THE EFFECTS OF A SYMPTOM MANAGEMENT PROGRAM ON SYMPTOM EXPERIENCE AND PHYSICAL FUNCTION IN ADULTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

BY

APINYA KOCHAMAT

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
THE DOCTOR OF PHILOSOPHY (NURSING SCIENCE)
FACULTY OF NURSING
THAMMASAT UNIVERSITY
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ABSTRACT

Patients with chronic obstructive pulmonary disease (COPD) encounter the most unpleasant symptoms including fatigue, dyspnea, sleep disturbances, anxiety, and depression related to physical function that are interrelated and influence one another. This study was a randomized controlled trial (RCT) with a repeated measures design aimed to determine the effects of a symptom management program on symptom experience and physical function in adults with COPD. The symptom management program was developed based on the symptom management theory by Dodd et al. (2001). The study was conducted in a district hospital in a northeastern province of Thailand. One hundred and two COPD patients from the COPD clinic who met the inclusion criteria were recruited. The sample was randomly assigned to the experimental group (n=51) and the control group (n=51). The experimental group received eight weeks of the symptom management program and usual care, while the control care group received only usual care. The instruments used were the demographic and clinical data questionnaire, the modified Medical Research Council (mMRC), the COPD Assessment Test (CAT), the Multidimensional Assessment of Fatigue (MAF), the Pittsburgh Sleep Quality Index (PSQI), and the Hospital Anxiety

and Depression Assessment Scale (HADS) and the 6-Minute Walk Test (6-MWT). Data analysis was performed with descriptive statistics, chi-square testing, independent t-test, and repeated measures multivariate analysis of variance (MANOVA).

The results indicated that the symptom management program effectively influenced symptom experience and physical function in the experimental group when measured over time at Weeks 4 and 8 ($F = 5.257$, $p < 0.001$), which was a significant improvement in the mean scores for the 6MWD, CAT, mMRC, and MAF ($p < 0.001$, $p < 0.05$). The experimental group had significant improvements in the mean scores for the mMRC, and the MAF than before starting the program and better than the control group when measured over time at Weeks 4 and 8 ($p < 0.001$, $p < 0.05$). The experimental group had significantly increased the mean score for the 6MWD and had lower mean scores for the CAT than the control group at Week 8 ($p < 0.05$) with improvement in the mean scores for the 6MWD and CAT at Weeks 4 and 8 ($p < 0.001$, $p < 0.05$). However, there were no significant differences in the mean PSQI scores between the experimental and control groups ($p > 0.05$), but the experimental group had a significantly lower mean PSQI score at Week 4 ($p < 0.05$). There was a significant decrease in the mean HADS-Anxiety score between the experimental and control groups at Week 8 ($p < 0.05$), and the mean HADS-Anxiety score had decreased significantly at Week 8 ($p < 0.05$). There was no statistically significant difference in the mean HADS-Depression score between the two groups during the study ($p > 0.05$). Integrating this symptom management program can potentially improve the ability of patients with COPD to manage and regulate symptoms successfully. Additionally, the program can facilitate the development of the ability to maintain physical function, thus reducing patients' dependence on their families and society.

Keywords: Symptom management program, symptom experience, physical function, chronic obstructive pulmonary disease patient

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Apinya Kochamat

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CHAPTER 1
INTRODUCTION

1.1 Background and Significance of the Study

Chronic obstructive pulmonary disease (COPD) is a major global health problem and has impacted more than 12% of the world's general population. The global prevalence of COPD has been steadily increasing, and its prevalence was reported to be 8.9% in 2006 and 12.16% in 2019 (Varmaghani et al., 2019). In 2016, COPD was the fourth leading cause of death worldwide. By 2030, COPD mortality is predicted to become the third leading cause of death worldwide at 4.5 million deaths or approximately 6.7% of all deaths (World Health Organization, 2018). The COPD mortality rate in Thailand during 2017, 2018, and 2019 increased to 10.37, 10.29, 10.53 deaths per 100,000 people, respectively (Division of Non-Communicable Disease, 2020). In addition, in 2020, Thailand had 3,834 patients with COPD who died in the hospital (Ministry of Public Health, 2020). In Mahasarakham Province, COPD's fatality rates during 2017–2020 were 2.99, 2.51, 3.43, and 2.78, respectively, which is similar to national trends (Digital Government Development Agency, 2021). Therefore, it can be seen that COPD is one of the most critical health problems today.

The major causes of COPD are harmful particulates or gaseous substances (American Thoracic Society, 2019; GOLD; 2020). Smoking is the most significant cause of COPD. First and secondhand smoking are associated with worse outcomes and airway wall thickness (Putcha et al., 2016). Furthermore, exposure to biomass fuels and occupational exposure to other substances are also risk factors for the development of COPD. In Thailand, one of the main health problems for farmers in rural communities is COPD, which has been associated with agricultural work and behavioral factors, such as smoking. Furthermore, agriculturists are often exposed to inhalable dust, fecal material, complex mixtures of organic material in animal feed, or biomass fuel for cooking, all of which may put farmers at risk of COPD (Kitjakrancharoensin et al., 2020).

Middle-aged and older adults are at higher risk of being affected by the disease and require sophisticated treatment and thorough care. The prevalence of COPD

increases with age (Cortopassi et al., 2017), with most cases occurring in adults aged 45 and above (Australian Institute of Health and Welfare, 2020; Holm et al., 2014). Middle-aged patients with COPD under 50 years of age who smoke heavily are similar to those aged over 60 years regarding disease severity and progression, implying that the disease process begins much earlier in life in patients at risk of the disease (Petersen et al., 2018). The physiological alteration of aging lungs leads to changes in lung function and structure relative to age, increasing pathogenetic vulnerability to COPD (Bowdish, 2019; Fukuchi, 2009). Patients with COPD continue to have a significant disease burden combined with functional impairment, thereby complicating effective COPD management. This disease is also chronic, cannot be cured, and requires long-term ongoing treatment in order to control symptoms and delay disease progression.

COPD's main treatment goals are to reduce further risk of exacerbation and reduce symptoms (GOLD, 2020). The influencing factors related to acute exacerbation of COPD include perceived symptoms of severity and habitual symptoms, acceptance of the disease, patient beliefs, knowledge, experience of exacerbation and perceived social support, etc. (Korpershoek et al., 2016). Acute exacerbations requiring hospitalization are significant life events for patients with COPD, with overwhelming consequences regarding physical activity, skeletal muscle function, exercise tolerance, and increasing symptom severity from baseline, such as shortness of breath, worsening coughing, sputum production, and fatigue (Jones et al., 2018). Therefore, patients should follow complex treatment procedures, control sympotoms, change lifestyles, and handle the physical and psychological effects of the disease (Fried et al., 2012).

The symptoms both affect and are associated with one another. Most previous studies on COPD symptoms have concentrated chiefly on one symptom and its associated causes. Since most patients with COPD have numerous and simultaneous symptoms, studying multiple or concurrent symptoms is significant (Fei et al., 2022). Symptoms can occur at any time during 24 hours, with more than half of patients with COPD reporting symptoms in the morning, during the day, and at night. Numerous patients experience chronic symptoms that impair their daily lives and increase morbidity (Singh et al., 2017). Physiological symptoms can overwhelm patients with COPD. Many somatic symptoms are associated with psychological symptoms. Therefore, preventing and controlling physical symptoms will help minimize

psychological symptoms (Matarese et al., 2020). The relationships among dyspnea, fatigue, sleep disturbance, anxiety, and depression are complicated, and these symptoms can be mutually causal and consequential. The physiological and psychological symptoms in patients with COPD have multiple co-occurrences and are interrelated (Miaskowski et al., 2017).

Dyspnea, fatigue, and sleep disturbance are COPD's most prevalent physiological symptoms (Blinderman et al., 2009; McNicholas et al., 2013; Theander et al., 2014). All of the above symptoms affect the functioning of patients with COPD (Theander et al., 2014). The experiences of fatigue and functional limitations are associated with psychological and physiological influencing factors, depressive symptoms, and insomnia, with dyspnea being the most prominent factor (Kentson et al., 2016). The mechanisms of the physical symptoms are the results of COPD pathology. Emphysema is the destruction of the gas exchanging surfaces of the alveoli. These conditions obstruct airflow in the respiratory system and cause respiratory problems (Prasad, 2020), while enhanced breathing function affects gas exchange. As a result, patients need to use accessory muscles to inhale and exhale and to increase oxygen consumption.

Furthermore, chronic bronchitis induces inflammation and narrowing of the bronchial tubes, causing mucus to build up and leading to hypersecretion or mucous production (Hinkle, 2014) with excessive mucus leading to coughing, delayed sleep onset (George & Bayliff, 2003), and increasing dyspnea. Hypoxemia in COPD may contribute to sleep disturbance and nocturnal dyspnea (Budhiraja et al., 2015). Additionally, dyspnea has been positively correlated with fatigue (Cavalcante et al., 2012; Lee et al., 2018). Patients with COPD also experience sleep disturbance leading to fatigue, lack of energy, or excessive daytime sleepiness. Sleep disturbances and fatigue are frequently interrelated, and can occur together (Matthews, 2011). Therefore, when a patient suffers a physical condition, it can also negatively impact the person's psychological condition.

The most frequent psychological symptoms of COPD are anxiety and depression, the causes of which are multi-factorial and include biological, behavioral, and social factors (Yohannes & Alexopoulos, 2014). However, the mechanisms of depression and anxiety in COPD are complicated and have not been clarified in terms

of pathophysiology (Pumar et al., 2014; Yohannes & Alexopoulos, 2014; Yohannes et al., 2010). In addition, the factors that may be involved include inflammation, hypoxia, smoking (Mikkelsen et al., 2004; Pumar et al., 2014; Yohannes & Alexopoulos, 2014), and exacerbations of COPD (Mikkelsen et al., 2004). In addition, anxiety and depression are connected with fatigue (Lee et al., 2018) and associated with dyspnea symptoms (Dua et al., 2018). Sometimes COPD patients feel depressed because they cannot meet their own needs and expectations (Johansson et al., 2019). Anxiety is often associated with depression; depressed individuals with COPD have seven times greater risk of anxiety than non-depressed patients (Lacasse et al., 2001; Light et al., 1985 as cited in Tselebis et al., 2016). Depression and anxiety are linked with a higher risk of COPD complications, while COPD is related to increased depression (Atlantis et al., 2013).

Symptom management is challenging for nurses in terms of helping the patients manage symptoms effectively and adequately; nurses must apply symptom management based on state-of-the-art knowledge of the pathological and psychological mechanisms underlying symptoms. This will also help nurses determine what knowledge and abilities patients require in terms of self-care (Larson et al., 1999). This dissertation develops a symptom management program based on the symptom management theory. Symptom management theory explains that symptom experience is dynamic, involving cognitive processes in interpreting perceptions, evaluating symptoms, and responding to changes in one's usual feelings. The perception, evaluation, and response to symptoms are simultaneous and can change over time (Dodd et al., 2001). Nurses are critical in assisting patients in terms of genuinely understanding their symptom experience and developing effective interventions in order to manage multiple symptoms covering the influencing factors, including the physical, psychological, and situational dimensions. Furthermore, the development of such a program must cover and explain the details of the components of symptom management strategies (who, what, when, where, how, how much, and to whom). Developing appropriate and feasible programs will enhance patient ability to manage his or her symptoms and self-care effectively. If the management strategies are suitable and convenient for the patients to adapt to real life, it will improve symptom outcomes.

The literature review for the present study revealed that the essential outcomes of COPD symptoms are dyspnea, anxiety, and depression, all of which directly affect physical functioning (Lee et al., 2018); these symptoms affect one another, thereby increasing their severity. The pathological changes in patients with COPD are related to self-care behavior restrictions due to the limited activities of daily living. Many patients with COPD view the burden of symptoms as a significant ongoing obstacle in managing their daily lives, thereby decreasing exercise tolerance and leading to reduced health-related quality of life (Ekici et al., 2015; Miravitlles & Ribera, 2017). Furthermore, dyspnea, fatigue, and sleep quality impact the six-minute walk distance (6MWD) (Al-Shair et al., 2016; Hale et al., 2008; Valderramas et al., 2013; Vardar-Yagli et al., 2015). Thus, assessing symptom experience and physical function is crucial to evaluating program outcomes.

Several studies have reported that non-pharmacological strategies are effective in symptom management. Thus, developing interventions or programs for managing multiple symptoms remains limited. A review of the literature found that exercise training was an effective non-pharmacological intervention for managing each of the following symptoms: dyspnea, fatigue, sleep disturbances, depression, and anxiety in patients with COPD (Lan, 2014; Lewko, 2014; Paneroni et al., 2020; Volpato et al., 2018; Volpato et al., 2015). Exercise is critical for patients with COPD in order to reduce their symptoms and activity limitations (Lin & Yeh, 2021). Walking is practical and beneficial endurance training, as the activity involves continuous use of large muscle groups (Patel et al., 2017). Walking is also widely used in endurance exercise that uses the rehabilitation technique because it has the advantage of being a practical activity that can be quickly converted into improving walking skills (Spruit et al., 2013). Walking is a form of physical activity the general people can perform. It is typically healthy, easy to apply, requires no equipment, an inexpensive way to improve physical activity, and easily implemented in real life (Gotink et al., 2016; Moy et al., 2012), which proves that it is beneficial to patients with COPD. It is an effective intervention that improves fatigue, dyspnea, subjective sleep quality, airflow obstruction, level of physical activity, and quality of life (Arslan & Öztunç, 2016; Mendoza et al., 2015; Sadate Moazeni et al., 2020; Thapamagar et al., 2021; Ward et al., 2021; Widyastuti et al., 2018).

During exercise, the lungs bring oxygen to the body to provide energy and remove carbon dioxide, which is produced as a waste product when giving energy. In addition, the heart delivers oxygen to exercising muscles. Patients who exercise regularly will improve their strength and muscle function, and the muscles will use less oxygen and create less carbon dioxide. Furthermore, these patients will immediately decrease the amount of air required to breathe in and out for a given exercise (European Lung Foundation, 2016). The benefits of regular endurance exercise for patients with COPD in terms of physical outcomes include improving endurance exercise capacity, inspiratory muscle strength, exercise-induced hyperinflation, ventilatory demand, and exertional dyspnea (Chen et al., 2014; Wootton et al., 2014).

In addition, exercising improves dynamic respiratory mechanics and muscle function. Delaying metabolic acidosis can reduce inspiratory neural drive and attendant dyspnea, while exertional dyspnea in patients with COPD is connected to increased inspiratory neural drive to the respiratory muscles (Neder et al., 2019). Therefore, exercise can manage dyspnea, which is the leading cause of other symptoms. Simultaneously, it can also improve the breathing mechanism, thereby affecting the occurrence and alleviation of other symptoms as well. Therefore, walking can be considered the main strategy of a symptom management program. At the same time, mindfulness meditation is another interesting strategy for symptom management in patients with COPD.

Mindfulness meditation mainly focuses on improving self-regulation of attention, body awareness, emotional regulation, and changes in the perspective of the self (Hölzel et al., 2011; Tang et al., 2015; Tang & Tang, 2015). The term "mindfulness" refers to a form of meditation that emphasizes present-moment awareness and has a profound and possibly unique effect on brain function (Ludwig & Kabat-Zinn, 2008). Although research using mindfulness meditation is increasing steadily, knowledge of the underlying mechanisms of mindfulness is still in its beginnings (Hölzel et al., 2011; Tang et al., 2015). The mechanism of mindfulness associated with the brain areas mainly involves cognitive processing and executive control, attention, sensory awareness, motivation, learning, and emotional processing (Tang et al., 2015). Changing brain states (CBS) can be achieved in two ways through mental and physical processes. The physical process relates to the gradual adjustment and training of body

posture with full awareness, which leads to a sense of aliveness and presence in our bodies. The physical process essentially includes an implicit process through the autonomic nervous system (ANS). Therefore, awareness of the body's function can facilitate mindfulness practice. The mental process frequently involves an explicit process mediated by the central nervous system (CNS) (Tang & Tang, 2015). As a result, mindfulness meditation can have positive effects on COPD such as improving dyspnea, fatigue, anxiety, and depression, as well as physical outcomes in patients with COPD, such as lung function, 6-minute walk tests, and the nutritional risk index of patients with COPD (American Thoracic Society, 2020; Chan & Lehto, 2016; Tian et al., 2019). Therefore, mindfulness walking interventions cover physical and psychological influencing factors.

Mindfulness walking or walking meditation combines mindfulness and moderates physical activity training, where walking serves as a rhythmic meter for focusing attention (Cochrane et al., 2021; Jones et al., 2021). Mindfulness walking exercises are beneficial for managing symptoms in patients with COPD and have been shown to decrease dyspnea, depression, and anxiety, while significantly increasing exercise tolerance (Lin et al., 2019; Lin & Yeh, 2021; Seetee et al., 2016). Lin et al. (2019) used a breathing-based walking intervention in outpatients with COPD for about 30 minutes per day, five days a week for two months, and demonstrated effectiveness regarding dyspnea, anxiety, and depression. Furthermore, Lin et al. (2021) developed a walking and mindfulness intervention for 35 minutes once a day, five days a week for eight weeks for outpatients with COPD. The results improved the patients' exercise capacity but did not improve their dyspnea. Seetee et al. (2016) used a pulmonary rehabilitation program with adjunct walking meditation for eight weeks at home, 20 minutes per time, for at least three times a week. This study showed the significance of exercise tolerance and decreased dyspnea at four and eight weeks to lower than at baseline. Although mindfulness walking can manage symptoms and increase exercise capacity in COPD, one study found that it did not reduce the symptoms of dyspnea. Because dyspnea has inconsistent results, this study examines the effect of mindfulness walking on dyspnea. No study has examined the effects of mindfulness walking or walking meditation on fatigue or sleep disturbance symptoms, both of which are associated with dyspnea, anxiety, and depression in patients with COPD.

The steps of the Dhammamongkol Temple walking meditation are a popular Buddhist meditation technique in Thailand that involves walking, which helps participants improve their concentration levels, release tension, and achieve calmness (Pilunowad, 2000). Walking meditation is a physical movement that influences one's emotions and mind, improving physical and psychological outcomes (Jones et al., 2021). Therefore, it would be of interest to apply walking meditation to symptom management programs in adults with COPD at home in terms of the experience of dyspnea, fatigue, sleep disturbance, anxiety, depression, and physical function.

The focus on helping patients manage co-occurrence of symptoms would be a challenge, and research focused on only one symptom, or isolating symptoms, may not be sufficient to help patients with COPD effectively control their symptoms. Motivating patients with COPD who have multiple symptoms to engage in COPD interventions must be focused on disease knowledge and coping strategies, both of which are critical in assisting these patients in managing their conditions and resulting in reduced symptom burden (Bentsen et al., 2013). Therefore, in symptom management research, comprehensive symptom management strategies need to be developed (Miaskowski et al., 2004), as patients with COPD need to acquire knowledge and skills to manage multiple symptoms, which will help improve self-reliance and reduce dependence on family care.

Home program implementation should be affordable, easy to comply with, and convenient to adapt to real-life conditions. Patient rehabilitation at home keeps patients close to family and encourages performance of some activities freely and daily (Pradella et al., 2015). Family support is one of the important factors in the situational dimension, which may influence a person's self-care behavior by enhancing his or her motivation, providing knowledge and feedback (Xiaolian et al., 2002). The family's participation in rehabilitation interventions might increase patients' physical activity and encourage greater involvement in the program (Chen et al., 2017; Cruz et al., 2014). Technology-based interventions such as telephone or video calls, the LINE application, online media, and pedometers integrated with this program may also help patients access care and convenience in monitoring behavior. Therefore, the researcher is interested in integrating health education, walking, walking meditation, technology-based intervention, and family support into a symptom management program to be

implemented at home. This dissertation will help examine the effectiveness of symptom management programs regarding symptom experience and physical function. Moreover, the results will suggest improvements for nursing care, developing nursing interventions and rehabilitation programs, or clinical practice in adults with COPD in the future.

1.2 Research Question

Among adults with COPD, what are the differences in symptom experience and physical function over time for the symptom management (experimental) group compared with the usual care group?

1.3 Research Objectives

1.3.1 General Objective

The purpose of this randomized controlled trial research design aims to determine the effects of a symptom management program on symptom experience and physical function in adults with COPD.

1.3.2 Specific Objective

1.3.2.1 To compare symptom experience and physical function in adults with COPD between experimental and usual care groups.

1.3.2.2 To compare symptom experience and physical function in adults with COPD who participate in a symptom management program that measures the participants over time (at baseline, Week 4, and Week 8).

1.4 Scope of the Study

This study focused on determining a symptom management program for adults with COPD. Data collection was conducted with individuals in middle and older adulthood with COPD who were receiving services from the COPD clinic, Out-patient Department, at Bourabeu Hospital in Mahasarakham Province, Thailand. The data collection was conducted from 25 January to 9 August 2023.

1.5 Conceptual Framework

This dissertation focuses on examining the effects of the symptom management program on the symptom experience and physical function of patients with COPD. Personal factors, age, and disease severity affected the symptom management program development, which covered symptom experience and symptom management strategies. The symptom management strategies used influenced the patient's symptom perception, evaluation, and response. Patients' experiences were influenced by individual capacity to use symptom management strategies and effectiveness. The symptom management program development was aimed at alleviating dyspnea, fatigue, sleep disturbances, anxiety, and depression in addition to improving the 6-minute walking distance, as in the conceptual framework in Figure 1.1.

As stated earlier, the symptom management program was developed based on the theory of symptom management (Dodd et al., 2001). Symptom management theory is used to understand symptoms, develop and evaluate symptom management strategies, and assess outcomes. It is also presented as a conceptualization of select management strategies (Dodd et al., 2001).

Personal factors, such as age and disease severity, are essential for symptom mangagement. Furthermore, some symptoms have the same variables as other symptoms. Anxiety, depression, and dyspnea are significant COPD symptoms and leading causes or etiology of other symptoms, such as fatigue and sleep disturbance. Therefore, preventing or managing symptoms must cover the factors and symptom experience. As variable factors and symptoms interact, they must be controlled or managed regarding the variable factors that may influence symptom experience.

As stated previously, symptoms can occur alone or isolated, and are more frequently experienced concurrently. Multiple symptoms co-occurring are more likely to produce a multiplicative than an additive experience. That is, two or more co-occurring symptoms are likely to catalyze the occurrence of another. Each symptom is viewed as a multidimensional experience that may be analyzed and assessed independently or combined with other symptoms (Lenz et al., 1997). For example, symptoms of fatigue, dyspnea, sleep disturbance, anxiety, and depression are interrelated, and each symptom may also influence the occurrence of other symptoms. As a result, it is critical to recognize and analyze concurrent symptoms. It is also crucial

to identify the evidence-based symptom management of each symptom, as it enables comprehensive symptom management. If the related symptoms can be managed simultaneously, it will help to improve these five symptoms more effectively.

Patients with COPD experience physical and psychological symptoms such as fatigue, dyspnea, sleep disturbance, anxiety, and depression that affect their daily living activities. Nurses play a crucial role in helping patients select effective strategies to deal with the symptoms. First of all, nurses and patients must understand the influencing factors that are causes of the symptoms affecting symptom perception, evaluation, and response. The understanding of these domains will help to provide appropriate knowledge for selecting management strategies. Appropriate symptom management strategies are helpful for improving symptom outcomes of the symptoms. Therefore, nurses must develop suitable, feasible, and effective interventions for patients, which is essential in promoting continuing care for chronic illness patients.

Symptom experience is the perception and understanding of symptoms, the interpretation of their meaning, and the reaction to changes in usual feelings. Patients' perception of a change in symptom frequency, severity, or distress affects decisions about symptom management strategies (Bender et al., 2018; Dodd et al., 2001). Patients must report symptom experience because symptom perception is difficult to separate from symptom evaluation. In addition, symptom experience can change over time, so detecting symptoms must be an individual report and a response to the symptoms. Therefore, patients must acquire the necessary knowledge about the disease and symptoms affecting cognitive processes in order to consider possible actions when the patient can choose an appropriate management strategy with adherence that will improve the outcomes of the symptoms.

The symptom management program in this study consisted of two parts: symptom experience training and symptom management strategies. It aimed to reduce frequency, decrease severity, and relieve the distress of patients due to the symptoms. The program focuses on application to the real lives of patients and their families. The goal of the program is to help patients and their families implement the strategies in this program. The program development relied on the state of the science regarding multiple symptoms in relation to COPD.

This program covers the components of symptom management theory. The details of this program are as follows: Part One: symptom experience training. Nurses are key persons in terms of enhancing symptom perception and evaluation. The conversation between the nurses (who) and the patient (to whom) meet the patients' symptom management needs. Nurses (who) exchange knowledge about the factors affecting symptoms, share experiences with patients, and promote their ability to perceive, evaluate, and respond to symptoms and disease (what). The activities include giving information and training special skills (how) that can promote the patients' ability to perceive, evaluate, and respond to symptoms. The symptom experience training was conducted at the COPD clinic first, then the patients continued to practice symptom experience training at home (where). The nurse provided information about perceiving, evaluating, and responding to unpleasant symptoms in everyday life (how) with weekly telephone or video call follow-ups to evaluate progress.

In Part Two, symptom management strategies, the nurse provided health education and training sessions. The patients and family caregivers received the necessary knowledge and primary skills in sleep hygiene, diet, energy conservation techniques, breathing techniques, effective coughing, relaxation, and stress management. The training special skills included walking meditation and using a pedometer to promote physical activity (how). Then the nurse asked the patients to perform walking meditation at home three days per week (on the first, third, and fifth day), 10 minutes per time, three times per day (how much), and record the checklist in a daily log independently or with caregivers. The researcher asked the patients to use a pedometer at home (where). The pedometer motivated and encouraged the patients to improve daily walking (why). The patients recorded feelings and possible problems after completing the walking meditation by using a daily log.

Additionally, the nurse encouraged family caregivers to support the patients in symptom management at home. The health discussion group of the patients and family caregivers helped assess knowledge and experience after providing beneficial information and allowing the patients to reflect on individual behavior and prior knowledge (why). The health discussion and health education was conducted once at the hospital for approximately 90 minutes on Day One of Week One. The nurse aimed for the patients and caregivers to participate in the discussion group together. This

session encouraged the patients to perceive support from families and increase individual knowledge, experience, skills, confidence, and motivation to improve their abilities (how). At Week 4 (when), the researcher made appointments with the patients for a health discussion and follow-up tests. After that, the nurses will participate in a follow-up call via the LINE application or telephone to reflect on the patients' behavior, ask about problems, give suggestions, encourage vigilance, and evaluate the benefits (why) of the program. This program offers equipment to help the patients and their families implement the activities themselves at home, including a booklet and online media content so that they can recall their knowledge and demonstrate their walking meditation training via the LINE application (how).

The patients continued to practice symptom management activities and evaluated the symptom outcomes leading to selecting and adhering to the appropriate symptom management strategies. The researcher believes that completing eight weeks (when) of the symptom management program was able to positively affect symptoms, such as symptom experience and physical function. If these unpleasant symptoms can be managed, it will decrease symptoms and promote physical function, which are related outcomes, as seen in the conceptual framework in Figure 1.1.

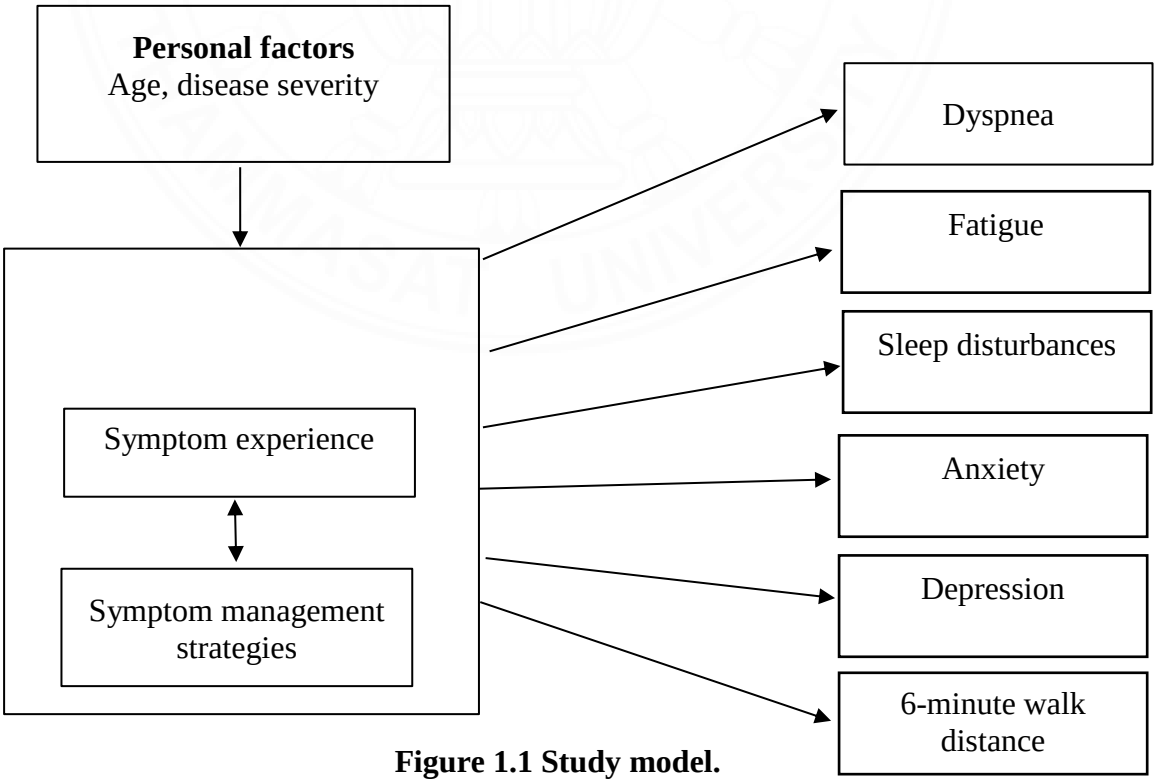


Figure 1.1 Study model.

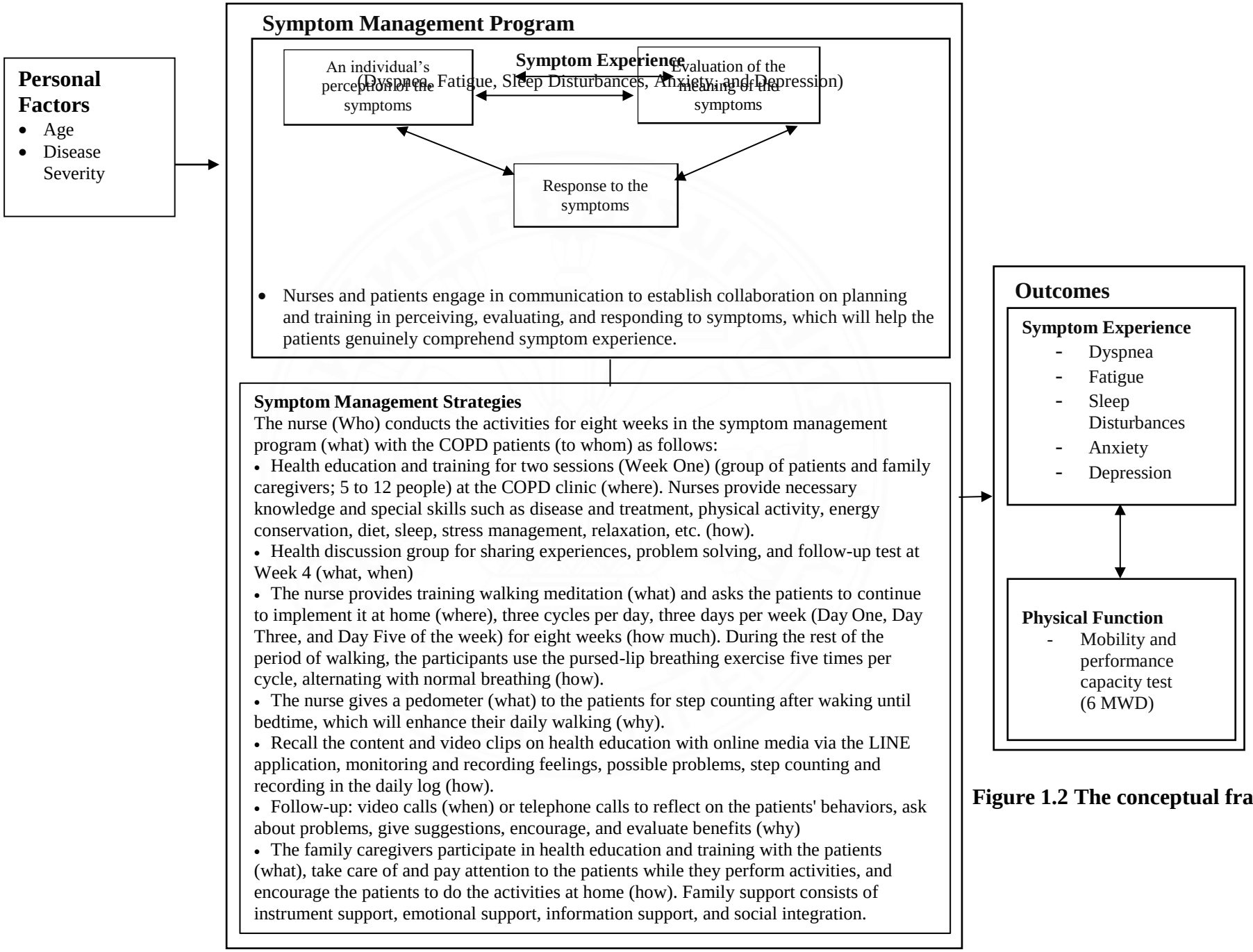


Figure 1.2 The conceptual framework.

1.6 Research Hypotheses

1.6.1 The symptom experience and physical function in adults with COPD in the experimental group using the symptom management program will be significantly better than the usual care group when measured over time at Week 4 and Week 8.

1.6.2 The symptom experience and physical function in adults with COPD will be significantly different for at least one pair when measured over time at baseline, Week 4, and Week 8 in the experimental group using the symptom management program.

1.7 Operational Definitions

1.7.1 The symptom management program is a program developed to manage the symptoms in COPD patients. This program can be implemented in groups and individually over a period of eight weeks. The main strategies in this program are as follows:

One, a nurse and patients engage in communication to establish collaboration on planning.

Two, a nurse provides training to patients to promote perception, evaluation, and response to symptoms—this strategy can help patients understand symptoms and consider appropriate methods for symptom management and relief.

Three, a nurse educates the patients regarding the necessary knowledge and special self-care skills, providing video clips to help the participants recall the content at home. The contents include COPD and treatment, the most common symptoms and symptom management strategies, physical activities, energy conservation, diet, sleep, stress management, and relaxation.

Four, a nurse trains the patients in walking meditation and promotes walking by using a pedometer to be continued at home. During the rest of the walking meditation period, the participants use the pursed-lip breathing exercise five times per cycle and alternating with normal breathing. The patients receive a pedometer for step counting each day, which is used from waking until bedtime.

Five, a nurse encourages families to assist patients in their ongoing activities and monitor, support, coordinate, and encourage the participants to continue the program at home.

Six, a nurse follows up on the program by a weekly video call via the LINE application or a weekly telephone call.

1.7.2 Usual care is the education the registered nurses routinely give the participants regarding self-care and medication use at the COPD clinic at the follow-up. The participants in the usual care group did not receive mindfulness meditation training, did not participate in physical activity or rehabilitation programs, did not receive telephone calls or video calls from the healthcare team, or participate in the health education program on disease or symptom management. If these participants had any health problems, they could request help or receive service from the COPD clinic staff.

1.7.3 The family caregivers are the family members responsible for taking care of patients with COPD at home, including assisted self-care, household tasks, emotional and social support, advocacy and coordination of medicine and treatment. The family caregivers live with patients with COPD and participate in activities at a clinic or via the LINE application.

1.7.4 Symptom experiences are the participants' experiences related to fatigue, dyspnea, sleep disturbance, anxiety, and depression.

1.7.4.1 Fatigue is a subjective, unpleasant symptom marked by lack of energy that affects physical, emotional, and social functioning. For this symptom, the multidimensional assessment of fatigue (MAF) was used to assess four dimensions: severity, distress, timing, and degree of interference in the activities of daily living (Antoniu & Ungureanu, 2015; Meek & Lareau, 2003).

1.7.4.2 Dyspnea is the perception of difficulty breathing or labored breathing that impacts COPD health status. For the dyspnea symptoms, the modified Medical Research Council (mMRC) Dyspnea Scale (Mahler & Wells, 1988) and the COPD Assessment Test (CAT) (Jones et al., 2009) were used.

1.7.4.3 Sleep disturbances are problems with initiating and maintaining sleep, consisting of sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sedatives, and daytime dysfunction. For this

symptom, the Pittsburgh Sleep Quality Index (PSQI) was used for assessment (Buysse et al., 1988).

1.7.4.4 Anxiety is a natural response to a situation in which a person feels pressured, which encompasses more than just feeling stress or worry. For this symptom, the Hospital Anxiety and Depression Assessment Scale (the HADS-Anxiety) was used for assessment (Zigmond & Snaith, 1983).

1.7.4.5 Depression involves feelings of sadness, discouragement, lack of motivation, irritability, hopelessness, and a general lack of interest or pleasure in life. The depression symptoms were measured by using the Hospital Anxiety and Depression Assessment Scale (HADS-Depression) (Zigmond & Snaith, 1983).

1.7.5 Physical function is the ability to perform exercise, which was measured by using the 6-minute walk test.

1.8 Expected Benefits of the Study

1.8.1 Nursing Practice

This study's results will benefit the nursing care of adults with COPD, and the findings can also help patients with COPD manage symptoms by applying this program for usual care and promoting it for continued implementation at home. This will help patients with chronic illness make decisions regarding whether to apply mindfulness-based or technology-based interventions, or both, to manage symptoms.

1.8.2 Future Research Study

The findings of this study will serve future nursing research on symptom management strategies for applications in other settings or contexts. In addition, this study will be a foundation for future research focusing on developing appropriate interventions for improving symptom experience and physical function in adults with COPD.

CHAPTER 2
REVIEW OF LITERATURE

This chapter reviews the existing literature, describing the concepts of interest in this study as follows:

2.1 Chronic obstructive pulmonary disease (COPD)

2.1.1 Definition of COPD

2.1.2 Causes, diagnosis, and classification of airflow limitations in COPD

2.1.3 COPD management

2.1.4 COPD treatment

2.2 Most common symptoms in COPD

2.2.1 Most common symptoms in COPD

2.2.2 Factors associated with COPD symptoms

2.2.3 Mechanisms of the most common symptoms in COPD

2.2.4 Relationships of the most common symptoms and physical function in COPD

2.2.5 Measurement of symptoms

2.2.6 Evidence-based practice regarding symptom management

2.3 Physical Function

2.3.1 Definition and components of physical function

2.3.2 Measurement of physical function

2.4 The theory of symptom management and a symptom management program for patients with COPD

2.4.1 Theory of symptom management

2.4.2 Application of the theory of symptom management for the symptom management program

2.4.2.1 Self-care health education regarding COPD

2.4.2.2 Walking in daily life

2.4.2.3 Walking meditation

2.4.2.4 Family support

2.4.2.5 Technology-based intervention

2.4.2.6 Summary of the symptom management program

2.1 Chronic obstructive pulmonary disease

2.1.1 Definition of COPD

Chronic obstructive pulmonary disease has been defined as follows: "Chronic obstructive pulmonary disease is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities caused by significant exposure to noxious particles or gases and influenced by host factors including abnormal lung development" (GOLD, 2020). Patients with COPD have emphysema, obstructive bronchitis, or combined conditions (American Thoracic Society, 2019). Emphysema is the destruction of the gas exchange surfaces of the alveoli. Chronic bronchitis induces inflammation and narrowing of the bronchial tubes, causing mucus to build up. These conditions obstruct airflow in the respiratory system and cause respiratory problems (Prasad, 2020).

2.1.2 Causes, Diagnosis, and Classification of Airflow Limitations in COPD

2.1.2.1 Causes of COPD

(1) Excessive exposure to toxic particles or gases

Exposure to harmful gases is a frequent cause of COPD (American Thoracic Society, 2019; GOLD; 2020). Exposure to smoking has an essential effect on lung function, which causes COPD and impacts disease progression. Additionally, active and passive smoking are related to adverse outcomes and increased airway wall thickness (Putcha et al., 2016). Cigarettes have various harmful chemicals that affect the lungs. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) cautions that e-cigarettes lack data on COPD safety (Gupta et al., 2020). Various types of tobacco, such as pipe tobacco or marijuana, contact with biomass fuels (coal, wood, agricultural waste, and animal dung), and occupational exposure to a variety of elements (dust, fumes, and chemical agents) all contribute to the development of COPD. Long-term exposure to harmful gasses or particles, with genetic factors, bronchial hyperactivity, and impaired childhood pulmonary development, can

contribute to COPD in nonsmoking patients (GOLD, 2020; Jaramillo & Mora Salazar, 2018.

(2) Genetic, lung growth, and development factors

Genetic factors are a significant cause of COPD because the deficiency of alpha-1 antitrypsin, glutathione S-transferase, and the gene encoding matrix metalloproteinase-12 have also been found to be related to COPD or declining lung function. There are many genetic factors related to COPD, but COPD heredity remains unexplained (GOLD, 2020; Silverman, 2020). Furthermore, there is significant evidence that emphysema is a destructive process and a failure of the cells and molecular maintenance systems required for normal lung function (Boucherat et al., 2016).

