Transitional Care Based e-Health Program for Older Muslim Thai Adults with Chronic Obstructive Pulmonary Disease After Hospital Discharge: A Feasibility Study

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Abstract: Older adults with chronic obstructive pulmonary disease frequently visit the emergency department due to an acute exacerbation of the disease or symptoms after discharge from the hospital. Therefore, providing programs that enable caregivers to recognize and manage alert signs and symptoms in caring for older adults with chronic obstructive pulmonary disease at home is essential. This feasibility study is a part of emergency health management in a transitional care program to reduce emergency department visits in older adults with dyspnea and aims to develop and test the Transitional Care Based e-Health Program. The program was tested using one group pre-test and post-test design with 50 family caregivers of older adults living with chronic obstructive pulmonary disease. Data were collected from November 2021 to May 2022. The ability to manage dyspnea symptoms among family caregivers and patient emergency department visits was assessed 30 days after hospital discharge. Data were analyzed using the Wilcoxon Signed Rank Test to compare the pre- and post-score differences.

After implementation, it was found that the program was feasible and could improve the ability to manage dyspnea. Only three of 50 cases had emergency department visits within 30 days after discharge, accounting for 6% compared to the earlier report of 27.18%. The findings provide potential transitional care based on an e-health program to enhance the ability of dyspnea symptom management among family caregivers. Nurses can use this program in practice. However, further study is needed with randomized controlled trials before it can be widely used nationally.

Keywords: Chronic obstructive pulmonary disease, e-Health program, Feasibility study, Hospital discharge, Muslim, Nursing, Older adults, Transitional care

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Background

Thailand is one of the fastest-ageing countries in the world. According to projections, the percentage of people 60 years and older will rise from 13% in 2010 to 33% in 2040,[1] which causes issues in the demand for health care.[2] Previous studies have shown that 10-26% of older adults have experienced emergency department (ED) visits,[3] 8.2% have visited the ED more than five times a year, and individuals over 80 need ED services every year.[4] Furthermore, the most common chief complaint presenting with disease-related ED visits was dyspnea from chronic obstructive pulmonary disease (COPD).[5] Similarly, the number of older adults visiting the ED due to

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dyspnea from COPD at a large public hospital in the deep south of Thailand in the five years since 2016 gradually increased.[6] Approximately a third of patients with acute exacerbation chronic obstructive pulmonary disease (AECOPD) returned to the ED within 30 days of discharge, similar to other countries.[6] Additionally, the use of emergency services after hospital discharge reflects the inadequacy of the transitional care process.[7]

Transitional care for older adults is essential because it can minimize medication errors and adverse drug events and help prevent a lack of timely follow-up care and unnecessary ED visits.[8] To avoid discontinuity of treatment and adverse effects on older adults, transitional care is required. Poor transitional care, on the other hand, may lead to increased ED utilization.[9] Such ED visits could be prevented and reduced by assisting persons to manage dyspnea symptoms at home.

Several organizations have developed guidelines and recommendations for treating dyspnea in people with COPD (PW-COPD), such as the Global Initiative for Chronic Obstructive Lung Disease (GOLD).[10] The recommendations from most organizations, including those from Thailand, do not specifically address issues in older adults with COPD (OAW-COPD).[10] Therefore, OAW-COPD would not benefit from the recommendations.[10] Moreover, it was found that less than 50% of clinical innovations have ever been utilized in practice.[11] The programs may not meet the intended purposes or goals of the OAW-COPD because most of the programs have been initiated by researchers who may not relate to the patient cultural context. Each OAW-COPD has a different background, knowledge, skills, expertise, and experience of COPD, including individual needs. A program must be culturally appropriate and personalized to motivate patients to draw upon their potential or abilities. In addition, telehealth offers various benefits to assist and support patients and caregivers to improve chronic disease management.[11] Telehealth should be a key tool for providing care during the COVID-19 outbreak or for people in remote and sensitive areas while ensuring the safety of both patients and healthcare providers.[12] This is especially so for older Muslim people who are a minority group in Thailand and whose language can be a barrier to accessing healthcare. Thus, this study developed and tested the feasibility and efficacy of the Transitional Care Based e-Health Program (TCeHP) for Thai Muslim OAW-COPD after hospital discharge.

