asthma, allergic rhinitis, lung surgery or other respiratory diseases; were experiencing a COPD exacerbation or exacerbation of co-morbidities in the past 3 months or have had a change in medication in the past 3 months.

# Sample size

The sample size was calculated using the sample size formula for comparing two proportions (Figure 1). In addition, the attrition rate may occur at 30% with study subjects being absent and/or not cooperating in the study continuously for the full 3 months, it was estimated that each group needs to have 45 participants.

n = 
$$Z_{(\alpha,\beta)}^2 \frac{p_1(1-p_1)+p_2(1-p_2)}{(p_1-p_2)^2}$$

# Figure 1. Sample size calculation formula

# **Data collection**

Demographic participants' characteristics was developed based on the existing literature and included seven items, include age, gender, education level, employment status, smoking status, and number of years of illness.

Treatment adherence was assessed through 2 contents, including adherent to inhaled drugs, and adherent to breathing exercises. Assessment of adherence to inhaled drugs by the Test of Adherence to Inhalers (TAI-10) that developed by Plaza et al. (2016), consisted of 10 questions [6]. Each item bases on a 5-Likert scale that ranged from 1- worst to 5 - best adherence. The total score was from 10 to 50 points, in which patients were seen as adherence with the score range



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from 46 to 50, and non-adherence for score  $\leq$  45. Additionally, adherence with breathing exercises assessed based on successful practice as well as maintaining the frequency of daily breathing exercises [7]. Patients were seen as adherence if they did the correct all steps through the practice checklist of breathing exercises and did one or more times per day within 10 to 15 minutes per time, and/or gradually increases by their own ability. Non-adherence was recorded for the patient did not maintain daily practice or maintains daily practice but practiced with "fail" result. Finally, the patient was assessed as adherence to treatment if there was concurrent adherence with inhaled drugs and breathing exercise therapy; conversely, non-adherent if adherence one of two contents or non-adherence with both.

### Intervention

At home, the intervention program continued implementing by phone. Specifically, the researcher created a zalo group (that a kind of social network popularity in Vietnam) consisting of 30 patients, and researchers. Accordingly, once a week in the 8-9 am time frame (by appointment) on Wednesday of the week, the researcher will make a group phone call via the Zalo chat group, the time for each phone call 3- 5 minutes and no more than 10 minutes for 1 call. In case of the patients absented, the researcher will call through their personal phone number to remind them to join the chat group. The private call will be made 3 times, at five-minute intervals to ensure that patients were all present. Participants are instructed not to share the phone call with others, if a participant loses or changes their phone number, a new phone number will be replaced as soon as they notified for the researcher/ or their nurses.

The online meeting content usually consists of 2 phases. Firstly, each patient will share their self-reported drug use; drug side effects (if any); number of episodes of dyspnea per week, amount, and color of sputum. Then, the researcher and nurses provided some health information related to self-care skills, breathing exercises; and remind them to record that information in the diary. The patient's information will be recorded in the patient's diary and serve as the basis for the doctor to adjust medication and for nurses to give health advice every month.

### Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences (SPSS, version 23.0). Continuous variables were calculated as mean and variance and used t-test statistical technique to compare 2 research variables. Categorical and hierarchical variables were calculated as percentages, using the Chi Square ( $\chi$ 2) statistical technique to compare two variables. Comparison of percentage differences in variables before and after intervention was performed using McNemar's test, and the difference is statistically significant with p < 0.05. Additionally, the efficiency index (EI) was count by a formula (in with p1: ratio of value before intervention; and **p2:** ratio of value after intervention)

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$$EI = \frac{\left| p2 - p1 \right|}{p1} 100\%$$

# RESULTS

### Table 1. Participant's characteristic

Group characteristics	Intervention (n= 45) N,%	Control (n=45) N, %		
Gender				
Male	34 (75.6)	37 (82.2)		
Female	11 (24.4)	8 (17.8)		
Education level				
High school or under	6 (13.3)	5 (11.1)		
University	39 (86.7)	40 (88.9)		
Employment status				
Worker	6 (13.3)	4 (8.9)		
Civil servant	3 (6.7)	17 (37.8)		
Free business	27 (60.0)	19 (42.2)		
Retired	9 (20.0)	5 (11.1)		
Smoking status				
No	22 (48.9)	21 (46.7)		
Yes	23 (51.1)	24 (53.3)		
Number of years of illness				
$\leq$ 5 years	8 (17.8)	14 (31.1)		
5 to 10 years	12 (26.7)	12 (26.7)		
> 10 years	25 (55.6)	19 (42.2)		

After a 3-month intervention period, a total of 45 patients participated in the intervention group and 45 patients participated in the control group. No patient gave up during the intervention; 12 group calls were conducted with 100% patient participation; 100% of patients participate in regular follow-up examinations once a month. According to the survey after the end of the intervention program, 100% of the subjects in our study were satisfied with the content, methods, and organization of communication.