(3) Age, sex, and socioeconomic status

COPD is a leading cause of mortality and disability in older adults. Older adults undergo changes in lung function and are more sensitive to the causes of COPD (Bowdish, 2019). Additionally, changing pulmonary function and structuring relative to age increases pathogenetic vulnerability to COPD (Fukuchi, 2009). Previously, COPD was more common in males than females, but several studies in the last two decades have revealed that incidence and mortality have significantly increased in women (Emma et al., 2020). The prevalence of COPD among women has reached the level of males since 2008. This trend can be attributed, at least in part, to the rising global rates of cigarette consumption among women and exposure to biomass fuels (Gut-Gobert et al., 2019).

Furthermore, the effects of gender on COPD are complicated. Gender encompasses additional factors, such as sensitivity to physiological, hormonal, and behavioral differences and therapeutic responses (Aryal et al., 2014; GOLD, 2020). Additionally, socioeconomic status has been associated as a risk factor (Kanervisto et al., 2011)whereby socioeconomic status and unhealthy behaviors such as smoking, poor nutrition, and physical inactivity pose a risk of COPD (Pampel et al., 2010).

2.1.2.2 Diagnosis and classification of airflow limitation severity in COPD

The GOLD (2020) provides guidelines for the diagnosis of COPD as follows:

(1) Considering the symptoms of dyspnea, sputum production, and chronic cough.

(2) Considering the history of COPD risk factors that are excessive and/or the history of recurrent lower respiratory tract infection

(3) Confirming airflow limitations by using a spirometer. A spirometer is used to diagnose the presence of FEV1/FVC<0.7, which is measured after using a bronchodilator. After diagnosing COPD, patients should assess airflow limitation level, which is used to assess the effects of a patient's health condition and the risk of a future event (acute exacerbation, hospitalization, or death), and guide COPD treatment. GOLD's initial guidelines used forced expiratory volume (FEV_1) to determine the stage of disease severity (Hurst et al., 2020). FEV_1 detects only one aspect of COPD's severity, whereas the GOLD approach recommends using a combined assessment to guide treatment, depending on the symptoms and history of an individual's exacerbation. COPD evaluation identifies the degree of airflow limitation. Airflow limitation severity in COPD can be classified as follows (GOLD, 2020; Thoracic Society of Thailand under Royal Patronage, 2022):

a. Stage GOLD 1, or mild, is FEV1 predicted to be more than 80%.

b. Stage GOLD 2, or moderate, is $50\% \leq FEV_1 < 80\%$ predicted.

c. Stage GOLD 3, or severe, is $30\% \leq FEV1 < 50\%$ predicted.

d. Stage GOLD 4, or severe, is FEV_1 predicted less than 30%.

2.1.3 COPD Management

The objective of COPD treatment is to control the development of the disease and its symptoms. Risk reduction aims to prevent progress of illness, prevent and manage acute exacerbations, and decrease mortality rates. Symptom relief,

improved exercise tolerance, and improved health status are all benefits of decreased symptoms. Treatment and management of COPD are crucial for achieving the above goals. Treatment can take place in two parts, including pharmacological and non-pharmacological approaches.

2.1.3.1 Pharmacological Treatment

Pharmacological therapy for COPD can reduce symptoms and acute exacerbations, such as bronchodilator medications. These are β2-adrenergic agonists, anti-muscarinic drugs, anticholinergic agents, and methylxanthines (Lewis et al., 2015). Bronchodilator inhalants are recommended more than oral bronchodilators. Regularly using short-acting muscarinic antagonist (SAMA) or short-acting beta-agonist (SABA) bronchodilators improves FEV_1 and symptoms. The combination of SABA and SAMA is better than either medication alone for improving symptoms and FEV_1.

The long-acting β2 agonists (LABA), long-acting bronchodilators, or long-acting muscarinic antagonists (LAMA) help improve dyspnea and lung function, reduce acute exacerbation, and improve health status. The combination of LABA and LAMA significantly increases FEV_1 and reduces symptoms (GOLD, 2020). However, most patients will continue to have symptoms and exacerbations. Therefore, dual bronchodilation is recommended for these individuals (Hillas et al., 2020). Long-term monotherapy with inhaled corticosteroid (ICS) therapy is considered along with LABA in patients with a history of exacerbation, despite treatment with adequate long-acting bronchodilator therapy (GOLD, 2020). The rationale for prescribing medication in patients with COPD requires careful consideration, not just the severity of airflow restrictions. Therefore, it is crucial to consider the severity of symptoms, the risk of exacerbation, and which ABCD assessment tool is appropriate for COPD management.

2.1.3.2 Non-pharmacological treatment

Non-pharmacological treatment is used along with pharmacological treatment, including 1) smoking cessation, 2) vaccinations, 3) rehabilitation, education, and self-management, and 4) supportive, palliative, and end-of-life care (GOLD, 2020).

(1) Smoking cessation

Smoking cessation is an essential strategy for managing COPD. Smoking cessation consists of pharmacological and non-pharmacological treatment. Nicotine replacement therapy is a pharmacotherapy used to help people quit smoking. Examples of medications used include bupropion, varenicline, and nortriptyline. Nicotine replacement therapy is of various types, including nasal spray, nicotine gum, transdermal patches, and inhalers. Non-pharmacology for smoking cessation is a five-step approach that offers a structure for healthcare providers to assist people in quitting smoking.

(2) Vaccinations

The recommendation for vaccinations is the influenza and pneumococcal vaccine. Influenza vaccination can reduce exacerbations, hospitalizations, and outpatient visits in addition to reducing mortality. Simultaneously, pneumococcal vaccination can decrease the incidence of community-acquired pneumonia and pneumococcal pneumonia as well as the risk of acute exacerbations of existing conditions such as pneumonia (Bekkat-Berkani et al., 2017; Froes et al., 2017).

(3) Rehabilitation, education, and self-management

The evidence indicates that pulmonary rehabilitation is a benefit for patients with COPD. A systematic review and meta-analysis demonstrate that pulmonary rehabilitation effectively alleviates symptoms such as dyspnea and fatigue, enhancing emotional function and increasing individuals' sense of control over their disease, all of which improve exercise capacity and health-related quality of life (McCarthy et al., 2015). The study involved individuals who were enrolled in a standard inpatient multidisciplinary pulmonary rehabilitation program for 12 weeks. The program consisted of regular sessions held five days per week. The average fatigue score demonstrated a statistically significant and clinically meaningful enhancement as compared to the initial measurement. The prevalence of fatigue decreased from an initial rate of 74.9% at the beginning of the public relations intervention to 33.0% following implementation (Van Herck, 2019). Furthermore, pulmonary rehabilitation programs improved FEV_1, peak workload, peak VO2, exercise capacity, dyspnea, and health-related quality of life (He et al., 2023; Higashimoto et al., 2020; Zhang et al., 2022; Zheng et al., 2022). In a pulmonary rehabilitation program, patients with COPD can receive education on various subjects, including smoking cessation, medication

management, exercise, breathing techniques, exacerbations, and stress management. The best method for conducting this education is printed material, brochures, demonstrations, and practices. Thus, these are the predominant tools and techniques (Stoilkova et al., 2013). However, the GOLD guidelines recommend that education alone is insufficient (GOLD, 2020).

(4) Supportive and palliative care

Supportive and palliative care consists of symptom control and palliative therapy for patients with COPD, including dietary assistance, fatigue, anxiety, depression, and end-of-life care.

2.1.4 COPD treatment

The recommendation for COPD in Thailand follows the COPD management cycle based on the Thoracic Society of Thailand under Royal Patronage (2022). The COPD management cycle consists of three parts: review, assess, and adjust. The model is as presented in Figure 2.1, and the assessment of response to treatment is in Figure 2.2.

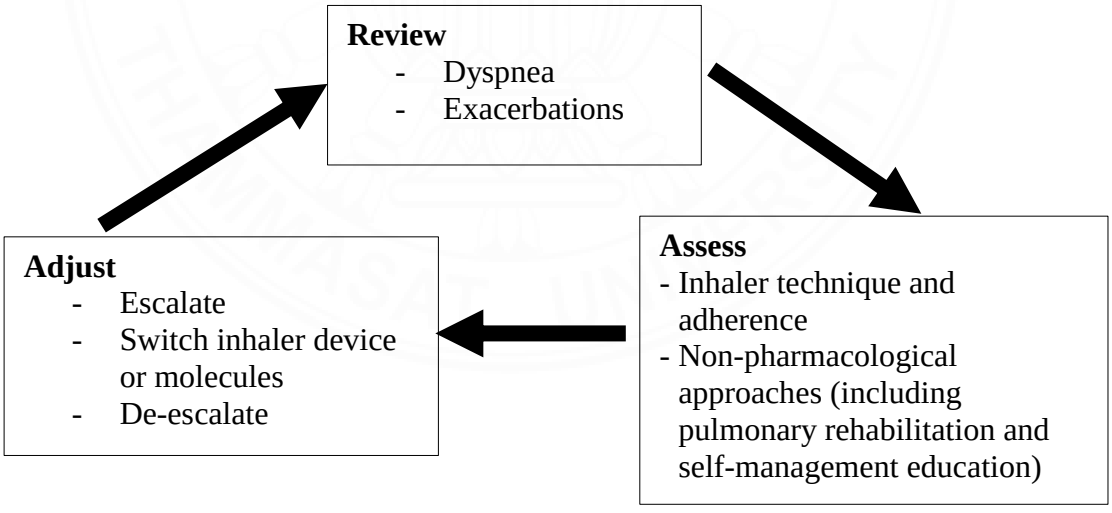
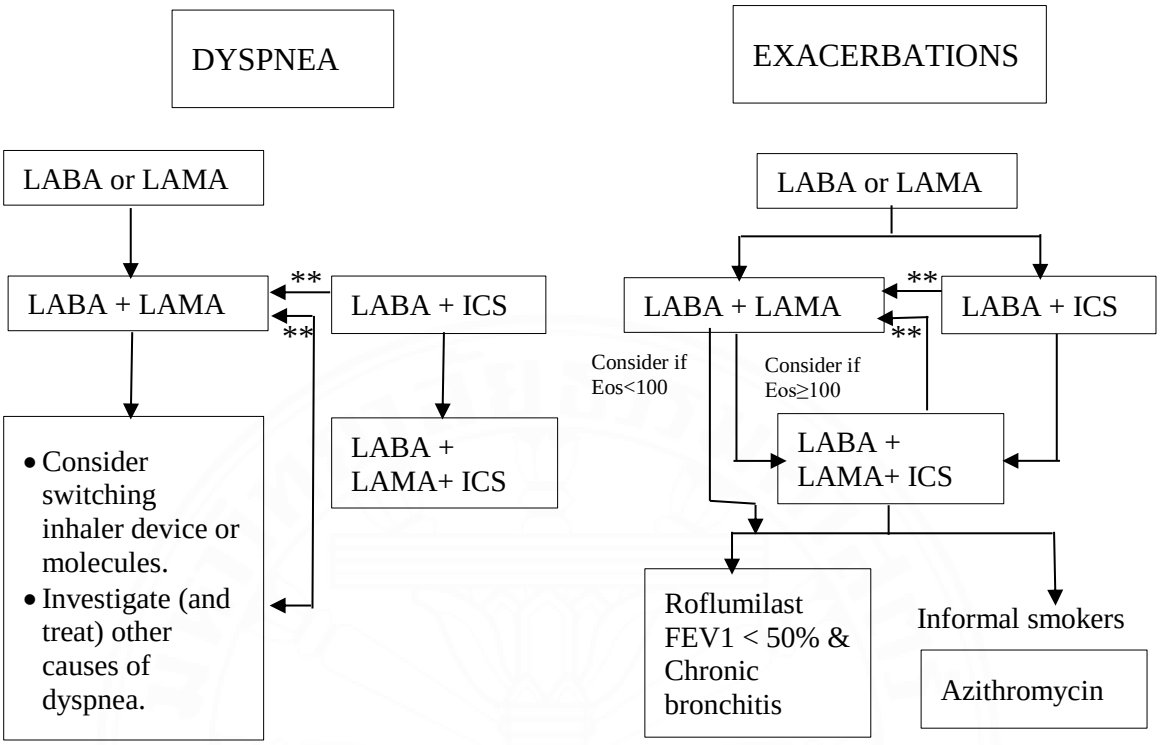


Figure 2.1 Management cycle of COPD

(Thoracic Society of Thailand under Royal Patronage, 2022)



EOS = Absolute blood eosinophil count (cell/µL)

***** Consider if Eos ≥ 300 or Eos ≥100 and ≥2 moderate exacerbations/ 1 hospitalization**,** moderate exacerbation: treat SABD+antibiotics and/or oral corticosteroids.

**Consider de-escalation of ICS or switch if pneumonia, inappropriate indication, or lack of response to ICS.

Figure 2.2 Assessment of response to treatment.

(Thoracic Society of Thailand under Royal Patronage, 2022)

2.2 Most common symptoms of COPD

2.2.1 Most common symptoms of COPD

The study of the frequency of the most common symptoms in Thai COPD found that dyspnea was the most prevalent symptom perceived by patients (100%), followed by fatigue (91.70%). Insomnia was reported as the third most prevalent symptom with a prevalence rate of 58.90%. Anxiety and depression were listed as the most minor perceived symptoms with a prevalence rate of 0.60% per symptom (Ekkamart et al., 2021). The frequency of the five most prevalent symptoms may vary; nonetheless, co-occurrence is possible.

2.2.1.1 Dyspnea

Dyspnea is the most common symptom of COPD, with significant morbidity and dyspnea alleviation as a primary COPD treatment goal (O'Donnell et al., 2020). The American Thoracic Society defines dyspnea as "a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity" (Parshall et al., 2012). Dyspnea is common in patients with cardiovascular or respiratory disorders. Additionally, the aging process induces a progressive decline in lung function due to reduced lung elasticity, increased chest wall rigidity, and reduced muscle strength in the respiratory tract. Therefore, there are many reasons why healthy older adults can get breathless (O'Donnell et al., 2009). While both dyspnea and fatigue are common in patients with COPD, dyspnea is frequently mistaken for fatigue. This ambiguity can arise because the causes of fatigue and dyspnea in patients with COPD are not always clear and sometimes overlap (Meek & Lareau, 2003). Dyspnea levels are a positive correlation with fatigue (Cavalcante et al., 2012). Structural equation modeling results present the fact that higher dyspnea and fatigue levels are associated (Lee et al., 2018). The research findings of Goërtz et al. (2019) show that severe fatigue is experienced with greater dyspnea than patients with normal and mild fatigue. Dyspnea is the most common symptom and is difficult to distinguish from the fatigue symptoms in COPD.

2.2.1.2 Fatigue

Fatigue is the most common symptom in patients with chronic disease and has been defined as follows: “Fatigue is a subjective, unpleasant symptom which incorporates total body feelings ranging from tiredness to exhaustion creating an unrelenting overall condition which interferes with individuals’ ability to function to their normal capacity” (Ream and Richardson, 1996). A systematic review of the prevalence and related factors of fatigue reported that the prevalence of fatigue in COPD ranged from 17-95%. Fatigue symptoms have significant associations with age, gender, marital status, FEV_1, number of exacerbations, number of comorbidities, number of medications, muscle strength, functional capacity, dyspnea, anxiety, depression, and quality of life (Zjala et al., 2021). Furthermore, fatigue increases dyspnea and decreases sleep quality; fatigue is also associated with other symptoms such as anxiety and depressed moods, both of which affect functional performance in older adults with COPD (Kapella et al., 2006). Fatigue is a complex mechanism that is similar to and can be correlated with sleep disturbances.

2.2.1.3 Sleep disturbances

Sleep disturbances are more severe with increasing illness and substantially reduce the quality of life of patients with COPD (George & Bayliff, 2003). Insomnia is independently associated with smoking, depression, and anxiety. The involvement of insomnia is also associated with increased sleepiness during the day and poor quality of life (Budhiraja et al., 2012). More than 50% of COPD patients have sleep problems with a longer delay of falling asleep, insomnia, or more frequent arousals and awakenings. Cough and excessive mucus can also delay the onset of sleep, and the difficulty associated with prolonged airflow weakness in the horizontal position can also lead to insomnia (George & Bayliff, 2003, as cited in Xiang et al., 2014). Sleep disturbances in relation to COPD can be attributed to decreased physical activity, decreased outdoor time, nocturnal dyspnea, decreased exposure to bright light, and the use of daytime sleep to compensate for illness-related fatigue because of the decrease of nighttime sleep (Kapella et al., 2011). If patients suffer from insomnia and do not recover, it can result in a significant loss of cognitive function and increased emotional and physical fatigue during the day (Vanfleteren et al., 2020).

2.2.1.4 Anxiety

Anxiety has been defined as “an emotion characterized by apprehension and somatic symptoms of tension in which an individual anticipates impending danger, catastrophe, or misfortune” (American Psychological Association, 2020). Anxiety can occur when people are concerned, uneasy, or fearful about upcoming or future occurrences (Mind, 2017 as cited Milne & Munro, 2020). Anxiety stimulation can be a symptom of dyspnea, which is a basic form of COPD. Anxiety can also arise from an inability to perform everyday tasks or fulfill anticipated social roles (Elkington et al., 2004). Additionally, anxiety and dyspnea are interrelated and frequently correlate with poor health status, diminished quality of life, and withdrawal from social activities and home duties due to fear of anxiety and dyspnea during exercise (Yohannes et al., 2017). Not only are dyspnea symptoms common in COPD, but depression is also a fairly common symptom connected with anxiety.

2.1.1.5 Depression

Depression has been defined as “a negative affective state ranging from unhappiness and discontent to an extreme feeling of sadness, pessimism, and despondency that interferes with daily life. Various physical, cognitive, and social changes also tend to co-occur, including altered eating or sleeping habits, lack of energy or motivation, difficulty concentrating or making decisions, and withdrawal from social activities. It is symptomatic of a number of mental health disorders” (American Psychological Association, 2020). Depression and anxiety are refractory to treatment because their symptoms frequently overlap with those of COPD. The causes of depression symptoms are multi-factorial and include behavioral, social, and biological factors (Yohannes & Alexopoulos, 2014). For example, depression predicts shortness of breath, fatigue, and impairment in patients with COPD (Maurer et al., 2008). Therefore, depression can cause and be an outcome of COPD; Furthermore, depression and anxiety can lead to panic, fear, low self-esteem, hopelessness, social isolation and caregiver dependency, all of which form a vicious circle that can cause anxiety and depression (Yohannes & Alexopoulos, 2014).

2.2.2 Factors associated with COPD symptoms

The factors associated with symptoms in COPD patients in the present study covered three parts related to the theory of unpleasant symptoms (physical, psychological, and situational factors) related to factors such as age, disease severity, comorbidities, and socioeconomic status.

2.2.2.1 Age

Age is an essential factor associated with symptoms of COPD. A study by Lim (2017) found that the three symptom clusters of patients with COPD consist of a fatigue-sleep cluster (fatigue and sleep disturbance), a respiratory-functional cluster (dyspnea, dry mouth, and physical functional status), and a mood cluster (anxiety and depression) that significantly differ depending on age. Additionally, age is a factor that predicts anxiety, depression, breathlessness, and health-related quality of life in COPD. Younger ages of people with COPD are associated with greater depression and symptoms of breathlessness (Holm, 2014). Tsai et al. (2013) revealed that younger women and those with low income had an increased risk of depression. One research supports the notion that age is a crucial factor in COPD symptoms and that younger age is associated with variability in breathlessness (Kessler et al., 2011). Furthermore, a study by Wong (2010) presents that age is associated with fatigue in the dimension of reduced activity and motivation. Therefore, age is the factor associated with the most common symptoms of COPD.

2.2.2.2 Disease severity

Disease severity is one of the critical factors affecting symptoms of COPD. For example, dyspnea is noticeably more severe in patients with severe airflow restriction, but the incidence of exacerbations is similar throughout the COPD stages (Dransfield et al., 2011). Fatigue is associated with the GOLD disease severity and dyspnea (Lewko et al., 2009). Sleep disturbance is associated with pulmonary function or airflow obstruction in smokers with COPD. A higher FEV1 has been seen to be associated with greater sleep disturbance in patients with airflow obstruction (Donovan et al., 2017). Furthermore, patients diagnosed with very severe COPD have the highest quantity of symptoms with a median value of 15. Subsequently, those diagnosed with severe COPD display a median of 14 symptoms, while individuals diagnosed with mild and moderate symptoms experience a median of 10 symptoms per patient. The most

onerous symptoms experienced by individuals include dyspnea, fatigue, insomnia, anxiety, dry mouth, nervousness, and irritability. The patients diagnosed with very severe COPD experience the highest symptom burden, whereas those with severe, moderate, and mild COPD follow in descending order (Melhem et al., 2021). Therefore, disease severity or level of airway obstruction is an influencing factor leading to symptom experience.

2.2.2.3 Comorbidities

Comorbidities can have a major impact on the course of COPD, altering disease-related symptoms and increasing patient morbidity and death (Garvey & Criner, 2018). Comorbidities can increase the outcomes of COPD, such as dyspnea and exercise capacity, and negatively influence pulmonary rehabilitation outcomes (Franssen & Rochester, 2014; Hornikx et al., 2013; Raherison et al., 2018). Furthermore, some comorbidities are associated with increased dyspnea symptoms, such as cardiovascular disease, pulmonary hypertension, and anemia (Garvey & Criner, 2018; Putcha et al., 2018; Sharma & Sharma, 2019).

Additionally, cardiovascular disease can influence fatigue symptoms (Garvey & Criner, 2018). Some comorbidities, such as hypertension, arthritis, cancer, and heart disease, are significant predictors of the depression risk associated with COPD (Holm, 2014). A systematic review of the prevalence and impact of the comorbidities in individuals with COPD found that the COPD comorbidities occurring most frequently were hypertension, coronary artery disease, diabetes mellitus, osteoarthritis, psychiatric problems, and asthma. The frequency and severity of COPD exacerbations and the quality of life and mortality risk are influenced by many comorbidities, including malignancies, coronary artery disease, chronic heart failure, and cardiac arrhythmias. Comorbidities, particularly cardiovascular illnesses and diabetes mellitus, are prevalent in individuals with COPD, and some comorbidities have been linked to increased mortality rates (Santos, 2022).

In addition, the severity and duration of the disease, hospitalization, and frequency of hospital admissions in the preceding year all contribute to anxiety and depression related to COPD (Jose et al., 2016). In addition, Wu et al. (2018) discovered that BMI had a moderately positive correlation with pulmonary function and a negative

correlation with acute exacerbations. BMI, therefore, may be a useful indicator in predicting COPD patients' prognoses and long-term management.

2.2.2.4 Educational levels

Lower educational levels have been observed to be associated with dyspnea and fatigue symptoms (Karakurt and Unsal, 2013; Sharma & Sharma, 2019). In addition, there is are statistically significant differences in anxiety and depression levels among literate, primary school graduates and those with lower income. A low education level influences symptom of COPD and is associated with a higher prevalence of smoking and lung function decline (Tabak et al., 2009). COPD patients with lower educational levels have lower health-related quality of life, while those with higher levels of education can reduce mortality rates (Lutter et al., 2020; Miravitlles et al., 2011).

2.2.3 Mechanisms of the most common symptoms in COPD

The most common symptom of COPD is dyspnea, which affects other symptoms. The mechanism of dyspnea in COPD links the pathophysiological and neurobiological mechanisms (Hanania & O'Donnell, 2019). Airway obstruction increases the mechanical work of breathing, resulting in elevated respiratory resistance. Additionally, the increased afferent impulses from peripheral chemoreceptors decreases arterial blood PO_2, thereby improving integrated chemical respiratory sensation.

Additionally, airway obstruction makes it more difficult to provide the ventilatory volume and timing desired by the brain. The mismatch between the motor command corollary discharge and the integrated mechanical respiratory sensation causes dyspnea (Fukushi & Okada, 2019). Therefore, the mechanism of dyspnea in COPD patients integrates neurological and pathophysiological mechanisms affecting other symptoms.

Fatigue is not only related to one pathogenic pathway. The interplay among multiple pathways is complicated in COPD, partly because one path gives rise to several symptoms such as hypoxemia, which can lead to fatigue, dyspnea, or depression and determine whether the overlap among the pathways can produce a particular symptom. These mechanisms tend to include fatigue, which interferes with other

symptoms (Antoniu & Ungureanu, 2015). The complicated interactions among the physical and behavioral characteristics in humans and various physical problems are the cause of fatigue. Patients with COPD are susceptible to a vicious cycle of events including decreased activity due to the labor of heavy breathing and dyspnea, severe deconditioning, impaired exercise capacity, and willingness to engage in strenuous activity, all of which worsen deconditioning and fatigue (Baltzan et al., 2011).

Systemic inflammation is one mechanism that demonstrates an association with fatigue. The study by Matura et al. (Matura et al., 2018) presented that chronic illnesses are related to the underlying biological modifications correlated with fatigue. Patient features and dynamic variables influence these biological changes. The biological processes are shown to impact physical function, cognitive-behavioral factors, activity, and energy balance. Although there have been few studies on this mechanism, the above researchers identified one study finding TNF-α to be associated with fatigue in patients with COPD.

Sleep disturbance is the biggest problem in patients with COPD. Many patients with COPD are filled with excess mucus and cough when they try to sleep. Additionally, the arousal associated with coughing can result in light sleep (Sharafkhaneh et al., 2009). The changes in pathology in COPD patients significantly increase the amount of labor required to breathe and cause the airflow to the lungs to become obstructed. Additionally, the increased labor of breathing affects gas exchange rates. As a result, patients need to use accessory muscles to inhale and exhale, thereby increasing the need for oxygen.

Sleep in COPD is typically associated with oxygen desaturation. Patients with COPD undergo physiological changes during sleep such as changes in central respiratory control, resistance in the airways, and contractility of the respiratory muscles (McNicholas et al., 2013). Additionally, patients with COPD have nocturnal dyspnea episodes that trigger frequent awakening, and chronic airflow limitation induces breathing and leads to sleep disturbance resulting in decreased residual functional capacity. These alterations are particularly evident during rapid eye movement (REM) sleep when the postural muscular tone is absent, while ventilation and respiratory effort increase in response to hypoxia or hypercapnia (George & Bayliff, 2003). Nevertheless, the medication used to treat COPD, concurrent anxiety

and depression, and comorbid sleep disorders can also be found in other etiologies (Collop, 2010).

Anxiety in COPD is associated with dyspnea symptoms (Hill et al., 2008; O'Donnell et al., 2007; Tselebis et al., 2016). Anxiety causes significant alterations in ventilation and physical feelings in the lungs. Thus, the affective neural control system modulates respiratory sensations. Additionally, various sensory modalities could work together to change the sensory threshold. As a result, the respiratory sensations associated with dyspnea impact anxiety symptoms in patients (O'Donnell et al., 2007). COPD's physiological manifestations include hyperinflation, decreased ventilatory capacity, increased neural respiratory drive, increased ventilatory load, and neuromechanical dissociation. These manifestations contribute to an efferent-afferent mismatch, which develops into dyspnea in COPD (Tselebis et al., 2016).

Additionally, patients with dyspnea generate emotional reactions such as fear, panic, anxiety, and distress. When patients cannot overcome emotional reactions, the sympathetic nervous system is activated, thereby worsening respiratory discomfort (Tselebis et al., 2016). Moreover, patients compensate with mouth breathing, which causes dry mouth and in turn induces chemical changes causing over-breathing. Acute hyperventilation reduces the blood CO2 level. Left unresolved, the decreased CO2 level reduces blood supply to the brain, thereby leading to the development of additional emotional symptoms such as anxiety (Yohannes et al., 2017). In short, dyspnea and anxiety are the causes and consequences of each other with a complex mechanism.

Depression and anxiety constitute a complex and incompletely understood pathophysiology in COPD patients (Pumar et al., 2014; Yohannes & Alexopoulos, 2014; Yohannes et al., 2010). COPD and depression has a bidirectional link since depression is both a cause and consequence of COPD. However, the precise processes through which COPD is associated with anxiety and depression remain unknown (Yohannes & Alexopoulos, 2014). Depression has a systemic inflammatory mechanism since sTNFR-1 shows a close relationship with depression rates in COPD, but TNF shows contradictory results (Al-shair et al., 2011 as cited in Pumar et al., 2014). Hypoxia, smoking, and exacerbations are essential causes of depression in COPD patients (Mikkelsen et al., 2004; Pumar et al., 2014). Hypoxia affects psychomotor ability, memory, and depressed mood since smoking and COPD produce hypoxia.

Additionally, cognitive dysfunction and blood gas abnormalities are correlated (Mikkelsen et al., 2004). Low arterial oxygen saturation is associated with periventricular white matter lesions, which are particularly prevalent in patients suffering from depression (Campbell, 2001 as cited in Pumar et al., 2014).

2.2.4 Relationships of the most common symptoms and physical function in COPD

Dyspnea is the most common symptom, and fatigue is the second most frequently reported in patients with COPD (Blinderman et al., 2009). Dyspnea is an important factor that affects fatigue, anxiety, depression, and sleep disturbance (Borge et al., 2010; Lee et al., 2018). Furthermore, increased dyspnea has been observed to be associated with decreased physical performance (Lee et al., 2018). One systematic review presented the idea that dyspnea (r=0.13 to r=0.78), anxiety (r=0.36 to r=0.61), and depression (r=0.41 to r=0.66) showed significant associations with fatigue. This systematic review is consistent with other studies indicating that dyspnea is statistically associated with fatigue (Ebadi et al., 2021; Lee et al., 2018). Other studies have shown that dyspnea and fatigue are interrelated (Peters et al., 2011).

Fatigue is an influencing variable and consequence in many patients with COPD (Kapella et al., 2006). Fatigue has also been found to be associated with sleep disturbances and emotional problems. According to path analysis, fatigue increases as dyspnea and depression increase and sleep quality decreases (Kapella et al., 2006). Additionally, dyspnea is related not only to fatigue, anxiety, and depression but also to sleep disturbance (Reishtein, 2005; Spina et al., 2017). Fatigue is associated with exercise capacity (r=-0.77 to -0.14), with most studies indicating that having lower exercise capacity results in increased fatigue. Most studies use the 6MWT to measure exercise capacity (Ebadi et al., 2021), while fatigue, dyspnea, and anxiety have been found to directly impact functional performance (Kapella et al., 2006).

Disturbed sleep has been observed to be significantly higher in patients with greater exertional breathlessness or dyspnea (Omachi et al., 2012; Spina et al., 2017). The degree of dyspnea is associated with poor subjective sleep quality (r^2 = 0.069), increased sleep disruptions (r^2 = 0.08), and daytime dysfunction (r^2 = 0.0108) (Ghalehbandi et al., 2021). Reishtein (2005) found that three symptoms, dyspnea,

fatigue, and sleep disturbance, are significantly related, with dyspnea being the only symptom related to the other two and functional performance. Thus, sleep disturbance has been identified as the cause of depressive symptoms in COPD patients (Lee et al., 2011). Two studies present fatigue and sleep disturbance in the same symptom cluster (Hao et al., 2021; Lim et al., 2017). Furthermore, sleeping difficulty demonstrates a weak but negative relationship with functional performance (Melhem et al., 2021).

Consistent with Kim et al.'s work (2017), the study of Hao et al. (2021) revealed that the emotional cluster consists of anxiety and depressive symptoms. Many studies have found that patients with COPD have depression and anxiety (Tselebis et al., 2016; Valenza et al., 2014). Anxiety is significantly associated with dyspnea and worse functional capacity measured using the 6MWT (Giardino et al., 2010), which is consistent with Doyle et al.'s (2013) study. The results indicate that, after adjusting for covariates, the main effect models reveal that higher anxiety levels are associated with greater dyspnea and fatigue. Similarly, greater depression symptoms can also predict dyspnea and fatigue, while higher anxiety and depression are significantly associated with decreased physical performance (Lee et al., 2018). Furthermore, significant anxiety has been seen due to 6MWT interaction with dyspnea, demonstrating that patients with lower 6MWT have a stronger association between anxiety and dyspnea than those with higher 6MWT scores. Shortness of breath is more common in patients who perform poorly on the 6MWT and have higher anxiety levels (Doyle et al., 2013).

Finally, the study of Witheethamsak et al. (2010) confirms the relationship of dyspnea, fatigue, sleep disturbance, anxiety, and depression symptoms in COPD patients. The data were collected from 130 patients with COPD who were more than forty years old. The relationship was analyzed using Pearson's correlation coefficient. It was found that dyspnea, fatigue, insomnia, anxiety, and depression were interrelated. The study classified a group of symptoms using hierarchical techniques that revealed two symptom clusters: Symptom Cluster 1 (dyspnea, fatigue, insomnia); and Symptom Cluster 2 (anxiety and depression). Symptom Clusters 1 and 2 have a significant negative correlation with functional status (r=-.854, -.653, respectively).

Some previous studies have suggested that dyspnea is a significant cause and the beginning of other symptoms. Therefore, focusing on dyspnea may be an excellent method for managing or improving both symptom experience and functional

performance in patients with COPD (Reishtein, 2005). Most previous symptom management studies focused on managing a specific symptom or only one symptom. Empirical evidence, however, is currently available on the relationships among the symptoms, namely the occurrence of simultaneous or multiple symptoms. The state-of-the-art approaches for explaining multiple symptoms or symptom clusters have greatly benefited from developing effective symptom management strategies (Hao et al., 2021; Kim et al., 2017). The relationship between the most common symptoms and physical function in COPD is shown in Figure 2.3.

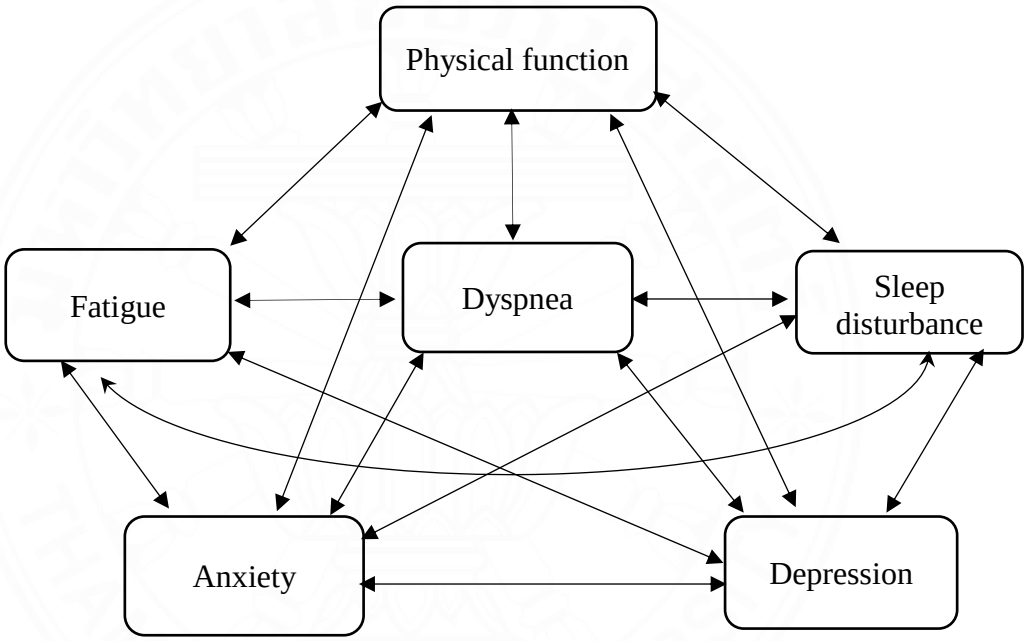


Figure 2.3 Relationships between the most common symptoms and physical function in COPD

2.2.5 Measurement of symptoms

2.2.5.1 Measurement of dyspnea symptoms

The measurement of dyspnea in COPD patients has two purposes: 1) to differentiate or discriminate among patients with less and more dyspnea and 2) to determine whether patients' dyspnea has changed over time/assess treatment outcomes. The clinical instruments for evaluating the severity of dyspnea are unidimensional and multidimensional. The unidimensional instruments include the MRC scale, the visual analog scale, the ATS dyspnea questionnaire, and the WHO dyspnea questionnaire. Multidimensional instruments include the dyspnea component of CRQ, the baseline dyspnea index (BDI), and the transition dyspnea index (TDI) (Mahler, 2006). Furthermore, dyspnea tools can be divided into three main categories: short-term intensity, situational, and impact measures (Meek, 2004).

(1) Short-term intensity dyspnea tools are the most commonly used to evaluate dyspnea symptoms before, during, and after exposure to exercise. Additionally, they are used to assess the current level of dyspnea. The short-term intensity dyspnea tools are extraordinary measures with exercise in a laboratory setting; these tools include the modified Borg scale and the visual analog scale (VAS).

(2) Situational dyspnea tools are standardized self-reports related to everyday activities, such as walking on level ground or uphill. These tools cannot capture the rapid changes in the current treatment state. The tools in this category include the mMRC scale, BDI, and TDI. These situational dyspnea tools offer various applications in various intervention types, but are limited in terms of rating or assigning dyspnea linked with activities. Although the association between dyspnea and activities is beneficial for comparison, it is impossible to separate activity levels from dyspnea intensity. As a result, the application of these factors in evaluating dyspnea following any intervention must take this issue under consideration.

(3) The impact measures of dyspnea examine the varied consequences of chronic respiratory disease. Some of these instrument items are specific symptoms of dyspnea, while others measure activity and other symptoms affecting quality of life with COPD. The tools in this category consist of the CRQ questionnaire, the Pulmonary Functional Status and Dyspnea Questionnaire (PFSDQ). Additionally, questionnaires for COPD symptoms, such as the COPD Assessment Test (CAT), include specific questions about activity-related dyspnea.

The CAT was developed and validated to assess the symptom impact of COPD. The scoring for dyspnea items ranged from zero for "when I walk uphill or up a flight of stairs, I am not breathless" to five for "when I walk up a hill or one flight of stairs, I am very breathless". The instrument is unidimensional, brief, sensitive to state differences, and should provide valid, reliable, and globally comparable measures of COPD health status (Jones et al., 2009). Dyspnea is an important symptom that affects the health status of patients with COPD (Huang et al., 2015); therefore, evaluating dyspnea and health status should be beneficial for intervention outcomes.

The mMRC scale was the instrument used in this study. The original version was published in 1959. The original scale is simple, easy to use, and takes seconds to complete. It is widespread in many studies worldwide, where it is used for evaluating effective interventions or pulmonary rehabilitation. The modified MRC is a critical component of the GOLD 2011 recommendations for COPD assessment. This tool is specific to respiratory problems and is widely used in patients with other systemic disorders (Williams, 2017). The modified MRC scale ranges from 0–4, which is similar to the original version.

2.2.5.2 Measurement of fatigue symptoms

Fatigue assessment tools have been developed for COPD patients in various areas. Many methods for assessing fatigue are intended for self-assessment (Whitehead, 2009). Fatigue measurements can be grouped into unidimensional and multidimensional approaches.

(1) Unidimensional fatigue assessment has the purpose of measuring one dimension (Antoniu & Ungureanu, 2015). Some unidimensional scales use only fatigue symptoms, such as the Visual Analog Scale, the Fatigue Intensity Scale, and multi-item tools such as the Fatigue Severity Scale (FSS) and the Fatigue Assessment Scale (FAS). Furthermore, the numerical multi-symptom scales such as the Edmonton Symptom Assessment System (ESAS) have been developed for the screening of pulmonary and extrapulmonary symptoms (Antoniu & Ungureanu, 2015; Lewko et al., 2012).

(2) Multidimensional fatigue measurements are proposed to provide contextual information on symptom characteristics such as timing, frequency, distress, and severity, all of which help to determine the effects of symptoms on daily mental, physical, and social activities (Antoniu & Ungureanu, 2015). Examples of multidimensional fatigue measurements such as the Brief Fatigue Inventory (BFI) assess mood, social status, physical activity, and global scores, while the Fatigue Impact Scale (FIS) is designed to measure cognitive, physical, and psychological functioning (Whitehead, 2009), and the Multidimensional Assessment of Fatigue (MAF) assesses the effects of fatigue on severity, distress, timing of fatigue, and daily activities (American College of Rheumatology, 2021).

The MAF scale is the multidimensional measurement for fatigue used in this study. It is a comprehensive instrument with good psychometric properties and effectively measures changes over time (Whitehead, 2009). The MAF scale is an excellent choice for measuring fatigue in chronic disease. It is simple to administer and score, while the time required to collect data is short in duration, as it takes only five minutes or less to complete (American College of Rheumatology, 2021; Neuberger, 2003). Thus, the MAF is a helpful evaluation instrument for assessing fatigue and the effectiveness of interventions for various diseases in clinical settings. It has high internal consistency, validity, reliability, and sensitivity to fatigue levels (Belza et al., 2018; Belza et al., 2015). This measure has been proven to be effective in COPD patients for demonstrating various physical activity impairment levels correlated with various phases of subjective fatigue severity (Belza et al., 2001, as cited in Antoniu & Ungureanu, 2015).

2.2.5.3 Measurement of sleep disturbance symptoms

Objective and subjective sleep measurements can measure sleep disturbances. The most common instrument for objective sleep measures is polysomnography (PSG), the gold standard for recording sleep that can monitor overnight sleep by recording eye movement, brain waves, muscle tension, heart rate, respiratory rate, and leg movement (Ancoli-Israel, 2015). Additionally, actigraphy is a non-invasive technique for quantifying continuous bodily motions using an actiwatch. The actigraphy parameters evaluate nocturnal awakening, efficiency of sleep, waking after sleep onset, sleep-onset latency, and total sleep time (Budhrani et al., 2015).

The subjective reports on sleep quality are critical in clinical settings because they can assist in determining whether more screening and interventions for a sleep complaint are necessary (O'Donnell et al., 2009). Instruments for evaluating subjective sleep in COPD patients, such as the Epworth Sleepiness Scale (ESS), measure daytime drowsiness and test how sleep can affect daytime activities (Nobeschi et al., 2020). Additionally, the COPD and Asthma Sleep Impact Scale (CASIS) was developed and validated for use with COPD patients (Garrow et al., 2015).