Conceptual Framework and Literature Review

This study was guided by the Transitional Care Model (TCM),[13] the Symptom Management Model (SMM)[14] and our previous study.[15] The TCM is concerned with sustaining high standards of care across healthcare settings.[13] The nine core components of the TCM include screening, staffing (the researcher or discharge nurse care manager who has the main role in managing care during acute illness and community nurses who assume primary responsibility for care management after hospital discharge), maintaining relationships, engaging patients and family caregivers, assessing and managing risks and symptoms, educating and promoting self-management, collaborating, promoting continuity, and fostering coordination.[16] The SMM proposed by Dodd and colleagues[14] was applied to increase the ability of dyspnea symptom management in OAW-COPD. This model was chosen to provide a comprehensive analysis of the symptom feeling to provide an understanding of human abilities and symptom management behavior and a basis for constructing an intervention to improve patient outcomes.[17] Three key concepts in the symptom management model, including symptom experience, symptom management strategies, and symptom outcomes, were used to understand, monitor and manage dyspnea symptoms that arise in OAW-COPD. In addition, a mobile application was integrated to facilitate the caregivers' ability to manage the patient's dyspnea symptoms after discharge.

Our previous study[15] found that the main barriers to caring for Muslim OAW-COPD, as perceived by the nurses and family caregivers, were discontinuity of care and the lack of knowledge related to the cause and management of dyspnea. In this study, we integrated the TCM of Naylor[13] and, as mentioned above, the Symptom Management Model (SMM) of Dodd[14] to guide the intervention. These two models were fit and valuable for the direction of the study. This study attempted to incorporate every component to arrange and develop a comprehensive program that effectively uses the model to direct the intervention and guarantee program efficacy. The Naylor TCM integrates the components and is relatively simple to grasp. Additionally, the SMM of Dodd is a very versatile model for a comprehensive approach.

The TCM is one of the transitional care programs with the most published data in credible scientific journals. A systematic review found that studying the effectiveness of transitional care interventions can help optimize the transition of care for older ED patients and reduce the risk of costly and potentially harmful readmissions for this population.[18] In addition, symptom management programs significantly reduce dyspnea symptoms and anxiety among OAW-COPD.[19]

Study aim

This study aimed to evaluate the feasibility and efficiency of the TCeHP to improve dyspnea symptom management and reduce ED visits for Muslim OAW-COPD. It was hypothesized that after the program's implementation, the mean score of dyspnea symptom management among family caregivers would be higher than the pre-score, and the ED visit rate of the sample group would be less than the baseline data 30 days after hospital discharge.

Methods

Design: A pre-test, post-test and one-group design study was used. This report follows the STROBE Statement-Checklist for cross-sectional studies.

Settings: Two settings were selected: a provincial hospital and a community hospital reported with the highest number of OAW-COPD visits to the ED in one deep south province of Thailand. Family caregivers of OAW-COPD who were discharged from the ED or a medical ward of those two hospitals were invited to take part to evaluate the program's feasibility in their homes.

Samples: The samples of this study were family caregivers who cared for Muslim OAW-COPD after discharge from ED/medical wards from those selected hospitals. A dyad of 50 Muslim OAW-COPD and family caregivers were recruited to participate. Inclusion criteria for family members were being at least 18 years old, living with the OAW-COPD, providing direct care both during hospitalization and at home, communicating and understanding well in Thai or Malayu, and using a smartphone. Inclusion criteria for OAW-COPD were age ≥ 60 years, being diagnosed with COPD by a physician, having a family member with primary responsibility in providing care, having the ability to communicate and understand Thai or Malayu language, no vision and hearing problems, no dementia and delirium, available to be contacted by phone and can access the Internet, and has a history of at least one ED visit because of AECOPD before the initial meeting with the primary investigator (PI).