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Group Outcomes		Control N (%)		Intervention N (%)				
-		Pretest	Posttest	EI	Pretest	Posttest	EI	Р
		(n = 45)	(n = 45)	(%)	(n = 45)	(n = 45)	(%)	value <sup>2</sup>
Adherence	Adherence	16 (35.6)	21 (46.7)	31.2	15 (33.3)	40 (88.9)	167	0.000
to inhaled	Non-	29 (64.4)	24 (53.3)		30 (66.7)	5 (11.1)		
medications	adherence							
	$P value^{1}$	0.23			0.000			
Adherence	Adherence	20 (44.4)	23 (51.1)	15.0	15 (33.3)	38 (84.4)	137	0.001
to	Non-	25 (55.6)	22 (48.9)		30 (66.7)	7 (15.6)		
breathing	adherence							
exercises	$P value^{1}$	0.32			0.000			
Treatment	Adherence	16 (35.6)	22 (48.9)	37.0	16 (35.6)	38 (84.4)	137	0.001
adherence	Non-	29 (64.4)	23 (51.1)		29 (64.4)	7 (15.6)		
	adherence							
	$P value^{1}$	0.06			0.000			

Table 2. Between-group comparisons respecting medication adherence status

*EI: Efficiency Index;* <sup>1</sup>*Within-group comparisons through the paired-sample t test;* <sup>2</sup> *The results of the Chi-square test* 

At baseline, the rate of adherence to inhaled medication of participants in the intervention and the control groups had low (33.3% vs. 35.6%). However, after the intervention, adherence to inhaled medication status in the intervention group was significantly better than the control group (EI=167; P = 0.000; Table 2). For status of adherence to breathing exercise, the rate of adherence in both groups was low at the begiining. After intervention, this rate increased significantly by 84.4% for intervention group, and this rate increased 10 times higher than in the control group (EI=137), while the difference between before and after intervention, between the control group and the intervention group were statistically significant (P< 0.05).

Futhermore, the number of participants adhernce to treatment was low (35.6% for both groups) at baseline. After 3 months, the rates of adherence increased in the intervention group (84.4%) that was higher 4 times than in the control group (EI=137); however, the between-group and before/after intervention differences respecting these rates were statistically significant (P=0.000).

### DISCUSSION

In our study, the treatment adherence rate of COPD outpatient increased by 84.4% compared to the control group with only 48.9% after health education intervention conducted by nurses, and the level of achievement was higher than the initial expectation with the EI increasing 137 times (p<0.05) (table 2). The health education intervention model was built on a foundation of the theory of planned behavior, additionally, solutions to improve knowledge and practice of COPD disease combining many different measures such as direct counseling,



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providing videos for self-practice at home, weekly monitoring by phone, monitoring through the investigator's diary, and regular follow-up examinations [8],[9],[10]. The results show that the intervention model was effective in improving treatment compliance for people with COPD.

Moreover, the study by Sanlturk and Ayaz-Akaya (2021) also proved that an educational program using the theory of planned behavior for asthma control and medication adherence was effective. Specificcally, the educational program was provided to participants in the intervention group for a total of five home visits over three months based on the Theory of Planned Behavior. Compared to our study, Sanlturk'study showed that before the educational program, all participants in the intervention group and 90% of those in the control group had poorly controlled asthma (p > 0.05). After the educational program, all individuals in the intervention group and 20% of the control group had well-controlled asthma (p < 0.001) [11]. This result is completely consistent with our study. The reason of this model is effective is because it meets the following criteria: (1) appropriate and feasible; (2) sustainable; (3) has the ability to access and meet the shortage of patients [10].

In particular, this study was carried out in the context of the COVID-19 epidemic that has just been controlled in Da Nang city. It can be said that with continuous outbreaks in Da Nang city from the beginning of 2020, especially from 2021 to mid-2022, major hospitals in Da Nang city focused resources to collect and treat patients. Treating COVID-19 patients, managing people with COPD and bringing them to commune/ward health care levels, this partly causes the treatment adherence rate to be low due to the fear of spreading the disease when going for medical examinations and difficult during the period of social distancing due to epidemics, many patients arbitrarily quit taking medicine when clinical signs improve or forget to take or run out of medicine without having the conditions to buy or receive it, and the patient's knowledge in for a long time was reduced due to lack of updates from medical staff. Thus, implementing an educational intervention program at the time of research is considered a golden time to supplement the lack of knowledge and improve practical skills for patients.