In this study, the Pittsburgh Sleep Quality Index (PSQI) was the tool used for evaluating sleep disturbances. The PSQI is a subjective sleep disturbance measure widely used with COPD patients (Khalil et al., 2019). The PSQI components are subjective sleep quality, habitual sleep efficiency, duration, sleep latency, daytime sleep dysfunction, sleep alteration, and sedative use (Hartman et al., 2015; Nobeschi et al., 2020). The PSQI has been proven to be an independent predictor of COPD patients' quality of life (De, 2012). Most sleep studies in relation to COPD rely on two general sleep problems measures: 90% of the reviewed publications either use the PSQI or the ESS (Garrow et al., 2015). Although both the PSQI and ESS assess orthogonal aspects of sleep-wake symptoms, neither is associated with objective sleep measurements. The PSQI has a stronger relationship with psychological symptom ratings and sleep diary measurements than the ESS in community samples (Buysse et al., 2008).

2.2.5.4 Measurement of anxiety and depression

Although anxiety and depression symptoms are closely associated, they are related to distinct causal factors and consequences. Therefore, most research should evaluate anxiety and depression symptoms together rather than singularly (Beuke et al., 2003). There are various tools for assessing anxiety and depression symptoms that are capable of assessing either one symptom or can be used to assess anxiety and depression in the same instrument.

Anxiety-screening tools, such as the Geriatric Anxiety Inventory Scale (GAI) and the Anxiety Inventory for Respiratory Disease (AIR), have been validated for COPD (Pumar et al., 2014). In terms of depression, the four most common and best-validated screening tools for assessment of depressive symptoms associated with COPD consist of the Beck Depressive Inventory (BDI), the Geriatric Depressive Scale (GDS), the Center for Epidemiological Studies Scale on Depression (CES-D), and the Hospital Anxiety and Depression Scale (HADS). However, three screening, namely the BDI, CES-D, and GDS tools, do not screen for anxiety symptoms. Therefore, the only tool for screening for anxiety and depression symptoms is the HADS (Bock et al., 2017).

The HADS is a self-reported questionnaire used in this study to assess anxiety and depression. It has been verified and widely used in various non-psychiatric inpatients and outpatients, including those with COPD (Bock et al., 2017). The ability of the scale to detect depression in patients with a simultaneous somatic disease is also beneficial in primary care. Additionally, the HADS has subscales for depression and anxiety. Thus, advantageously, the HADS enables independent assessment of the two conditions (Hansson et al., 2009).

2.2.6 Evidence-based practice regarding symptom management

Most problems are specific to older adults and can affect the symptoms of this population overall. Managing concurrent symptoms is essential and helps reduce symptom outcomes and physical function. The process of gathering, processing, and implementing research findings to improve clinical practice, work environments, or patient outcomes is referred to as evidence-based practice (Chrisman et al., 2014). It is beneficial for nursing practice in various ways. It assists nurses in developing their own knowledge and bridging the gaps among nursing research, education, and practice.

Furthermore, it helps standardize nursing practices and improve clinical outcomes (Abu-Baker et al., 2021). The evidence for this study was obtained in articles published in 2011-2021 on Pubmed, CINALH, and Google Scholar. This evidence-based practice aims to summarize the strategies or interventions for managing or alleviating each symptom.

2.2.6.1 Dyspnea

Dyspnea is a subjective experience of breathing discomfort. Patients with COPD often experience dyspnea, which affects their everyday life. Effective management strategies for dyspnea include pharmacological and non-pharmacological interventions. However, this review focuses only on non-pharmacological interventions to improve dyspnea symptoms. The evidence-based practice for dyspnea management of COPD is as follows:

(1) A comprehensive intervention to improve psychological and physical conditions, pulmonary rehabilitation (PR) is effective in managing dyspnea symptoms (Spruit et al., 2013). Approaches to PR are hospital-based, home-based, and community-based. Compared with control group, home or community-based pulmonary rehabilitation, the sensation of dyspnea as measured by the MRC has significantly decreased (Neves et al., 2016). The results of this study are consistent with a systematic review by Yang et al. (2019), who identified significant effects in the dyspnea domain of the Chronic Respiratory Disease Questionnaire (CRQ).

However, comparisons of home or community and outpatient pulmonary rehabilitation have shown no significant differences between the interventions in the domain of dyspnea assessed using the CRQ (McCarthy et al., 2015; Nerves et al., 2016). Furthermore, the evidence presents a significant decrease in dyspnea assessed by the baseline dyspnea index and the Borg score in home-based pulmonary rehabilitation compared with a control group after 12 weeks (Liu et al., 2014). Therefore, it can be shown that the different types of pulmonary rehabilitation do not affect the perception of dyspnea. Thus, all pulmonary rehabilitation types effectively improve dyspnea compared with the control or usual care groups in patients with COPD.

(2) Exercise training helps patients with COPD improve their dyspnea. Eleven studies provided evidence to support the effectiveness of exercise training in managing dyspnea.

a. Any specific type of exercise can effectively reduce dyspnea, including resistance training, breathing exercises, upper limb exercises, muscle training, land-based exercise, and water-based exercise.

i. Resistance exercise has shown statistically significant improvements in the CRQ dyspnea domain compared with a non-exercise control group (Liao et al., 2015).

ii. Compared with a control group, home-based breathing interventions, including diaphragmatic breathing, breathing gymnastics, singing, and yoga, can significantly affect the modified MRC (Lu et al., 2020).

iii. Muscle training covers upper limb endurance or resistance training, lower limb training, cycle ergometry training, inspiratory muscle training, expiratory muscle training, and respiratory muscle training. Muscle training can effectively reduce dyspnea during exercise (Borg scale) and in activities of daily living (MRC or mMRC) (Zhang et al., 2021).

iv. Upper limb training is more effective in reducing dyspnea in mild to moderate levels of COPD (Kruapanich et al., 2019). A small significance in dyspnea symptoms was shown when comparing upper limb training and non-training or sham training. However, when only endurance or resistance exercise was analyzed, dyspnea was not significantly improved. Furthermore, when a combination of upper and lower training was compared to lower limb training alone, there was no difference in dyspnea (McKeough et al., 2016). Furthermore, the upper extremity exercise-relieved dyspnea during activities of daily living measured with the Borg scale (Pan et al., 2012).

v. As demonstrated by the MRC, traditional dyspnea index, modified Borg scale, and CRQ dyspnea domain, lower limb endurance training can improve dyspnea compared with a control group. The most common lower limb endurance training types are walking, an ergometer, or a treadmill. The evidence has shown that a minimally necessary PR program including lower limb endurance training and a sufficient intervention period (4 to 12 weeks) improves dyspnea (Higashimoto et al., 2020).

vi. Land and water-based aerobic exercises can effectively improve dyspnea compared to a control group, where subgroup analysis showed significant dyspnea improvement in a land group, while a water group showed no improvement (Chen et al., 2021).

b. The combination of exercise training and psychological interventions has been consistently associated with beneficial effects on dyspnea. Psychological interventions are the procedure's objective and systematic endeavor to influence patients' behavior through psychological means, resulting in symptom reduction or positive behavior change. There are diverse interventions, such as psychological support, cognitive behavior therapy, and relaxation. The interventions last eight to 16 weeks (Wiles et al., 2015).

Furthermore, unsupervised exercise significantly improves the MRC score and the CRQ dyspnea domain. Unsupervised exercise is aerobic or resistance exercise that can include a supervised introductory period of up to two weeks for demonstration, teaching, or familiarization, but not a formal supervised program (Taylor et al., 2021).

c. Exercises with equipment helpful for dyspnea consist of devices for inspiratory muscle training and elastic resistance training. The results of this evidence are as follows:

i. Inspiratory muscle training using threshold devices combined with general exercise training can reduce dyspnea after 4 and 8 weeks with a Pi max greater than 60 cmH2O (Beaumont et al., 2018).

ii. Elastic resistance training using tubing or an elastic shows similar effects on dyspnea in patients with COPD (de Lima et al., 2020).

As a result, various kinds of exercise interventions can effectively improve dyspnea symptoms. Therefore, exercise recommendations should be integrated into programs that improve dyspnea symptoms.

(3) Eight systematic review studies considered complementary and alternative medicine (CAM) or alternative therapy. The CAM or alternative therapies are meditation movements, music therapy, neuromuscular electrical stimulation, manipulative therapy, and fan therapy.

a. Meditation movement (tai chi and yoga) significantly reduced dyspnea in the CRQ. After three months, a pooled effect size from two trials indicated that meditative movement was more helpful in reducing dyspnea than non-exercise (Wu Additionally, Liuzijue training can effectively improve dyspnea for stable COPD patients evaluated using the MRC or mMRC (Gao et al., 2021; Xiao et al., 2020). Liuzijue training should be at least 150 minutes per week, five days per week (Xiao et al., 2020). Another systematic review suggests that the intervention duration of Liuzijue should be at least 3-6 months (Gao et al., 2021). et al., 2018).

b. Compared to the control group, music therapy has been seen to reduce dyspnea significantly. The forms of music therapy consist of distractive auditory stimuli (passive music) or a combination of listening and singing (mixed listening and singing music) for dyspnea (Huang et al., 2021). Moreover, distractive auditory stimuli reduce dyspnea symptoms during exercise (Lee et al., 2014).

c. Neuromuscular electrical stimulation interventions can improve the perceived sensation of dyspnea during exercise in patients with COPD (Wu et al., 2020).

d. Manipulative and soft tissue therapy can improve dyspnea more than soft tissue therapy alone (Galletti et al., 2018).

e. Fan therapy involves applying a handheld or electronic fan as part of a complex intervention used in clinical practice to alleviate dyspnea. Five minutes is the most frequently used duration of fan therapy, and most studies have been conducted in hospital settings. Although this result indicates that the majority of studies report significant improvement in dyspnea, the sample used in this systematic review was not limited to patients with COPD. Additionally, fan therapy should be investigated further to determine its effectiveness in patients with COPD, particularly in RCT studies (Qian et al., 2019).

(4) Education-based or program development provides the necessary knowledge about COPD for improving the skills for managing the disease and its symptoms. Integrated disease management programs (IDM programs) consist of multidisciplinary teams (two or more healthcare professionals) and multi-treatment (two or more components). The duration of the IDM program is at least three months. The results have presented clinically and statistically significant improvement in the dyspnea domains of the CRQ questionnaire after 12 months (Kruis et al., 2013). Additionally, one study focused on exploring the content and delivery of education regarding pulmonary rehabilitation. Dyspnea and symptom management are certainly important topics. However, educational programs should take a patient-centered motivational approach to ensure effective delivery (Roberts et al., 2018). Moreover, home-based nursing interventions for breathlessness and hospital-based nursing interventions with home follow-up improve dyspnea in patients with COPD. Additionally, nurses are involved in various interventions for dyspnea management, including providing information, instructions on breathing and physical exercise, mentoring, and implementing nursing practice models (Steindal et al., 2019).

2.2.6.2 Fatigue

Fatigue is a serious problem and a common symptom in patients with chronic diseases. It significantly affects daily life and can have physical, social, mental, emotional, and spiritual impacts on patients with chronic illnesses and their family members (Van Heest et al., 2017). Therefore, the effective management of fatigue has physical and psychological dimensions. The essential strategies from the systematic reviews are shown below.

(1) Three pulmonary rehabilitation programs and one integrated disease management program were seen to alleviate fatigue significantly. The details of these reviews are as follows:

a. One systematic review summarized 17 RCTs. Patients with COPD received a pulmonary rehabilitation program for at least four weeks and at most 52 weeks that identified significant effects in the fatigue domain of the CRQ compared with the control group (Yang et al., 2019). One more systematic review confirmed that pulmonary rehabilitation significantly improved quality of life in all four domains: dyspnea, fatigue, emotion, and mastery. Additionally, a hospital-based pulmonary rehabilitation group had more significant differences in the treatment effects for all domains of the CRQ than a community-based pulmonary rehabilitation program (McCarthy et al., 2015). Furthermore, compared with the control group, the home or community pulmonary rehabilitation group influenced quality of life in the fatigue domain. In contrast, compared with outpatient pulmonary rehabilitation, there were no significant differences between the interventions in the domain of fatigue in the CRQ (Nerves et al., 2016).

b. The systematic review of integrated disease management for COPD showed a statistically and clinically significant improvement in fatigue in the CRQ but no significant difference in the symptom domains of the SGRQ when compared between the integrated disease management group and the control group (Kruis et al., 2013).

(2) The most common strategy for managing fatigue is exercise training. There was no difference in fatigue between outpatient and home-based exercise training programs, and the comparison between outpatient and community-based exercise training programs showed that they were equally effective at improving

CRQ fatigue (Wuytack et al., 2018). One systematic review described endurance exercises, including cycling, walking, calisthenics, and combinations. The course lasted from 6 to 24 weeks, with 2 to 7 weekly sessions, each lasting 30-90 minutes. Exercise training also includes breathing exercises such as diaphragmatic or pursed lip breathing. The intervention group outperformed the control group on the CRQ's fatigue domain and the Fatigue Severity Scale (Paneroni et al., 2020). Furthermore, unsupervised exercise enhanced the fatigue domain of the CRQ statistically and clinically (Taylor et al., 2021).

(3) Complementary therapy uses evidence-based fatigue management techniques such as meditative movement and distractive auditory stimuli. Additionally, the distractive auditory stimuli helped to alleviate fatigue during exercise training (Lee et al., 2015).

The elements of the meditative movement are as follows: focus on the mind and movement, focus on breathing, and maintain a peaceful state of mental and physical relaxation. The interventions found in this systematic review included tai chi, yoga, qigong, and a combination of tai chi and qigong. The durations ranged from 12 weeks to 9 months. After three months, the pooled effect of two studies demonstrated that meditative movement was more useful for alleviating fatigue than non-exercise (Wu et al., 2018). Another systematic review found that a tai chi group was superior to the control group in terms of short-term (three months) fatigue scores for the CRQ (Guo et al., 2016).

2.2.6.3 Sleep disturbances

A review found that evidence-based practice for managing sleep disturbances comes from three studies (one systematic review and two RCTs). Additionally, one systematic review revealed that music therapy improved sleep quality as measured by the Pittsburgh Sleep Quality Index (Huang et al., 2021). Furthermore, progressive muscle relaxation is an intervention that improves some sleep quality subscales such as sleep duration, sleep latency, sleep efficiency, and subjective sleep quality (Seyedi Chegeni et al., 2018).

Finally, yoga yielded statistically significant differences regarding sleep quality measured by the Asthma and COPD Sleep Impact Scale (CASIS). However, this study was implemented not only for patients with COPD but also for patients with asthma (Özer et al., 2021).

2.2.6.4 Anxiety

Anxiety symptoms are multidimensional and include biological, behavioral, and social factors. Therefore, management interventions are complex and cover multi-factorial causes. The strategies used to manage anxiety symptoms are as follows:

(1) Pulmonary rehabilitation is a valuable strategy for anxiety management and has been seen to have a moderately significant effect on anxiety symptoms compared to usual care. Moreover, the effects have been statistically significant for shorter programs (less than eight weeks) but no longer ones (Gordon et al., 2019). Anxiety/depression and stress management are regularly addressed in pulmonary rehabilitation programs (Roberts et al., 2018). Compared with a control group or active comparators, exercise training combined with psychological interventions affected anxiety symptoms in COPD patients. The psychological therapies were 8 to 16 weeks with a number of supervised sessions (4 to 63), and a duration of 15 to 240 minutes. Additionally, the location was out-of-hospital and at home (Wiles et al., 2015).

(2) Complementary therapy significantly reduces anxiety symptoms. The primary interventions of complementary therapy that reduce anxiety symptoms are tai chi, qigong, yoga, music therapy, and relaxation techniques.

a. A systematic review of mind-body exercises revealed that the difference in anxiety between a mind-body exercise group and a control group was significantly reduced anxiety. The results of this systematic review were as follows (Li et al., 2020):

i. Both yoga and health qigong had significant effects on anxiety symptoms.

ii. The mind-body exercise was demonstrated to be more useful for patients with COPD with anxiety over ten years.

iii. The mind-body workout proved useful for patients with COPD over 70 years.

iv. The effects of two to three times a week and six to seven times a week are better than four to five times a week for patients with COPD with anxiety.

v. The 24-week mind-body exercise intervention significantly benefited patients with COPD with anxiety.

In patients with COPD, qigong and conventional therapy significantly improved anxiety compared to conventional therapy (Wu et al., 2019). Additionally, tai chi may be an appropriate alternative or complement to standard rehabilitation programs to improve anxiety symptoms in patients with COPD. Compared with the control group, tai chi in a short time (less than three months) statistically decreased HADS (anxiety) scores (Guo et al., 2020).

b. A systematic review of music therapy found this method to significantly affect anxiety symptoms compared to a control group. Most types of music are passive, so patients can self-select genres such as big band, classical, pop, country, tempo, and instrumental (Huang et al., 2021).

c. A systematic review used relaxation techniques with minimal impact on anxiety symptoms. The relaxation techniques covered progressive muscle relaxation, distraction therapy, guided imagery, biofeedback, breathing techniques, tai chi, and acupressure. The type of intervention appears to affect the treatment's efficacy. The anxiety level varies significantly, depending on the kind of relaxation used. The primary distinctions are between combining relaxation therapies and breathing techniques, implementing various relaxation techniques, as well as a combination this latter alternative and yoga (Volpato et al., 2015).

(3) Cognitive behavior therapy (CBT) is an essential intervention for anxiety management. CBT intervention can help with anxiety symptoms, and intervention durations of at least eight weeks substantially impact anxiety improvement (Zhang et al., 2020). Furthermore, another systematic review showed significant improvements in anxiety, which is consistent with a previous study. The sub-group analysis was conducted when the control group used passive comparisons such as routine care, self-help leaflets, and information booklets. The benefits of CBT on

anxiety symptoms were statistically significant. In contrast, active comparators of COPD education and befriending were insignificant (Ma et al., 2020). However, one systematic review found that CBT was ineffective in treating long-term anxiety in patients with COPD compared to usual care (Liang et al., 2022).

(4) Program development often includes strategies for anxiety management with COPD patients. Three systematic reviews used self-management programs and complex interventions (Coventry et al., 2013). First, two systematic reviews focused on self-management programs. The first study presented interventions using patient empowerment in self-efficacy and psychological counseling to improve anxiety symptoms (Yadav et al., 2020). An additional study examined the effectiveness of nurse-led self-management programs. The results indicated that the intervention group substantially affected anxiety reduction compared to the control group (Helvaci & Gok Metin, 2020). Therefore, psychological and/or lifestyle interventions with exercise components can be included in the complex interventions that significantly alleviate anxiety symptoms in patients with COPD over the short term. The most successful interventions included 3 to 12 weeks of 30-minute group-based exercise training in the context of pulmonary rehabilitation (Coventry et al., 2013).

2.2.6.5 Depression

The interventions for managing depression symptoms in patients with COPD are cognitive behavior therapy, mind-body intervention, pulmonary rehabilitation, exercise, coaching and health education, telephone intervention, and music therapy. The details of effective interventions are as follows:

(1) Three studies investigated the effectiveness of cognitive behavior therapy in treating depression. While the first systematic review established that CBT had a significant overall effect on depression, no statistically significant variations in depression levels were identified among the groups when active comparisons were used for the control groups. There were, nevertheless, substantial differences when the control groups used passive comparisons (Ma et al., 2019). A systematic review established that CBT can alleviate depression in people with COPD in a short time (less than eight weeks) (Zhang, 2020). A recent systematic review has increased confidence in CBT's ability to help manage depression. The results indicate that CBT is more effective than usual care in relieving long-term depression in people with COPD (Liang et al., 2022).

(2) Pulmonary rehabilitation is an effective strategy for symptom management of COPD. Depression, anxiety, and stress management are all educational components of pulmonary rehabilitation (Roberts et al., 2018). Compared to the usual care, pulmonary rehabilitation programs have clinically significant advantages in reducing depressive symptoms in individuals with COPD. There was no effect caused by differences in program duration between less than and greater than eight weeks (Gordon et al., 2019).

(3) When exercise training was paired with psychological interventions, a consistent advantage in depression was shown compared to the control group (Wiles et al., 2014).

(4) Different mind-body interventions, such as relaxation techniques, tai chi, qigong, and yoga, help alleviate depression. Individual and group relaxation techniques have significant differences in the effects on depression, and doing homework improves depression symptoms. However, the kind of relaxation technique used seems to influence the effectiveness of treatment. There are differences between combining approaches and progressive muscle relaxation or tai chi (Volpato et al., 2015).

Additionally, tai chi in a short period of less than three months decreased HADS-depression scores compared with a control group (Guo et al., 2020). Qigong combined with conventional therapy can improve self-rating depression scale (SDS) ratings in patients with COPD (Wu et al., 2019). Patients with COPD older than 70 years and with a disease course of less than ten years benefited from health qigong 2 to 3 times a week, 30-60 minutes each time for depression (Li et al., 2019).

2.3 Physical function

2.3.1 Definition and components of physical function

2.3.1.1 Definition

Physical function is defined as "the ability to perform basic actions (mobility, strength, and endurance) that are essential for maintaining independence and performing more complex activities" (Painter et al., 1999; as cited in Shah et al., 2017). Thus, physical function is a general term representing one's ability to be mobile in performing ADLs, and IADLs. When patients have poor physical function, it applies to functional limitations, physical disability, and impaired mobility (Noran et al., 2012).

2.3.1.2 Components

The components of physical function consist of physical capacity, physical performance, and psychosocial factors. Physical capacity refers to "the basic cellular and anatomic functions such as cardiac ejection fraction, nerve conduction velocity, or muscle strength per cross-sectional area." Physical performance is "the ability to integrate these physiological systems into coordinated, efficient movements to achieve optimum physical function." Psychological factors such as perceived ability, motivation, confidence, depressive symptoms, and social roles also influence physical function (Cress et al., 1996).

The first specified physical performance measure is used to evaluate an individual's ability to perform various activities of daily living (ADLs) or physical activities. Previous decades have measured physical performance related to transfer and ambulation. Therefore, the definition of physical performance is "an objectively measured whole body function related to mobility" (Beaudart et al., 2019). Furthermore, physical function integrates physical performance capacity, physiological capacity, and psychological factors (Cress et al., 1996).

The domain of physical functioning consists of basic physical movements and complex activities. The basic physical movements are walking, standing up or transferring from a chair or toilet, climbing stairs, gripping, holding, twisting, pushing or pulling objects, lifting or carrying, bending, stooping, kneeling, reaching overhead, writing, and holding utensils. The complex activities consist of self-care or self-maintenance activities allowing an individual to live independently and that are necessary actions to maintain a function (Dias, 2014; Painter et al., 1999).

2.3.2 Measurement of physical function

Measuring physical function is essential because it serves as a current health status indicator forecasting future health and other outcomes in addition to predicting social care (Lang, 2011). Assessment of physical function is essential in clinical practice because it can identify the outcomes of interventions (Painter & Marcus, 2013). Physical function is measured either through self-report of status or through the use of standardized performance measures (Guralnik 1989, as cited in Lang, 2011).

(1) Self-reported Function: Self-reported function relates to three types of functions, including the activities of daily living (ADLs), the instrumental activities of daily living (IADLs), and mobility.

(2) Measured Function: The aspects of measured function include gait or walking speed, tests of balance, grip strength, sit-to-stand tests or chair stand tests, getting up and going or time to getting up and going, and short physical performance battery. Additionally, measuring physical functioning can determine physical impairments (laboratory-based), mobility, and performance capacity (Painter & Marcus, 2013).

a. Measures of physiologic impairment (laboratory-based) consist of cardiorespiratory fitness (maximal oxygen uptake, submaximal exercise test, and peak oxygen uptake) and muscle function (strength, power, and endurance).

b. Measures of mobility and performance capacity (field-based) consist of field tests (6-minute walk test, intermittent shuttle walk test, gait speed, stair climb power test, repeated chair stands, time up and go, and walk-stair

climb test) and self-reported tests (Katz ADL, Lawton IADL, LCADL, and the SF-36 Physical Function Scale).

In this study, mobility and performance capacity (field-based) were measured by using the 6MWT. The 6MWT is performed according to a standardized protocol based on the American Thoracic Society's guidelines. Furthermore, the 6MWT is a low-cost process of measuring lung function and treatment responsiveness in patients with COPD (Thomas & Sukumaran, 2016).

2.4 Symptom management theory and a symptom management program for patients with COPD

2.4.1 Symptom management theory

Symptom management theory (SMT) is beneficial for guiding symptom assessment and management in nursing practice and research (Bender et al., 2018). This theory supports the perspective that symptom management is a dynamic process that impacts symptom outcomes and nursing (Mathew et al., 2021). The original version was a symptom management model in 1994, followed by a revised model in 2001. The revised model explained the domain of nursing science, including the person, environment, and health/illness, which are contextual variables (Dodd et al., 2001).

Contextual variables affect symptom experience, symptom management strategies, and outcomes. First, the personal domain, for example, includes demographic, physiological, psychological, social, and developmental factors and how an individual interprets and responds to symptom experience. Second, health and illness are composed of an individual's health or disease state, risk factors, injuries, or disabilities. Finally, the last contextual variable is the environmental domain, which refers to the context or condition in which a symptom occurs such as the physical (hospital, home, work), the cultural (beliefs, values, or religious), and the social (interpersonal relations and social support) (Dodd et al., 2001). Thus, the three nursing domains can explain the direct and indirect effects of the variables on the dimension of symptom experience.

The individual's perception of a symptom, evaluation of its meaning, and response to the symptom is referred to as symptom experience. These three aspects of symptom experience interact. Symptom perception describes how an individual feel or behaves because of a change in symptoms. The term "evaluation of meaning" relates to determining the source, severity, treatability, and impact of a symptom on a person's life. Physiological, psychological, social-cultural, and behavioral factors play a role in symptom response (Dodd et al., 2001). However, the symptoms experienced contain more than one synergistic symptom (Bender et al., 2018). Although the three dimensions of symptom experience are clearly explained, some issues are complex descriptions between symptom perception and symptom response. For example, some psychological symptoms are a symptom perception but also a psychological response to symptoms such as anxiety and depression (Mathew et al., 2021).

The strategies for symptom management are intended to prevent, minimize, or reduce symptom experience. The strategy is beneficial in three ways: by decreasing the frequency with which symptoms occur, by decreasing the intensity with which symptoms occur and the distress associated with symptom occurrence (Bender et al., 2018). Symptom management begins with an assessment of the condition from the individual's perspective. Following assessment, the emphasis on intervention methods is determined. When designing, developing, and prescribing symptom management strategies based on particular questions, the researcher is concerned with strategy, when, where, and why, the extent of the intervention dosage, to whom the intervention will be given, or the recipient of the intervention, and how it is given. Finally, the strategies used to relieve symptoms are determined by the state of the science for the symptoms, which changes over time in response to symptom experience, the effectiveness of the strategies for symptom improvement, or the lack of acceptance of the strategies created (Dodd et al., 2001).

Adherence refers to whether the intended user of the approach gets or uses it, whereas intervention integrity is a potentially more challenging issue. Excessively demanding intervention strategies is related to an increased risk of non-adherence (Dodd et al., 2001), which is understood as occurring in the setting of overly demanding interventions, interventions that are not applied, or interventions that are applied inconsistently (Humphreys et al., 2008, as cited in Linder, 2010). Therefore, symptom

management strategy should be practical and suitable for the symptom and the person's characteristics, which affects patient compliance.

Outcomes occur because of both symptom management strategies and symptom experience. Symptom management theory outcomes include nine other outcomes: symptom status, functional status, emotional status, self-care, costs, morbidity, quality of life, co-morbidity, and mortality (Dodd et al., 2001). Symptom outcomes are observable and quantifiable results that are assessed before and after implementing an intervention approach (Bender et al., 2018). The duration of symptom evaluation is determined by the persistence of the condition, the necessity for further intervention, and the management response. When a symptom is effectively treated and resolved, the model is no longer applicable; nevertheless, if further intervention can control reoccurring symptoms, the model remains appropriate, and direct treatment and outcome assessment continue (Dodd et al., 2001). Therefore, the time of measurable outcomes depends on the strategies' effectiveness for managing symptoms**.**

The literature review revealed that symptom management theory has been increasingly applied in several research areas. Symptom management theory has been used as a framework in various ways to understand and develop the relationships among the three main concepts of this theory in multiple diseases (Bender et al., 2018). Symptom management theory is the theoretical framework needed for patients with COPD in order to understand the symptoms experienced or symptom clusters in patients with COPD (Ekkamart et al., 2021; Srirat et al., 2014; Srirat et al., 2015).

Some studies have used symptom management theory to explain the pattern of successful symptom management strategies in acute exacerbation patients (Chatreewatanakul et al., 2022) and to evaluate dyspnea experience and dyspnea management intervention (Parveen et al., 2014). Some researchers have employed this theoretical framework to investigate the relationships among the domains of person, health/illness, and environment in patients with COPD, which encompasses several aspects such as symptom experience, symptom management strategies, and outcomes (Zhang et al., 2023). Furthermore, symptom management theory is critical and widely used to guide and develop interventions for patients with COPD (Pinkaew, Kangchai, & Rattanajarana, 2021; Thiebkhun, Kangchai, & Somanusorn, 2016).

The theory of symptom management is instructive for clinical practice and research. On the other hand, symptom management theory would need to be established by additional studies employing longitudinal designs to examine simultaneous symptoms. Consequently, the symptom management theory must be beneficial and appropriate for developing and examining the effects of symptom management programs on symptom occurrences that are concurrent symptoms in patients with COPD.

2.4.2 Application of the theory of symptom management for a symptom management program

In this study, the symptom management program aimed to manage most symptoms of COPD, including dyspnea, fatigue, sleep disturbances, anxiety, and depression. The five symptoms mentioned in this study are in the physical and psychological dimensions, and correlated. The symptom management program consists of two parts: part one, symptom experience training, and part two, symptom management strategies.

Part one, known as symptom experience training, is the procedure to augment one's understanding and competence in perceiving, evaluating, and responding to symptoms. The knowledge and self-assurance significantly impact their capacity to make informed decisions regarding selecting suitable strategies for symptom management or alleviation. The researcher provides knowledge about factors that influence symptoms, engages in sharing experiences with patients, and enhances their capacity to perceive, evaluate, and effectively respond to symptoms and diseases. The activities encompass providing information and imparting specialized skills to enhance patients' capacity to perceive, evaluate, and effectively address their symptoms.

Part two is symptom management strategies. The strategies used in this study are covered in the physical and psychological mechanisms consisting of self-care health education and discussion, which assist the patients in improving their knowledge about their disease and treatment. Enhanced walking in daily life and walking meditation are effective interventions in exercise that can improve physical and psychological symptoms. Family support is crucial because the decision-making process within a family generally involves determining the tasks, scheduling activities,

or establishing health goals. Family members frequently offer the necessary emotional support that assists patients in coping with the various challenges associated with their condition. The technology-based intervention is the process to help the patients and their families easily access health information and contact the health care professional. The details of each strategy are as follows.

2.4.2.1 Self-care health education for COPD

The self-care health education program also takes data and guidance from professionals and believes that knowledge can contribute to behavioral changes (GOLD, 2020). Therefore, educational programs should be integrated, and most are based on the GOLD and ATS/ERS statements on pulmonary rehabilitation (Stoilkova et al., 2013). The primary educational method is education sessions delivered by healthcare professionals on the topics of teaching and providing specific skills. For example, most self-care educational programs consist of the physical condition of patients with COPD and support for individual beliefs (Ji et al., 2019). COPD influences the emotional and physical lives of patients and affects social and family lives. Thus, self-care educational programs should be implemented to help individuals avert, control, and manage the physical, psychological, and social consequences of these conditions (Clari et al., 2017).

For patients with COPD, self-management is helpful because it can help the patients gain self-confidence and enhance coping behavior. The primary characteristics of self-management strategy that patients thought improved feelings of well-being, social support, and psychological support. The group exercise components of self-management programs were also well received, with participants reporting better well-being and social interaction (Baker & Fatoye, 2019). Therefore, it cannot be denied that pulmonary rehabilitation, educating, and promoting self-management are effective methods for increasing the activities and quality of life of people with COPD. Nurses should, therefore, be interested in developing integrative or comprehensive programs to encourage patients to gain adequate knowledge and confidence in self-care behavior.

A meta-synthesis of self-care of people with COPD found that self-care behavior and strategies consist of eight categories: 1) COPD self-care in order to avoid, control, and manage respiratory symptoms caused by the disease; 2) self-care to avoid and manage limits in everyday activities; 3) self-care as a way of resolving sleep disturbances; 4) self-care to minimize and manage COPD exacerbations; 5) self-care to alleviate mental distress; 6) self-care to manage changes in social life; 7) contact with medical personnel; and 8) self-care knowledge and skill acquisition (Clari et al., 2017). Additionally, a large amount of additional research into the health education content of pulmonary rehabilitation programs has shown similar results.

Health education on pulmonary rehabilitation can improve COPD symptoms, including COPD pathophysiology, smoking cessation, self-management, breathing control and sputum clearance, nutrition and diet, benefits of exercise, medication and inhaler techniques, relaxation, and energy conservation (Lewko, 2014; Paz-Díaz et al., 2007; Sadate Moazeni et al., 2020). Additionally, a systematic review presented major instruments and methods such as printed material, brochures, demonstrations, and practices (Stoilkova et al., 2013). Furthermore, the anticipation of patients engaging in a self-care health education program provides essential information for developing the program. COPD sufferers desire assistance in dealing with the emotional effects of the disease. Additionally, social and family changes can occur as the disease progresses. Therefore, patients should be inspired to make positive adjustments in many areas of their lives and develop appropriate coping mechanisms (Clari et al., 2017). Since self-care education is crucial for patients, healthcare professionals should understand how people care for themselves and design enhanced self-care education programs integrated with patients' essential lifestyles for treating COPD and sustaining independence. As a result, health education raises awareness, improves health-related decisions, and improves knowledge and abilities related to health and illness and preventive and coping with challenging situations (Przybylska et al., 2014).

Health education attempts to increase awareness, gain skills, expand knowledge, and shape a health-orientated attitude. The approach is designed to help people understand personal health, lifestyle, and physical and social environments. It does not only imply the transfer of knowledge but enables the learner to apply the knowledge effectively, i.e., to consider, think, make decisions, and engaged in health-related activities, thereby acquiring skills that contribute to its improvement (Przybylska et al., 2014). Furthermore, educational programs for COPD addressing the disease, acute exacerbation, and inhaler use topics are crucial for patients with COPD. In the study conducted by Lee et al. (2016), it was shown that the CAT scores exhibited statistically significant improvement of 49.7% (n = 79) and 51.2% (n = 65) higher than the Minimal Clinically Important Difference (MCID) after the implementation of an educational intervention ($p < 0.05$).

The term "symptom experience" refers to an individual's perception of a symptom, evaluation of its meaning, and subsequent response (Dodd et al., 2001). Health knowledge, values, prior experiences, a sense of coherence, and the meaning an individual place on symptom experience can influence how a symptom is perceived, regardless of its severity or recurrence (Armstrong, 2003; Posey, 2006). For example, if the patient understands that the symptoms are possible occurrences and how they may manifest, this can influence the patient's evaluation of response urgency and selection of management strategies. Therefore, health education, discussion, and symptom experience training are all impacted by controlling cognitive changes in patients, which assist the patients in improving their knowledge, values, and application of knowledge to change perception, evaluation, and response to symptom experience.

2.4.2.2 Walking in daily life

Patients with COPD can benefit from the low-impact, risk-free activity of walking. Walking is one form of low-impact exercise that can help the body become more efficient at using oxygen, increase endurance, strengthen muscles, and improve general health and well-being (Leader, 2022). The types of walking activities used to enhance symptoms and physical functioning in COPD include ground-based, uphill, Nordic walking, meditation, or mindful walking.

Patients with COPD were randomly assigned to either a walking group that received supervised ground-based walking training two to three times per week for eight weeks or a control group that received standard medical care but did not engage in exercise training. Walking training was conducted on a flat indoor track in the hospital. The 30-minute ground-based walking training session began at 80% of the average speed attained during the 6-minute walk test (6MWT). Ground-based walking training improved HRQoL and endurance exercise capacity in COPD patients compared to standard medical care (Sally et al., 2014).

The usefulness of walking exercise is not only fatigue symptoms but also dyspnea symptoms. In the above study, the patients walked at home, in a garden, or in a park on a 20-meter-long, level track delineated by a mark at each end and another at the track's midpoint. At the program's start, the training intensity was at least 70% of the SWT maximal speed. The duration of the session, including breaks, was one hour, with one session per day, six days per week for a duration of twelve weeks. Additionally, the patients visited the hospital every two weeks to monitor clinical status, treatment, and exercise regimen compliance. The results presented that this program improved post-effort dyspnea, basal dyspnea, exercise tolerance, and quality of life in COPD patients (Hernández et al., 2000).

In addition, ground-based walking combined with relaxation techniques significantly reduces the symptoms of dyspnea and anxiety, while improving health status. The study of Muthukumar et al. (2018) presented an experimental group who practiced ground-based walking on a 20-meter track at their own pace for 15 minutes with adequate rest periods for five days a week over a period of 15 days and in the Pulmonary Rehabilitation Department while using relaxation techniques for 15 minutes before and after the walk, while the control group used relaxation techniques such as progressive muscle relaxation techniques and breathing exercises for 15 minutes daily for 15 days.

Regarding Nordic walking intervention, the patients with COPD in the experimental group participated in a three-month outdoor Nordic walking exercise program consisting of one hour of walking at 75% of their initial maximum heart rate three times per week, whereas those in the control group did not exercise. The results revealed that the 6MWD increased significantly compared to the baseline and controls (Breyer et al., 2010). Another preliminary study used Nordic walking intervention. Five patients participated in a 30-minute session of Nordic walking five days a week for three weeks as part of the experimental group. The control group consisted of six patients who received traditional rehabilitation (selective training of the arms and legs) for the same duration as the experimental group. The study showed that the control group only experienced improvements in MRC, while those in the experimental group experienced significant improvements in the post-training, MRC, 6MWD, EuroQoL, and Saint George (Maria et al., 2012).

Furthermore, a systematic review of the ten studies of walking exercise and breathing control presented three categories (Satrial et al., 2022): 1) walking exercise and breathing control intervention performed two-three times per week for 30 minutes per session; 2) breathing control exercise intervention performed 10-30 minutes twice daily in the morning and evening, or three times per week; 3) walking exercise performed three times per week for 30 to 45 minutes per session. Any patients who experienced shortness of breath were able to cease and rest. The study discovered that this exercise can help COPD patients reduce shortness of breath, anxiety, and depression. The equipment to improve walking consists of a pedometer or wearable device. The study by Arslan and Öztunç (2016) revealed that walking with a pedometer three times per week for eight weeks in the experimental group reduced fatigue symptoms more than the control group that did not receive walking training (Arslan & Öztunç, 2016).

2.4.2.3 Walking meditation

The term "mindfulness" refers to a form of meditation that emphasizes present-moment awareness (Ludwig & Kabat-Zinn, 2008). Mindfulness is commonly described as paying non-judgmental mental attention to “this moment experience”, including mental and physical training. Body and mind regulation are typically included

in mindfulness practice (also known as mindfulness meditation) (Tang & Tang, 2015). Originating in Buddhism, the Buddha strove to teach humanity how to deal with suffering by this approach. Mindfulness meditation entails teaching people to let go of "attachment", or the imaginary things we all cling to, such as desire, comfort, pleasure, and the past, because these things will dissipate into nothingness sooner or later. The four pillars of mindfulness are the most basic formulation of the Buddha's teachings. Additionally, the Buddha taught various meditation techniques to help people achieve peace, enlightenment, and the qualities of compassion, love, and friendship. Such meditations are at the heart of today's mindfulness practice (Verni, 2015).

Mindfulness or meditation is mental training that can help people connect the mind, body, and spirit. This practice improves the function of consciousness and the attainment of balance, relaxation, and self-control (Sampaio et al., 2017). The origins of mindfulness in Buddhism are to alleviate suffering and promote compassion, suggesting that this practice can be a part of dealing with patients. There are different meditation practices, both through specific religious traditions, which is the kind that seeks to connect with spirituality, and without religious connection, which is a purely mental practice (Menezes et al. 2011 as cited in Sampaio et al., 2017). Mindfulness practices can be informal in everyday life or formal, such as breathing, body scanning, breathing, and walking (Zhang et al., 2021).

Mindfulness is frequently used interchangeably with "insight" meditation, which refers to a profound, non-conceptual look into the mind and reality (Kabat-Zinn, 2003). Mindfulness contributes to decreased stress, anxiety, depression, and perception of pain as well as increased adherence to treatment, motivation for lifestyle changes, enhanced interpersonal relationships and social connectedness. Furthermore, mindfulness can change biological pathways associated with health, such as neuroendocrine, autonomic nervous system, and immune system functions. Additionally, Buddhist meditation techniques improve sleep quality, reduce the tendency to sleep, and alleviate hyperarousal (Britton et al., 2014). Thus, mindfulness meditation can influence the physiological and psychological variables associated with well-being in patients (Ludwig & Kabat-Zinn, 2008).

Walking meditation is straightforward. It is a universal technique for developing calmness, connectedness, and embodied awareness that uses the natural

movement of walking to cultivate mindfulness and awakened presence while also building strength and stamina. The benefit of walking meditation is the cultivation of mindfulness, a helpful way of building concentration. Additionally, the sensation of walking can be more relaxing and compelling than the more subtle sensations of breathing while sitting (Dudeja, 2018).