The sample size was determined using the table of Polit and Beck.[20] Statistical significance was set at .05, the power size was .80, and the effect size was determined using the test analysis formula for Cohen's statistic,[21] which obtained the magnitude of the influence value (effect size) from a prior study.[22] In this study, the effect size was .80; thus, the total group size was 50 dyads of OAW-COPD and family members.

Ethical Considerations: Approval was obtained from the Research Ethics Review Committee of the Faculty of Nursing, Prince of Songkla University (PSU IRB 2021-LL-Nur017). Participants were given written information explaining the purpose of the study, procedures and plans to maintain confidentiality.

Participants were also informed about their right to withdraw from the study at any time without interfering with health service benefits. Both verbal and written consent were given.

Instruments: There were two parts: instruments for data collection and the intervention TCeHP. There were four instruments described below:

The Demographic Data Questionnaire was developed by the PI to obtain the data of the family caregivers, including age, gender, marital status, and educational level. The items for the OAW-COPD comprised age, gender, marital status, educational level, occupation, main caregiver, smoking period and current smoking status, length of time diagnosed with COPD, date of last hospitalization, and other comorbid diseases.

The Assessment of the Ability of Dyspnea Symptom Management Questionnaire (A-DSMQ) was used in controlling acute exacerbation. This instrument was developed by Chantaro[22] in Thai and modified by the PI with permission. The questionnaire consists of 17 items within three subscales measuring the ability to assess symptoms, symptom management and control, and seeking assistance when developing acute exacerbation. Each item is scored on a 6-point scale ranging from practice every time = 5, practice almost every time = 4, practice moderately = 3, practice less = 2, never practice = 1, and no such event = 0. An example of an item is "I used the wheezing sound as the assessment symptom of dyspnea." The scores range from 0-85, with a high score indicating a high level of caregiver's ability to manage dyspnea. The score of ability to manage dyspnea symptoms is divided into three levels: poor (0-28), moderate (29-56), and high (57-85) based on the criteria from a study by Chantaro.[22] The Cronbach's alpha coefficient, which measures the reliability of evaluating the ability to manage and control symptoms of acute exacerbation, was 0.97 in the pilot study and 0.92 in the actual study.

The Record of Emergency Department Visits (30 days after discharge) involved collecting one item from the hospital information system and confirming visits with family caregivers. The record was 0 (no ED visits 30 days after discharge) or 1 (Yes, ED visits 30 days after discharge).

The Feasibility and Satisfaction with the TCeHP Checklist form was developed by the PI a literature review. It was used to assess the perceptions of both family caregivers of OAW-COPD and healthcare workers for feasibility and satisfaction when using the TCeHP (mobile application), determine how well it fits and what sorts of programs should be improved. There were ten items evaluating the feasibility of utilizing the program. Each item was scored on a 3-point scale ranging from high (3), moderate (2), and low (1). The total score ranges from 1- 30, with a higher score indicating higher feasibility. The total feasibility score was divided into three levels: low (1-10), moderate (11-20), and high (21-30). An example of a question for the participant is, "Do you think the application is very suitable and feasible to use?" The Cronbach's alpha coefficient was 0.76 in the pilot study and 0.82 in an actual study. There were 12 items for evaluating the satisfaction of utilizing the program. Each question was scored on a 5-point scale ranging from highest (5), high (4), moderate (3), low (2), and lowest (1). The total score ranges from 1-50, with a higher score indicating higher satisfaction. The level of satisfaction of utilizing the program can be divided into five levels: lowest (1-10), low (10-20), moderate (20-30), high (30-40), and highest (40-50). A question example is, "Could you rate the overall satisfaction with the application." The Cronbach's alpha coefficient was 0.94 in the pilot study and 0.90 in the actual study.