# CONCLUSION

Intervention activities significantly improved treatment adherence of outpatients with COPD. The control group initially evaluated the adherence rate to be 44.4%, after 3 months this rate increased only 48.9%; meanwhile, the rate in the pre-intervention group was 35.6%, and after the intervention the rate increased significantly to 82.2%. Therefore, health education interventions have proven effective in increasing treatment adherence of outpatients with COPD.

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# REFERENCES

**1.** Goldcopd.com [homepage on the Internet]. Global strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease: Update 2020 [cited 2020 Jun 25]. Available from: http://ww.goldcopd.org

2. Lim S, Lam DC-L, Muttalif AR, Yunus F, Wongtim S, Lan LTT, et al. Impact of chronic obstructive pulmonary disease (COPD) in the Asia-Pacific region: the EPIC Asia population-based survey. Asia Pac Fam Med [serial on the Internet]. Apr 2015 [cited 2023 Jan 16];14(1):4. Available from: https://pubmed.ncbi.nlm.nih.gov/25937817/

3. Chaudri NA. Adherence to long-term therapies evidence for ActionWorld health organization (WHO). Ann Saudi Med [serial on the Internet]. May-Jun 2004 [cited 2023 Jan 16];24(3):221–2. Available from: http://dx.doi.org/10.5144/0256-4947.2004.221

4. Gregoriano, C., Dieterle, T., Breitenstein, A.-L., Dürr, S., Baum, A., Giezendanner, S., Maier, S., Leuppi-Taegtmeyer, A., Arnet, I., Hersberger, K. E., & Leuppi, J. D. (2019). Does a tailored intervention to promote adherence in patients with chronic lung disease affect exacerbations? A randomized controlled trial. *Respiratory Research*, 20(1), 273.

5. Ibrahim et al. Effect of educational programs on knowledge and self-management of patients with chronic obstructive pulmonary disease [serial on the Internet]. September 2021 [cited 2023 Jan 16]. Available from <a href="https://www.enj.eg.net/article.asp?issn=2090-6021;year=2018;volume=15;issue=3;spage=246;epage=257;aulast=Ibrahim">https://www.enj.eg.net/article.asp?issn=2090-6021;year=2018;volume=15;issue=3;spage=246;epage=257;aulast=Ibrahim</a>

6. Plaza, V., Fernández-Rodríguez, C., Melero, C., Cosío, B. G., Entrenas, L. M., de Llano, L. P. (2016). Validation of the 'test of the adherence to inhalers' (TAI) for asthma and COPD patients. Journal of Aerosol Medicine and Pulmonary Drug Delivery, 29(2), 142–152. doi:10.1089/jamp.2015.1212

7. Nguyen, T.-S., Nguyen, T. L. H., Van Pham, T. T., Hua, S., Ngo, Q. C., & Li, S. C. (2019). Impact of pharmaceutical care in the improvement of medication adherence and quality of life for COPD patients in Vietnam. Respiratory Medicine, 153, 31–37. doi:10.1016/j.rmed.2019.05.006

8. Yang, Y., Wei, L., Wang, S., Ke, L., Zhao, H., Mao, J., ... Mao, Z. (2022). The effects of pursed lip breathing combined with diaphragmatic breathing on pulmonary function and exercise capacity in patients with COPD: a systematic review and meta-analysis. Physiotherapy Theory and Practice, 38(7), 847–857. doi:10.1080/09593985.2020.1805834

9. Trieu, N. T. T., Upval, M., Hoai, N. T. Y., Van Long, T., & Phuong, N. T. A. (2023). Acceptability, appropriateness, and feasibility of an educational program to promote treatment adherence in patients with chronic obstructive pulmonary disease. Home Healthcare Now, 41(6), 330–337. doi:10.1097/nhh.00000000001206

ISSN 2710-1150 (Online)



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10. Ajzen I. (1991). The theory of planned behavior. Organ Behavior Human Decision Process, 50(2):179-211.

11. Şanlıtürk, D., & Ayaz-Alkaya, S. (2021). The effect of a theory of planned behavior education program on asthma control and medication adherence: A randomized controlled trial. The Journal of Allergy and Clinical Immunology in Practice, 9(9), 3371–3379. doi:10.1016/j.jaip.2021.03.060



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