Buddhist walking meditation is a mind-body intervention that establishes a connection between the mind and autonomic functions to enhance physical and mental fitness. As a result, the relationships among the brain, body, and behavior are highlighted in this intervention. Furthermore, Buddhist walking meditation incorporates both physical and mental elements, allowing an individual to focus on the movement of his/her legs while walking, resulting in profound and continuous attention (Srisoongnern et al., 2021). Thus, Buddhist mindfulness meditation is an effective intervention covering physical and psychological dimensions in various research fields. For example, people with depression who have participated in Buddhist mindfulness meditation for six weeks every day for at least five days/week, 15 minutes per time, significantly improved depressive symptoms (Turakitwanakan et al., 2017). Furthermore, aerobic walking exercise combined with Buddhist meditation was performed three times/week for twelve weeks. The Buddhist walking meditation results were more beneficial than standard walking in decreasing depression, enhancing functional fitness, and increasing vascular reactivity in depressed older adults (Prakhinkit et al., 2014).

Regarding patients with COPD, the intervention of walking, breathing, and meditating for 35 minutes per day for eight weeks significantly improved exercise capacity measured by the 6MWT (Lin & Yeh., 2021). Additionally, breathing-based walking intervention about five days a week, 30 minutes per day, for two months presented significant changes in the experimental group's dyspnea, depression, anxiety, and quality of life across three months (Lin et al., 2019). Furthermore, the programs of integrated mindfulness meditation with pulmonary rehabilitation at home with walking meditation for 20 minutes at least three times a week with five minutes for breathing exercises over a total of eight weeks was able to improve respiratory rate, oxygen saturation, and exercise tolerance after completing the program (Seetee et al., 2016).

Furthermore, walking meditation or mindfulness walking is beneficial for improving physical function and COPD symptoms.

2.4.2.4 Family support

Family support is "the provision of information that leads subjects to believe their basic social needs are gratified through interaction with their family" (Thoits, 1982 as cited in Komjakraphan et al., 2009). The functional aspects of family support include four domains: 1) instrumental support refers to practical assistance that others offer, such as housekeeping, financial aid, or transportation; 2) emotional support is the experience of being liked, loved, admired, or respected; 3) information support refers to data being received during a stressful time; and 4) social integration is when group members share interests and activities (Komjakraphan et al., 2009).

Family caregivers play a critical role in delivering daily tasks and assistance to many patients with COPD. Supportive caregivers for community-dwelling patients are regarded as one of the most significant elements in postponing and avoiding patient hospitalization. However, the care of patients with COPD brings difficulty, including multiple medication regimens, symptom control, and emotional reactions (Caress et al., 2009). Additionally, patients with COPD need help within families and close relationships, such as requiring access to information and support from caregivers, needing personal care and practical help, transportation, care regarding finances, housing, and emotional support from family caregivers (Gardener et al., 2018).

These results are consistent with the systematic review entitled "Family Members' Experiences and Expectations of Self-management Counseling While Caring for A Person with Chronic Obstructive Pulmonary Disease," which presented the idea that health professionals often do not include family members in the care process and fail to recognize the family members' diverse counseling requirements. Family caregivers want to learn more about managing COPD and coping techniques in their roles as caregivers (Siltanen et al., 2019). Therefore, family caregivers are the key persons for improving symptoms and self-care behavior in patients. Healthcare professionals should, therefore, provide the necessary information and skills to care for patients at home.

Family support is essential for patients with COPD, and adequate family social support helps patients control the disease (Chen et al., 2017). The predominant

symptoms include hypoxia caused by fatigue and limitations in everyday living activities (Gullick & Stainton, 2008). Such constraints increase physical impairment and elders' reliance on others (Vander Valk et al., 2004; as cited in Fotokian et al., 2017). Additionally, for patients who have considerable emotional needs, frustration, anxiety, and depression are common. Additionally, patients face various lifestyle and social interaction losses and limitations (Russell et al., 2018). Finally, family support has a statistically significant relationship with self-care behaviors (Kara Kasikci & Alberto, 2007; Xiaolian et al., 2002) and self-efficacy in COPD (Kara Kasikci & Alberto, 2007).

One family-based pulmonary rehabilitation (PR) program helped with patients' and family members' COPD management-coping strategies. The patients and family members received education and psychosocial support for twelve weeks. The study's findings indicated that the experimental group performed considerably better in terms of family coping, sexual relationships, and psychological distress than the control group (Marques et al., 2015). Therefore, family support is essential in improving the self-care behavior, control, and management of a person’s disease. Therefore, nurses should integrate family support into symptom management programs for persons with COPD

Furthermore, the pedometer-based walking program in another study improved force vital capacity, CAT scores, and daily steps in patients with COPD. The 21 patients in the experimental group used pedometers daily for target steps for approximately 12 hours a day for six weeks, while the 24 patients in the control group patients were counseled during six weeks of weekly visits. The patients were encouraged to be physically active at home and walk unsupervised for at least 30 minutes daily (Chen et al., 2022).

A pedometer helps monitor daily steps and provides real-time feedback on walking results. In the study of Bender et al. (2016), the patients in the experimental group donned a pedometer for 7 to 10 days following the initial visit to establish baseline steps/day. At the second visit, patients were randomly assigned to the intervention or control conditions and instructed to continue wearing the pedometer for the 12-week study intervention period, during which they received a phone call every two weeks for ten weeks. All patients documented daily steps from the pedometers in

a study calendar and reported during telephone calls. Two weeks after the fifth call, the patients returned the pedometers and had exit interviews with a staff member who was not the patients' wellness coach during the third visit. In the control group, the patients wore pedometers and recorded daily steps in the study calendar. During bi-weekly phone calls, the participants were required to report daily steps to the study staff. While the patients were encouraged to walk, they were not instructed to establish personal activity objectives or discuss barriers to walking. The study personnel responded to inquiries and provided information but did not provide additional assistance. The results presented that the mMRC dyspnea scale, the CAT, and the St. George's Respiratory Questionnaire revealed no group differences (Bender et al., 2016).

2.4.2.5 Technology-based intervention

Technology-based interventions are defined as the use of technology to manage or promote health in order to provide accessible and affordable healthcare to a target population (Su et al., 2020). Technology-based interventions are those in which computer technology is used as the primary mode of delivering the intervention. Technology-based interventions can be divided into eight categories: 1) the Internet and personal computers; 2) multimedia and videos; 3) mobile technology; 4) sensor-based and wearable technologies; 5) active surfaces; 6) natural graphical user interfaces; 7) virtual reality; and 8) robotics (The Cooperative Research Centre for Living with Autism, 2021). Many articles discuss how technology can enable therapy to reach many individuals or reach people more effectively. Furthermore, patients can access information online, mobility, and via other types of technology-based practices from anywhere as long as they have access to the necessary equipment and the Internet (Kazdin, 2015). Therefore, nurses should encourage patients to have easy access to technology and use various technologies, so they can access health information easily. As a result, the role of technology is crucial in improving the efficiency of healthcare systems.

Technology-based interventions are essential for optimizing healthcare professionals' practice and improving outcomes. The most effective type of technology intervention is decision support, which provides healthcare professionals with the knowledge and patient-specific data to manage patients (Keyworth et al., 2018). The use of technology in healthcare systems can be divided into screening and service

access, treatment delivery and monitoring, patient self-assessment and illness management, quality assurance, and performance improvement (Kane, 2014). Obviously, the adoption of technology in the health system can help patients and their families access health services more quickly and reduce the burden of transfer expenses. Additionally, healthcare professionals can reduce workloads in the clinical setting because technology can be applied to every step of the health service system.

Effective technology-based interventions for patients with COPD are of various kinds. For example, a literature review on technology for long-term or outpatient COPD management discovered that telemedicine improves patient confidence in self-management and provides "peace of mind" to patients with COPD. Additionally, electronic means such as e-mail, text messaging, and video conferencing can also communicate medical information. A symptom diary and self-assessment data consist of vital signs, step counters, home exercise, or portable at-home spirometers that are commonly used (Spencer & Barcomb, 2014). Additionally, technology-based interventions that use pedometers and accelerometers, the Internet, and mobile applications to increase physical activity in patients with COPD have been developed (Wan et al., 2020).

Wearable technology involves technology-based interventions developed to study physical activity in COPD patients (Pericleous & van Staa, 2019). A pedometer is a small electronic device that counts steps by sensing the vertical movement generated by each step when walking or running (Beighle et al., 2001). Pedometers are matchbook-sized, battery-operated motion sensors attached on either side of the body to the waistband in the middle of the thigh. Pedometers have been developed to calculate the number of steps taken by an individual during ambulatory activities (Berlin et al., 2006). For example, patients with COPD are advised to walk for at least 30 minutes per day. They are encouraged to be more active by using the pedometer to record the number of steps walked each day in the diary provided.

As a result, COPD patients can significantly improve scores on the 6MWT, step counts, CAT, and St. George's Respiratory Questionnaire (Mendoza et al., 2015). Furthermore, patients with COPD who have used pedometer-mediated web-based interventions have had a significantly lower incidence of acute exacerbations (Wan et al., 2020). Thus, the pedometer can open up new possibilities for increasing physical

activity in patients with COPD, since patients can monitor progress and establish specific objectives for increasing physical activity in daily life (de Blok et al., 2006).

Furthermore, incorporating pedometers as a real-time feedback signal in order to optimize everyday behavior helps patients meet individualized physical activity goals, which can be measured and enhanced alongside motivational interviewing strategies (Mantoani et al., 2016). The pedometer's appeal for being able to objectively monitor physical activity is based on its ability to assess ambulatory activity while walking, running, and jogging using a simple metric (i.e., steps). Additionally, pedometers are relatively low-cost and can effectively provide input and encouragement for actions. Pedometers also are capable of offering a valid estimate of the level of physical activity. However, the pedometer's main disadvantages are its inability to calculate energy expenditure, posture, non-ambulatory activities, and proprietary step-determining algorithms (Ainsworth et al., 2015). Furthermore, a literature review revealed that technical problems with the usage of wearable technology include memory storage issues, a high signal-to-noise ratio, and count inaccuracy (Pericleous & Van Staa, 2019).

Mobile health (mHealth) has become a more valuable instrument in delivering improved healthcare (Park, 2016). Mobile health can be defined as “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.” Additionally, mHealth entails using and capitalizing on the basic functionality of a cell phone, such as voice and SMS. However, Mobile health has more complex functionalities and applications, such as general packet radio service (GPRS), global positioning system (GPS), 3G and 4G mobile telecommunications, and Bluetooth technology (WHO, 2011).

Mobile health represents medical practice and healthcare with mobile computers and devices such as tablets and mobile phones. Mobile technology has been used in various health interventions to promote health education, raise health knowledge, and change health behaviors (Yang & Van Stee, 2019). For example, patients with COPD have reported the benefits of using mHealth for self-management, including assistance in taking appropriate actions, demonstrating current health status,

contributing to symptom deterioration awareness, and enabling quick healthcare contact.

Alternatively, the patient's mHealth obstacles manifest as a desire to avoid confronting COPD, a preference for human interaction, difficulty showing emotion via the application, and a lack of faith in the device through mHealth. Therefore, future mHealth interventions should, according to the researchers, focus on strengthening self-management abilities over time by providing appropriate information, decision support, and feedback on self-management behavior (Quach et al., 2023). Furthermore, mHealth should be used along with regular care (Korpershoek et al., 2018). Therefore, technology-based interventions can be viewed as necessary for assisting healthcare professionals in monitoring symptoms and health conditions, providing information, and helping with decision-making for managing or treating chronically ill patients at home.

2.4.2.6 Summary of the Symptom Management Program

Simultaneous symptoms are difficult to explain and manage. A comprehensive symptom management program must be developed in order to help patients with COPD. The factors influencing symptoms should cover physical, psychological, and situational factors. Some of the influencing factors are associated with other factors that can affect symptoms. On the other hand, some symptoms can influence other symptoms. Therefore, nurses should be concerned about the influencing factors affecting the symptom management program and symptom outcomes. Furthermore, symptom experience is the component that most affects symptoms. Patients who are properly aware of their symptoms can assist in determining the cause, severity, route of treatment, and impact on their lives. When patients are perceived and evaluated effectively, they will also appropriately manage symptoms.

In this study, the symptom management program covered the phases of symptom experience training and symptom management strategies. The symptom management program duration was eight weeks. The literature review revealed that the most effective pulmonary rehabilitation or mindfulness interventions that improve physical function and symptoms in patients with COPD are more than or equal to eight weeks. A symptom management program provides strategies that assists patients with sufficient knowledge of the disease and symptoms will enhance patient confidence.

Self-care health education and health discussion groups are methods for providing knowledge, skills, and experience sharing. Additionally, technology was an essential aspect of this study.

Mobile health helps patients easily and conveniently access information and reminds them of certain knowledge. Some mobile applications, such as the LINE application, are very interesting in terms of applicability in follow-ups or in monitoring patients at home. Pedometers also provide real-time feedback signals that help patients reach individualized physical activity goals by optimizing everyday behavior. Therefore, the development of the symptom management program in this study was expected to provide adequate self-care, symptom management education, and strategies to encourage patients to perceive, evaluate, and respond to symptoms.

Furthermore, walking meditation is a mind-body intervention that promotes physical and psychological aspects by establishing a connection between the mind and autonomic systems. This intervention emphasizes the connections among the brain, body, and behavior. Furthermore, this study integrated family support, which is useful for encouraging relationships with patients' families. Family members can become more knowledgeable, resulting in more excellent assistance and support planning for patients. The researcher hopes that such a comprehensive symptom management program can alleviate the accompanying symptoms and improve the physical function of patients with COPD.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter describes the methodology used to conduct this study. First is the research design description of the randomized controlled trial study design, followed by an overview of the setting, the sample size, the population with a description of the sampling method, as well as the inclusion, exclusion and discontinuation criteria. Next is the discussion of the instruments used in this research. Lastly, the protection of human subjects, data collection, and data analysis are described in this chapter.

3.1 Research Design

The study was a randomized controlled trial with a repeated measures design. The researcher conducted an experiment in order to test the research hypotheses.

	wk1		wk4		wk8
RE	O_1	X_1	O_2	X_1	O_3
RC	O_4	-	O_5	-	O_6

4 weeks 4 weeks

R Random

E Experimental group participating in the symptom management program.

C Control group receiving usual care only.

X_1 The symptom management program combined with usual care for eight weeks.

O_1 Baseline of symptom experience and physical function before participating in the symptom management program.

O_2 Measure after Week 4: symptom experience and physical function measured after participating in the symptom management program for four weeks.

O_3 Post- test Measure after Week 8: symptom experience and physical

function measured after participating in the symptom management program when the eight weeks are completed.

O_4 Baseline of symptom experience and physical function before receiving usual care at baseline

O_5 Measure after Week 4: symptom experience and physical function measured after receiving usual care only at four weeks.

O_6 Post- test Measure after Week 8: symptom experience and physical function measured after receiving usual care only at eight weeks.

3.2 Setting

As stated earlier, this study was implemented at the COPD Clinic at Borabue Hospital and the participants' houses in Borabue District, Mahasarakham Province, Thailand. Borabue Hospital is a secondary hospital that serves as the center of the healthcare system for clients in Borabue District, which encompasses 15 sub-districts, including 206 villages.

3.3 Population and Sample

3.3.1 Population

The participants were male and female adults with COPD receiving usual care and follow-up provided by the COPD Clinic staff in the Outpatient Department of Borabue Hospital, Mahasarakham Province, Thailand, in 2023.

3.3.2 Sampling and Sample Selection

The eligible samples were selected based on the following inclusion and exclusion criteria:

3.3.2.1 Sample Selection

(1) Inclusion Criteria

a. Stable stage 1-3 (mild-severe) COPD based on GOLD 2020, diagnosed by a physician and confirmed by spirometry testing, which indicated that post-bronchodilator ratio of FEV1 to FVC < 0.7.

b. Age: 40-80 years.

c. Ability to perform activities of daily living independently assessed by using the Chula Activities of Daily Living Index (CAI) (Jitapunkul et al., 1994). The cut-off score was less than four out of nine, which meant less ability to conduct daily activities.

d. Cohabitation with the family caregivers.

e. Ability of participants or family caregivers to access the LINE application.

f. Willingness to participate in the program.

g. Ability to read and write the Thai language.

(2) Exclusion Criteria

a. Stressed by life events such as the death of a spouse, partner or other family member.

b. Comorbidities, including congestive heart failure, cancer, myocardial infarction, neurological disease, uncontrolled or severe psychosis, schizophrenia, or walking problems.

c. Unwillingness to participate in the study or other self-management programs or pulmonary rehabilitation.

d. Cognitive impairment, severe dementia, or severe Alzheimer's disease.

e. Visual or hearing impairment

f. Hospitalization within four weeks before participating in this study.

(3) Discontinuation Criteria

a. Withdrawal of consent or request to terminate before completing the program.

3.3.2.2 Sample Size Calculation

The sample size was calculated by using G*Power software (Version 3.1.9.4). The statistical test was MANOVA: repeated measures, within-between interaction. The F-test of repeated measures was carried out three times for the two groups. Power analysis estimated the sample size based on the significance level's setting power of 0.80 and α at 0.5. The effect size was 0.33 (Cohen f) based on the fatigue variable, as demonstrated previously in the study entitled “Comparing various exercise tests for assessing the response to pulmonary rehabilitation in patients with COPD” (Mador & Modi, 2016). The target sample size was 92 participants. Based on the previously demonstrated attrition rate of eight percent (Lin et al., 2019), this study required 10 percent for the attrition rate. Therefore, the researcher enrolled 102 participants. This study followed the CONSORT flow diagram in Figure 3.1

3.3.2.3 Sampling Method

(1) Enrollment

This study's participants were recruited from 25 January to 21 June 2023 from the target patients (mild, moderate, and severe) receiving treatment at a COPD clinic. After the Ethical Review Sub-Committee Board approved the proposal for Human Research Involving Sciences (No.3) at Thammasat University, the researcher contacted the COPD clinic staff to explain the study's details. After that, the researcher screened the name list and medical history, including the disease severity and age range of 40-80 years, from the medical record information at the COPD Clinic, Borabue Hospital, Mahasarakham Province. Furthermore, the researcher posted a poster inviting patients who met the inclusion criteria and were interested in participating in the study to submit an application. Recruitment was undertaken every

month between 25 January 2023 and 21 June 2023. The number of COPD patients was recorded in the enrollment process. The researcher invited the participants who met the inclusion criteria to participate in this study. The enrollment was continued until the recruitment goal of 102 patients was met. The researcher invited the participants and caregivers to participate in the study at the clinic follow-up appointment. The participants received an overview of the significance and objectives of this study from the researcher.

(2) Randomization

The experimental and usual care groups were randomly assigned following stratified block randomization to ensure that critical confounding factors included age and disease severity. The number of patients was separated by the age group and disease severity of the patients in the sampling frame and totaled 207 patients [Age group = 40-59 years; total = 50 (25 mild, 21 moderate, and 4 severe), Age group = 60-80 years; total = 157 (64 mild, 81 moderate, and 12 severe)]. The proportion of sample size aged 40-59 years was 24 (12 mild, 10 moderate, and 2 severe), and 77 participants were aged 60-80 years, 78 participants (32 mild, 40 moderate, and 6 severe). The breakdown of the sample size is presented in Table 3.1.

A randomization sequence was created using a computer-generated random number that creates a randomization list by the Sealed envelop™ (Sealed Envelope Ltd, 2022). This study was an allocation of a random block size of four to minimize the risk of predicting the treatment assignment for the next eligible participants. The single-blind method was utilized to mitigate the Hawthorne effect. The researcher did not inform the participants whether they were assigned to an experimental or control group. The research assistant prepared the envelope's seal for the researcher, who was blind to the allocation of random numbers. All participants were randomly assigned to an experimental group of 51 and a usual care (control) group of 51. The researcher conducted an intervention for both groups at different times and places.

Tables 3.1: Proportion of the sample size.

	Age 40-59 yrs.		Age 60-80 yrs.	
Disease Severity	**Number of Sampling Frame**	**Proportion of Sample Size**	**Number of Sampling Frame**	**Proportion of Sample Size**
Mild	25	12	64	32
Moderate	21	10	81	40
Severe	4	2	12	6
Total	**50**	**24**	**157**	**78**

(3) Follow-up

The researcher used video calls via the LINE application or telephone calls to remind the participants of the study procedures and inquire about possible problems. The researcher called once per week at Weeks 2, 3, 5, 6, and 7, asking about activity problems and promoting, appreciating, and encouraging the participants to continue their activities until the completion of eight weeks. Furthermore, the researcher sent video clips to the participants or family members via the LINE application. The follow-up test was measured at Weeks 4 and 8. This study followed the CONSORT flow diagram in Figure 3.1.

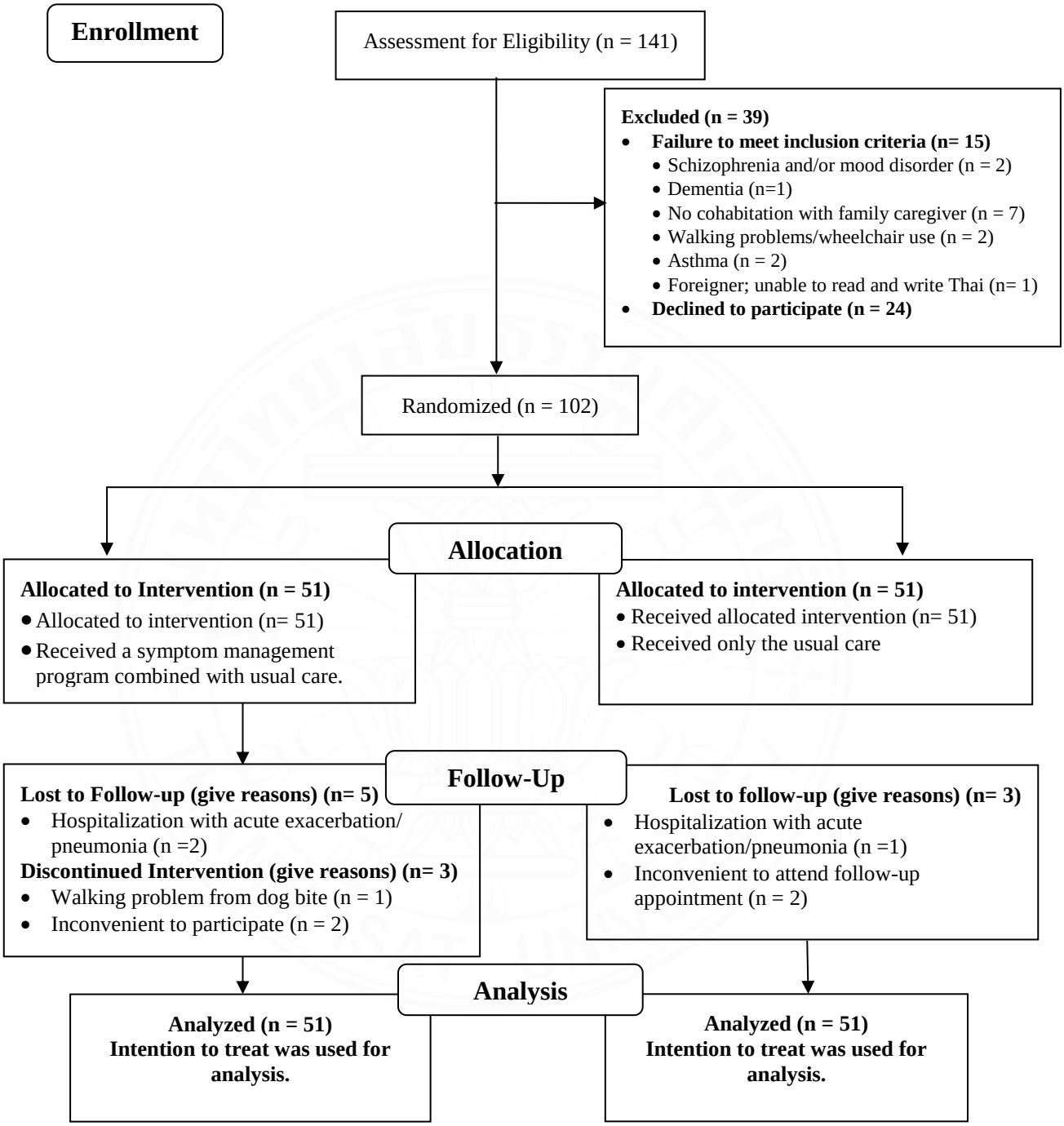


Figure 3.1 The CONSORT flow diagram of randomized experimental research designs examines the effects of a symptom management program on symptom experience and physical function in adults with chronic obstructive pulmonary disease.

3.4 Instruments and Instrument Properties

3.4.1 Data Collection Instruments

3.4.1.1 The demographic and health history data

The demographic and health history data of the participants included gender, age, marital status, education, occupation, family members, disease severity, duration of the disease, BMI, smoking status/number of packs smoked per year, comorbidities, history of hospitalization in the past year, history of acute exacerbation in the past year, and medication to treat COPD.

3.4.1.2 Symptom Experience

The symptom experience instruments in this study consisted of the Modified Medical Research Council (mMRC) Dyspnea Scale, the COPD Assessment test (CAT), the Multidimensional Assessment of Fatigue (MAF), the Pittsburgh Sleep Quality Scale (PSQI), and the Hospital Anxiety and Depression Scale (HADS).

(1) Modified Medical Research Council Dyspnea Scale

The mMRC assesses dyspnea used for diagnostic evaluation and clinical trials (Jones et al., 2005). The mMRC must be used in patients with COPD when the goal is to discriminate better the physical activity of daily living, including sedentary behavior (Munari et al., 2018). The mMRC scale is a self-rating tool that measures the degree of incapacity that breathlessness causes in day-to-day activities. It uses a 5-point scale from 0 to 4: "0: patients only affected by dyspnea during strenuous exercise; 1: I get short of breath when hurrying on level ground or walking up a slight hill; 2: I walk slower than people of the same age on level ground because of breathlessness, or I have to stop for breath when walking at my own pace on level ground; 3: I stop for breath after walking about 100 meters or after a few minutes on level ground; and 4: I am too breathless to leave the house, or I am breathless when dressing or undressing" (GOLD, 2020). The test-retest reliability using intraclass correlation coefficients was 0.82-0.82 (Mahler et al., 2009).

(2) COPD Assessment Test

The COPD Assessment Test (CAT) is a patient-completed instrument that can quantify the global impact of COPD on the patient's health status. A higher score indicates that COPD has a more severe impact on the patient's life. However, there is a five-unit difference between stable and exacerbated patients. Therefore, no target score reflects the optimal outcome (American Thoracic Society, 2018). The CAT contains eight items consisting of cough, sputum, chest tightness, breathlessness, limited activities, confidence leaving home, sleep, and energy loss. Each of the items in CAT has a 0-5 rating scale. Therefore, the total CAT score recommended for reporting ranges from 0 to 40 (Lewthwaite, Jensen & Ekström, 2021). Internal consistency with Cronbach's $\alpha = 0.88$ and intraclass correlation coefficient = 0.8 (Jones et al., 2009). The researcher asked for permission to use the Thai version of the GSK™.

(3) Multidimensional Assessment of Fatigue Scale

The MAF scale has been a comprehensive instrument with good psychometric properties and is effective in measuring changes over time (Whitehead, 2009). The MAF scale contains 16 items, but only 15 are used to calculate the Global Fatigue Index (GFI). Item 16 is excluded from the GFI. It measures four dimensions of fatigue: severity (Items 1 to 2); distress (Item 3); degree of interference in activities of daily living (Items 4 to 14); and timing (Items 15 to 16) (Neuberger, 2003). This instrument uses a numerical rating scale (1 to 10), Item 1 and 4 to 14 (1 = not at all, 10 = a great deal); Item 2 (1 = mild to 10 = severe); and Item 3 (1 = no distress, 10 = a great deal of distress). Items 15 and 16 are categorical responses (1 to 4)

In scoring calculations, the GFI converts Item 15 into a 0 to 10 scale by multiplying each score by 2.5, and then summing Items 1, 2, and 3, averaging 4 to14, and newly scoring Item 15. The score for Items 4 to 14 is not assigned if the participants gave a response of "I do not perform any activity for reasons other than fatigue." If a participant selects "not at all (no fatigue)" for Item 1, 0 will be assigned to Items 2 to 16. A higher score indicates severe fatigue, fatigue distress, or effects on activities of daily living (American College of Rheumatology, 2021; Neuberger, 2003). Cronbach's alpha for the MAF in the Thai version is 0.91 (Kongsombun et al., 2019). The researcher asked for permission and used the Thai version from ePROVIDE™ (ePROVIDE, 2021).

(4) Pittsburgh Sleep Quality Index

The PSQI is the most frequently used method for assessing sleep health in clinical and non-clinical populations (Manzar et al., 2018). Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction are all assessed using the PSQI (Buysse et al., 1988). Each factor is graded on a scale of 0 (no difficulty) to 3 (severe difficulty). The PSQI global score (range: 0-21) comprises all component scores and a score greater than 5 indicates significant sleep disturbance (Methipisit et al., 2016). The Thai-PSQI has excellent internal consistency (Cronbach's α 0.83) and test-retest reliability (intraclass correlation coefficient of 0.89) based on the global scores (Sitasuwan et al., 2014). The researcher asked for permission and use the Thai version from Sitasuwan et al. (2014).

(5) Hospital Anxiety and Depression Scale

The HADS is a questionnaire that effectively screens patients from non-psychiatric hospital clinics for the distinct dimensions of anxiety and depression as well as cases of anxiety disorders and depression (Bjelland et al., 2002). The odd numbers of the items are depression and the even numbers are anxiety. The HADS is a 14-item scale comprising seven items for the anxiety and depression subscales, respectively. Each object is scored on a scale of 0 to 3. A subscale score greater than 8 indicates anxiety or depression (Nilchaikovit et al., 1996; Rishi et al., 2017). The HADS is a reliable and valid instrument for screening patients attending a clinic for clinically significant anxiety and depression (Zigmond & Snaith, 1983). It was translated into the Thai language with good internal consistencies with Cronbach's α values of 0.85 for anxiety and 0.82 for depression (Nilchaikovit et al., 1996).

3.4.1.3 Physical Function

The 6MWT measures physical function and assesses walking distance. The length of the walking course must be 30 meters, and every 3 meters is labeled on the floor with brightly colored tape. A cone is placed at the turnaround point. The area of the test must be a long flat, straight, and hard surface. The test can be performed indoors or outdoors where the environment is safe and comfortable (American Thoracic Society, 2002). The researcher measured blood pressure, pulse, O2 saturation, and recorded the details on the worksheet and rated the patients' baseline for overall dyspnea using the modified Borg scale before and at the end of the test.

3.4.2 Experiment Intervention and Materials

The experiment intervention and materials used for the experiment included the following.

3.4.2.1 A Symptom Management Program for the Experimental Group

The COPD symptom management program is implemented for eight weeks. This program consists of health education and discussion groups, walking meditation, encouraging physical activity, and family support. The details of the strategies are as follows:

(1) Health Education and Symptom Experience Training

The duration of this session is 90 minutes. In this study, the researcher conducted health education and symptom experience training on Day 1 of Week 1. The researcher educated the participants and demonstrated the necessary skills. The participants and caregivers participated, asked questions, and shared experiences with the researcher. The researcher wrote the script for the health education content and educated the participants by using PowerPoint slides and video clips, which was able to help with consistency in every group. The group had 5 to 12 participants.

In cases involving outbreaks during the COVID-19 pandemic, the researcher conducted the health education and group discussion parts of the intervention via the LINE application with approximately four to five participants per group.

The details of the health education and symptom experience group training are as follows:

a. The researcher conducted the symptom experience training by exploring the perception, response, and evaluation of the symptoms.

b. The researcher gave the health education to the participants and their family caregivers in relation to the overview of COPD and its treatment, the most common symptoms of COPD, breathing exercises, effective coughing, the benefits of walking meditation and physical activity, energy conservation techniques, nutrition and diet, sleep hygiene and stress management.

c. The researcher trained and promoted the participants to perform walking meditation and increase walking by using the pedometer for monitoring daily walking. After that, the researcher sent a video clip to the participants or family caregivers via the LINE application, which recommended the performance of walking at the participants' homes.

(2) Walking meditation

The researcher asked the experimental group to walk a flat five meters in the mornings for a total of thirty minutes, three days per week (Day 1, Day 3, and Day 5 of the week). The steps of walking meditation in this study were as follows:

a. The participants assumed a stable posture with hands crossed over the abdomen with eyes kept on the ground. Next, they adjusted their bodies slightly until they reached perfect stability.

b. The participants walked at a normal pace with natural movements of feet and body and eyes kept open while walking.

c. The participants internally recited the mantra "Buddho," a two-syllable word, in tune with their natural breathing rhythms. The concentration on this mantra is used to align an individual's brain wave vibrations with universal vibrations. While meditating, the changing pattern of the mantra calms and controls the restless waves in the brain, gradually leading the mind into a peaceful state (Pilunowad, 2000).

d. The participants began with the right foot and walked until they reach five meters, at which point they turned around, halted for a second, and stepped with the right foot, continuing this process for 10 minutes.

e. The participants maintained a steady, careful walking pattern, repeating the mantra and paying attention to the stimuli as they raised and noted any adjustments. They continued walking forward and backward along the lane at 10 minutes per cycle for three cycles.

f. When the participants performed walking meditation, they were able to stop and rest if they felt shortness of breath. After the walking meditation round for 10 minutes, the participants used the pursed-lip breathing exercise for five rounds, alternating with their normal breathing for five rounds for 10 minutes during the rest period (American College of Sports Medicine, 1998, as cited in Luangaram, 2018). If the 10-minute rest period was complete, but the participants felt shortness of breath, they were able to rest and continue with pursed-lip breathing until breathlessness improved.

g. After the walking meditation for each cycle, the participants recorded the duration and feelings after the walking exercise in the diary log. Then the researcher re-checked with a follow-up. Finally, the researcher explained the data and encouraged the patients to improve their walking via a video follow-up call, thereby motivating them to continue their walking meditation.

(3) Health discussion group

The participants participated in order to share their symptom experiences, symptom management strategies, experiences the activities in the program and problem-solving. The one-time discussion took 90 minutes and was held at the completion of the fourth week at the COPD clinic. This activity was useful in encouraging, supporting, and motivating the participants to continue the program.

(4) Family support

The researcher asked the family caregivers to assist the patients with their activities. The assistance of the caregivers was to provide health education and training for the patients, take care of them, pay attention to them, encourage them to do activities at home, monitor them, encourage the patients to record in their diary logs, and coordinate with the researcher when the patients had problems at home.

3.4.2.2 Materials for the Experimental Group

(1) A Pedometer

A pedometer is a tool for counting steps that provides real-time feedback to help the participants perceive a change in their daily walking. The researcher provided pedometers for the experimental group and asked them to record the number of steps every day before sleeping. The participants wore the pedometers during the entire time they were awake in order to monitor physical activity (Schneider et al., 2018). The pedometer was removed when the participants had had a bath and sleep. Furthermore, the pedometers were also helpful for intervention fidelity. The researcher selected single pedometers with 3D walking step counts that use tri-axis sensor technology to track daily activity accurately and are easy to use.

(2) Booklet for a Symptom Management Program

The booklet consisted of sufficient knowledge of health education for COPD based on the content of health education sessions, walking meditation, and the guidelines for using the pedometer.

(3) Information Sheet and Video Clips for the Symptom Management Program

Video clips covered part of the content on walking meditation and using the pedometer. The researcher gave the video clips to the participants during the first week. Then the researcher set up a group for communication and sent the information sheets via the LINE application. Next, the researcher sent the walking meditation video clips and information sheets to the experimental group every other day, reminding the experimental group to implement the activity in the morning. Finally, the researcher sent the information sheets and video clips on health education to the participants or caregivers via the group chat in the LINE application from Weeks 5 to 8. After that, the participants could repeat the activity as many times as they wanted.

(4) Daily Log for the Symptom Management Program

The daily log format is the record of the participant's walking performance consisting of the date and period of the walking meditation, daily step counts, symptom experience, and possible problems during walking.

3.4.3 Instrument Validity and Reliability

3.4.3.1 Validity

The COPD symptom management handbook, the content of the booklets and video clips, and the daily log were validated for content by five experts, including one physician expert in COPD, a nurse instructor, and a nurse practitioner who are experts in symptom management; and a nurse instructor and nurse practitioner who are experts on patients with COPD. The list of the experts is shown in Appendix D. After the five experts' suggestions, the researcher revised the practical recommendations for suitability After that, the researcher conducted a pilot study with three participants in a similar setting. After completing the pilot study, the researcher modified the research instruments in preparation for the main study. These included PowerPoint, the online media in LINE OA, and updated recommendations for follow-up via LINE or telephone calls. The researcher used six standard instruments, the mMRC, CAT, MAF, PSQI, HADS, and CAI, which were translated into Thai. Thai version instruments demonstrated strong psychometric properties for validity and reliability.

3.4.3.2 Reliability

As indicated above, the instruments for collecting the data in this study consisted of the CAT, mMRC, MAF, PSQI, and HADS questionnaires. After obtaining permission to use the Thai versions, the researcher tested the reliability of the questionnaires. All instruments used with the 30 COPD patients were similar to this study's participants in Kantharawichai Hospital, Mahasarakham Province. After that, reliability was tested by using Cronbach's α coefficient or test-retest. The results of the reliability of all instruments of this study were as follows:

(1) The mMRC utilized test-retest reliability by administering the same test twice over time to the same group of patients. The duration of the test was eight weeks. The test-retest reliability using intraclass correlation coefficients was 0.836.

(2) The reliability of the CAT with Cronbach's α was 0.659

(3) The reliability of the MAF with Cronbach's α was 0.891

(4) The reliability of the PSQI with Cronbach's α was 0.711

(5) The reliability of the HADS-Anxiety with Cronbach's α was 0.644, and 0.624 for the HADS-Depression. The reliability of the HADS in total items was 0.601, and the intraclass correlation coefficient was 0.739

(6) The test-retest reliability of CAI using intraclass correlation coefficients was 0.889.

3.5 Protection of Human Subjects

The Human Research Ethics Committee of Thammasat University (Science), (HREC-TUSc) approved this research proposal for the Human Research Ethics Committee on December 29, 2022, COA No.111/256 5 after the research approval by the Human Research Ethics Committee of Thammasat University (Science), (HREC-TUSc). The researcher registered with the Thai Clinical Trials Registry on January 11, 2023. The ID Number of this study was TCTR20230111006.

The researcher protected the participants' rights by explaining the research objectives, describing the data collection procedures, and summarizing the expected benefits from the research to the participants and family caregivers. The researcher provided detailed information about the study through verbal explanations and gave information sheets to provide detailed information before the participants provided written informed consent. The patients had the right to refuse to participate without any impact on health services during the study. If the participants had any problems joining the program, such as accident signs or symptoms due to discomfort, the researcher stopped the activities and took care of the participants until the problems were resolved or until the symptoms improved. After that, the researcher asked about the participants' needs again. The researcher had to keep the participants' information confidential.

The study results were presented as an overview, not as individual identification. After collecting the post-test data, if the participants in the usual care group were willing to undertake the health education and training program, they received the same program as the experimental group. The researcher gave the participants a booklet for the symptom management program and video clips for the walking meditation training.

3.6 Data Collection

3.6.1 Preparation Phase

3.6.1.1 The researcher was studied for the meditation training course for a total of 200 hours (100 hours of online theory lessons and 100 hours of self-guided walking and meditation) with an expert at the Willpower Institute, Thailand. After completing this course, the researcher received a certificate for meditation training.

3.6.1.2 After the Human Research Ethics Committee of Thammasat University (Science), (HREC-TUSc) approved this study, the researcher sent a letter of recommendation from the Dean of the Faculty of Nursing at Thammasat University to Borabue Hospital's directors, asking for permission to conduct the study.

3.6.1.3 The researcher met with the head of the COPD clinic and staff to explain the study's objectives and steps, and to arrange for the coordination of the data collection.

3.6.1.4 There were four research assistants. The researcher prepared the assistants to explain the research objectives and steps of data collection, train in the use of the research questionnaires, and describe the roles of the research assistants. Three research assistants collected data using questionnaires at baseline, follow-up, and post-test; another research assistant administered only the 6-minute walk test. The research assistants collecting data did not know which participants were in the experimental and usual care groups.

3.6.2 Data Collection Procedures

3.6.2.1 The researcher explained the objectives and methods of the study to the participants recruited from the COPD clinic while ensuring the participants' confidentiality and anonymity of the information. Then the participants signed the informed consent forms.

3.6.2.2 The researcher randomized the participants into two groups. Then the researcher conducted the following steps:

(1) For the experimental group, the research assistants invited the participants to complete the questionnaires. The experimental group received usual care from the COPD clinic staff and the symptom management program from the researcher. After the participants completed the treatment, the researcher made appointments with the participants and family caregivers to participate in the symptom management program. After completing health education and symptom experience training, the researcher provided equipment and encouraged the participants to continue walking meditation at home. The experimental group engaged in walking meditation three times/week and used the pedometers to count steps every day for seven days and recorded the step counts from the pedometers in the daily log.

The researcher followed up by video call via the LINE application or telephone call once weekly at Weeks 2, 3, 5, 6, and 7. After completing four weeks, the participants followed up with appointments at the COPD clinic. The researcher conducted a health discussion group and follow-up test. The participants continued the activities at home until completing eight weeks of the program. Therefore, activities such as the group discussion of patients after the follow-up test from Weeks 1 to 4 differed from Weeks 5 to 8. After that, the researcher repeated the necessary knowledge

and skills in health education through video clips via the LINE application before the telephone follow-up calls every week. The video clips were different topics from Weeks 5 to 8. The research assistants collected the data at follow-up and post-test.