The Transitional Care Based e-Health Program (TCeHP) and Program Implementation

The TCeHP was developed by the PI using the TCM and the SMM and synthesized from a qualitative study that occurred in the first phase of the research and development process. It was a one-month program consisting of the following activities (**Table 1**), which were implemented at the hospital and at home.[15] The

first two days were held at the hospital to engage the team to screen, educate and facilitate patients and family caregivers to recognize and manage alert signs and symptoms when discharged. Regarding engaging the patients and family caregivers, mutual goals were set for increasing their ability to dyspnea symptom management and assessing the factors contributing to the frequent ED visits. The strategies or methods to manage risk factors and dyspnea symptom management were individually discussed to tailor the intervention. To improve the family caregivers' knowledge and confidence in caring for OAW-COPD at home after discharge, health education was given as an additional option from routine care by both the PI with a brochure as well as instructing on how to use the mobile application (e-Health) so that the family caregivers could access the information at any time.

Table 1. Characteristics of participants (N = 50)

Characteristics		Feasibility study n (%)
Gender	Female	41(82)
	Male	9(18)
Age (M = 40.08, SD = 11.52)	20-29 years	10(20)
	30-39 years	15(30)
	40-49 years	15(30)
	50-59 years	8(16)
	> 60 years	2(4)
Marital status	Married	35(70)
	Single	10(20)
	Divorced/widowed	5(10)
Educational level	Unschooled	1(2)
	Primary school	5(10)
	Secondary school	29(58)
	Diploma	8(16)
	Bachelor's degree	7(14)
Occupation	Unemployed/housewife	25(50)
	Labor	8(16)
	Seller	9(18)
	Agriculture	5(10)
	Government employee	3(6)

After discharge, from days 3 to 30, family caregivers were encouraged to assess and monitor their relative's symptoms using e-Heath on the COPD-C App mobile application. There are five modes of the COPD-C app: 1) video-guide mode was used to offer caregivers advice so they can study and learn skills at home. It contained a 10-minute recording with detailed guidance on dyspnea symptom management to avoid acute exacerbation and the risk factors related to acute exacerbation of COPD; 2) the alarm timing mode was used to alert the patient and caregivers to assess the daily personal health record, take medication regularly, and attend any appointments with the doctor. There was a warning alert saying, "It's time to assess the patient, take medication, follow up"; 3) the reports of daily personal health records. The results were displayed in green, yellow and red, as well as how to encounter each severity level, and the results also popped up to the researcher and community nurses; 4) a red flag was displayed to alert patients and caregivers on how to cope when a red flag symptom appeared; lastly, 5) the emergency mode of contact numbers

for hospitals, community nurses, and the researcher's numbers were given in case of an emergency.

This program was a tailored intervention following the step-by-step approaches with the 10 participants for a pilot study (**Appendix, Table 1**). The feasibility and satisfaction of utilizing the mobile application was also assessed. Some participants were initially unable to follow the steps, particularly the mobile application procedures. The PI then adapted and adjusted the program to be more fit and more easily used with each participant and to continue the intervention process.

Data Collection: The study was conducted at ED/medical ward and patient's home after hospital discharge from November 2021 to May 2022. After receiving permission from the Research Ethics Review Committee, the PI collected data with the DDQ and A-DSMQ on day one as baseline data to compare the data with the last day (day 30) of utilizing the program. The DDQ, A-DSMQ, the Record of Emergency Department (ED) Visits, and the Feasibility and Satisfaction with the TCeHP checklist form were evaluated after completing the program on day 31. All data was collected, and the TCeHP was conducted and implemented by the PI.

Data Analysis: A statistical software program was used to analyze the data. The statistical significance was set at 0.05. Data obtained from all 50 dyads were analyzed, and descriptive statistics were used for analyzing demographic data, the ability of dyspnea symptom management, the ED visit rate, and the feasibility and satisfaction of utilizing the mobile application. A normality test using the Shapiro-Wilk test revealed that the data on the ability of dyspnea symptom management did not distribute normally. Therefore, the Wilcoxon Signed Rank Test was used to compare outcomes before and after participating in the program.

Results

Participants Characteristics

All the participants participated throughout the program. Most of the OAW-COPD were male, with a mean age of 74.15 years (SD = 8.46), were married (69.23%), and were retired. They were all Muslim. For almost half of these participants (46.15%), their primary caregiver was their wife. About half (53.85%) had a smoking history of over 20 years, but the majority quit smoking (77.78%). More than half reported having hypertension disease (61.54%). For the family caregivers of OAW-COPD (as shown in **Table 1**), most were female (82%), with an average age of 40.08 years (SD = 11.52). The majority were married (70%) and completed secondary school (58 %), and 50% of the participants were housewives.

Efficiency and Feasibility of the TCeHP

At 30 days after completion of the program, the overall median score of the caregivers' ability to manage dyspnea was 78, which increased compared to the baseline score of 60.5. Although the pre- and post-score were high, the Wilcoxon signed-rank test revealed that the overall median score was significantly higher than before ($Z = -5.629$, $p < 0.001$), as shown in **Table 2**.

Table 2. Comparison of the median scores of the ability in managing dyspnea of caregivers before and after using program (N = 50)

Score level	Median (level)		Statistic Z	p-value
	Before	After		
Managing dyspnea ability (overall)	60.5 (High)	78.0 (High)	-5.629	< .001
Severity assessment ability	15.42	20.28	-4.141	< .001
Symptom management and control ability	28.44	38.36	-5.778	< .001
Seeking assistance ability with acute exacerbation	10.22	12.84	-4.190	< .001

The participants rated the program's feasibility as high level in each item. The item that had the highest scores of feasibility in utilizing the application in the items for this application was that it was very interesting and useful, and this application would increase their ability and confidence to manage dyspnea in OAW-COPD at 28.6. Although the lowest score in the feasibility of using the program was in understanding and following the instructions for using the application, the level was still high, reflecting a level of 26, as shown in **Table 3.**

Table 3. Feasibility of using the application (N = 50)

	Items	Score (30)	Level
1.	This application is very creative and modern	28.4	High
2.	This application will give you confidence in monitoring for signs and symptoms associated with dyspnea at home	27.8	High
3.	This application has greatly increased the channels of contact in older adults with COPD after discharge	26.6	High
4.	This application will add more knowledge about managing dyspnea	27.6	High
5.	This application is very convenient, and not complicated	26.8	High
6.	This application is very easy to understand and follow the instructions	26.0	High
7.	This application is very suitable for you and can recommend it to others	27.2	High
8.	This application is very interesting and useful to you	28.6	High
9.	This application will greatly increase the ability and confidence to manage dyspnea in older adults with COPD at home	28.6	High
10.	Overall, do you think the application is very suitable and feasible to use?	28.4	High

The participants also expressed the maximum level of satisfaction in using the application. With the program receiving the highest rating of 48 in terms of creativity and modernity, it inspired confidence in monitoring and identifying dyspnea-related signs and symptoms at home. The participants could understand and follow the instructions in utilizing the application, found it interesting to use, and increased their ability and confidence to manage dyspnea in OAW-COPD at home at a level of 47. The lowest scores of satisfaction in utilizing the application were the items that this application could improve knowledge about managing dyspnea, the process of using the application was very convenient, and this application was very suitable, scoring a level of 45. However, those scores were still at the highest level of satisfaction, as shown in **Table 4.**

Table 4. Satisfaction in using the application (N = 50)

	Items	Average (50)	Level
1.	This application is creative and modern	48	Highest
2.	This application gives you confidence in monitoring signs and symptoms of dyspnea at home	48	Highest
3.	This application has greatly increased the channels of contact and monitoring of dyspnea in older adults with COPD after discharge	46	Highest
4.	This application will add more knowledge about managing dyspnea	45	Highest
5.	This application could be used to care for other older adults with with difficulty breathing	46	Highest
6.	This application is very convenient, and not complicated	45	Highest
7.	This application is very suitable for you	45	Highest

Table 4. Satisfaction in using the application (N = 50) (Cont.)