(2) Similar to the experimental group, the participants in the usual care group were invited to complete the questionnaires. The usual care group received the usual care from the COPD clinic staff. The researcher sought cooperation from the control group, having them avoid exercise programs, other physical activity programs, or pulmonary rehabilitation programs apart from usual care.

The usual care group did not receive mindfulness meditation training, telephone calls or virtual healthcare team visits, or formal health education on disease and symptom management. However, if they had any health problems, they could request help or receive services from the clinic staff. If the participants called or met the clinic staff and accidentally received some symptom management or education about the disease, the researcher coordinated with clinic staff and monitored the usual care group participants who accidentally received the activities previously mentioned. The researcher indicated in the daily log that the participant had received a small amount of intervention content and clarified the study's possible limitations during data analysis and discussion of the findings.

3.6.2.3 At the end of the experiment, which was completed within eight weeks, all of the participants in the two groups were given appointments at the COPD clinic for a post-test. The researcher concluded the program, thanked the participants, and explained the termination of the activities to the participants and family caregivers. In the usual care group, the researcher provided the necessary information, training skills, booklets, and video clips for the group.

3.7 Data Analysis

Statistical analysis was performed using SPSS (IBM Corporation, USA). The data analysis was undertaken in four sections.

First, the researcher screened the missing data in the data screening phase of the data analysis.

Second, the researcher analyzed the demographic and clinical data by descriptive statistics, including frequency, percentage, mean, standard deviation, median, and interquartile range.

Third, the chi-square test and Fisher's Exact test compared the categorical variables between the baseline of the experimental and usual care groups. Independent t-test and the Mann-Whitney U test compared the differences in the continuous variables regarding the demographic and health history data between the experimental and usual care groups at baseline.

Fourth, the researcher examined the data in order to come up with two hypotheses. The intention to treat data was used to analyze all research hypotheses, which is crucial for researchers aiming to adopt an intention-to-treat (ITT) approach to consider the potential occurrence of missing outcome data. Addressing missing outcome data requires strategies appropriate for the particular pattern of missingness (Polit & Gillespie, 2010). The researcher employed the original data set, which consisted of both missing values and a data set of imputed values conducted on all outcomes. The findings indicate that there were no statistically significant differences in the outcomes seen when analyzing the two datasets with the two hypotheses. The primary analysis was conducted using the ITT approach.

In this study, the researcher computed the missing outcome rate of 7.84% (8 participants) (see Figure 1 and Table 1, Appendix A). The Missing Value Analysis (MVA) is the program for testing the pattern of missingness. In this study, Little's MCAR was used for the testing. The hypothesis of the missingness was as follows:

H_0: The data are missing completely at random (MCAR)

H_1: The data are not missing completely at random (MCAR)

The results of Little's MCAR test was chi-square 31.835, DF=21, sig = 0.61 (see Table 2 Appendix A). The test was insignificant; the null hypothesis was not rejected; the data was MCAR.

The MCAR indicated the likelihood that the missing data were unrelated to any observed or unobserved variables. The methods provided unbiased estimates of treatment effects and accurate estimates of standard errors and p-values in MCAR such as likelihood-based, multiple imputation, inverse probability weighting, and complete case analysis (Dziura et al., 2013). Although the MCAR is not imputation necessary,

complete case analysis is less precise but still valid for the MCAR. Typically, a missing data rate of 5% is cited as a type of cutoff. Nonetheless, it should be understood that the percentage of missing data and the intensity of the relationship between missing and observed variables is crucial (Heymans & Twisk, 2022). The computational simplicity of complete case analysis enables common statistical tests to be conducted and provides an unbiased assessment of the intervention effect. Still, the reduced sample size and reliance on the strong MCAR assumption results in a loss of power and precision in estimating treatment effects (Dziura et al., 2013).

The researcher used the Expectation-Maximum (EM) algorithm imputation to replace the missing data. The EM algorithm is an iterative process comprising two distinct parts, the expectation step (E-step) and the maximization step (M-step). The resulting output is a succession of parameter estimates that converge toward a maximum-likelihood estimate (Gormley & Murphy, 2008). The EM method is utilized to analyze multivariate data sets containing missing observations and aims to enhance statistical inference by maximizing the remaining data (Ogbeide, 2018).

After that, repeated measures MANOVA was used to test the hypotheses statistically. The statistical significance was set at $p<0.05$.

The assumption testing was as follows (Hair et al., 2014; Srisatisnarakul, 2020; Tabachnick & Fidell, 2014):

1) There has to be an adequate sample size. The researcher checked the for missing data using the Missing Value Analysis (MVA).

This study had a sufficient sample size; the G*power estimated 102 participants using the significance level's setting power of 0.80, α at 0.5, and the effect was 0.33. The MVA shows that the missingness analysis pattern was MCAR for the EM algorithm imputation utilized in this investigation.

2) The researcher checked for the absence of outliers and examined the multivariate normal distribution by Mahalanobis distance (D^2) (Srisatisnarakul, 2020).

The *p*-value of Mahalanobis distance at Time 1 was between 0.60-17.52; Time 2 was 0.43-26.92, and Time 3 was 0.68-41.06. The interpretation of the Mahalanobis distance was that the *p*-value of all values was no less than or equal to 0.01, meaning a multivariate normal distribution (Tabachnick & Fidell, 2014; Srisatidnarakul, 2021). When using chi-square versus the Mahalanobis distance plot,

the plots show the multivariate normal distribution in each time and group (see Table 3, Appendix A).

3) The researcher checked the homogeneity of variance using the Levene test and the homogeneity of variance-covariance matrices using Box's M test.

The test of homogeneity of variance of the 6MWD variable at each time point determined the variance at Time 1 (F =1.274, df1 =1, df2 = 100, p = 0.262), Time 2 (F =0.082, df1 = 1, df2 = 100, p = 0.775), and Time 3 (F = 1.556, df1 = 1, df2 = 100, p = 0.215). The p-value results at all time points were found to be distinct without statistical significance at the level of 0.05; all p-values exceeded 0.05, which means homogeneity of variance.

The test of homogeneity of variance of the CAT variable at each time point determined the variance at Time 1 (F = 0.002, df1 = 1, df2 =100, p = 0.262), Time 2 (F = 16.167, df1 = 1, df2 = 100, p < 0.001), and Time 3 (F = 7.031, df1 = 1, df2 = 100, p = 0.009). The p-value results at Time 1 were found to be distinct without statistical significance at the level of 0.05. The p-value was more than 0.05, which means homogeneity of variance. At Time 2 and Time 3, the p-values were found to be statistically significant at the level of 0.05; the p-value was less than or equal to 0.05, which means non-homogeneity of variance.

The test of homogeneity of variance of the dyspnea (mMRC) variable at each time point determined the variance at Time 1 (F = 0.011, df1 = 1, df2 = 100, p = 0.915), Time 2 (F = 5.788, df1 = 1, df2 = 100, p = 0.18), and Time 3 (F = 14.714, df1 = 1, df2 = 100, p < 0.001). The p-value results at Time 1 and Time 2 were found to be distinct without statistical significance at the level of 0.05. The p-value was more than 0.05, which means homogeneity of variance. At Time 3, the p-values were found to be statistically significant at the level of 0.05; the p-value was less than or equal to 0.05, which means non-homogeneity of variance.

The test of homogeneity of variance of the fatigue (MAF) variable at each time point determined the variance at Time 1 (F = 0.002, df1 = 1, df2 = 100, p = 0.967), Time 2 (F = 0.113, df1 = 1, df2 = 100, p = 0.737), and Time 3 (F = 0.002, df1 = 1, df2 = 100, p = 0.961). The p-value results at all time points were found to be distinct without statistical significance at the level of 0.05; all p-values exceeded 0.05, which means homogeneity of variance.

The test of homogeneity of variance of sleep disturbance (PSQI) variable at each time point determined the variance at Time 1 (F = 0.141, df1 = 1, df2 = 100, *p* = 0.708), Time 2 (F = 0.071, df1 = 1, df2 = 100, *p* = 0.790), and Time 3 (F = 1.093, df1 = 1, df2 = 100, *p* = 0.298). The *p*-value results at all time points were found to be distinct without statistical significance at the level of 0.05; all *p*-values exceeded 0.05, which means homogeneity of variance.

In terms of the anxiety (HADS-Anxiety) variable, the test of homogeneity of variance at each time point determined the variance at Time 1 (F = 3.371, df1 = 1, df2 = 100, *p* = 0.69), Time 2 (F = 3.695, df1 = 1, df2 = 100, *p* = 0.57), and Time 3 (F = 9.079, df1 = 1, df2 = 100, *p* = 0.003). The *p*-value results at Time 1 and Time 2 were found to be distinct without statistical significance at the level of 0.05. The *p*-value was more than 0.05, which means homogeneity of variance. At Time 3, the *p*-values were found to be statistically significant at the level of 0.05; the *p*-value was less than or equal to 0.05, which means non-homogeneity of variance.

Regarding the depression (HADS_Depression) variable, the test of homogeneity of variance at each time point determined the variance at Time 1 (F = 4.464, df1 = 1, df2 = 100, *p* = 0.37), Time 2 (F =0.399, df1 = 1, df2 = 100, *p* = 0.57), and Time 3 (F = 0.362, df1 = 1, df2 = 100, *p* =0.549). The *p*-value results at Time 1, Time 2, and Time 3 were found to be distinct without statistical significance at the level of 0.05. The *p*-value was more than 0.05, which means homogeneity of variance. The result of the test of homogeneity of variance at each time point is presented in Table 4, Appendix A.

In terms of the homogeneity of variance-covariance matrices using Box's M test (see Table 5, Appendix A), it was found to be statistically significant at the level of 0.05; the *p*-value was less than or equal to 0.05, which means the covariance matrices of the dependent variables were not equal across groups.

4) There had to be a linear relationship of dependent variables using Pearson's correlation for test assumption.

The correlation coefficients of all dependent variables at Time 1 were r between -0.285 and 0.466; Time 2 was r between -0.305 and 0.565, and Time 3 was r between -0.425 and 0.536. Thus, the strong linear relationship was r between -1 and

+1, and r = 0.30-0.70 means a moderate linearity relationship (Srisatisnarakul, 2020) (see Table 6, Appendix A).

5) There had to be an absence of multicollinearity using correlation coefficients and variance inflation factor (VIF) values for test assumption.

The seven dependent variables of this study were tested for the absence of multicollinearity by Pearson's correlation, variance inflation factor (VIF), and tolerance. The results of the seven dependent various at each time point show that Time1 was r between -0.285 and 0.466, Time 2 was r between -0.305 and 0.565, and Time3 was r between -0.425 and 0.536, So the results of the correlation coefficient of all dependent variables not more than or equal to 0.70 (Peat & Barton, 2005 cited in Srisatidnarakul, 2021). It can be interpreted as the absence of multicollinearity (see Table 6, Appendix A).

In terms of VIF and Tolerance, the results show the VIF of seven dependent variables at Time 1 was 1.152-1.593; Time 2 was 1.221-2.076, and Time 3 was 1.369-1.855, which were not more than and equal to 10. The Tolerance presented in Time 1 was 0.628-0.868; Time2 was 0.200-0.487; Time 3 was 0.539-0.730, and all dependent variables had Tolerance of no less than or equal to 0.10 (Srisatisnarakul, 2020). It can be summarized, therefore, that the seven dependent variables had an absence of multicollinearity (see Table 7, Appendix A).

6) The researcher tested sphericity using Bartlett's test.

The result of Bartlett's test of sphericity was $p < 0.001$ (see Table 8, Appendix A), and the *p*-value was less than or equal to 0.05 (Srisatisnarakul, 2021; Wanichbancha, 2018), which means all dependent variables fit the criteria for a correlation matrix.

After the assumption test met the criteria, a repeat measures MANOVA analysis was conducted.

CHAPTER 4
RESULTS AND DISCUSSION

This study focused on investigating the impact of a symptom management program on adults diagnosed with chronic obstructive pulmonary disease (COPD). The participants were divided into two groups: an experimental group receiving both usual care and the symptom management program and a usual care group receiving only usual care. The study comprised 102 COPD patients who sought medical attention at the COPD clinic in Borabue Hospital, Mahasarakham Province. Consequently, the experimental and usual care groups consisted of 51 participants each, ensuring a balanced representation for comparative analysis. This research aimed to evaluate the effectiveness of the symptom management program in enhancing physical function and management of COPD symptoms.

The symptom management program was administered over the course of eight weeks, and the results were monitored every four weeks. Thus, symptom experience and physical function scores were assessed at baseline, four and eight weeks until the end of the program.

4.1 Results of the study

The findings of this study are presented as follows:

Part I: Demographic data, health history and treatment of the participants.

Part II: Comparison of 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-depression scores between the participants who received usual care combined with the symptom management program and those receiving usual care only.

Part I: Demographic Data, Health History and Treatment of Participants

4.1.1 Demographic Data of the Participants

The mean age of the participants was 66.68 (SD7.87). Most of the participants, (76.50%) were classified as older adults, and 23.50% were classified as adults; 93.10% identified as males and 6.90% as females. Most participants (80.40%)

were categorized as being married, divorced (15.70%) or single (3.90%); 80.40% of participants had attained an elementary school level of education, 17.60% had graduated from secondary school, while a similar 1.0% had diplomas and bachelor's degrees. Additionally, 75.50% were actively engaged in agriculture. All participants remained in the care of their respective caregivers, and most primary caregivers consisted of spouses, accounting for 56.86% of the total. Frequent symptoms reported by the whole of the participants encompassed fatigue (90.20%), dyspnea (73.50%), sleep disturbance (38.20%), anxiety (13.70%), and depression (6.90%). The median number of family members was 4, and the interquartile range was 3-5.

The characteristics of the two study groups demonstrated control of confounding factors such as age and disease severity through stratified block randomization. The participants were across two age categories: 40-59 years (23.50%) and 60-80 years (76.50%), with similarities in the experimental and usual care groups. Disease severity was stratified into three categories: mild (22 participants, 43.10%), moderate (25 participants, 49.00%), and severe (4 participants, 7.80%). Remarkably, these categories were proportionately and evenly represented in both groups. This stratified block randomization of age and disease severity enhanced the study's internal validity, bolstering confidence in drawing accurate conclusions without undue influence from these potential confounders.

In the experimental group, the mean age of the participants was 66.50 (SD 7.72). Most participants were male, accounting for 90.20% of the group. Regarding marital status, 84.30% were married or in committed relationships, 11.80% were divorced, and 3.90% were single. In terms of education, most participants had completed elementary school (80.40%). In terms of occupation, the majority were engaged in agriculture (76.50%). Among the primary caregivers for participants in the experimental group, the majority were spouses (64.70%), followed by children (25.50%), relatives (7.80%), and nephews or nieces (2.00%). The common symptoms occurring in the experimental group consisted of fatigue (86.30%), dyspnea (78.40%), sleep disturbance (33.30%), anxiety (13.70%), depression (3.90%), and chest tightness and cough (5.90%), respectively. The median number of family members was 4, and the interquartile range was 3-5.

In the usual care group, the mean age of the participants was 66.86 (SD 8.09). Most participants (76.50%) were 60-80, signifying a predominantly older adult composition within the group. Additionally, 96.10% were male, and only 3.90% were female. Concerning marital status, 76.50% of the participants were married or in committed relationships, while 19.60% were divorced, and 3.90% were single. Regarding educational level, 80.40% had completed elementary school, 17.60% had a secondary school education, and a minor proportion (2.00%) possessed bachelor's degrees. The predominant occupation was agriculture, accounting for 74.50%. Other occupations included private-sector employment (7.80%), government-sector employment (2.00%), merchants (3.90%), and 7.80% reported no occupation. Spousal caregivers were the most prevalent primary caregivers, identified by 52.90% of the participants, followed by children (35.30%) and other relatives (2.00%), etc. Frequent symptoms reported by the participants encompassed fatigue (94.10%), dyspnea (68.60%), sleep disturbance (43.10%), anxiety (13.70%), and depression (9.80%). The median number of family members was 4, and the interquartile range was 3-5.

For the statistical testing of the differences between the experimental and usual care groups, the categorical variables (analyzed using chi-square testing and Fisher's Exact test), a p-value of less than 0.05 indicated a statistically significant difference between the two groups. The data showed no statistically significant differences in age range, gender, marital status, education level, occupation, smoking status, primary caregivers, and frequent symptoms between the experimental and usual care groups.

For the continuous variables (analyzed using the Independent t-test and Mann-Whitney U test), a p-value of less than 0.05 suggested a statistically significant difference in the median between the experimental and usual care groups. The data indicated no statistically significant differences between the two groups in age and number of family members. The statistical analysis found no significant differences in demographic characteristics between the experimental and usual care groups, with all p-values exceeding 0.05. This result suggests that both groups were relatively comparable at baseline, which is essential for conducting a robust and reliable comparison during the study. The details are shown in Table 4.1

Table 4.1: Demographic data of the participants (n = 102).

Variables	Frequency (Percentage)/ Mean (SD) / Mdn (IQR)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
1. Age	x̄ 66.68 (SD 7.87) (41-80)	x̄ 66.50 (SD 7.72) (44-80)	x̄ 66.86 (SD 8.09) (41-79)	-0.23[a]	0.82
40-59 years	24 (23.50)	12 (23.50)	12 (23.50)	.00[b]	0.60
60-80 years	78 (76.50)	39 (76.50)	39 (76.50)		
2. Gender					
Male	95 (93.10)	46 (90.20)	49 (96.10)	1.38[d]	0.44
Female	7 (6.90)	5 (9.80)	2 (3.90)		
3. Marital Status					
Single	4 (3.90)	2 (3.90)	2 (3.90)	1.20[c]	0.55
Married/Committed Relationship	82 (80.40)	43 (84.30)	39 (76.50)		
Divorced	16 (15.70)	6 (11.80%)	10 (19.60%)		
4. Education Level					
Elementary School	82 (80.40)	41 (80.40)	41 (80.40)	2.77[c]	0.43
Secondary School	18 (17.60)	9 (17.60)	9 (17.60)		
Diploma	1 (1.00)	1 (2.00)	0 (0.00)		
Bachelor's Degree	1 (1.00)	0 (0.00)	1 (2.00)		
5. Occupation					
Agriculture	77 (75.50)	39 (76.50)	38 (74.50)	2.34[c]	0.67
None	10 (9.80)	4 (7.80)	6 (11.80)		

Variables	Frequency (Percentage)/ Mean (SD) / Mdn (IQR)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
Private-Sector Employment	6 (5.90)	2 (3.90)	4 (7.80)		
Merchant	5 (4.90)	3 (5.90)	2 (3.90)		
Government-Sector Employment	4 (3.90)	3 (5.90)	1 (2.00)		
6. Primary Caregivers					
Spouse	60 (58.80)	33 (64.70)	27 (52.90)	7.15[c]	0.13
Children	31 (30.40)	13 (25.50)	18 (35.30)		
Other Relatives	5 (4.90)	4 (7.80)	1 (2.00)		
Nephew/Niece	4 (3.90)	1 (2.00)	3 (5.90)		
Sibling	2 (2.00)	0 (0.00)	2 (3.90)		
7. Frequent Symptoms					
Fatigue	92 (90.20)	44 (86.30)	48 (94.10)	0.77[b]	0.18
Dyspnea	75 (73.50)	40 (78.40)	35 (68.60)	1.25[b]	0.26
Sleep Disturbance	39 (38.20)	17 (33.30)	22 (43.10)	1.03[b]	0.31
Anxiety	14 (13.70)	7 (13.70)	7 (13.70)	0.00[b]	1.00
Depression	7 (6.90)	2 (3.90)	5 (9.80)	1.38[b]	0.24
Chest Tightness and Cough	3 (2.90)	3 (5.90)	0 (0.00)	3.09[b]	0.08
8. Number of family members	Mdn 4 IQR (3-5)	Mdn 4 IQR (3-5)	Mdn 4 IQR (3-5)	0.39[e]	0.68

Note: [a] = Independent t-test, [b] = Pearson chi-square (χ^2), [c] = Likelihood ratio chi-square (χ^2 LR), [d] = Fisher's Exact test, [e] = Mann-Whitney U test,
* *p-value <0.05*

4.1.2 Health History and Treatment of the Participants

Most participants were smokers who had stopped (84.30%); 7.80% were in a group of smokers who were current and those who had never smoked. In a group of former smokers who had quit, the mean years of smoking were 28.48 (SD 14.84) and the median years after smoking cessation was 13 (IQR 7-30). The median number of cigarettes smoked daily was 10 (IQR 6.75-20). The group's current smoking had a median of 35 (IQR 1-40) and this group smoked cigarettes daily at 10 (IQR 4-10). The frequency of hospitalization was found to be 0.42 times (SD 0.82). The median of hospitalizations zero times throughout previous years (IRO 0-1). The most recent admission for COPD had occurred approximately 4.72 months before data collection, with a standard deviation of 3.34 months. Moreover, the median of frequency of acute exacerbations observed was zero (IQR 0) in previous years. The most recent acute exacerbation in the emergency room was observed to be 4.69 (SD 3.68) or within a timeframe ranging from 1 to 12 months before data collection; 55.90% of the participants had no comorbidities, and 44.10% had comorbidities. The prevalence rates of the five most common comorbidities in this study were as follows: hypertension (27.50%), diabetes mellitus (21.60%), dyslipidemia (15.70%), benign prostatic hyperplasia (12.70%), and gout (10.80%).

The median disease duration of COPD was 72 months (IQR 36-120). The disease severity of all participants was mild, moderate, and severe at 43.20%, 49.00%, and 7.80%, respectively. The mean BMI was calculated to be 22.61 kg/m2 (SD 3.70), encompassing a range of 14.69 to 30.80 kg/m2. The interpretation of BMI categories revealed that 13.70% of the participants were classified as underweight (<18.5 kg/m2), 35.30% were within the normal weight range (18.5-22.9 kg/m2), 21.60% were categorized as overweight (23-24.9 kg/m2), and 28.40% were classified as obese (≥25 kg/m2).

Regarding the health history in the experimental group, most had smoked cigarettes but had quit (76.50%); current smoking and never smoking were 11.80%. In a group of smokers who had stopped, the mean years of smoking were 28.50 (SD 14.58), and the median years since quitting smoking was 16 (IQR 6-30). The median number of cigarettes smoked daily was 10 (IQR 5-20). The group's current smoking

had a median duration of smoking of 35 years (IQR 10-40), and the participants had smoked ten cigarettes per day (IQR 2.50-10).

The median of history of hospitalization in this group was zero (IQR 0-1) times in the years preceding data collection; the last time of admission for COPD was 3.94 (SD 2.92) months before data collection. Furthermore, the median of acute exacerbations occurring was zero (IQR 0) times in previous years. The last ER visit for acute exacerbation was 5.00 (SD 4.30) or 1-12 months before data collection. The top five comorbidities were hypertension (25.50%), diabetes mellitus (21.60%), dyslipidemia (17.60%), gout (13.70%), and benign prostatic hyperplasia (9.80%).

The mean BMI in the experimental group was calculated to be 22.63 kg/m^2 (SD 3.67), encompassing a range of 14.69 to 30.12 kg/m^2. The interpretation of BMI categories revealed that 11.80% of the participants were classified as underweight, 39.20% were within the normal weight range, 19.60% were categorized as overweight, and 29.40% were classified as obese.

In the usual care group, the smoking status analysis indicated that the majority (92.20%) of participants were ex-smokers who had stopped smoking, signifying a high prevalence of former smokers. Only 3.90% were current smokers, while 3.90% had never smoked. The mean duration of smoking among individuals who had ceased smoking in a particular group was found to be 28.46 years (SD 15.21). Additionally, the median duration for these individuals to quit smoking was ten years (IQR 7-30). The median number of cigarettes smoked per day was 20 (IQR 8-20). The median smoking rate of the current smokers was 28 years (IQR 1-28), with a median of 7.50 cigarettes per day (IQR 5-7.5).

Regarding hospitalization, the participants in this group experienced a median of zero hospitalizations due to COPD in the past year (IQR 0). Moreover, acute exacerbations occurred at a median of zero times (IQR 0) during the past year. Approximately 45.10% of the participants in this group reported comorbidities, while 54.90% did not have any comorbid conditions. The five most common comorbidities included diabetes mellitus (21.60%), hypertension (25.50%), benign prostatic hyperplasia (9.80%), dyslipidemia (13.70%), and gout (7.80%).

The median disease duration was 72 (IQR 36-120) months or six years, indicating that most individuals had lived with COPD for a considerable period. This

group's mean body mass index (BMI) was 22.59 kg/m^2. The BMI interpretation showed that 31.40% were of normal weight, 23.50% were overweight, 15.70% were underweight, and 27.50% were categorized as obese.

The statistical analysis found no significant differences in health history between the experimental and usual care groups, with all *p*-values exceeding 0.05. This result suggests that both groups were relatively comparable at baseline, which is essential for conducting a robust and reliable comparison during the study. The details are shown in Table 4.2.

Table 4.2: Health history of the participants (n = 102).

Variables	**Frequency (Percentage)/ Mean (SD)/ Mdn (IQR)**				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual care Group (n = 51)**	**Statistical Value**	***p***
1. Smoking Status					
Former Smokers	86 (84.30)	39 (76.50)	47 (92.20)	4.93[c]	0.09
Never Smokers	8 (7.80)	6 (11.80)	2 (3.90)		
Current Smokers	8 (7.80)	6 (11.80)	2 (3.90)		
1.1 Former Smokers					
- Smoking Duration (years)	x̄ 28.48 (SD 14.84) (1.67-64)	x̄ 28.50 (SD 14.58) (1.67-64)	x̄ 28.46 (SD 15.21) (3-55)	0.11[a]	0.99
- Cessation Duration (Years)	Mdn 13.00, IQR (7-30)	Mdn 16.00, IQR (6-30)	Mdn 10.00, IQR (7-30)	1.173[e]	0.39
- Cigarettes per Day	Mdn 10.00, IQR (6.75-20)	Mdn 10.00, IQR (5-20)	Mdn 20.00, IQR (8-20)	3.23[e]	0.11

Variables	Frequency (Percentage)/ Mean (SD)/ Mdn (IQR)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual care Group (n = 51)**	**Statistical Value**	***p***
1.2 Current Smokers					
- Smoking Duration (Years)	Mdn 35.00, IQR (1-40)	Mdn 35.00, IQR (10-40)	Mdn 28.00, IQR (1-28)	0.58[e]	1.00
- Cigarettes per Day	Mdn 10.00, IQR (4-10)	Mdn 10.00, IQR (2.50-10)	Mdn 7.50, IQR (5-7.5)	5.50[e]	1.00
2. History of Hospitalization and Acute Exacerbation in the Past Year					
2.1 Hospitalizations in the past year (times)	Mdn 0, IQR (0-1)	Mdn 0, IQR IQR (0-1)	Mdn 0, IQR (0)	1,189[e]	0.35
2.2 Last Admission for COPD (months)	x̄ 4.72, SD 3.34 (1-12)	x̄ 3.94, SD 2.92 (1-12)	x̄ 5.83, SD 3.20 (2-12)	-1.53[a]	0.14
2.3 Acute Exacerbations in the Past Year (times)	Mdn 0, IQR (0)	Mdn 0, IQR (0)	Mdn 0, IQR (0)	1,278[e]	0.82
2.4 Last ER Visit to the Due to an Acute Exacerbation (months)	x̄ 4.69, SD 3.68 (1-12)	x̄ 5.00, SD 4.30 (1-12)	x̄ 4.38, SD 2.32 (2-9)	0.36[a]	0.73
3. Comorbidities					
Yes	45 (44.10)	22 (43.10)	23 (45.10)	0.04[b]	0.84
No	57 (55.90)	29 (56.90)	28 (54.90)		
3.1 Diabetes Mellitus	22 (21.60)	11 (21.60)	11 (21.60)	0.00[b]	1.00

Variables	Frequency (Percentage)/ Mean (SD)/ Mdn (IQR)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual care Group (n = 51)**	**Statistical Value**	***p***
3.2 Hypertension	28 (27.50)	13 (25.50)	15 (29.40)	0.19[b]	0.66
3.3 Benign Prostatic Hyperplasia	13 (12.70)	5 (9.80)	8 (15.70)	0.79[b]	0.37
3.4 Gout	11(10.80)	7 (13.70)	4 (7.80)	0.91[b]	0.34
3.5 Dyslipidemia	16 (15.70)	9 (17.60)	7 (13.70)	0.29[b]	0.59
3.6 Gastritis	3 (2.90)	3 (5.90)	0 (0.00)	3.09[d]	0.24
3.7 Thyroid	2 (2.00)	1 (2.00)	1 (2.00)	0.00[d]	1.00
3.8 Rhinitis	3 (2.90)	2 (3.90)	1 (2.00)	0.34[d]	1.00
3.9 Chronic Kidney Disease	3 (2.90)	1 (2.00)	2 (3.90)	3.43[d]	1.00
4. Disease Severity					
Mild	44 (43.20)	22 (43.10)	22 (43.10)	0.00[c]	1.00
Moderate	50 (49.00)	25 (49.00)	25 (49.00)		
Severe	8 (7.80)	4 (7.80)	4 (7.80)		
5. Disease Duration (months)	Mdn 72.00, IQR (36-120)	Mdn 72.00, IQR (28-96)	Mdn 72.00, IQR (36-120)	1,375.00[e]	0.62
6. Body Mass Index (BMI)	x̄ 22.61(SD 3.70) (14.69- 30.80)				
Underweight (<18.5 kg/m^2)	14 (13.70)	6 (11.80)	8 (15.70)	0.93[b]	0.82
Normal Weight (18.5–22.9 kg/m^2)	36 (35.30)	20 (39.20)	16 (31.40)		
Overweight (23–24.9 kg/m^2)	22 (21.60)	10 (19.60)	13 (25.50)		
Obese (≥25 kg/m^2)	29 (28.40)	15 (29.40)	14 (27.50)		

Note: [a] = Independent t-test, [b] = Pearson chi-square (χ^2), [c] = Likelihood ratio chi-square (χ^2 LR), [d] = Fisher's Exact test, [e] = Mann-Whitney U test,

* *p-value <0.05*

Regarding medications for treating COPD in the participants, most participants (92.20%) received a treatment regimen consisting of combination therapy of inhaled corticosteroid/long-acting beta-agonist (ICS/LABA), specifically Seretide™. Around 32.35% of the participants employed inhaled corticosteroid monotherapy. Among this particular subgroup, Fixotide™ was prescribed for 22.50% of the patients, while Pulmicort™ was prescribed for 9.80%. Additionally, it is worth noting that 24.50% of the individuals in the study were prescribed long-acting muscarinic antagonist (LAMA) medication, specifically Spiriva™. Most participants (88.20%) received combined therapy of short-acting muscarinic antagonist/short-acting beta-agonist (SAMA/SABA), namely Berodual™. Finally, it should be noted that 9.80% of the individuals in the study were administered short-acting beta-agonist (SABA) monotherapy, mainly Ventolin™. Regarding oral medications, most participants in the study were supplied pharmaceutical substances with diverse therapeutic properties. The medicines most frequently utilized in this study encompassed those possessing anti-inflammatory properties (Theophylline, 51.00%), antihistamines (Cetrizine, 48.00%), mucolytic agents (Bromhexine, 47.10%), expectorants (Phyllanthus Emblica syrup, 47.10%), cough suppressants or anti-tussive (19.60%), decongestants (Pseudoephedrine, 4.90%), antibiotics (Roxithromycin, 2.90%), and corticosteroids (prednisolone, 2.00%).

In the experimental group, the common medication was the inhaled corticosteroid/long-acting beta2-agonist (ICS/LABA) combination therapy, specifically Fluticasone/Salmeterol (Seretide™), utilized by 90.20% of individuals. Short-acting muscarinic antagonist/short-acting beta-agonist (SAMA/SABA) therapy, represented by Ipratropium/Fenoterol (Berodual™), was used by 86.30% of participants. Long-acting muscarinic antagonist (LAMA) in the form of Tiotropium (Spiriva™) was used by 25.50% of the participants. Additionally, 25.50% of the participants received inhaled corticosteroids such as Budesonide (Pulmicort™), while 54.90% were administered expectorants, namely Phyllanthus Emblica syrup. Other medications, including anti-inflammatory agents, antihistamines, cough suppressants,

mucolytic agents, and antibiotics, were also part of the treatment regimens, highlighting the comprehensive approach adopted for COPD management in this experimental group.

The usual care group's medications for treating COPD revealed diverse prescription patterns. The most commonly prescribed medication was the inhaled corticosteroid/long-acting beta2-agonist (ICS/LABA) combination therapy, particularly Fluticasone/Salmeterol (Seretide^{TM}), administered to 94.10% of the participants. Short-acting muscarinic antagonist/short-acting beta-agonist (SAMA/SABA) therapy, represented by Ipratropium/Fenoterol (Berodual^{TM}), was utilized by 90.20% of the participants. Additionally, 25.50% of the participants were prescribed the long-acting muscarinic antagonist (LAMA), Tiotropium (Spiriva^{TM}). Other medications were also observed, including inhaled corticosteroids, anti-inflammatory agents, antihistamines, expectorants, mucolytic agents, and antibiotics.

The *p*-values were greater than 0.05, indicating no statistically significant differences between the two groups for all variables. The details are shown in Table 4.3.

Table 4.3: Medications for the Participants

Variables	**Frequency (Percentage)**				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
1. Long-acting muscarinic antagonist (LAMA):					
Tiotropium (Spiriva^{TM})	25 (24.50)	13 (25.50)	12 (23.50)	0.53[b]	0.82
2. Long-acting bata2- agonist (LABA):					

Variables	Frequency (Percentage)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
Indacaterol (Onbrez™)	0 (0.00)	0 (0.00)	0 (0.00)	0.00[b]	1.00
3. Inhaled corticosteriod/ LABA (ICS/LABA):					
Fluticasone/ Sameterol (Seretide™)	94 (92.20%)	46 (90.20)	48 (94.10)	0.54[d]	0.72
4. Short-acting Beta Agonist (SABA):					
Salbutamol (Ventolin™)	10 (9.80%)	6 (11.80)	4 (7.80)	0.44[b]	0.51
5. Short-acting Muscarinic Antagonist SAMA/SABA:					
Ipratropium/Fenoterol (Berodual™)	90 (88.20)	44 (86.30)	46 (90.20)	0.37[b]	0.54
6. Inhaled Corticosteroids:					
Budesonide (Pulmicort™)	10 (9.80)	7 (13.70)	3 (5.90)	1.74[b]	0.18
Fluticasone MDI (Fixotide™)	23 (22.50)	13 (25.50)	10 (19.60)	0.50[b]	0.48

Variables	Frequency (Percentage)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
7. Inhaled Corticosteroids:					
Fluticasone Furoate (Avamys nasal Spray™)	10 (9.80)	6 (11.80)	4 (7.80)	0.44[b]	0.51
8.Corticosteroids:					
Prednisolone	2 (2.00)	0 (0.00)	2 (3.90%)	0.34[d]	1.00
9. Anti-inflammatories Effects:					
Theophylline	52 (51.00%)	23 (45.10)	29 (56.90)	1.41[b]	0.24
10. Antihistamine:					
Chlorpheniramine (CPM)	4 (3.90)	3 (5.90)	1 (2.00)	1.04[b]	0.31
Cetirizine	49 (48.00)	20 (39.20)	29 (56.90)	3.18[b]	0.07
11. Decongestants:					
Pseudoephedrine	5 (4.90)	2 (3.90)	3 (5.90)	0.21[b]	0.65
12. Cough Suppressants or Antitussives:					
Dextromethorphan	20 (19.60)	13 (25.50)	7 (13.70)	2.23[b]	0.14
13. Expectorants:					
Phyllanthus Emblica syrup	48 (47.10)	28 (54.90)	20 (39.20)	2.51[b]	0.11
Ma-Waeng Lozenges	15 (14.70)	9 (17.60)	6 (11.80)	0.70[b]	0.40

Variables	Frequency (Percentage)				
	Total (n = 102)	**Experiment Group (n = 51)**	**Usual Care Group (n = 51)**	**Statistical Value**	***p***
14. Mucolytic Agents:			6		
Acetylcysteine	14 (13.70)	8 (15.70)	6 (11.80)	0.33[b]	0.57
Bromhexine	48 (47.10)	28 (54.90)	20 (39.20)	2.51[b]	0.11
15. Antibiotics:					
Roxithromycin	3 (2.90)	2 (3.90)	1 (2.00)	0.34[d]	1.00

Note: [a] = Independent t-test, [b] = Pearson chi-square (χ^2), [c] = Likelihood Ratio Chi-Square (χ^2 LR), [d] = Fisher's Exact test

* *p-value <0.05*

Part II Comparison of 6MWD, CAT scores, dyspnea, fatigue, sleep disturbance, anxiety, and depression scores between the experimental group receiving usual care combined with a symptom management program and the usual care group receiving usual care only.

In this part, the data analysis employed multivariate analysis of variance (MANOVA) to assess the differences between the experimental and usual care groups at baseline. This investigation performed repeated measures MANOVA to examine the impact of the symptom management program on seven dependent variables. This method involved assessing both between-group differences and within-group changes over time. Assessing the test assumptions is necessary before performing MANOVA and repeated measures MANOVA.

1) In the multivariate normality distribution of the dependent variables, the multivariate normal distribution of seven dependent variables was analyzed by Mahalanobis distances (D^2), the graphical plot of Mahalanobis distances, and chi-square testing. The data met the assumption of multivariate normal distribution because there were no probability values for Mahalanobis distances that were less than or equal to 0.001 at each time point. Furthermore, the researcher performed chi-square testing

versus Mahalanobis distance plot to confirm the multivariate normal distribution (Arifin, 2015) (see Table 3, Appendix A)

2) The results of the homogeneity of variance were determined by using the Levene test and the homogeneity of variance-covariance matrices using Box's M test. The Levene statistic of dependent variables was the *p*-value between 0.000-0.967, which means non-homogeneity of variance. The Box's M test of equality of covariance matrices shows the *p*-value < 0.001, which means covariance matrices of the dependents were not equal across groups (See Table 5, Appendix A). Therefore, Pillai's Trace was used to analyze the repeated measure MANOVA when it violated the assumptions of homogeneity of variance and covariance matrices (Srisatidnarakul, 2021).

3) The data met the assumption of linearity and the absence of multicollinearity after testing using Pearson's correlations. The r results at Time 1, Time 2, and Time 3 were between -0.285 to 0.466, -0.305 to 0.565, and -0.425 to 0.536, respectively. (see Tables 6, Appendix A) Furthermore, the researcher confirmed the multicollinearity testing using VIF and Tolerance. The results of VIF were no more than and equal to 10. The Tolerance presented in all dependent variables was no less than or equal to 0.10 (see Tables 7, Appendix A). The findings of this study suggest a correlation between the variables, specifically in terms of linearity and the absence of multicollinearity.

4) The data met the assumption of sphericity at $p < 0.001$ (see Table 8, Appendix A), and the *p*-value was less than or equal to 0.05.

4.1.3 Comparison of the Dependent Variable Differences between the Experimental and Usual Care Groups at Baseline

At Time 1 (pre-test or baseline), the comparison of 6MWD, CAT scores, dyspnea, fatigue, sleep disturbance, anxiety, and depression scores between the experimental group and usual care groups used MANOVA. The multivariate test for comparing the dependent variables of adults with COPD between groups showed no significant differences [Pillai's Trace = 0.111, F (7, 94) =532.274, $p = 0.124$]. It can be concluded, therefore, that the mean scores of the seven dependent variables had no

differences between the experimental and usual care groups at baseline. The results are shown in Tables 4.4 and 4.5.

Table 4.4: Multivariate test for comparison of dependent variables between experimental and usual care groups at baseline (n = 102).

Effect	Pillai's Trace	F	Hypothesis df	Error df	*P*	Partial Eta Square
Intercept	0.975	532.274	7.00	94.00	0.000**	0.975
Group	0.111	1.676	7.00	94.00	0.124	0.111

***p-value <0.001*p-value <0.05*

Table 4.5: Test of between-subject effects or comparison of the mean scores for dependent variables of adults with COPD between groups at baseline (n = 102).

Source	Variables	Type III Sum of Squares	df	Mean Square	F	*P*	Partial Eta Square
Group	6MWD_Time 1	1641.039	1	16416.039	3.619	0.600	0.035
	CAT_Time 1	58.127	1	58.127	2.492	0.118	0.024
	mMRC_Time 1	0.039	1	0.039	0.066	0.797	0.001
	MAF_Time 1	0.493	1	0.493	0.005	0.944	0.000
	PSQI_Time 1	3.176	1	3.176	0.300	0.585	0.003
	HADS-Anxiety _Time 1	14.157	1	14.157	1.864	0.175	0.018
	HADS-Depression _Time 1	12.706	1	12.706	1.958	0.165	0.019

**p*-value <0.05,

Note: 6MWD: 6-minute walk distance, CAT: COPD Assessment Test scores, mMRC: modified Medical Research Council scores, MAF: Multidimensional Assessment of Fatigue scores, HADS-Anxiety: Hospital Anxiety and Depression Scores-Anxiety, and HADS-Depression: Hospital Anxiety and Depression Scores-Depression scores**.**

4.1.4 Comparison of the Dependent Variable Differences between the Experimental and Usual Care Groups when measured over time.

Hypothesis 1: The symptom experience and physical function in adults with COPD in the experimental group using the symptom management program will be significantly better than the usual care group when measured over time at Week 4 and post-test at Week 8.

In order to investigate the effectiveness of the symptom management program in terms of physical function and symptom experience between the experimental group receiving the usual care combined with the symptom management program and the usual care group receiving usual care only when measured over time at Week 4 and Week 8, these data were evaluated using the repeated measure MANOVA.