Items	Average (50)	Level
8. This application is easy to understand and follow the procedure	47	Highest
9. This application is very interesting to you	47	Highest
10. This application will greatly increase the ability and confidence to manage dyspnea in older adults with COPD at home	47	Highest
11. This application can reduce emergency department visits due to difficulty breathing in older adults with COPD	46	Highest
12. Overall satisfaction with the application	46	Highest

Regarding the ED visits within 30 days after hospital discharge, we found that only three cases out of 50 had ED visits within 30 days after discharge, accounting for 6%. The data collection period of this study over six months (November 2021- May 2022) was compared to the six months baseline data of the studied hospital, when 103 older adults with COPD visited the ED, and 28 of 103 older adults with COPD visited the ED (27.18%) within 30 days after discharge.

Discussion

The results showed that the TCeHP was feasible and potentially effective in improving the family caregivers' ability to manage dyspnea symptoms for OAW-COPD. The TCeHP was a comprehensive intervention that concentrated on the whole transitional care setting from hospital discharge to at-home care. In numerous previous studies, transitional care interventions were applied to patients with COPD.[23] The different transitional care intervention components used by each included structure assessment,[24] predischarge education,[25] a structured care plan,[26] a home visit program,[27] and telephone follow-up.[28] However, those interventions did not consider the entire transition pathway. This study is more beneficial regarding a comprehensive transitional care intervention since it prepared OAW-COPD before they were discharged from the hospital to home. Due to little support to assist family caregivers in caring for OAW-COPD at home, this study supplied a program and integrated mobile application that helped family caregivers gain access to COPD and care information whenever needed. In addition, the language used in the mobile application could help the participants easily understand and directly communicate with the PI in emergencies. Education, prescription reminders, daily health checks, medical appointment alerts, and contact modes were given via mobile applications. Additionally, this program offered a home visit program and telephone follow-up services following discharge. When discharged, these would help the transitional process for caring for OAW-COPD because it can communicate and monitor patient's symptoms, including timely follow-up care management and unnecessary ED visits.[8]

In addition, the TCeHP was created to assist family caregivers in the area, by using the local languages, Malayu and Thai, as a bilingual version of the mobile application. Several modes, including the video-guide mode, alarm timing mode, results of the daily personal health records, identification of red flag warnings, and mode of contact numbers, were developed to address the problems from the real situation. The information was available anytime when the family caregivers needed it. They could choose between Thai and Malayu languages, which was appropriate for them. In addition, this mobile application has many modes to assist family caregivers in caring for OAW-COPD at home. It allows medical professionals to monitor patients' symptoms daily and immediately connect when they require assistance, including during the COVID-19 outbreak.

This study has shown the feasibility and efficacy of the TCeHP in enhancing the ability of dyspnea symptom management among family caregivers of

OAW-COPD. It is consistent with the previous studies in terms of providing patient and caregiver education and notification of the primary care physician of any warning signs, as well as two home visits and four phone calls in a nurse-led hospital-to-home transitional care intervention, which was a feasible and efficient way to enhance health outcomes and improve patient/caregiver experience for older adults with multiple chronic diseases.[27] Moreover, it is consistent with a previous study[29] that evaluated the intervention of high-quality nursing care combined with transitional care can improve the self-management compliance of 141 patients with COPD, significantly improving pulmonary function, psychological status, and life quality. The components and tailored interventions for patient and family needs were extremely important.[29] Therefore, transitional care with e-Health intervention was feasible in enhancing symptom management ability, monitoring patient's symptoms, and may lead to patient's health-related quality of life in the future.