The results of the data analysis using repeated measure MANOVA show the mean scores for 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression variables between the experimental and usual care groups had statistically significant differences between groups [$F(7, 94) = 2.338$, $p = 0.030$]. In terms of time, all dependent variables had statistically significant differences at various time points [$F(14, 87) = 4.708$, $p < 0.001$]. Additionally, the findings indicate that there were statistically significant differences in the mean scores of all dependent variables across different time points, as evidenced by the interaction between the group and time [$F(14, 87) = 5.257$, $p < 0.001$]. It can be concluded, therefore, that the duration of the symptom management program impacted the increased mean scores for the variables of 6MWD and decreased mean scores of CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression in at least one pair within the experimental and usual care groups. The interactions between the groups and time points affected the seven dependent variables. The results are shown in Table 4.6.

Table 4.6: Repeated measured MANOVA test between subjects and within subjects for seven dependent variables.

Effect	Pillai's Trace	F	Hypothesis df	Error df	*P*	Partial Eta Square
Between Subjects						
Intercept	0.983	771.932	7	94	0.000**	0.983
Group	0.148	2.338	7	94	0.030*	0.148
Within Subjects						
Time	0.431	4.708	14	87	0.000**	0.431
Time*Group	0.458	5.257	14	87	0.000**	0.458

***p-value <0.001, *p*-value <0.05*

In Table 4.7, the results reveal that the increase in mean scores for 6MWD (F = 7.104, $p = 0.001$), CAT (F = 14.474, $p < 0.001$), mMRC (F = 5.714, $p = 0.004$), MAF (F = 9.075, $p < 0.001$), HADS-Anxiety (F = 3.512, $p = 0.032$), and HADS-Depression (F = 6.482, $p = 0.002$) was significant relative to the duration of the symptom management program, which implies significance difference between at least one pair in the experimental and usual care groups. The pairwise comparison of the mean scores of all dependent variables between the experimental and usual care groups (between groups) each time found that the mMRC and MAF variables were statistically significant at Time 2 and Time 3 [mMRC: Time 2 (F = 6.634, $p = 0.011$), Time 3 (F = 21.193, $p < 0.001$); MAF: Time 2 (F = 12.158, $p = 0.001$), Time 3 (F = 9.785, $p = 0.002$)]. In terms of 6MWD, CAT, and HADS-Anxiety, the variables were statistically significant at only Time 3 [6MWD: Time 3 (F = 8.820, $p = 0.004$); CAT: Time 3 (F = 8.657, $p = 0.004$); HADS-Anxiety (F = 6.476, $p = 0.012$). However, the results of this test found that the two variables had no significant difference in the mean scores of the PSQI and HADS-Depression variables each time. The results of a pairwise comparison is presented in Table 4.9.

Furthermore, Table 4.7 on the effects of testing within-subjects presents that the results of the interaction effect between times and groups were statistically significant ($p < 0.001$) when the variables of 6MWD, CAT, mMRC, MAF, PSQI,

HADS-Anxiety, and HADS-Depression changed over three time points. Mauchly's test of Sphericity of the dependent variables shows that 6MWD [$\chi^2(2) = 13.882$, $p = 0.001$], MAF [$\chi^2(2) = 11.110$, $p = 0.004$], and HADS-Depression [$\chi^2(2) = 9.642$, $p = 0.008$], which were less than or equal to 0.05, meaning means that Mauchly's Test of Sphericity indicated that the assumption of sphericity had been violated, and the Epsilon (ε) was more than 0.75. Hence, the Huynh-Feldt correction was used for 6MWD, MAF, and HADS-Depression variables. In terms of Mauchly's test of Sphericity of the dependent variables shows that CAT [$\chi^2(2) = 3.366$, $p = 0.186$], mMRC [$\chi^2(2) = 2.225$, $p = 0.329$], PSQI [$\chi^2(2) = 2.564$, $p = 0.277$], and HADS-Anxiety [$\chi^2(2) = 2.166$, $p = 0.339$] were more than 0.05, which means that Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated, which the Sphericity Assumed.

The results also showed that the interaction between the symptom management program and the duration of measures influenced the increase of the mean scores for 6MWD ($F = 26.947$, $p < 0.001$) and the decrease of the mean scores of CAT ($F = 7.262$, $p = 0.001$), mMRC ($F = 6.957$, $p = 0.001$), MAF ($F = 4.579$, $p = 0.011$). Nevertheless, the mean scores of PSQI, HADS-Anxiety, and HADS-Depression did not change over time compared to the usual care group. However, it was necessary to investigate the mean differences for each pair within each group using a post-hoc comparison test, as indicated in Hypothesis 2 (Table 4.9).

Table 4.7: Univariate test for the mean scores difference of 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression variables within groups over repeated measure three times (baseline, Week 4 and Week 8) (n = 102).

Source	Variables	Type III Sum of Squares	df	Mean Square	F	*P*	Partial Eta Square
Time	6MWD	17099.586	2.000	8549.793	7.104	0.001*	0.066
	CAT	404.47	1.993	202.99	14.474	0.000**	0.126
	mMRC	3.272	2.000	1.636	5.714	0.004*	0.054
	MAF	1041.231	2.000	520.615	9.075	0.000**	0.083
	PSQI	18.217	2.000	9.109	3.512	0.162	0.018

Source	Variables	Type III Sum of Squares	df	Mean Square	F	*P*	Partial Eta Square
	HADS-Anxiety	25.401	2.000	12.700	3.512	0.032*	0.034
	HADS-Depression	42.503	2.000	21.251	6.482	0.002*	0.061
Time* Group	6MWD	64857.442	2.000	32428.721	26.947	0.000**	0.212
	CAT	202.953	1.993	1.993	7.262	0.001*	0.068
	mMRC	3.984	2.000	1.992	6.957	0.001*	0.065
	MAF	525.310	2.000	262.655	4.579	0.011*	0.044
	PSQI	7.982	2.000	3.991	0.805	0.448	0.008
	HADS-Anxiety	4.753	2.000	2.377	0.657	0.519	0.007
	HADS-Depression	2.127	2.000	1.063	0.324	0.723	0.003
Error (Time)	6MWD	240686.803	200.000	1203.434			
	CAT	2794.583	199.258	14.025			
	mMRC	57.266	200.000	0.286			
	MAF	11473.353	200.000	57.367			
	PSQI	991.244	200.000	4.956			
	HADS-Anxiety	723.341	200.000	3.617			
	HADS-Depression	655.745	200.000	3.279			

***p-value <0.001*, **p*-value <0.05

Hypothesis 2: The symptom experience and physical function in adults with COPD will be significantly different for at least one pair when measured over time at baseline, Week 4, and post-test at Week 8 in the experimental group using the symptom management program.

To compare the differences in the mean scores for 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression variables with different points of measurement (Time 1 baseline or pre-test, Time 2 at Week 4, and Time 3 at Week 8 or post-test) within the group, which the pairwise comparison using Bonferroni's test to analyze these results.

Table 4.8: The analysis of repeated measure MANOVA test of 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression variables between groups over repeated measure at three-time points (baseline, Week 4, and Week 8) reveals that the experimental groups received the symptom management program was increased in the mean scores of all dependent variables over time. The mean scores of all dependent variables of the experimental group were statistically significant [F (14, 87) = 8.229, p <0.001]. On the other hand, the usual care group received only the usual care with no significant difference [F (14, 87) = 1.736, p = 0.063] (Table 4.8).

Following the implementation of the symptom management program, it was observed that the mean scores of all variables within the experimental group demonstrated significant changes (Within group). The post-hoc comparison results indicated statistically significant differences in the mean scores for the 6MWD between Time 1 and Time 2, Time 1 and Time 3, and Time 2 and Time 3 (p < 0.001). There were statistically significant differences in the mean scores for CAT factors between Time 1 and Time 2 (p = 0.006), Time 1 and Time 3 (p < 0.001), and Time 2 and Time 3 (p = 0.002). The mean scores for the mMRC variable exhibited statistically significant differences between Time 1 and Time 2 (p = 0.003), Time 1 and Time 3 (p < 0.001), and Time 2 and Time 3 (p = 0.047). The mean scores for the MAF variable exhibited statistically significant differences between Time 1 and Time 2 ($p < 0.001$), Time 1 and Time 3 (p < 0.001). There was just one pair of variables that differed regarding PSQI and HADS-Anxiety. There was a statistically significant difference in the mean PSQI score between Time 1 and Time 2 (p = 0.046). There was a statistically significant difference in the mean score of the HADS-Anxiety variable between Time 1 and Time 3 (p = 0.015). Additionally, there were no significant differences in the mean scores for the HADS-Depression variable over time.

The decreasing scores between baseline, Week 4, and Week 8 suggest that the symptom management program administered to the experimental group could assist

patients with COPD in alleviating symptoms such as dyspnea, fatigue, and COPD assessment tests. In addition, the symptom management program could enhance physical function, as evidenced by the rising mean 6MWD walking distance over time. Although scores for sleep disturbances, anxiety, and depression symptoms did not change over time, after eight weeks of program participation in the experimental group, the mean HADS-Anxiety scores decreased relative to baseline. Regarding sleep disturbance, after four weeks of participating in the program, the scores improved relative to baseline, but upon completion of eight weeks, the scores slightly increased compared to the duration of four weeks. Only depression symptoms did not change over time, but the scores of HADS-Depressions tended to decrease steadily compared to before participation in the program. The details are presented in Table 4.9 and Figure 4.1.

Table 4.8: Repeated measure MANOVA test of 6MWD, CAT, mMRC, MAF, PSQI, HADS-Anxiety, and HADS-Depression variables between groups over repeated measure three times (baseline, Week 4, and Week 8) (n = 102).

Effect	Pillai's Trace	F	Hypothesis df	Error df	*P*	Partial Eta Square
Between Subjects						
Experimental	0.570	8.229	14	87	0.000**	0.570
Usual Care	0.218	1.736	14	87	0.063	0.218

***p-value <0.001, *p*-value <0.05

Table 4.9: Post-hoc comparison of the mean scores of 6MWD, CAT, mMRC, MAF, HADS-Anxiety, and HADS-Depression variables at different time points (baseline, Week 4, and Week 8) by time and group (n =102).

Variables/		Between Groups			Within Group (Bonferroni)		
Time	Group	Mean ± SD	F	*p*-value	Mean difference		
					Time 1	Time 2	Time 3
6MWD							
Time1	Experimental	329.27(61.00)	3.619	0.060	-	-24.759**	-51.965**
(Baseline)	Usual care	354.64(73.15)			-	-3.448	17.635*
Time2	Experimental	354.03(55.50)	0.101	0.751	-	-	-27.206**
(Week four)	Usual care	358.095(72.41)			-	-	21.083*
Time3	Experimental	381.240(58.39)	8.820	0.004*	-	-	-
(Week eight)	Usual care	337.012(88.88)			-	-	-
CAT							
Time1	Experimental	8.15(5.09)	3.619	0.118	-	2.254*	4.600**
(Baseline)	Usual care	6.64(4.55)			-	-0.788	0.843
Time2	Experimental	5.90(3.65)	2.090	0.151	-	-	2.346*
(Week four)	Usual care	7.43(6.62)			-	-	1.631*
Time3	Experimental	3.55(2.55)	8.657	0.004*	-	-	-

Variables/ Time	Group	Between Groups Mean ± SD	F	*p*-value	Within Group (Bonferroni) Mean difference		
					Time 1	Time 2	Time 3
(Week eight)	Usual care	5.80(4.81)			-	-	-
mMRC							
Time1	Experimental	0.72(0.75)	0.066	0.797	-	0.321*	0.519**
(Baseline)	Usual care	0.68(0.78)			-	-0.091	-0.014
Time2	Experimental	0.40(0.56)	6.634	0.011*	-	-	0.198*
(Week four)	Usual care	0.77(0.86)			-	-	0.078
Time3	Experimental	0.20(0.37)	21.193	0.000**	-	-	-
(Week eight)	Usual care	0.69(0.66)			-	-	-
MAF							
Time1	Experimental	16.86(10.01)	0.005	0.944	-	6.597**	6.639**
(Baseline)	Usual care	17.00(9.85)			-	0.572	1.711
Time2	Experimental	10.26(8.26)	12.158	0.001*	-	-	0.042
(Week four)	Usual care	16.43(9.54)			-	-	1.139
Time3	Experimental	10.22(7.62)	9.785	0.002*	-	-	-
(Week eight)	Usual care	15.29(8.70)			-	-	-

Variables/ Time	Group	Between Groups Mean ± SD	F	*p*-value	Within Group (Bonferroni) Mean difference		
					Time 1	Time 2	Time 3
PSQI							
Time1 (Baseline)	Experimental	6.15(3.25)	0.300	0.585	-	0.921*	0.781
	Usual care	6.50(3.24)			-	0.176	0.178
Time2 (Week four)	Experimental	5.23(3.07)	3.225	0.076	-	-	-0.140
	Usual care	6.33(3.55)			-	-	0.001
Time3 (Week eight)	Experimental	5.37(2.94)	2.189	0.142	-	-	-
	Usual care	6.33(3.55)			-	-	-
HADS-Anxiety							
Time1 (Baseline)	Experimental	3.11(2.46)	1.864	0.175	-	0.303	0.958*
	Usual care	3.86(2.82)			-	0.346	0.452
Time2 (Week four)	Experimental	2.81(2.43)	1.998	0.161	-	-	0.655
	Usual care	3.51(2.79)			-	-	0.532
Time3 (Week eight)	Experimental	2.15(1.62)	6.476	0.012*	-	-	-
	Usual care	3.41(3.11)			-	-	-
HADS-Depression							

Variables/		**Between Groups**			**Within Group (Bonferroni)**		
Time	**Group**	**Mean ± SD**	**F**	***p*-value**	**Mean difference**		
					Time 1	**Time 2**	**Time 3**
Time1	Experimental	2.58(2.23)	1.958	0.165	-	0.276	0.673
(Baseline)	Usual care	3.29(2.82)			-	0.276	1.075*
Time2	Experimental	2.44(2.43)	1.215	0.273	-	-	0.532
(Week four)	Usual care	3.01(2.78)			-	-	0.798*
Time3	Experimental	1.91(1.93)	0.630	0.429	-	-	-
(Week eight)	Usual care	2.21(1.94)			-	-	-

***p-value <0.001, *p-value <0.05*

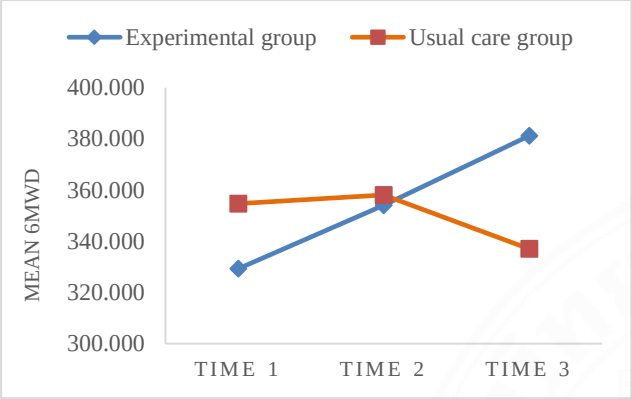


Figure 4.1A Mean changes in 6MWD

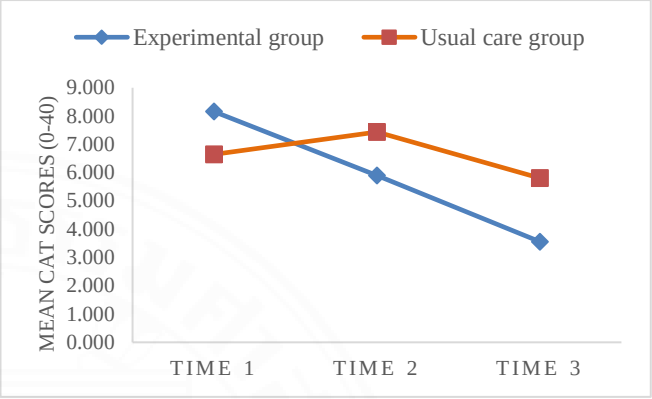


Figure 4.1B Mean changes in CAT

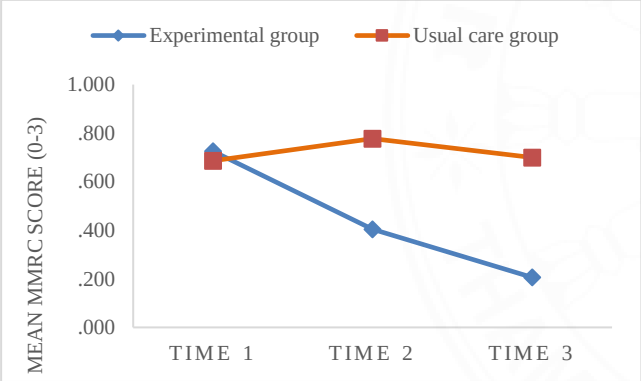


Figure 4.1C Mean changes in mMRC

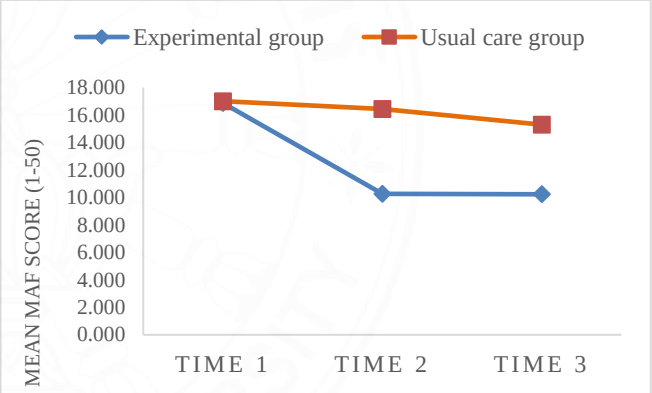


Figure 4.1D Mean changes in MAF

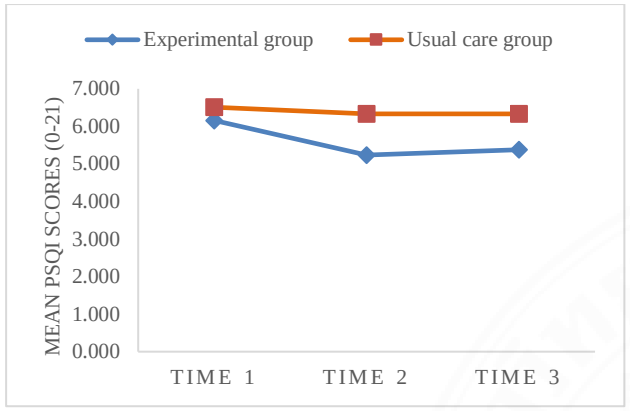


Figure 4.1E Mean changes in PSQI

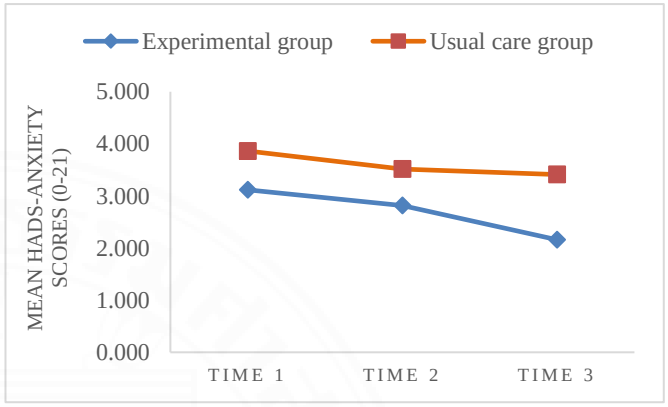


Figure 4.1E Mean changes in HADS-Anxiety

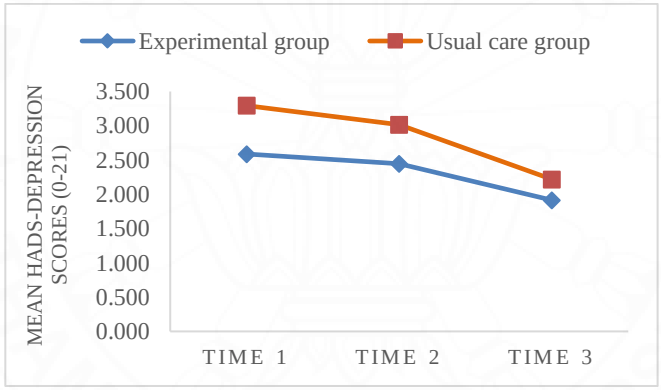


Figure 4.1F Mean changes in HADS-Depression

Figure 4.1: Changes in 6MWD, CAT, MAF, PSQI, HADS-Anxiety, and HADS-Depression of the experimental and usual care groups at baseline (Time 1), weeks four (Time 2), and weeks eight (Time 3)

4.2 Discussion

This study was a randomized controlled trial (RCT) with a repeated measures design. The purpose was to determine the effects of a symptom management program on symptom experience and physical function in adults with COPD. The discussion of the significant findings related to the demographic data and two hypotheses are presented below.

4.2.1 Demographic Data

In this study, the researcher used stratified randomization blocks to control for the following crucial confounding factors: 40–59 and 60–80 years of age and mild, moderate, and high disease severity. The study found that most participants (76.50%) were categorized as older adults. Furthermore, nearly all of the participants (93.13%) self-identified as males. Most participants (80.40%) were identified as being married, while a similar proportion (80.40%) of participants were noted to have had education at the primary school level. Additionally, 75.50% were engaged in agriculture. Approximately 84.30% of the participants exhibited a prior smoking history. These individuals' median daily tobacco consumption was 10 (IQR 5-20). Conversely, 7.80% of the participants were identified as current smokers, with a median daily consumption of 7.50 (IQR 5-7.5). Notably, the other 7.80% of participants reported never smoking.

Interestingly, data should also be collected on the number of participants who quit smoking after completing a symptom management program. The present study's findings are compatible with the research conducted by Kitjakrancharoensin et al. (2020), which examined the prevalence of COPD in rural populations residing in central Thailand. The prevalence of COPD was substantially greater in males than females. The study revealed that those in agriculture aged 60 years or older had a higher likelihood of developing COPD than those younger than 60. Furthermore, there was a significant association between the intensity of cigarette smoking and the occurrence of COPD, demonstrating a dose-response relationship. The findings suggest that individuals engaged in animal husbandry and those who smoke are more likely to be connected with COPD.

Furthermore, agriculture can be affected by increasing the symptoms of COPD. In this study, the context of agricultural workers in northeast rural Thailand was farming and animal husbandry. Most participants who work outside face higher temperatures—the hot weather is due to increased sweat and dehydration. Moreover, certain patients require the physical exertion of lifting substantial objects, such as handling large amounts of grass, retrieving water for their farm animals, or walking to transport them to suitable grazing areas. These activities face a variety of occupational and lifestyle factors that can impact their respiratory symptoms. Agricultural activities generate particulate matter, including dust, outdoors during field labor and indoors within the barn environment, such as exposure of particles to organic dust derived from livestock barns, grain dust, pesticides, and microbiological agents originating from hay, silage, bedding, feeding systems, and machinery fumes (O' Brien et al., 2023).

Regarding comorbidity, the present study found that the three most common comorbidities were hypertension, diabetes mellitus, and dyslipidemia. The first most common comorbidity was congruent with the systematic review of Santos et al. (2022), which found that the leading comorbidity in COPD was hypertension, followed by coronary artery disease and diabetes mellitus.

The median duration of COPD was found to be six years (IQR 36-120), and most of the participants had no history of hospitalization in the past year with COPD, accounting for 71.60%, one hospitalization in the last year (19.60%) and two hospitalizations (5.90%). Approximately 83.30% of the participants did not receive treatment for acute exacerbation at the emergency department, while others received ER treatment once (9.80%) and twice (3.90%). Most of the participants had BMI indicating normal weight (35.30%), obese (28.40%), overweight (21.60%), and underweight (13.70%) conditions. The results of this study are consistent with those of Wu et al. (2018). who found that the proportions of patients classified as underweight, normal weight, overweight, and obese based on BMI medians were 7.80%, 45.97%, 27.96%, and 18.28%, respectively. The same study also found that BMI was moderately and positively correlated with pulmonary function and negatively correlated with acute exacerbations. BMI may, therefore, be a beneficial indicator for predicting COPD patients' prognosis and long-term management.

Regarding the frequency of symptoms, 90.20% of the participants reported a prevalence of fatigue, making it the most frequently experienced symptom. Dyspnea was the second most prevalent symptom, seen by 73.50% of the participants. Sleep disturbance was reported by 38.20% of the participants, while anxiety and depression were experienced by 13.70% and 6.90%, respectively. The findings of Ekkamart et al. (2021) were inconsistent with those of the present study. Ekkamart et al. reported dyspnea as the most prevalent symptom perceived by patients (100%), followed by fatigue (91.70%). Insomnia was reported as the third most prevalent symptom, with a prevalence rate of 58.90%. However, the present study found that anxiety and depression were listed as the least frequently perceived symptoms, as was the study of Ekkamart et al., which had a prevalence rate of 0.60% per symptom. Furthermore, the results of the present study, consistent with Melhem et al. (2021), found that the most burdensome symptoms were shortness of breath, lack of energy, sleep difficulty, worry, dry mouth, nervousness, and irritability.

Finally, the participants in both groups were similar in all demographic data when tested by chi-square and independent t-test at p-values of 0.05. Before the hypothesis testing, MANOVA was used to test the differences in dependent variables such as mMRC, MAF, PSQI, Anxiety, Depression, CAT, and 6MWD. The results show that the mean scores of the seven dependent variables did not differ between the experimental and usual care groups at baseline.

4.2.2 Hypothesis 1: The symptom experience and physical function in adults with COPD in the experimental group using the symptom management program will be significantly better than the usual care group when measured over time at Week 4 and post-test at Week 8.

These research results support Hypothesis 1 in that the experimental group receiving usual care and the symptom management program was statistically significantly better than the usual care group in symptom experience and physical function when measured over time at Weeks 4 and 8. The main results confirmed the usefulness of the symptom management program implemented in groups and individuals based on the symptom management theory (Dodd et al., 2001). The

symptom management program comprises symptom experience training and symptom management strategies.

Symptom experience training involves cognitive processes that entail interpreting perceptions, evaluating symptoms, and appropriate responses to alterations in one's feelings. The participants acquired knowledge and exchanged insights regarding the prevalent symptoms of COPD. In addition, the patients were provided with information regarding common symptoms, thus facilitating their comprehension of the interconnectedness of those symptoms. The researcher actively encouraged patients to openly communicate and share personal experiences with symptoms while also providing the patients with guidance and training to engage in the practice of symptom experience effectively. This component helped improve symptom perception, evaluation, and response, thereby enabling the monitoring of symptom frequency and severity. The findings also support identifying solutions to alleviate patient discomfort caused by these symptoms.

The participants expressed their perspectives regarding the training program to cultivate perception, evaluation, and response abilities. Additionally, they engaged in continued practice at their own homes through the use of training booklets and weekly telephone follow-up sessions conducted by the researcher. The participants expressed enhanced confidence in detecting abnormalities within their bodies compared to the past. The participants could recognize and express their experiences of unpleasant symptoms, enabling them to effectively strategize and modify work or activities following their state of health. In addition to growing confidence and the capacity to detect symptoms promptly, the participants had the confidence to decide effectively to seek assistance from family members or receive care from healthcare providers.

Symptoms management strategies encompass several approaches aimed at preventing, delaying, or reducing the occurrence of symptoms. The effectiveness of this approach can manifest in three distinct manners: by diminishing the frequency of symptom occurrence, mitigating the intensity of symptoms, or alleviating the distress associated with the symptoms (Portenoy et al., 1994, as cited in Bender et al., 2018). This program implemented various strategies purposed to improve the symptoms of fatigue, dyspnea, sleep disturbance, anxiety, and depression and to maintain physical

function in the participants. The strategy in this program covered the management of physical and psychological symptoms, including self-care health education and skills training for COPD symptom management, training in walking meditation, instruction on using a pedometer to promote daily walking, encouragement of family involvement, and follow-up through video calls or telephone communication. The program utilized several tools, including a pedometer, a comprehensive booklet including information on symptom management in COPD, a daily log, video clips, and access to the official LINE account.

Self-care health education and skills training were essential to improving the knowledge of symptom management for patients. According to Przybylska et al. (2014), health education enhances individual awareness, facilitates informed health-related decision-making, and enhances learning and skills involving health, sickness prevention, and effective coping strategies for complex circumstances. Group discussions provide patients the opportunity to engage in exchanges of personal experiences of the processes of symptom perception, symptom evaluation, and treatment response. This method aims to improve patients' ability to remember their symptom experience and encourage independent practice in managing symptoms. Patients' selection of symptom management strategies is impacted by their subjective assessment of changes in symptom frequency, severity, or distress (Bender et al., 2018; Dodd et al., 2001). During the health education session, the participants engaged in the expression of personal viewpoints. Certain aspects of the material were novel to the participants, particularly concerning energy conservation strategies.

The technology-based intervention in this study consisted of the Internet, mobile technology, video clips, and pedometers to encourage daily walking as wearable technology. Mobile technology has been employed in several health interventions to facilitate health education, enhance health knowledge, and influence health behaviors (Yang & Van Stee, 2019). In this study, mobile technology, including the LINE application, telephone calls, and video call follow-ups, facilitated the monitoring of patients by the researcher and fostered a greater connection between healthcare providers and patients and their families. Mobile technology serves as a means of communication for patients and their families, enabling them to seek information

regarding self-care and address any inquiries they may have while in the convenience of their homes.

The pedometer offered a real-time feedback signal, helping patients achieve personalized physical activity objectives by optimizing daily behavior (Tsujimura et al et al., 2023). The participants demonstrated engagement and interest in using pedometers and the official LINE account. None of the participants had prior experience using a pedometer, and they expressed pleasure in acquiring the necessary skills to operate it. Several participants shared personal perspectives on the usefulness of the pedometer, highlighting its ability to provide accurate step counts and inspiring daily walking endeavors. The participants exhibited a remarkable degree of involvement, as evidenced by their active participation in the discussion and commitment to increasing daily step counts through group discussions and follow-up phone calls.

Family support is vital for persons diagnosed with COPD since these patients frequently rely on assistance from family members. This support encompasses various aspects, including providing information on how patients may lack assistance with physical and mental care, such as transportation, financial management, housing, and emotional support (Gardener et al., 2018). In this program, family members participated in health education sessions and telephone follow-ups to help patients and family members have close relationships. Some family caregivers were able to detect factors associated with symptoms occurring in the participants. However, the participants had differences in individual family relationships or problems, which could be a concern. Family members deeply understand the health issues and symptoms that patients face. This understanding is vital for assisting patients to monitor and implement strategies for managing their symptoms. In addition, older people lack self-assurance in their ability to utilize technology. At first, family members can assist them in getting used to the pedometer, enabling video calls, and using the Line OA. Consequently, after a certain period of the program, certain patients can use the devices without the help of their family members. So, family support was necessary to help the patients face the health issues and symptoms experienced.

Walking meditation is characterized by its simplicity and ease of implementation. This practice is a widely applicable method for cultivating a state of

peace, establishing a sense of interconnectedness, and creating a heightened state of bodily consciousness. It enhances physical strength and endurance and promotes mindfulness, a valuable means of strengthening attention. Buddhist walking meditation is a mind-body intervention that aims to build a symbiotic relationship between the mind and autonomic functions to improve physical and psychological well-being. Consequently, this intervention emphasizes the interconnectedness of the brain, body, and behavior.

Moreover, the practice of Buddhist walking meditation encompasses the integration of both corporeal and cognitive components, enabling practitioners to direct their attention toward the motion of lower limbs during ambulation, thus facilitating a state of deep and sustained mindfulness (Srisoongnern et al., 2021). In this program, the participants engaged in pursed-lip breathing during walking meditation. Pursed lip breathing facilitates oxygen transfer into the lungs and removes carbon dioxide from the lungs. This approach assists in prolonging airway opening, thus enabling the release of trapped air inside the respiratory system by decreasing the respiratory rate and alleviating dyspnea (American Lung Association, 2023).

Based on the explanation of the main components of a symptom management program in the present study, it was apparent that the exercise benefited both symptom experience and physical function. The findings in the present study indicate that the experimental group engaged in a symptom management program, while those in the usual care group did not. This comparison was made by considering the effects of group, time, and interactions between group and time. The mean scores for symptom experience and physical function in the experimental group showed improvement compared to the usual care group across three time points: baseline, Week 4, and Week 8 ($F_{14,87} = 5.257$, $p < 0.001$). The findings indicate a significant interaction between the group and time for each dependent variable; specifically, the experimental group's 6MWD, CAT, mMRC, and MAF showed improvement over time compared to the usual care group ($p < 0.001$, $p < 0.05$). However, compared to the usual care group, no significant statistics were observed in the PSQI, HADS-Anxiety, and HADS-Depression over time.

Moreover, the experimental group had better symptom experience and physical function than before participating in the program and the usual care group at

Week 8 ($F_{7,94} = 2.338$, $p = 0.030$). Nevertheless, the findings about the mean scores of the experimental and usual care groups with each dependent variable indicate that the mean scores of the 6MWD, CAT, and HADS-Anxiety ($p = 0.05$) in the experimental group exhibited statistically significant improvement compared to the usual care group at Week 8. As for the mMRC and MAF, the mean scores in the experimental group demonstrated statistically significant improvement compared to the usual care group at Weeks 4 and 8 ($p < 0.011$, $p < 0.05$). However, it is essential to note that no statistically significant differences were observed in the mean scores of the PSQI and HADS-Depression between the experimental group and the usual care group at any given time during the study ($p > 0.05$). Moreover, based on the findings, the patients with COPD who participated in the symptom management program had better outcomes regarding symptom experience and physical functioning than those who received only usual care.

The findings of this study are consistent with a systematic review conducted by Zheng et al. (2022), which showed that home-based pulmonary rehabilitation therapies led to notable enhancements in 6MWD outcomes compared to the usual group. In addition, the effects of home-based pulmonary rehabilitation therapies on dyspnea showed statistically significant improvements compared to the control group. Furthermore, a systematic review conducted by He et al. (2023) revealed that exercise-based pulmonary rehabilitation has the potential to improve exercise capacity, as assessed by the 6MWD, and alleviate dyspnea symptoms, as measured by the Borg scale scores, in patients with severe and very severe COPD when compared to a control group.

In stable COPD, Higashimoto et al. (2020) observed that lower limb endurance exercise in pulmonary rehabilitation lasted 4-12 weeks. MRC, TDI, modified Borg scale, CRQ dyspnea, 6MWD, ISWT, peak VO2, and peak load exercise capacity changed more in the intervention groups. The findings of the investigation exhibited consistent alignment. Zhang et al. (2022) found that COPD patients who received a pulmonary reachability program had statistically significant improvements in the 6MWT and Modified British Medical Research Council scores compared to normal treatment. A systematic review by Cheng et al. (2023) examined how minimal-equipment pulmonary rehabilitation affected dyspnea and the 6MWD. The study only needed Nordic walking, ground walking for aerobic training, body weight resistance

exercise, hand weights, and elastic resistance bands for resistance training. Cheng et al. found that minimal equipment groups improved dyspnea outcomes as measured by mMRC compared to conventional therapy. In terms of 6MWD, the groups improved by 85 meters. This is congruent with the present results, which revealed that the experimental group improved more than the usual care group, which increased by 44.22 meters. The Minimal Clinically Important Difference (MCID) for the 6MWD for adults with COPD has been demonstrated to be a minimum improvement of 30 meters, as reported by Holland et al. in 2014. The study found that the experimental group had a higher percentage of patients reaching the MCID for the 6MWD, with 68.62% in the experimental group compared to 20.00% in the usual care group.

The findings of Higashimoto et al. (2020), Zhang et al. (2022), and Cheng et al. (2023) are consistent with the findings of this study. Dyspnea and 6MWD were the program's frequent outcomes. Souto-Miranda et al. (2022) found three common results in pulmonary rehabilitation program evaluations. The 6MWT assessed exercise capacity, the Saint George's Respiratory Questionnaire assessed health-related quality of life, and the mMRC assessed symptoms. In addition, the MCID for the mMRC scale is the least essential difference of the mMRC and is accurately determined to be a drop of 0.5 points (Ana Luisa Araújo et al., 2017). This study found that the experimental group had a higher percentage of patients who reached the MCID for mMRC, with 43.13% in the experimental group and 25.49% in the usual care group.

In terms of CAT scores, the findings of this study indicate that the mean CAT score was lower than the usual care group after completing a symptom management program similar to Shen et al. (2022), which revealed that an 8-week integration routine treatment with Tai Chi Chun practice could significantly improve pulmonary symptoms measured by CAT in persons with COPD. Furthermore, the CAT scores were improved after completing 48 weeks of an educational guidance program (Liu et al., 2015). The results are congruent with Lee et al. (2016), who used an educational intervention involving disease, inhaler use, and action plans for acute exacerbation issues, finding that CAT scores significantly improved after participating in the educational program. Moreover, the MCID for CAT has determined that the minimal important difference can be calculated as a reduction of 2 points (Kon et al., 2014). The findings of this study indicate that the experimental group had a higher

percentage of patients who achieved the MCID for the CAT measure. Specifically, 56.86% of patients in the experimental group reached the MCID, compared to 37.25% in the usual care group.

Regarding fatigue, this study demonstrated that the mean fatigue scores after completing the symptom management program were better than those of the usual care group, aligning with the findings of a systematic review conducted by Paneroni et al. (2020). The systematic review's findings indicated improvements in the experimental group engaging in endurance training activities such as walking or cycling, which targeted the locomotor muscles, as well as calisthenics exercises. The duration of programs varied between 6 and 24 weeks, with a frequency of 2 to 7 sessions per week and 30 to 90 minutes for each session. The findings demonstrated the positive impact of several exercise training interventions on the subjective experience of fatigue in individuals diagnosed with chronic obstructive pulmonary disease (COPD). Similarly, in a study by Van Herck et al. (2019), patients participated in a usual care in-patient multidisciplinary pulmonary rehabilitation program for 12 weeks, with sessions occurring five days per week. The mean fatigue score exhibited a significant and clinically relevant improvement compared to the baseline. The fatigue experienced a decline from an initial rate of 74.9% at the commencement of the PR intervention to 33.0% after implementing the PR program.

A previous study by Kapella et al. (2011) examined the effects of CBT and a wellness educational program on fatigue, global sleep quality (as measured by the PSQI), and depression in individuals with comorbid insomnia and COPD. The study found that completing six sessions of CBT significantly improved fatigue and global sleep quality. Additionally, the wellness educational program was associated with considerably improved depressive mood. These findings differ from the results of the present study, particularly concerning the PSQI and depressive symptom outcomes.

The present study examined the lack of significant changes in the three dependent variables, namely the PSQI, HADS-anxiety, and HADS-depression outcomes, following an eight-week symptom management program. The experimental group did not exhibit a statistically significant improvement in sleep disturbance, as determined by the PSQI ratings compared to the usual care group. This discovery contradicted the study conducted by Işıkel et al. (2023) in which COPD patients used a

regimen of relaxation activities encompassing upper extremity and lower extremity and breathing exercises for 30 minutes each day over six weeks. The findings significantly improved PSQI scores. Nevertheless, the study conducted by Thapamagar et al. (2021) did not see any significant enhancements in objective sleep metrics as assessed using actigraphy. Acknowledging the significance of evaluating sleep disruptions or sleep quality by considering subjective and objective data is, therefore, crucial.

Sleep quality is complex, and symptoms require both subjective and objective data for evaluating symptoms that could confirm sleep disturbance in patients with COPD. In the present study, most of the participants were older adults. The sleep patterns in this group were changeable. Across the aging process, regular changes to sleep include shorter sleep time, decreased time in slow wave and REM sleep, increased sleep-onset latency, and increased arousal following sleep onset. Daytime napping also increases, melatonin secretion is reduced, and the circadian rhythm decreases and advances (Lavoie, Zeidler & Martin, 2018). Moreover, COPD impacts sleep patterns.

The pathophysiologic changes in COPD are due to sleep disturbances. COPD results in an imbalance between the load capacity and drive in both waking and sleep, mostly due to expiratory flow limitation (D'Cruz et al., 2020). Sleep has been associated with many alterations in respiratory physiology, such as the cessation of behavioral stimuli that influence respiratory drive, disturbed ventilation–perfusion relationships contributing to hypoxia and hypercapnia, and a decline in the activity of accessory muscles involved in REM (Lee-Chiong, 2013; McNicholas et al., 2019). Hyperinflation increases the effort to breathe, thereby contributing to increased alertness and sleep disturbance (McNicholas et al., 2019). Patients with moderate to severe COPD may experience nocturnal oxygen desaturation (Lee-Chiong, 2013). The complex mechanism of the disease affects sleep. Therefore, sleep problems can occur in most COPD patients, making symptoms difficult to manage.

Moreover, sleep disturbance is also connected with anxiety and depression symptoms. In the study of Aldabayan (2023), poor sleep quality among patients with COPD was recorded at 32.6%. The prevalence rates of anxiety and depression were 48.9% and 34.7%, respectively. The results of the multivariate regression analysis indicated that depression and anxiety were statistically significant predictors of PSQI. This is congruent with the research of Fei et al. (2023) in a recent study to identify

symptom clusters and develop a symptom cluster model in COPD. Some results of this study present the following three symptom clusters: 1) Cough-dry mouth symptom cluster (poor appetite, insomnia, cough, dry mouth); 2) Respiratory-related symptom cluster (shortness of breathing, weakness, drowsiness, and poor morbidity) and 3) Psychological symptom cluster (anxiety and depression). The direct path of the psychological symptom cluster had an impact on the other two symptom clusters, while the two symptom clusters did not influence the psychological symptom cluster. Furthermore, the study by Smagula et al. (2016) found that depression and physical illness were the most consistent risk factors for future sleep disturbance in older adults (Smagula et al., 2016).

The results of sleep disturbance, anxiety, and depression were consistent with Gabrovska et al. (2023), who studied the effects of 30 group sessions of multidisciplinary pulmonary rehabilitation conducted three times weekly. After pulmonary rehabilitation, the PSQI score and sleep efficiency measured by angiography remained unchanged when subgroup analysis in the poor sleep efficiency group improved significantly, whereas the PSQI remained unchanged. The 6MWD and dyspnea improved, but the anxiety and depression scores showed no improvement. Gabrovska et al.'s findings are consistent with the findings of this study in that dyspnea was improved, while anxiety, depression, and sleep quality measured by the PSQI were not. The findings are also congruent with the findings of Gordon, who examined the effects of pulmonary rehabilitation durations less than and equal to eight weeks or more than eight weeks, finding no difference in impact on anxiety and depression, which confers greater significance than the usual care groups (Gordon et al., 2019).

The efficacy of CBT interventions in alleviating long-term depression associated with COPD was discovered in the present study, whereas the presence of anxiety symptoms did not appear to influence effectiveness. Evidence does not support the efficacy of walking programs, supplemental sugarcane bagasse dietary fiber, roflumilast, or tiotropium (Liang et al., 2022). In contrast, walking exercises with breathing control performed 30 minutes per session, two to three times per week, walking exercises three times a week for 30-45 minutes per session, and breathing exercises performed 10-30 minutes twice a day in the morning and night or performed

three times a week have been found to reduce degrees of shortness, anxiety, and depression (Satria, Suza & Tarigan, 2022).

The researcher's perspective revealed the intricate nature of the variables related to sleep disturbance, anxiety, and depression. The statistical analysis conducted in this study did not have statistically significant results for the scores related to anxiety and depression. However, it is worth noting that these scores exhibited a consistent downward trend throughout the investigation. It can be inferred, therefore, that implementing a symptom management program has the potential to influence the manifestation of anxiety and depressive symptoms. Additionally, the mean scores for anxiety and depression fell within the normal range at the beginning of the study. The reliability of the HADS-Anxiety, as measured by Cronbach α, was found to be 0.644.

Similarly, the HADS-Depression showed a reliability of 0.624. The overall item reliability of the Hospital Anxiety and Depression Scale (HADS) was 0.601, which could impact the outcomes obtained from the HADS. While increased reliability enhances result accuracy and improves the chances of making accurate research decisions, it is important to note that reliability alone is not enough to determine the validity of research (Mohajan, 2017).

In this study, the proportion of patients with severe disease was only 7.80%, a small group of study participants. Severe disease severity is a factor associated with anxiety and depressive symptoms in patients with COPD. Consequently, it is probable that the anxiety and depression symptoms of the participants in this study were not found. The study conducted by Jose and colleagues (2016) demonstrated a significant correlation between forced expiratory volume in one second (FEV_1) and the presence of anxiety and depression among individuals with COPD who were admitted to the hospital. Consistent with the findings of Negi et al. (2014), the survey demonstrated a correlation between FEV_1 levels and the manifestation of depression symptoms among individuals diagnosed with COPD. In the research conducted by Akalu, Mossie, and Tadesse (2020), the findings demonstrated a correlation between forced expiratory volume in one second (FEV_1) and depression scores among individuals diagnosed with COPD. The findings of this study are consistent with a prior study conducted by Manen et al. (2002), which showed that individuals with severe COPD are at a heightened susceptibility to developing depressive symptoms. The findings revealed a prevalence

rate of depressive symptoms at 25% among individuals with a high level of disease severity. When comparing the two groups, it was shown that individuals with mild severity had a 17.5% probability of developing signs of depression, but those with moderate severity had a 19.6% possibility. However, the symptom management program can enhance the alleviation of physical symptoms. Psychological symptoms or severe disease severity may require more prolonged or more frequent participation in the symptom management program.

Regarding the COVID-19 issue, people who have chronic respiratory diseases, such as COPD patients, are at a higher risk of experiencing severe repercussions from COVID-19 due to their increased sensitivity to infection due to the coronavirus. Patients with COPD are typically advised to avoid contact with or be socially separated from others as a form of defense against the disease. Individuals diagnosed with COPD are prone to experience exacerbated symptoms and mental health disorders, such as post-traumatic distress disorder, fear, anxiety, desperation, and heightened vulnerability to suicide ideation. The study conducted by Yohannes (2021), supported by Pedrozo-Pupo & Campo-Arias (2020), involved 148 asthma patients and 144 COPD patients, ages 18 to 96 years. The prevalence of high perceived stress associated with COVID-19 was 10.6% (n = 31); the prevalence of post-traumatic stress was 11.3% (n = 33); the prevalence of depression was 31.5% (n = 92); and the prevalence of insomnia was 57.7% (n = 169). There is evidence to suggest that the COVID-19 pandemic may impact the symptoms of sleep disturbance, anxiety, and depression in individuals with COPD.

4.2.3 Hypothesis 2: Symptom experience and physical function in adults with COPD will be significantly different for at least one pair when measured over time at baseline, Week 4, and post-test at Week 8 in the experimental group using the symptom management program.

The present study revealed significant differences in the symptom experience of dyspnea, fatigue, sleep disturbance, anxiety, depression, and the 6MWD of physical function among thirteen pairs in the experimental group. These differences were observed over time, specifically at baseline, Week 4, and Week 8, following the implementation of the symptom management program. The study examined three

dependent variables assessed with the 6MWD, mMRC, and CAT. Significant differences were observed across three pairs of time points: Time 1 and Time 2, Time 1 and Time 3, and Time 2 and Time 3 ($p < 0.001$, $p < 0.05$).

The measured dependent variable, MAF, exhibited significant differences between two pairs (Time 1 and Time 2 and Time 1 and Time 3) when assessed throughout time at baseline, Week 4, and post-test at Week 8 in the experimental group that underwent the symptom management program ($p < 0.001$). Over time, a statistically significant difference was observed in only one pair when measuring the two dependent variables, PSQI and HADS-Anxiety. A significant difference was observed in the PSQI scores between Time 1 and Time 2 ($p < 0.05$), as well as in HADS-Anxiety scores between Time 1 and Time 3 ($p < 0.05$). Only one dependent variable, HADS-Depression, did not exhibit a statistically significant difference when evaluated over time ($p > 0.05$).

In this study, the symptom management program was a comprehensive program consisting of health education and training skills, group discussion about the symptom experience covering symptom evaluation, symptom perception, symptom response, engagement in walking in daily life by a pedometer, walking meditation, and pursed-lip breathing. Furthermore, the participant could recall the knowledge in the VDO clips and follow up with the researcher to encourage monitoring via the LINE application or telephone. All activities in the symptom management program provided the necessary knowledge and skills for patients with COPD. The duration of this program was eight weeks. According to the literature review, exercise-based interventions help individuals with COPD with their most common symptoms and physical function (Couto et al., 2023; Diêgo et al., 2022; He et al., 2023).

Concerning the 6MWD, the present study revealed statistically significant differences in 6MWD and CAT scores, dyspnea levels, and fatigue levels across three time points: baseline, Week 4, and Week 8. The findings of the present investigation regarding the dependent variables of 6MWD and dyspnea align with those of Seetee et al. (2016), who employed a home-based pulmonary rehabilitation program supplemented with walking meditation. This intervention involved engaging in 20-minute walking meditation sessions at least thrice weekly over eight weeks. This study demonstrated the importance of exercise tolerance and reduced dyspnea at four and

eight weeks compared to the initial measurement. Contrary to the findings of Lin et al. (2021), the outcome of dyspnea did not align with the study, which demonstrated that a walking and mindfulness intervention consisting of a 35-minute session once a day, five days a week, over eight weeks, led to enhanced exercise capacity, as measured by the 6MWD among outpatients with COPD. However, the intervention did not significantly improve the patient's dyspnea.

Regarding dyspnea, the present study's findings were consistent with Higashimoto et al. (2020), who implemented a pulmonary rehabilitation program that included lower limb endurance training and an intervention period lasting from 4 to 12 weeks. The intervention was found to help improve dyspnea symptoms. A systematic review conducted by Wiles et al. (2015) found that implementing different psychological interventions such as psychological support, cognitive behavior therapy, and relaxation in conjunction with exercise training lasting between 8 and 16 weeks resulted in significant improvements in dyspnea symptoms among COPD patients. Furthermore, the present findings align with the research conducted by Lin et al. (2020) about dyspnea and CAT. However, there are differences between the two studies in relation to depression and anxiety. In their study, Lin et al. (2020) demonstrated that the walking group, which underwent a two-month intervention involving breathing exercises, meditation, and regular walking, exhibited significant differences compared to the control group across multiple time points (Months 1, 2, and 3) in terms of depression, anxiety, mMRC, and CAT.

In terms of fatigue symptoms, the results of this study are consistent with a study by Arslan and Öztunç (2016), which demonstrated that the experimental group engaging in walking three times a week for eight weeks while wearing pedometers experienced a more significant reduction in fatigue symptoms than the control group, which did not receive walking training. According to a study by McNamara et al. (2013), raising 6MWD and fatigue symptoms was considerably more successful with water-based walking training for eight weeks with three sessions per week than with land-based exercise training and control. Walking has been shown to assist COPD patients with symptoms of fatigue.

In this study, sleep disturbance statistically significantly differed at Week 4 but not at Week 8 compared to baselines because sleep disturbance is associated with

various factors such as living environment or behavior factors, medicines, physical, emotional, and psychological factors, especially in older adults (Reynolds & Adams, 2019). Weather and season were the factors associated with sleep quality and sleep patterns that could not be controlled.

Differences in season influence sleep duration. This study experimented from January through August 2023, covering the winter, summer, and rainy seasons. The winter season of this year was longer than the previous year. The summer season began in March, approximately three weeks later than the previous year. In the summer, the average maximum temperature was 35.5 degrees Celsius, higher than the highest temperatures in 2022. The highest temperature during the year of the study was 40-43 degrees Celsius. The weather was hot and humid in many areas at the end of April (National News Bureau of Thailand, 2023). From April to September, the upper northern and northeastern regions were approximately 0.5-1 degrees Celsius hotter than the central and southern regions. During the year of the study, Thailand's temperature was the highest in eight years. There was little rain, a sign of a drought (Thairhat online, 2023). The summer season was significantly associated with later bedtimes, waking up earlier, and an average increase of 3.5 hours in daylight compared to winter (Mattingly et al., 2021). Higher daily or nighttime temperatures are negatively associated with sleep quality and quantity worldwide. Higher ambient temperatures affect sleep more during the hottest months in vulnerable groups and the world's warmest places. (Chevance et al., 2023). From the researcher's perspective, it is hypothesized that weather and temperature could have influenced the sleep disturbance of the patients with COPD participating in the study. During the Week 8 follow-up of the study, it was found that temperature and air were stuffy with high humidity.

Regarding the HADS-Anxiety variable, it was observed that the experimental group displayed a statistically significant disparity in HADS-Anxiety scores between Time 1 and Time 3. The findings of this study indicate that implementing the symptom management program had a significant impact on anxiety symptoms, leading to notable improvement after eight weeks compared to the initial baseline. Similar to the research conducted by Zhang et al. (2020), it has been seen that implementing cognitive-behavioral therapy (CBT) for a minimum duration of eight weeks can effectively contribute to the improvement of symptoms of anxiety. In

addition, the findings of this study are corroborated by a systematic review indicating that a period of exercise training combined with psychological therapies ranging from 8 to 16 weeks with time-supervised sessions varying from 4 to 63 sessions and a duration of 15 to 240 minutes per session has been shown to significantly improve anxiety scores in patients with COPD (Wiles et al., 2015). Therefore, it can be concluded that the eight weeks of the symptom management program had statistically significant anxiety scores that were better than the baseline.

Regarding the HADS-Depression variable, this study's results presented no statistical differences in comparing Time 1, Time 2, and Time 3 in the experimental group receiving the symptom management program combined with usual care. On the contrary, in a systematic review by Zhang et al. (2020), CBT was found to be effective in reducing depressive symptoms in COPD within a relatively brief duration of less than eight weeks. Furthermore, the study conducted by Gordon et al. (2019) found no significant impact resulting from variations in program duration, specifically comparing durations of less than eight weeks to those exceeding eight weeks for pulmonary rehabilitation in which the pulmonary rehabilitation program was able to decrease depressive symptoms in patients with COPD in the experimental group compared to the control group.

Moreover, a mind-body intervention was effective in decreasing depressive symptoms. Guo et al. (2020) conducted a systematic study revealing that the mean duration of each Tai Chi session was 53.4 minutes. The participants engaged in an average of 4.13 sessions per week, with a total program duration of 4.13 months. Compared to the control group, the Tai Chi group exhibited a reduction in HADS scores in both anxiety and depression. The impact of program duration on symptom reduction in depression varies depending on the specific activities incorporated within the program. However, research has indicated that engaging in cognitive or psychological activities has been associated with a beneficial impact on symptoms of depression in patients with COPD.

Although the symptom management program did not statistically effectively improve depression symptoms in experimental groups over time, the depression scores of HADS exhibited a declining trend at each time point. The recognition of depressive symptoms is quite difficult for patients. According to an

investigation on the perceived frequency of common symptoms in this study, patients reported experiencing depression less frequently than symptoms of fatigue, dyspnea, sleep difficulties, and anxiety. Consistent with the survey by Ekkamart et al. (2021), who investigated the prevalence of frequently occurring symptoms in Thai patients with COPD, anxiety, and depression were identified as the least severe symptoms; the most frequent symptoms were dyspnea, fatigue, and insomnia, respectively. Furthermore, it has been observed that during group sessions focused on symptom experiences, most of the participants in the experimental group consistently report the absence of depressive symptoms. This finding aligns with the outcomes obtained from utilizing a daily log or notebook approach to evaluate symptom experiences at home. The conclusions of the daily log records indicate that most of the experimental group did not exhibit any signs of depression.

From the researcher's viewpoint, it is worth noting that the symptoms of depression can reveal similarities with other symptoms associated with COPD, including but not limited to sleep disturbance, exhaustion, changes in appetite, and diminished interest in activities. It may lead to some patients experiencing difficulty in accurately expressing symptoms of depression due to the presence of overlapping symptoms with additional possible symptoms.

In symptom management programs, it may be necessary to incorporate additional intensity in psychological activities, such as CBT, psychological counseling, or psychological interventions, that improve anxiety and depressive symptoms effectively (Coventry et al., 2013; Liang et al., 2022; Ma et al., 2020; Yadav et al., 2020; Zhang et al., 2020). While there was a group discussion regarding the symptoms experienced by the participants, it is essential to acknowledge that patients may require a significant amount of time to establish a sense of trust before they feel comfortable disclosing personal experiences with anxiety or depressive symptoms. Furthermore, based on the group discussion, it was determined that economic and familial problems emerged as significant determinants contributing to heightened levels of distress among the participants. Issues of this magnitude sometimes require sufficient time to enable participants to consider personalized approaches to addressing the problems alongside other activities, such as integrating walking meditation, practicing pursed-lip breathing,

and engaging in increased physical activity, which has been found to help improve psychological symptoms.

In summary, integrating the symptom management program with the usual care, guided by the symptom management theory, significantly enhanced physical functioning measured by the 6MWD and symptom experience regarding CAT, mMRC, and MAF compared to usual care alone and before starting the program when measured over time at Week 4 and post-test at Week 8.

Hence, it is imperative to implement symptom management programs for patients with COPD throughout the disease severity from mild to severe. Improving symptoms and enhancing physical function can effectively sustain and strengthen quality of life in patients with COPD.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

This study was a randomized control trial (RCT) research designed to determine the effects of a symptom management program on symptom experience and physical function in adults with COPD. One hundred and two COPD patients participated in the Borabue Hospital COPD clinic. The specific objectives of the research study were: 1) To determine a symptom management program used in adults with COPD; 2) To compare symptom experience and physical function in adults with COPD between the experimental and usual care groups; 3) To compare symptom experience and physical function in the adults with COPD who participate in a symptom management program that measures the participants over time (baseline, Week 4, and Week 8). The findings can be summed up as follows:

5.1.1 Sample Characteristics

The sample comprised 102 patients with COPD. The participants in the study were divided into two groups: the experimental group and the usual care group. This division was done randomly, using a technique called stratified block randomization. This randomization aimed to guarantee that essential parameters potentially influencing the results, such as age and disease severity, were evenly distributed throughout the two groups. The sample size was 51 patients per group. The study period was from January to August 2023.

Most participants (76.50%) fell into the category of older individuals. Moreover, a substantial percentage of the participants (93.10%) classified themselves as males. Most participants (80.40%) were classified as married, while a comparable proportion (80.40%) of the participants had received an elementary school education. Furthermore, 75.50% were actively involved in agricultural activities. All participants lived with their caregivers; the median number of family members was 4 (IQR 3-5). Most primary caregivers were spouses (56.80%), children (30.40%), other relatives (4.90%), nephews (3.90%), and siblings (2.00%).

Approximately 84.30% of the participants exhibited a previous smoking habit. The median daily cigarette consumption among the participants was 10 (IQR 6.75-20). In contrast, it was found that 7.80% of the participants fell into the category of current smokers, with a median daily consumption of 10 cigarettes (IQR 4-10). It is important to note that an additional 7.80% of the participants reported an absence of smoking history.

The median duration of COPD was six years. Furthermore, most individuals with COPD (71.60%) had no hospitalizations in the previous year. Conversely, 19.60% had been hospitalized once, while 5.90% had been hospitalized twice within the same timeframe. The data indicate that most participants, precisely 83.30%, did not undergo treatment for acute exacerbation in the emergency room. A smaller proportion (9.80%) received treatment once, while an even smaller proportion (3.90%) received treatment twice during the year preceding the study, while 44.10% had comorbidities. The three most prevalent comorbidities were hypertension (27.50%), diabetes mellitus (21.60%), and dyslipidemia (15.70%). The majority of BMI interpretations indicated normal weight (35.30%), followed by obesity (28.40%), overweight (21.60%), and underweight (13.70%).

Most participants (90.20%) reported experiencing fatigue, indicating its prevalence as the most common symptom. Dyspnea was observed in 73.50% of the participants, making it the second most commonly reported symptom; 38.20% of the participants reported experiencing sleep disturbance, while anxiety and depression were reported by 13.70% and 6.90% of the participants, respectively.

In treating COPD, most participants (92.20%) were administered inhaled corticosteroid/long-acting beta-agonist (ICS/LABA) combination therapy, specifically Seretide™. Approximately 32.35% of the participants utilized inhaled corticosteroid monotherapy, with Fixotide™ accounting for 22.50% and Pulmicort™ accounting for 9.80% of this subgroup. Furthermore, 24.50% of the participants received long-acting muscarinic antagonist (LAMA) therapy, specifically Spiriva™. Most participants (88.20%) were administered short-acting muscarinic antagonist/short-acting beta-agonist (SAMA/SABA) combination therapy, specifically Berodual™. Lastly, 9.80% of the participants received short-acting beta-agonist (SABA) monotherapy, specifically Ventolin™. Regarding oral medications, most participants in the study

were administered drugs with various therapeutic effects. Specifically, the most commonly used medications included those with anti-inflammatory effects (Theophylline, 51.00%), antihistamines (Cetrizine, 48.00%), mucolytic agents (bromhexine, 47.10%), expectorants (Phyllanthus Emblica syrup, 47.10%), cough suppressants or anti-tussives (19.60%), decongestants (Pseudoephedrine, 4.90%), antibiotics (Roxithromycin, 2.90%), and corticosteroids (prednisolone, 2.00%).

No statistically significant differences were reported between the experimental and usual care groups regarding any demographic data. No statistically significant differences were seen between the experimental and usual care groups in terms of the 6MWD, the CAT, the mMRC, the MAF, the HADS-Anxiety, and the HADS-Depression scores at the beginning of the study.

5.1.2 Conclusion of the Research Results

The research results on the effects of the symptom management program on symptom experience and physical function in adults with COPD can now be summarized.

5.1.2.1 The participants who participated in the symptom management program exhibited a statistically significant improvement in symptom experience and physical function when measured over time at Week 4 and Week 8 ($p < 0.001$). The mean scores for the 6MWD, the CAT, the mMRC, and the MAF in the adults with COPD who received the symptom management program were statistically and significantly better than those with COPD who received usual care only and before starting the program when measured over time at Week 4 and post-test at Week 8 ($p < 0.001$, $p < 0.05$).

5.1.2.2 The findings of this study demonstrate significant differences in the mean scores of the dependent variables at each time point between patients diagnosed with COPD who participated in the symptom management program and those who received usual care. These findings suggest significant differences between at least one pair of experimental and usual care groups ($p = 0.030$). The experimental group demonstrated statistically significant differences in the mean scores for the mMRC and MAF at Week 4 and Week 8 compared to the usual care group ($p < 0.001$, $p < 0.05$). The statistical analysis demonstrated that there were statistically significant

differences in the mean scores for the 6MWD, the CAT, and the HADS-Anxiety between the experimental and usual care groups at Week 8 ($p < 0.05$). There were no statistically significant differences in the mean PSQI and HADS-Depression scores during the study ($p > 0.05$).

5.1.2.3 Symptom experience and physical function in adults with COPD were significantly different for at least one pair when measured over time at baseline, Week 4, and Week 8 in the experimental group using the symptom management program ($p < 0.001$). Statistically significant differences were seen in the mean scores of the 6MWD, CAT, and mMRC when comparing baseline and Week 4, baseline and Week 8, and Week 4 and Week 8 ($p < 0.001$, $p < 0.05$). The mean score of the MAF displayed statistically significant variations between baseline and Week 4, as well as between baseline and Week 8 ($p < 0.001$). A statistically significant disparity was noted in the mean PSQI score when comparing the baseline measurement to the measurement taken at Week 4 ($p < 0.05$). A statistically significant difference was observed in the mean score of the HADS-Anxiety between the baseline assessment and Week 8 ($p < 0.05$). Additionally, no statistically significant disparity was detected in the mean HADS-Depression score during the study period ($p > 0.05$).

5.2 Recommendations

The findings suggest the following recommendations for improving symptom experience and physical function in patients with COPD:

5.2.1 Recommendations for Nursing Practice

5.2.1.1 Nurses should provide an extensive foundation for imparting information and training in symptom perception, symptom evaluation, symptom response, and symptom management strategies, beginning with the initial stage of diagnosis for the patients. This approach could have the potential to benefit patients by empowering them with the knowledge and skills necessary to evaluate symptom experience independently. Moreover, the strategy may motivate them to seek suitable ways to manage symptoms effectively.

5.2.1.2 At every follow-up appointment with COPD patients, nurses should assess and promote self-assessment of co-occurring symptoms.

5.2.1.3 It is recommended that nurses embrace mindfulness interventions, mobile health technology, and wearable technology to enhance physical function and alleviate symptoms experienced by patients diagnosed with COPD.

5.2.1.4 Nurses should apply for an official LINE account to provide information, online chat counseling, or follow-up visits.

5.2.1.5 The presence of familial support was crucial in improving the capacity to engage in activities and comply with treatment regimens among elderly patients.

5.2.2 Recommendations for Further Research

5.2.2.1 Further research should develop intensive symptom management programs to manage sleep disturbance, anxiety, and depressive symptoms effectively.

5.2.2.2 Further research should evaluate the effectiveness of symptom management programs on clinical outcomes such as rates of acute exacerbation, admissions, and in-patient hospital stays. Furthermore, studies in diverse settings and at several public health service facility levels, encompassing varied contexts such as inpatient departments and urban areas, would be interesting.

5.2.3 Recommendations for Nursing Policy

Technology-based interventions are recommended for delivering services within chronic obstructive pulmonary disease (COPD) clinics. These interventions may include follow-up sessions conducted through telephone or video calls, online consultations via chat platforms, or the dissemination of clinic-related material through an official LINE account. These services aim to facilitate the accessibility of the clinic's service system for patients and caregivers. It is essential to promote gathering precise and suitable information regarding the disease among patients and caregivers to facilitate the development of well-informed strategies for self-care and medical treatment.

5.3 Strength of the Study

5.3.1 The present study was designed with the use of wearable technology (pedometer). This device helped the participants have clear feedback and enhanced motivation, leading to effective walking behavior.

5.3.2 Walking meditation is simple and appropriate in Thai culture.

5.4 Research Limitations

The findings of this study have limited generalizability. The results can be applicable in populations with similar contexts and treatments.

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APPENDICES

APPENDIX A

Assumption Testing of Statistics

1. The missing value analysis and analysis pattern

Figure 1 The missing value analysis and analysis pattern

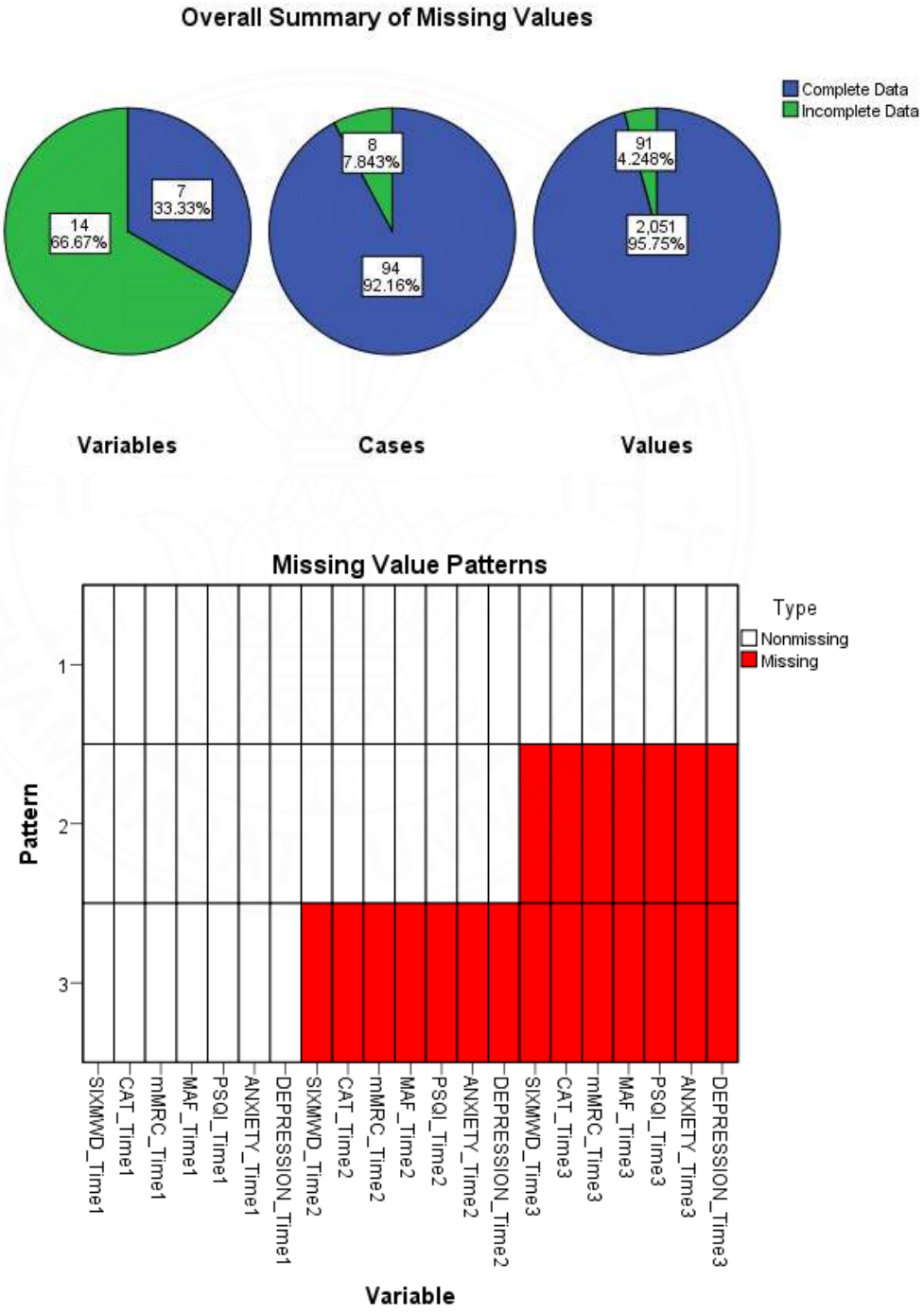


Table 1 The Missing value rate

Variable Summary[a,b]

	Missing				
	N	Percent	Valid N	Mean	Std. Deviation
DEPRESSION_Time3	8	7.8%	94	2.0319	1.98083
ANXIETY_Time3	8	7.8%	94	2.7766	2.61573
PSQI_Time3	8	7.8%	94	5.7872	3.32431
MAF_Time3	8	7.8%	94	12.6372	8.76876
mMRC_Time3	8	7.8%	94	.4468	.61552
CAT_Time3	8	7.8%	94	4.5745	4.12308
SIXMWD_Time3	8	7.8%	94	361.0106	79.65527
DEPRESSION_Time2	5	4.9%	97	2.7423	2.67425
ANXIETY_Time2	5	4.9%	97	3.1959	2.57245
PSQI_Time2	5	4.9%	97	5.7938	3.19158
MAF_Time2	5	4.9%	97	13.3967	9.60583
mMRC_Time2	5	4.9%	97	.5773	.76151
CAT_Time2	5	4.9%	97	6.6701	5.48620
SIXMWD_Time2	5	4.9%	97	356.7526	65.32312

a. Maximum number of variables shown: 25

b. Minimum percentage of missing values for variable to be included: .0%

Table 2 The MCAR testing

EM Means[a]

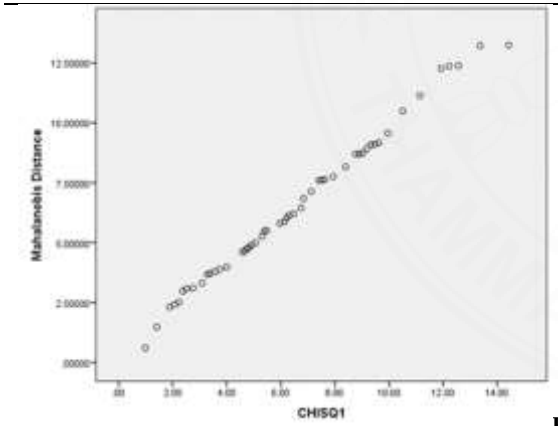
6MWD_Time1	CAT_Time1	mMRC_Time1	MAF_Time1	PSQI_Time1	Anxiety_Time1	Depression_Time1	6MWD_Time2	CAT_Time2	mMRC_Time2	MAF_Time2	PSQI_Time2	Anxiety_Time2	Depression_Time2	6MWD_Time3	CAT_Time3	mMRC_Time3	MAF_Time3	PSQI_Time3	Anxiety_Time3	Depression_Time3
341.9608	7.4020	.7059	16.9365	6.3333	3.4902	2.9412	356.0645	6.6690	.5909	13.3520	5.7846	3.1653	2.7322	359.1266	4.6806	.4529	12.7617	5.8538	2.7852	2.0671

a. Little's MCAR test: Chi-Square = 31.835, DF = 21, Sig. = .061

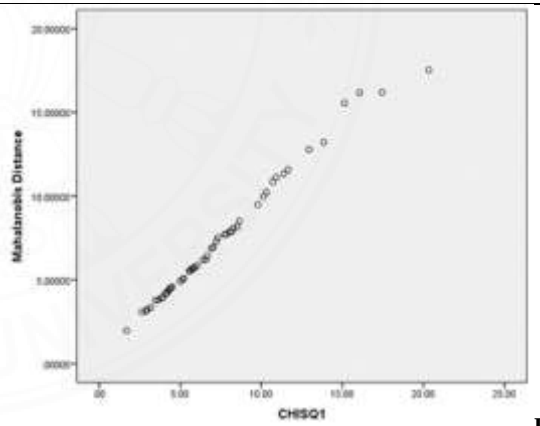
2. The Assumption testing of repeated measure MANOVA

Table 3 The multivariate normal distribution is shown as the graph of the Mahalanobis distance (D^2) and CHISQ

Time 1 (Pre-test or Baseline)

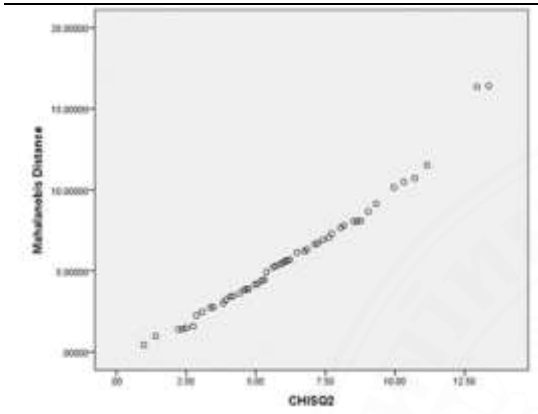


Experimental group

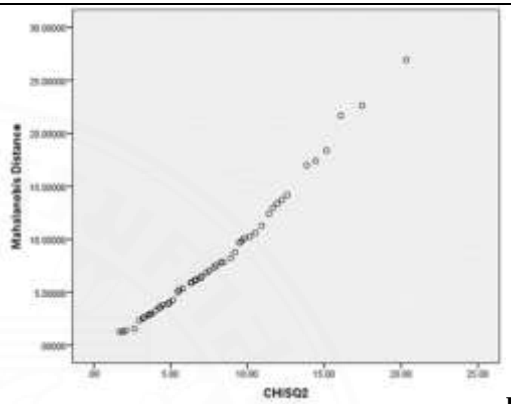


Usual care group

Time 2 (four weeks)

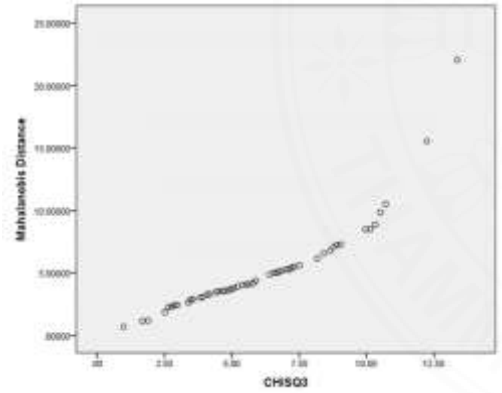


Experimental group

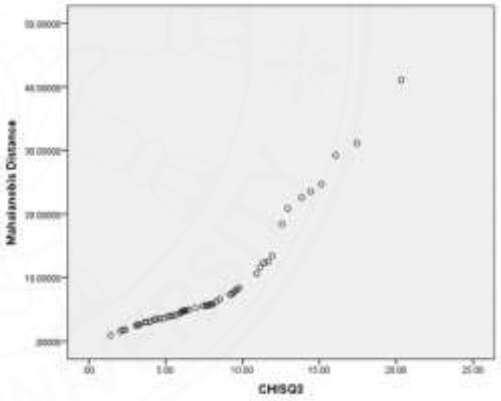


Usual care group

Time 3 (eight weeks)



Experimental group



Usual care group

2.2 The homogeneity of variance using Levene's test

Table 4 Levene's test of equality of error variancesa

	F	df1	df2	Sig.
6MWD_Time1	1.274	1	100	.262
6MWD_Time2	.082	1	100	.775
6MWD_Time3	1.556	1	100	.215
CAT_Time1	.002	1	100	.963
CAT_Time2	16.167	1	100	.000
CAT_Time3	7.031	1	100	.009
mMRC_Time1	.011	1	100	.915
mMRC_Time2	5.788	1	100	.018
mMRC_Time3	14.714	1	100	.000
MAF_Time1	.002	1	100	.967
MAF_Time2	.113	1	100	.737
MAF_Time3	.002	1	100	.961
PSQI_Time1	.141	1	100	.708
PSQI_Time2	.071	1	100	.790
PSQI_Time3	1.093	1	100	.298
HADS-Anxiety_Time1	3.371	1	100	.069
HADS-Anxiety_Time2	3.695	1	100	.057
HADS-Anxiety_Time3	9.079	1	100	.003
HADS-Depression_Time1	4.464	1	100	.037
HADS-Depression_Time2	.399	1	100	.529
HADS-Depression_Time3	.362	1	100	.549

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Group
Within Subjects Design: Time

2.3 The homogeneity of variance-covariance matrices using Box's M test

Table 5 Box's test of equality of covariance matricesa

Box's M	409.864
F	1.380
df1	231
df2	30509.703
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Group
Within Subjects Design: Time

2.4 The linearity of the relationships among the dependent variables using Pearson's correlation and the multicollinearity using VIF

Table 6 Correlations coefficient

Correlations Time 1 Pre-test or baseline

		6MWD Time1	CAT Time1	mMRC Time1	MAF Time1	PSQI Time1	HADS-Anxiety Time1	HADS-Depression Time1
6MWD Time1	Pearson Correlation	1	-.200*	-.285**	.006	.015	.099	-.113
	Sig. (2-tailed)		.044	.004	.953	.884	.322	.258
	N	102	102	102	102	102	102	102
CAT Time1	Pearson Correlation	-.200*	1	.378**	.466**	.243*	.251*	.353**
	Sig. (2-tailed)	.044		.000	.000	.014	.011	.000
	N	102	102	102	102	102	102	102
mMRC Time1	Pearson Correlation	-.285**	.378**	1	.234*	-.004	-.057	.143
	Sig. (2-tailed)	.004	.000		.018	.968	.566	.153
	N	102	102	102	102	102	102	102
MAF Time1	Pearson Correlation	.006	.466**	.234*	1	.180	.227*	.319**
	Sig. (2-tailed)	.953	.000	.018		.069	.022	.001
	N	102	102	102	102	102	102	102
PSQI Time1	Pearson Correlation	.015	.243*	-.004	.180	1	.356**	.189
	Sig. (2-tailed)	.884	.014	.968	.069		.000	.058
	N	102	102	102	102	102	102	102
HADS-Anxiety Time1	Pearson Correlation	.099	.251*	-.057	.227*	.356**	1	.456**
	Sig. (2-tailed)	.322	.011	.566	.022	.000		.000

	N	102	102	102	102	102	102	102
HADS-Depression Time1	Pearson Correlation	-.113	.353**	.143	.319**	.189	.456**	1
	Sig. (2-tailed)	.258	.000	.153	.001	.058	.000	
	N	102	102	102	102	102	102	102

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Correlations Time 2 (week four)

		6MWD Time2	**CAT Time2**	**mMRC Time2**	**MAF Time2**	**PSQI Time2**	**HADS-Anxiety Time2**	**HADS-Depression Time2**
6MWD Time2	Pearson Correlation	1	-.173	-.300**	-.176	-.012	-.061	-.305**
	Sig. (2-tailed)		.082	.002	.077	.907	.543	.002
	N	102	102	102	102	102	102	102
CAT Time2	Pearson Correlation	-.173	1	.446**	.565**	.379**	.364**	.496**
	Sig. (2-tailed)	.082		.000	.000	.000	.000	.000
	N	102	102	102	102	102	102	102
mMRC Time2	Pearson Correlation	-.300**	.446**	1	.491**	.272**	.205*	.294**
	Sig. (2-tailed)	.002	.000		.000	.006	.039	.003
	N	102	102	102	102	102	102	102
MAF Time2	Pearson Correlation	-.176	.565**	.491**	1	.215*	.342**	.447**
	Sig. (2-tailed)	.077	.000	.000		.030	.000	.000
	N	102	102	102	102	102	102	102
PSQI Time2	Pearson Correlation	-.012	.379**	.272**	.215*	1	.443**	.354**
	Sig. (2-tailed)	.907	.000	.006	.030		.000	.000
	N	102	102	102	102	102	102	102
HADS-Anxiety Time2	Pearson Correlation	-.061	.364**	.205*	.342**	.443**	1	.606**
	Sig. (2-tailed)	.543	.000	.039	.000	.000		.000
	N	102	102	102	102	102	102	102
HADS-Depression Time2	Pearson Correlation	-.305**	.496**	.294**	.447**	.354**	.606**	1
	Sig. (2-tailed)	.002	.000	.003	.000	.000	.000	
	N	102	102	102	102	102	102	102

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations Time 3 (week eight)

		6MWD Time3	CAT Time3	mMRC Time3	MAF Time3	PSQI Time3	HADS-Anxiety Time3	HADS-Depression Time3
6MWD Time3	Pearson Correlation	1	-.377**	-.425**	-.306**	-.151	-.202*	-.369**
	Sig. (2-tailed)		.000	.000	.002	.129	.041	.000
	N	102	102	102	102	102	102	102
CAT Time3	Pearson Correlation	-.377**	1	.536**	.494**	.287**	.467**	.324**
	Sig. (2-tailed)	.000		.000	.000	.003	.000	.001
	N	102	102	102	102	102	102	102
mMRC Time3	Pearson Correlation	-.425**	.536**	1	.374**	.039	.231*	.163
	Sig. (2-tailed)	.000	.000		.000	.701	.020	.101
	N	102	102	102	102	102	102	102
MAF Time3	Pearson Correlation	-.306**	.494**	.374**	1	.358**	.480**	.465**
	Sig. (2-tailed)	.002	.000	.000		.000	.000	.000
	N	102	102	102	102	102	102	102
PSQI Time3	Pearson Correlation	-.151	.287**	.039	.358**	1	.445**	.353**
	Sig. (2-tailed)	.129	.003	.701	.000		.000	.000
	N	102	102	102	102	102	102	102
HADS-Anxiety Time3	Pearson Correlation	-.202*	.467**	.231*	.480**	.445**	1	.384**
	Sig. (2-tailed)	.041	.000	.020	.000	.000		.000
	N	102	102	102	102	102	102	102
HADS-Depression Time3	Pearson Correlation	-.369**	.324**	.163	.465**	.353**	.384**	1
	Sig. (2-tailed)	.000	.001	.101	.000	.000	.000	
	N	102	102	102	102	102	102	102