With the low ED visits rate and high overall satisfaction toward the mobile application and program, the pilot study and large-scale intervention with 50 participants provided evidence that the TCeHP can deliver COPD care-related information, not only improve the symptom management ability but also reduce the ED visits after hospital discharge 30 days of OAW-COPD. The ED visit rate of participants was lower than the baseline. This study is consistent with a previous finding that ED-based transitional care interventions by healthcare professionals were associated with a significant decrease in ED visits.[18] We promoted coordination and continuity of care during the transition between providers, patients and families, and a personalized medical action plan was created via mobile application. A COPD pamphlet that explains how to use the green/yellow/red self-assessment and monitoring to monitor the early indications of an imminent exacerbation was given to family caregivers of OAW-COPD. It showed how to use an inhaler in the right order and with the right technique. The phone calls reinforced the instructions provided at the preceding home visit. The family caregivers' ability to record, monitor, and manage the COPD symptoms at home was assessed and reassessed by the PI before discharge and during the home visit. This application not only increased the ability to manage dyspnea in OAW-COPD at home, but also, they were satisfied with their use of the program.

Strengths and Limitations of the Study

This study's strength was that interventions were developed and tailored to the current problems. The methodology was flexible and dynamic to enable researchers to be able to adjust or revise as appropriate. However, there were some limitations. Firstly, compared to an RCT or other experimental study, the approach was not all that robust. Secondly, the design is one group pre-posttest. Thus, it may threaten internal validity. Thirdly, there were a small number of participants, and they were all Muslims, so the program is not broad enough to apply to other populations. Fourthly, there needs to be qualitative results from caregivers to evaluate the effectiveness of using the e-health program or the friendly use of this application. Finally, this program was created based on problems in a particular region, which might not apply to other regions of the country.

Conclusions and Implications for Nursing Practice

This study suggested that the TCeHP is helpful in improving family caregivers' ability to manage dyspnea symptoms and reducing ED visits within 30 days after discharge. Nurses can use this TCeHP with OAW-COPD and family caregivers. Due to some limitations, further study is required using a larger sample size to generalize and test the effectiveness of the TCeHP or study two groups with RCT. Additionally, more research should be implemented in settings with less accessibility to the Internet and need help for transportation or long distance.

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Appendix

Table 1. TCeHP and implementation

Day/Duration	Activities
1 (1-2 hours depending on the available time of participants)	1. **Screening** the OAW-COPD by the researcher or discharge nurse care manager who assumes the primary responsibility for care management throughout episodes of acute illness 2. **Staff engagement**: community nurses who assume primary responsibility for care management after hospital discharge were engaged 3. **Establish and maintain a trusting relationship** with OAW-COPD and family caregiver 4. **Engagement** of OAW-COPD and family caregivers in design and implementation of care plan aligned with their preferences, values, and goals 5. **Assessing and managing risks and symptoms** by assessing the OAW-COPD previous symptoms experienced and identify the patient's risk factors as well as the family caregiver's ability to manage dyspnea symptoms
2 (1-2 hours)	6. **Educating and promoting symptom management** by preparing OAW-COPD and family caregivers to identify and respond quickly to worsening symptoms using mobile application and encouraging how to use the mobile application and give manual instructions to learn at home and setting the alarm time mode for medication administration, monthly doctor appointments, and daily personal assessments
3-30 (1 hour once a week for four times)	7. **Collaborating with the team** by promoting plan of care between family caregivers and members of the care team 8. **Promoting continuity** by reminding family caregiver to assess a patient in checking symptoms daily, taking medications as prescribed, going to a doctor's appointment as well as discussing the results of personal health assessments, barriers in caring for OAW-COPD at home each week (4 times) 9. **Fostering coordination** by promoting communication and connections with family caregiver and community nurses using mobile application and performing a home visit with community nurse one time
31 (1 hour)	Assess the ability of family caregiver to manage dyspnea and follow up on ED visits during 30 days after discharge of older adults with COPD

โปรแกรมระยะเปลี่ยนผ่านด้วยเทคโนโลยีทางสุขภาพสำหรับผู้ป่วยสูงอายุไทยมุสลิมโรคปอดอุดกั้นเรื้อรังหลังจำหน่ายจากโรงพยาบาล: การศึกษาความเป็นไปได้ของการใช้โปรแกรม

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บทคัดย่อ: ผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรังเข้ารับการรักษาที่แผนกฉุกเฉินเนื่องจากอาการหายใจลำบากกำเริบหลังจำหน่ายจากโรงพยาบาลพบบ่อยขึ้น ดังนั้น การคิดค้นโปรแกรมช่วยให้ผู้ดูแลสามารถที่จะจดจำหรือจัดการอาการหายใจลำบากของผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรังขณะอยู่ที่บ้านมีความจำเป็นมาก การศึกษานี้เป็นส่วนหนึ่งของการจัดการภาวะฉุกเฉินทางสุขภาพในระยะเปลี่ยนผ่านเพื่อลดการเข้ารับการรักษาที่แผนกฉุกเฉินของผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรังที่มีภาวะหายใจลำบากกำเริบ งานวิจัยนี้มีวัตถุประสงค์ในการที่จะพัฒนาและทดสอบความเป็นไปได้ในการใช้โปรแกรมระยะเปลี่ยนผ่านด้วยเทคโนโลยีทางสุขภาพ (e-Health) โดยการศึกษาแบบวัดผลก่อนและหลังการใช้โปรแกรม ในกลุ่มตัวอย่างกลุ่มเดียว คือ ผู้ดูแลผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรังจำนวน 50 ราย มีการเก็บข้อมูลวิจัยตั้งแต่เดือนพฤศจิกายน พ.ศ. 2564 ถึง เดือนพฤษภาคม พ.ศ. 2565 ด้วยการวัดความสามารถในการจัดการอาการหายใจลำบากของกลุ่มตัวอย่างและการเข้ารับการรักษาที่แผนกฉุกเฉินของผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรัง ภายหลังจากทดลองใช้โปรแกรม 30 วัน วิเคราะห์ข้อมูลโดยใช้สถิติ Wilcoxon Signed Rank Test ในการเปรียบเทียบคะแนนก่อนและหลังการใช้โปรแกรม

หลังจากทดลองใช้โปรแกรม พบว่าโปรแกรมนี้มีความเป็นไปได้ในการใช้จริงและสามารถเพิ่มความสามารถในการจัดการอาการหายใจลำบากแก่ผู้ดูแล อีกทั้งยังสามารถลดการเข้ารับการรักษาที่แผนกฉุกเฉินในผู้ป่วยสูงอายุโรคปอดอุดกั้นเรื้อรังภายหลังจำหน่ายออกจากโรงพยาบาล โดยพบว่ามีเพียงร้อยละ 6 เท่านั้นที่เข้ารับการรักษาในแผนกฉุกเฉินใน 30 วันหลังจำหน่าย เมื่อเปรียบเทียบกับรายงานข้อมูลก่อนหน้านี้ที่ทดลองโปรแกรมพบว่ามีการเข้ารับการรักษาที่แผนกฉุกเฉินภายใน 30 วันหลังจำหน่ายสูงถึงร้อยละ 27.18 ดังนั้น วิจัยนี้แสดงให้เห็นว่าโปรแกรมระยะเปลี่ยนผ่านแบบ e-Health สามารถเพิ่มขีดความสามารถในการจัดการอาการหายใจลำบากในกลุ่มผู้ดูแลผู้สูงอายุโรคปอดอุดกั้นเรื้อรัง พยาบาลควรนำโปรแกรมไปใช้ในทางปฏิบัติ อย่างไรก็ตาม ควรมีการทดสอบประสิทธิภาพของโปรแกรมโดยใช้รูปแบบการทดลองที่มีความเข้มแข็งด้านระเบียบวิธีวิจัยก่อนการประยุกต์ใช้โปรแกรมอย่างแพร่หลายต่อไป

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คำสำคัญ: โรคปอดอุดกั้นเรื้อรัง โปรแกรมแบบ e-Health การศึกษาความเป็นไปได้ การจำหน่ายออกจากโรงพยาบาล มุสลิม การพยาบาล ผู้สูงอายุ การดูแลระยะเปลี่ยนผ่าน

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