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7 The multicollinearity test using the VIF and Torelance Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	6MWD_Time1	.284	3.524
	CAT_Time1	.533	1.878
	mMRC_Time1	.557	1.794
	MAF_Time1	.582	1.719
	PSQI_Time1	.541	1.848
	HADS-Anxiety_Time1	.390	2.564
	HADS-Depression_ Time1	.510	1.960
	6MWD_Time2	.200	5.007
	CAT_Time2	.477	2.098
	mMRC_Time2	.487	2.055
	MAF_Time2	.452	2.212
	PSQI_Time2	.409	2.447
	HADS-Anxiety_Time2	.370	2.703
	HADS-Depression_ Time2	.300	3.339
	6MWD_Time3	.302	3.306
	CAT_Time3	.432	2.313
	mMRC_Time3	.428	2.336
	MAF_Time3	.425	2.354
	PSQI_Time3	.378	2.644
	HADS-Anxiety_Time3	.402	2.490
	HADS-Depression_ Time3	.436	2.291

a. Dependent Variable: ลำดับที่

2.6 The sphericity using Bartlett's test

Table 8 Bartlett's test of Sphericity[a]

Effect		Likelihood Ratio	Approx. Chi-Square	df	Sig.
Between Subjects		.000	2831.039	27	.000
Within Subjects	Time	.000	4041.021	27	.000

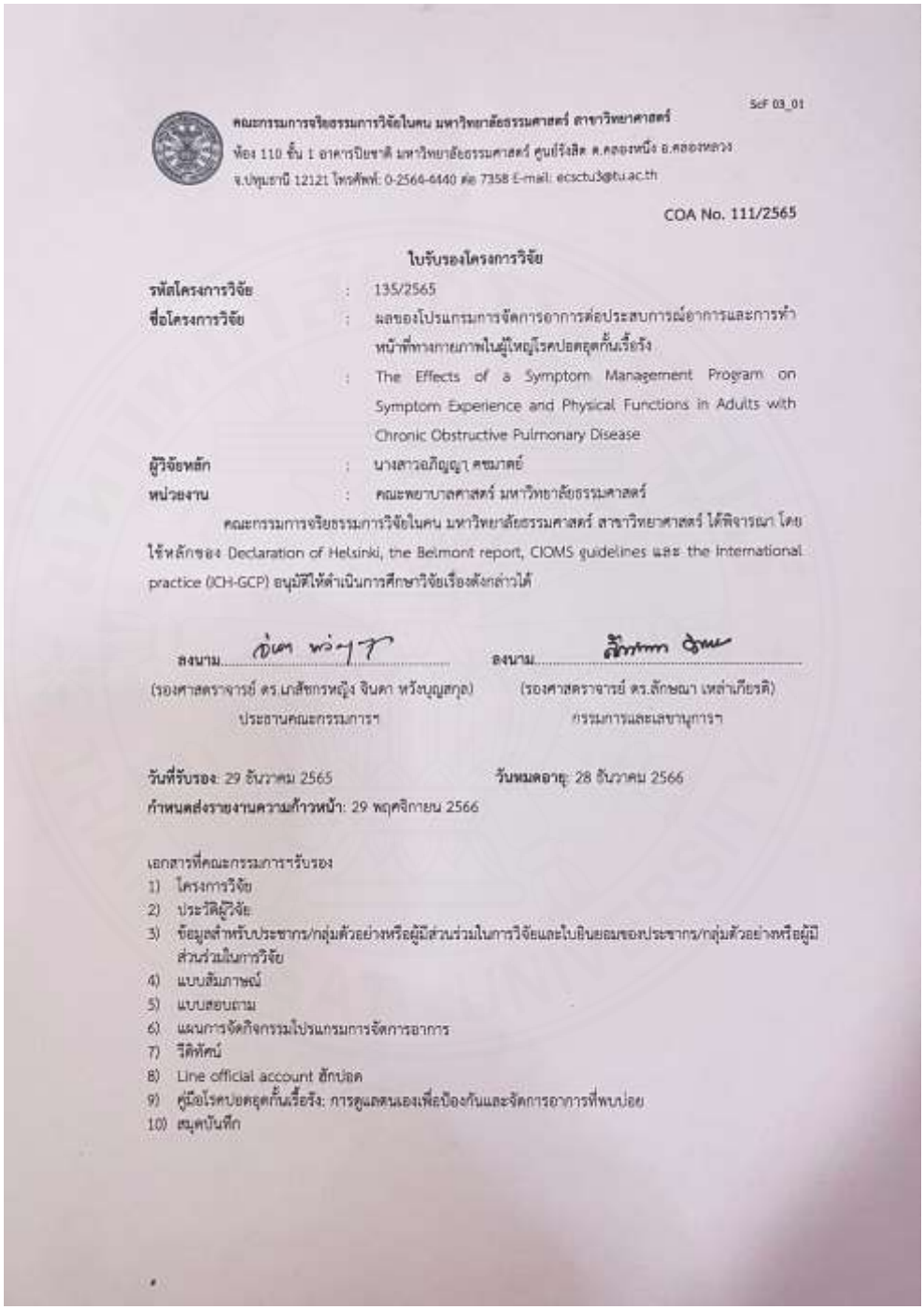
Tests the null hypothesis that the residual covariance matrix is proportional to an identity matrix.

a. Design: Intercept + Group

Within Subjects Design: Time

APPENDIX B

Certificated of EC Approval of Dissertation Proposal



SoF 03_01

คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์
ห้อง 110 ชั้น 1 อาคารปิยชาติ มหาวิทยาลัยธรรมศาสตร์ ศูนย์รังสิต ต.คลองหนึ่ง อ.คลองหลวง
จ.ปทุมธานี 12121 โทรศัพท์: 0-2564-4440 ต่อ 7358 E-mail: ecsctu3@tu.ac.th

COA No. 111/2565

ใบรับรองโครงการวิจัย

รหัสโครงการวิจัย : 135/2565
ชื่อโครงการวิจัย : ผลของโปรแกรมการจัดการอาการต่อประสบการณ์อาการและการทำหน้าที่ทางกายภาพในผู้ใหญ่โรคปอดอุดกั้นเรื้อรัง
: The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease
ผู้วิจัยหลัก : นางสาวอภิญญา คชมาตย์
หน่วยงาน : คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ สาขาวิทยาศาสตร์ ได้พิจารณา โดยใช้หลักของ Declaration of Helsinki, the Belmont report, CIOMS guidelines และ the International practice (ICH-GCP) อนุมัติให้ดำเนินการศึกษาวิจัยเรื่องดังกล่าวได้

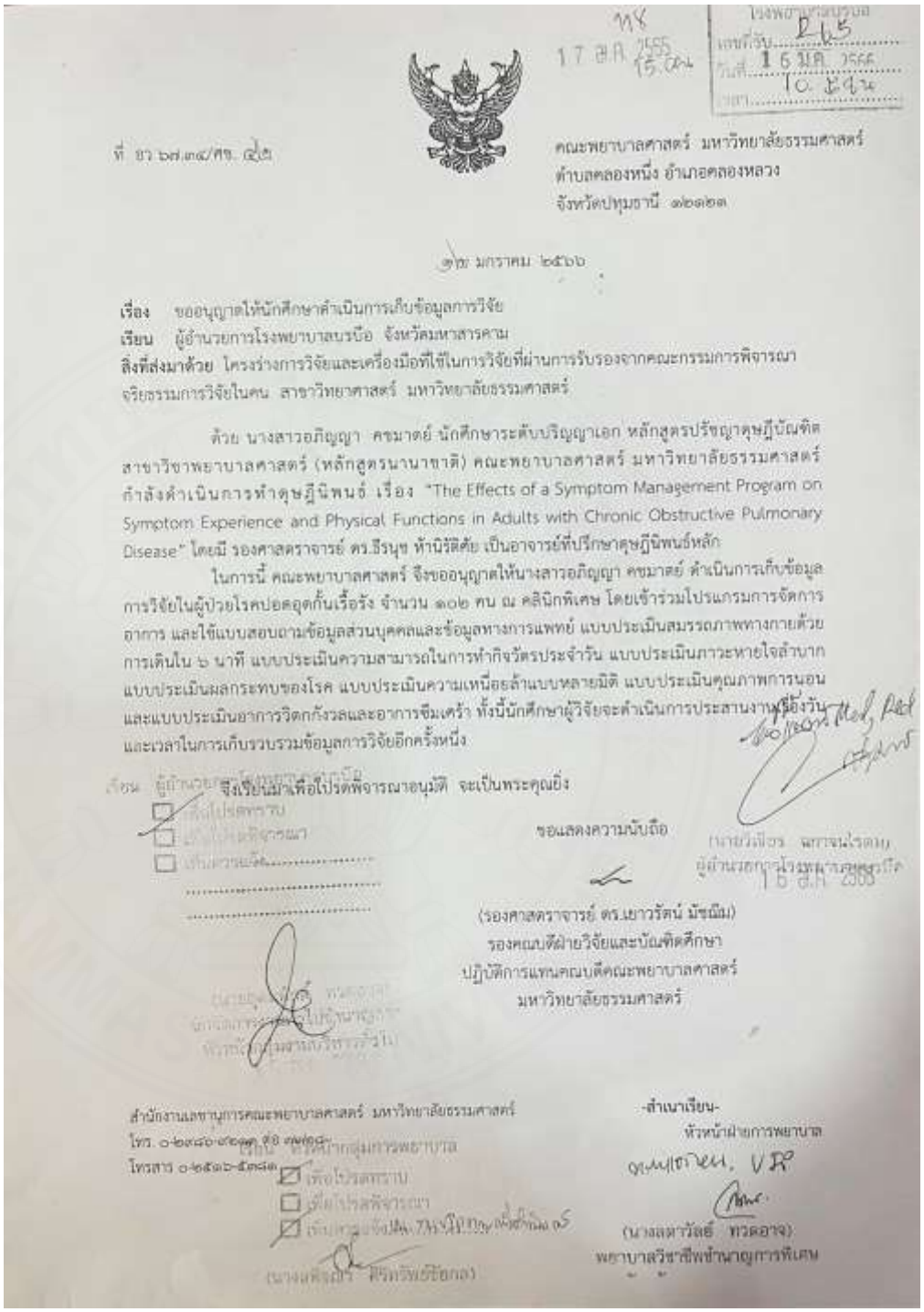
ลงนาม..... ลงนาม.....
(รองศาสตราจารย์ ดร.เกสัชกรหญิง จินดา หวังบุญสกุล) (รองศาสตราจารย์ ดร.ลักษณา เหล่าเกียรติ)
ประธานคณะกรรมการฯ กรรมการและเลขานุการฯ

วันที่รับรอง: 29 ธันวาคม 2565 **วันหมดอายุ**: 28 ธันวาคม 2566
กำหนดส่งรายงานความก้าวหน้า: 29 พฤศจิกายน 2566

เอกสารที่คณะกรรมการฯรับรอง
1) โครงการวิจัย
2) ประวัติผู้วิจัย
3) ข้อมูลสำหรับประชากร/กลุ่มตัวอย่างหรือผู้มีส่วนร่วมในการวิจัยและใบยินยอมของประชากร/กลุ่มตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย
4) แบบสัมภาษณ์
5) แบบสอบถาม
6) แผนการจัดกิจกรรมโปรแกรมการจัดการอาการ
7) วีดิทัศน์
8) Line official account สักปอด
9) คู่มือโรคปอดอุดกั้นเรื้อรัง: การดูแลตนเองเพื่อป้องกันและจัดการอาการที่พบบ่อย
10) สมุดบันทึก

APPENDIX C

Permission Letter for Data Collection



ที่ ยว ๖๗.๓๔/ศธ. ๔๕

คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
ตำบลคลองหนึ่ง อำเภอคลองหลวง
จังหวัดปทุมธานี ๑๒๑๒๑

๑๒ มกราคม ๒๕๖๖

เรื่อง ขออนุญาตให้นักศึกษาดำเนินการเก็บข้อมูลการวิจัย
เรียน ผู้อำนวยการโรงพยาบาลนรบือ จังหวัดมหาสารคาม
สิ่งที่ส่งมาด้วย โครงร่างการวิจัยและเครื่องมือที่ใช้ในการวิจัยที่ผ่านการรับรองจากคณะกรรมการพิจารณาจริยธรรมการวิจัยในคน สาขาวิทยาศาสตร์ มหาวิทยาลัยธรรมศาสตร์

ด้วย นางสาวอภิญญา คชมาตย์ นักศึกษาระดับบริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ กำลังดำเนินการทำดุษฎีนิพนธ์ เรื่อง "The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease" โดยมี รองศาสตราจารย์ ดร.ธีรนุช ท้านิรัติศัย เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์หลัก

ในการนี้ คณะพยาบาลศาสตร์ จึงขออนุญาตให้นางสาวอภิญญา คชมาตย์ ดำเนินการเก็บข้อมูลการวิจัยในผู้ป่วยโรคปอดอุดกั้นเรื้อรัง จำนวน ๑๐๒ คน ณ คลินิกพิเศษ โดยเข้าร่วมโปรแกรมการจัดการอาการ และใช้แบบสอบถามข้อมูลส่วนบุคคลและข้อมูลทางการแพทย์ แบบประเมินสมรรถภาพทางกายด้วยการเดินใน ๖ นาที แบบประเมินความสามารถในการทำกิจวัตรประจำวัน แบบประเมินภาวะหายใจลำบาก แบบประเมินผลกระทบของโรค แบบประเมินความเหนื่อยล้าแบบหลายมิติ แบบประเมินคุณภาพการนอน และแบบประเมินอาการวิตกกังวลและอาการซึมเศร้า ทั้งนี้นักศึกษาผู้วิจัยจะดำเนินการประสานงานกับท่านอีกครั้งหนึ่ง และเวลาในการเก็บรวบรวมข้อมูลการวิจัยอีกครั้งหนึ่ง

จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติ จะเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร.เยาวรัตน์ มัชฌิม)
รองคณบดีฝ่ายวิจัยและบัณฑิตศึกษา
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์
มหาวิทยาลัยธรรมศาสตร์

สำนักงานเลขานุการคณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
โทร. ๐-๒๙๘๐-๙๖๗๗ ต่อ ๗๗๐๘
โทรสาร ๐-๒๕๑๒-๕๓๘๑

-สำเนาเรียน-
หัวหน้าฝ่ายการพยาบาล

(นางสาวลดาวัลย์ ทวดอาจ)
พยาบาลวิชาชีพชำนาญการพิเศษ

โรงพยาบาลกันทรวิชัย
เลขรับ 139
วันที่ 12 ม.ค. 66
เวลา 13.20 น.

ที่ อว ๖๗.๓๔/ศข. [illegible]

คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
ตำบลคลองหนึ่ง อำเภอคลองหลวง
จังหวัดปทุมธานี ๑๒๑๒๑

[illegible] มกราคม ๒๕๖๖

เรื่อง ขออนุญาตให้นักศึกษาดำเนินการทดลองใช้เครื่องมือวิจัย

เรียน ผู้อำนวยการโรงพยาบาลกันทรวิชัย จังหวัดมหาสารคาม

สิ่งที่ส่งมาด้วย โครงร่างการวิจัยและเครื่องมือในการเก็บรวบรวมข้อมูลวิจัยที่ผ่านการรับรองจากคณะกรรมการพิจารณาจริยธรรมการวิจัยในคน สาขาวิทยาศาสตร์ มหาวิทยาลัยธรรมศาสตร์

ด้วย นางสาวอภิญญา คชมาตย์ นักศึกษาระดับปริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ กำลังดำเนินการทำดุษฎีนิพนธ์ เรื่อง "The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease" โดยมี รองศาสตราจารย์ ดร.ธีรนุช ห้านิรัติศัย เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์หลัก

ในการนี้ คณะพยาบาลศาสตร์ จึงขออนุญาตให้นางสาวอภิญญา คชมาตย์ ดำเนินการทดลองใช้เครื่องมือในการวิจัยในผู้ป่วยโรคปอดอุดกั้นเรื้อรัง จำนวน ๓๐ คน โดยใช้แบบสอบถามข้อมูลส่วนบุคคลและข้อมูลทางการแพทย์ แบบประเมินสมรรถภาพทางกายด้วยการเดินใน ๖ นาที แบบประเมินความสามารถในการทำกิจวัตรประจำวัน แบบประเมินภาวะหายใจลำบาก แบบประเมินผลกระทบของโรค แบบประเมินความเหนื่อยล้าแบบหลายมิติ แบบประเมินคุณภาพการนอน และแบบประเมินอาการวิตกกังวลและอาการซึมเศร้า ทั้งนี้นักศึกษาผู้วิจัยจะดำเนินการประสานงานเรื่องวันและเวลาในการเก็บรวบรวมข้อมูลการวิจัยอีกครั้งหนึ่ง

จึงเรียนมาเพื่อโปรดพิจารณาอนุมัติ จะเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(รองศาสตราจารย์ ดร.เยาวรัตน์ มัชฌิม)
รองคณบดีฝ่ายวิจัยและบัณฑิตศึกษา
ปฏิบัติการแทนคณบดีคณะพยาบาลศาสตร์
มหาวิทยาลัยธรรมศาสตร์

[illegible]

สำนักงานเลขานุการคณะพยาบาลศาสตร์
มหาวิทยาลัยธรรมศาสตร์
โทร. [illegible]
โทรสาร [illegible]

(นางนิศพรรณ ทีบุตร)
หัวหน้าพยาบาล
พยาบาลวิชาชีพชำนาญการพิเศษ

(นายภาคภูมิ อินทร์ม่วง)
ผู้อำนวยการโรงพยาบาล (นายแพทย์ชำนาญการพิเศษ)
รักษาการในตำแหน่ง ผู้อำนวยการโรงพยาบาลกันทรวิชัย

APPENDIX D

The Namelist of Experts

1. Associate Professor Narongkorn Saiphoklang, M.D.,
   Division of Pulmonary and Critical Care Medicine,
   Department of Internal Medicine, Faculty of Medicine, Thammasat University
2. Assistant Professor Dr. Noppawan Charususin
   Department of Physical Therapy
   Faculty of Allied Health Science, Thammasat University
3. Assistant Professor Dr. Buntarika Chatreewatanakul
   Department of Adult Nursing and the Aged
   Faculty of Nursing, Thammasat University
4. Assistant Professor Dr. Nanthawan Thienkaew
   Department of Sports and Health Science
   Faculty of Sports Science, Kasetsart University
5. Assistant Professor Dr.Apinya Wongpiriyayotha
   Department of Adults and Older Adults Nursing
   Faculty of Nursing, Mahasarakham University

APPENDIX E

Permission Letter for using the Instruments for the Data Collection and the Instruments

1. The Chula ADL (Thai version)

ที่ อว ๖๓.๓๔/ศย. ๒๔๖

คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
ตำบลคลองหนึ่ง อำเภอคลองหลวง
จังหวัดปทุมธานี ๑๒๑๒๑

๒๓ มีนาคม ๒๕๖๕

เรื่อง ขอความอนุเคราะห์ขอใช้เครื่องมือวิจัย

เรียน คณบดีคณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เนื่องด้วย นางสาวอภิญญา ศรมาตย์ นักศึกษาระดับบริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ กำลังดำเนินการพัฒนาดุษฎีนิพนธ์ เรื่อง "The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease" ซึ่งเป็นส่วนหนึ่งในการสำเร็จการศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต โดยมี รองศาสตราจารย์ ดร.ธีรนุช ห้าวิรัติศัย เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์หลัก

ในการนี้ คณะพยาบาลศาสตร์ จึงขอความอนุเคราะห์ใช้เครื่องมือวิจัย คือ เครื่องมือ The Chula ADL Index (Thai version) ของ ศาสตราจารย์ นายแพทย์สุทธิชัย จิตะพันธ์กุล บุคลากรในสังกัดของท่าน โดยผู้ทำวิจัยจะใช้ข้อมูลเพื่อใช้ในงานวิจัยดังกล่าว

จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ด้วย จะเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.ปรียกมล รัชนกุล)
คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

เรียน คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

กระผมอนุญาตให้ใช้เครื่องมือวิจัยดังกล่าวได้

(อ.นพ.ไอศวรรย์ เพชรล่อเหลียน)
หัวหน้าสาขาวิชาเวชศาสตร์ผู้สูงอายุ

สำนักงานเลขานุการคณะพยาบาลศาสตร์
โทร. ๐-๒๐๔๑-๗๖๓๓ ต่อ ๗๗๒๘
โทรสาร ๐-๒๕๑๑-๕๓๘๓
นางสาวอภิญญา ศรมาตย์ โทร. ๐-๙๕๖๓๓-๗๖๖๖

2. Hospital Anxiety an Depression Scale-Thai HADS

ภาควิชาจิตเวชศาสตร์ คณะแพทยศาสตร์
โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
270 ถนนพระราม 6 ราชเทวี กรุงเทพมหานคร 10400
โทร. 022011929 โทรสาร 023547299

ที่ อว 78.065/271
วันที่ 31 มีนาคม 2565
เรื่อง อนุญาตให้ใช้เครื่องมือวิจัย

เรียน คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

ตามหนังสือ คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ โดย นางสาวอภิญญา คชมาตย์ นักศึกษาปริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ แจ้งความประสงค์ขออนุญาตแบบวัด Hospital Anxiety and Depression Scale-Anxiety subscale (Thai HADS) ที่พัฒนาโดย ผู้ช่วยศาสตราจารย์ นายแพทย์ธนา นิลชัยโกวิทย์ เพื่อใช้ประกอบการวิจัยเรื่อง "The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease" ความละเอียดแจ้งแล้วนั้น

ภาควิชาจิตเวชศาสตร์ ได้พิจารณาแล้วเห็นว่าเป็นประโยชน์ และสมควรสนับสนุนอย่างยิ่ง จึงอนุญาตให้ใช้แบบประเมินดังกล่าว

ขอแสดงความนับถือ

(รองศาสตราจารย์ แพทย์หญิงสุวรรณี พุทธิศรี)
หัวหน้าภาควิชาจิตเวชศาสตร์

"มุ่งเรียนรู้ คู่คุณธรรม ใฝ่คุณภาพ ร่วมสานภารกิจ คิดนอกกรอบ รับผิดชอบสังคม"

3. The Thai version of the Pittsburgh Sleep Quality Index: Thai-PSQI

ภาควิชาอายุรศาสตร์
รับที่ 9361
รับที่ E-DOC 9341/2565
วันที่ - 8 เม.ย. 2565
เวลา 16.00

ฝ่ายวิจัย
คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
โทร. 92680

ที่ อว 78.011/E๐๑ ๑๔๘/๒๕๖๕
วันที่ - 8 เม.ย. 2565
เรื่อง ขอความอนุเคราะห์พิจารณาการขออนุญาตใช้เครื่องมือวิจัย จาก นางสาวอภิญญา คชมาตย์
(ภายนอกคณะฯ)
เรียน หัวหน้าภ.อายุรศาสตร์

ตามที่คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ ได้ขอความอนุเคราะห์ให้ นางสาวอภิญญา คชมาตย์ นักศึกษาระดับปริญญาเอกหลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) ใช้เครื่องมือวิจัยคือ TheThai version of the Pittsburgh Sleep Quality Index (Thai-PSQI) ของผู้ช่วยศาสตราจารย์ แพทย์หญิงตุลยา สีตสุวรรณ ภาควิชาอายุรศาสตร์ เพื่อเป็นข้อมูลประกอบการพัฒนาดุษฎีนิพนธ์เรื่อง "The Effects of aSymptom Management Program on Symptom Experience and Physical Functions inAdults with Chronic Obstructive Pulmonary Disease" โดยมี รองศาสตราจารย์ดร.ธีรนุช ห้านิรัติศัย เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์หลักนั้น

ในการนี้ ฝ่ายวิจัยจึงใคร่ขอความอนุเคราะห์จากท่านเพื่อโปรดพิจารณาการขออนุญาตใช้เครื่องมือวิจัยฯของบุคลากรในสังกัดของท่าน พร้อมทั้งโปรดพิจารณาให้ความเห็นและแจ้งกลับมายังฝ่ายวิจัย ภายในวันที่ 27 เมษายน 2565(รายละเอียดดังเอกสารแนบ)

จึงเรียนมาเพื่อโปรดพิจารณาอนุเคราะห์

เรียน หัวหน้าสาขาวิชาการบริบาลผู้ป่วยนอก

รศ.ดร.พญ.พจมาน พิศาลประภา

ประเสริฐ เอื้อวรากุล
(ศาสตราจารย์ ดร. นายแพทย์ประเสริฐ เอื้อวรากุล)
รองคณบดีฝ่ายวิจัย

รศ.นพ.ไชยรัตน์ เพิ่มพิกุล
หัวหน้าภาควิชาอายุรศาสตร์
11 เม.ย. 2565

ผศ.พญ.ตุลยา สีตสุวรรณ

ร่าง น.ส. พนิดา รัตนสมบูรณ์
ตรวจสอบ น.ส. อุสา ทีโน

4. modified Medical Research Council Dyspnea Scale, mMRC (Thai version)

ที่ อว ๖๗.๓๔/ศ.๓๕๗

คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
ตำบลคลองหนึ่ง อำเภอคลองหลวง
จังหวัดปทุมธานี ๑๒๑๒๑

๒๖ เมษายน ๒๕๖๕

เรื่อง ขอความอนุเคราะห์ขอใช้เครื่องมือวิจัย

เรียน นายกสมาคมอุรเวชช์แห่งประเทศไทยในพระบรมราชูปถัมภ์

เนื่องด้วย นางสาวอภิญญา คชมาตย์ นักศึกษาระดับปริญญาเอก หลักสูตรปรัชญาดุษฎีบัณฑิต สาขาวิชาพยาบาลศาสตร์ (หลักสูตรนานาชาติ) คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์ กำลังดำเนินการพัฒนาดุษฎีนิพนธ์ เรื่อง "The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease" ซึ่งเป็นส่วนหนึ่งในการสำเร็จการศึกษาหลักสูตรปรัชญาดุษฎีบัณฑิต โดยมี รองศาสตราจารย์ ดร.ธีรนุช ห้านิรัติศัย เป็นอาจารย์ที่ปรึกษาดุษฎีนิพนธ์หลัก

ในการนี้ คณะพยาบาลศาสตร์ จึงขอความอนุเคราะห์ใช้เครื่องมือวิจัย คือ เครื่องมือ The modified Medical Research Council (mMRC) Dyspnea Scale ฉบับภาษาไทย เพื่อใช้ในงานวิจัยดังกล่าว

จึงเรียนมาเพื่อโปรดพิจารณาให้ความอนุเคราะห์ด้วย จะเป็นพระคุณยิ่ง

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.ปริย์กมล รัชนกุล)
คณบดีคณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์

สำนักงานเลขานุการคณะพยาบาลศาสตร์
โทร. ๐-๒๙๘๖-๙๒๑๓ ต่อ ๗๓๒๔
โทรสาร ๐-๒๕๑๖-๕๓๘๓
นางสาวอภิญญา คชมาตย์ โทร. ๐-๙๕๖๖๙-๑๖๖๖

5. COPD Assessment Test

Mapi Research Trust

SPECIAL TERMS

These User License Agreement Special Terms ("Special Terms") are issued between Mapi Research Trust ("MRT") and Apinya Kochamat ("User").

These Special Terms are in addition to any and all previous Special Terms under the User License Agreement General Terms.

These Special Terms include the terms and conditions of the User License Agreement General Terms, which are hereby incorporated by this reference as though the same was set forth in its entirety and shall be effective as of the Special Terms Effective Date set forth herein.

All capitalized terms which are not defined herein shall have the same meanings as set forth in the User License Agreement General Terms.

These Special Terms, including all attachments and the User License Agreement General Terms contain the entire understanding of the Parties with respect to the subject matter herein and supersedes all previous agreements and undertakings with respect thereto. If the terms and conditions of these Special Terms or any attachment conflict with the terms and conditions of the User License Agreement General Terms, the terms and conditions of the User License Agreement General Terms will control, unless these Special Terms specifically acknowledge the conflict and expressly states that the conflicting term or provision found in these Special Terms control for these Special Terms only. These Special Terms may be modified only by written agreement signed by the Parties.

1. **User information**

User name	Apinya Kochamat
Category of User	Student
User address	55/6 Moo 14 The chill village mahasarakham 44000 mahasarakham Thailand
User VAT number	
User email	apinya.kcm@gmail.com
User phone	+66956693666
Billing Address	55/6 Moo 14 The chill village mahasarakham 44000 mahasarakham Thailand

2. **General information**

Effective Date	Date of acceptance of these Special Terms by the User
Expiration Date ("Term")	Upon completion of the Stated Purpose
Name of User's contact in charge of the request	Apinya Kochamat

3. **Identification of the COA**

Name of the COA	CAT™ - COPD Assessment Test™
Author	Jones PW Harding G Berry P Leidy NK Chen WH
Copyright Holder	GlaxoSmithKline
Copyright notice	CAT™ © 2009 GlaxoSmithKline group of companies. All rights reserved.
Bibliographic reference	Jones PW, Harding G, Berry P, Wiklund I, Chen WH, Kline Leidy N. Development and first validation of the COPD Assessment Test. Eur Respir J. 2009 Sep;34(3):648-54 (Full text article) Jones P, Harding G, Wiklund I, Berry P, Leidy N. Improving the process and outcome of care in COPD: development of a standardised assessment tool. Prim Care Respir J. 2009 Sep;18(3):205-15 (PubMed Abstract)
Modules/versions needed	CAT

4. **Context of use of the COA**

The User undertakes to use the COA solely in the context of the Stated Purpose as defined hereafter.

4.1 Stated Purpose

Other project

Title	The effects of a symptom management program on symptom experience and physical functions in adults with chronic obstructive pulmonary disease
Disease or condition	chronic obstructive pulmonary disease
Planned Term*	Start: 6/2022; End: 6/2024
Description (including format or media)	This study is a dissertation of the doctor of philosophy (Nursing science) degree, Faculty of Nursing, Thammasat University, Thailand.

4.2 Country and languages

MRT grants the License to use the COA on the following countries and in the languages indicated in the table below:

Version/Module	Language	For use in the following country

CAT	Thai	Thailand

The User understands that the countries indicated above are provided for information purposes. The User may use the COA in other countries than the ones indicated above.

5. **Specific requirements for the COA**

- If the COA has not already been translated into the Licensed Language, the User is entitled to translate the COA or have it translated in such language, provided that the User complies with the methodology and requirements set-out in section 4.2.2 of this WO
- In case the User wants to use an e-Version of the COA, the User shall send the Screenshots of the original version of the COA to MRT or ICON LS for review and approval. The Screenshots review may incur additional fees.
- The Copyright Holder of the COA recommends that each new translation of the COA undergoes a full linguistic validation process according to standard recognized methodology of translation, as described in the ISPOR guidelines by Wild et al. 2005. Value in Health 8 (2): 94-104.

By accepting these Special Terms, the User acknowledges and confirms that it has read and approves the User Agreement General Terms.

6. The Multidimensional Assessment of Fatigue: MAF

Mapi Research Trust

SPECIAL TERMS

These User License Agreement Special Terms ("Special Terms") are issued between Mapi Research Trust ("MRT") and Apinya Kochamat ("User").

These Special Terms are in addition to any and all previous Special Terms under the User License Agreement General Terms.

These Special Terms include the terms and conditions of the User License Agreement General Terms, which are hereby incorporated by this reference as though the same was set forth in its entirety and shall be effective as of the Special Terms Effective Date set forth herein.

All capitalized terms which are not defined herein shall have the same meanings as set forth in the User License Agreement General Terms.

These Special Terms, including all attachments and the User License Agreement General Terms contain the entire understanding of the Parties with respect to the subject matter herein and supersedes all previous agreements and undertakings with respect thereto. If the terms and conditions of these Special Terms or any attachment conflict with the terms and conditions of the User License Agreement General Terms, the terms and conditions of the User License Agreement General Terms will control, unless these Special Terms specifically acknowledge the conflict and expressly states that the conflicting term or provision found in these Special Terms control for these Special Terms only. These Special Terms may be modified only by written agreement signed by the Parties.

1. **User information**

User name	Apinya Kochamat
Category of User	Student
User address	55/6 Moo 14 Th chill village mahasarakham 44000 mahasarakham Thailand
User VAT number	
User email	apinya.kcm@gmail.com
User phone	+66956693666
Billing Address	55/6 Moo 14 Th chill village mahasarakham 44000 mahasarakham Thailand

2. **General information**

Effective Date	Date of acceptance of these Special Terms by the User
Expiration Date ("Term")	Upon completion of the Stated Purpose
Name of User's contact in charge of the request	Apinya Kochamat

3. **Identification of the COA**

Name of the COA	MAF - Multidimensional Assessment of Fatigue
Author	Belza Basia L
Copyright Holder	Belza Basia
Copyright notice	MAF © Basia Belza, 1993. All Rights Reserved.
Bibliographic reference	Belza B, Miyawaki CE, Liu M, Aree-Ue S, Fessel M, Minott KR, Zhang X. A Systematic Review of Studies Using the Multidimensional Assessment of Fatigue Scale. J Nurs Meas. 2018 Apr 1;26(1):36-75 (PubMed abstract) Belza B. Comparison of self-reported fatigue in rheumatoid arthritis and controls. Journal of Rheumatology. 1994;22:639-643 Belza BL, Henke CJ, Yelin EH, Epstein WV, Gilliss CL. Correlates of fatigue in older adults with rheumatoid arthritis. Nurs Res. 1993 Mar-Apr;42(2):93-9 (PubMed abstract)
Modules/versions needed	MAF

4. **Context of use of the COA**

The User undertakes to use the COA solely in the context of the Stated Purpose as defined hereafter.

4.1 Stated Purpose

Other project

Title	The Effects of a Symptom Management Program on Symptom Experience and Physical Functions in Adults with Chronic Obstructive Pulmonary Disease
Disease or condition	Chronic Obstructive Pulmonary Disease
Planned Term*	Start: 06/2022; End: 06/2024
Description (including format or media)	This project is the dissertation of the doctor of philosophy (Nursing Science), Faculty of Nursing, Thammasat University, Thailand

4.2 Country and languages

MRT grants the License to use the COA on the following countries and in the languages indicated in the table below:

Version/Module	Language	For use in the following country

MAF	Thai	Thailand

The User understands that the countries indicated above are provided for information purposes. The User may use the COA in other countries than the ones indicated above.

5. **Specific requirements for the COA**

- The Copyright Holder of the COA has granted ICON LS exclusive rights to translate the COA in the context of commercial studies or any project funded by for-profit entities. ICON LS is the only organization authorized to perform linguistic validation/translation work on the COA.
- In case the User wants to use an e-Version of the COA, the User shall send the Screenshots of the original version of the COA to MRT or ICON LS for review and approval. The Screenshots review may incur additional fees.
- In case the User wants to use an e-Version of the COA, ICON LS shall update (if needed) and populate the COA translations into the User's or IT Company's system and the User shall send the Screenshots of the translations of the COA to ICON LS for approval. The update (if needed), population of translations and the Screenshots review may incur additional fees.

By accepting these Special Terms, the User acknowledges and confirms that it has read and approves the User Agreement General Terms.

แบบสอบถามงานวิจัยเรื่อง

ผลของโปรแกรมการจัดการอาการต่อประสบการณ์อาการและการทำหน้าที่

ทางกายภาพในผู้ใหญ่โรคปอดอุดกั้นเรื้อรัง

ส่วนที่ 1 ข้อมูลส่วนบุคคลและข้อมูลทางการแพทย์

คำชี้แจง: กรุณาทำเครื่องหมายถูกในช่อง ☑ หรือเขียนรายละเอียดข้อมูลให้ครบถ้วนตามความเป็นจริงของท่าน

1. อายุ .....ปี
2. เพศ

☐ 1. ชาย ☐ 2. หญิง ☐ 3. อื่นๆ

3. สถานภาพสมรส

☐ 1. โสด ☐ 2. คู่/ สมรส ☐ 3. หย่าร้าง/ แยกกันอยู่/ หม้าย

4. ระดับการศึกษา

☐ 1. ไม่ได้เรียนหนังสือ ☐ 2. ประถมศึกษา

☐ 3. มัธยมศึกษาหรือเทียบเท่า ☐ 4. ปวส.อนุปริญญา

☐ 5. ปริญญาตรี ☐ 6. อื่นๆ (โปรดระบุ).....

5. อาชีพ

☐ 1. ไม่ได้ประกอบอาชีพ ☐ 2. เกษตรกร

☐ 3. รับจ้าง ☐ 4. ข้าราชการ (โปรดระบุ) .....

☐ 5. ค้าขาย/ ธุรกิจส่วนตัว ☐ 6. อื่นๆ (โปรดระบุ).....

6. จำนวนสมาชิกในครอบครัว.....คน
7. ผู้ดูแลหลัก

☐ 1. คู่สมรส ☐ 2. ลูก

☐ 3. พี่น้อง ☐ 4. หลาน

☐ 5. ญาติ ☐ 6. อื่นๆ (โปรดระบุ) .....

8. สถานะการสูบบุหรี่

☐ 1. ไม่ได้สูบบุหรี่ แต่เคยสูบบุหรี่ในอดีต

1.1 จำนวน.....มวนต่อวัน นาน.....ปี

1.2 ท่านหยุดสูบบุหรี่มานาน.....ปี

☐ 2. ยังคงสูบบุหรี่

2.1 ท่านสูบบุหรี่จำนวนกี่มวนต่อวัน ..... มวนต่อวัน นาน.....ปี

2.2 ระยะเวลาการสูบบุหรี่.....ปี

9. ประวัติการเข้ารับการรักษาในโรงพยาบาล

1. จำนวนครั้งของการรักษาตัวในโรงพยาบาลในปีที่ผ่านมา จำนวน.....ครั้ง

2. วันที่นอนรักษาในโรงพยาบาลครั้งล่าสุดด้วยโรคปอดอุดกั้นเรื้อรัง.....

3. จำนวนครั้งของการรักษาตัวแผนกฉุกเฉินหรือที่โรงพยาบาลด้วยอาการกำเริบเฉียบพลันในปีที่ผ่านมาจำนวน .....ครั้ง

4. วันที่เข้ารับการรักษาที่แผนกฉุกเฉินหรือที่โรงพยาบาลด้วยอาการกำเริบครั้งล่าสุด.....

10. โรคร่วมอื่นๆ

☐ 1. เบาหวาน ☐ 2. ความดันโลหิตสูง

☐ 3. อื่นๆ (โปรดระบุ) .....

11. ท่านมีอาการสำคัญที่พบบ่อยอาการใดบ้าง (ตอบได้มากกว่า 1 ข้อ)

☐ 1. อาการหายใจลำบาก ☐ 2. อาการเหนื่อยล้า

☐ 3. อาการนอนหลับแปรปรวน ☐ 4. อาการวิตกกังวล

☐ 5. อาการซึมเศร้า ☐ 6. อื่นๆ (โปรดระบุ) .....

สำหรับเจ้าหน้าที่เป็นผู้กรอกรายละเอียดข้อมูล

12. ระดับความรุนแรงของโรคปอดอุดกั้นเรื้อรัง

☐ 1. Mild (เล็กน้อย) ☐ 2. Moderate (ปานกลาง)

☐ 3. Severe (รุนแรง) ☐ 4. Very severe (รุนแรงมาก)

13. ระยะเวลาในการเป็นโรคปอดอุดกั้นเรื้อรัง.....ปี

14. น้ำหนัก.....กก. ส่วนสูง.....ซม. ดัชนีมวลกาย (BMI).....กก./ตร.ม.

15. ยาที่ใช้ในการรักษาโรคปอดอุดกั้นเรื้อรังในปัจจุบัน

☐ 1. Long-acting muscarinic antagonist (LAMA) เช่น Tiotorpium (Spiriva™)

☐ 2. Long-acting bata2- agonist (LABA) เช่น Indacaterol (Onbrez™)

☐ 3. Inhaled corticosteriod/LABA (ICS/LABA) เช่น Fluticasone/Sameterol (Seretide™), Budesonide/Fometerol (Symbicort™)

☐ 4. Short-acting beta agonist (SABA) เช่น Salbutamol (Ventolin™)

☐ 5. Short-acting muscarinic antagonist (SAMA)/SABA เช่น Ipratropium/Fenoterol (Berodual™)

☐ 6. Inhaled corticosteroids เช่น Budesonide (Pulmicort™)

☐ 7. Theophylline

☐ 8. อื่นๆ โปรดระบุ.....

แบบบันทึก 6-Minute Walk Test

รายละเอียด	ก่อนเริ่มการทดสอบ	เมื่อสิ้นสุดการทดสอบ
เวลา		
อัตราการเต้นของหัวใจ		
อัตราการหายใจ		
ความดันโลหิต		
SpO_2%		
Dyspnea (Borg scale)		

มีการหยุดหรือพักการทดสอบก่อนระยะเวลาครบ 6 นาทีหรือไม่

☐ 1. ไม่มี ☐ 2. มี เนื่องจาก.....

มีอาการอื่นๆ ที่พบภายหลังสิ้นสุดการทดสอบหรือไม่

☐ 1. เจ็บหน้าอก ☐ 2. หน้ามืด

☐ 3. ปวดสะโพก, ขา หรือน่อง ☐ 4. อื่นๆ (โปรดระบุ) .....

จำนวนรอบ: .....(*60 เมตร) + ระยะทางบางส่วนของรอบสุดท้าย: .....เมตร

รวมระยะทางเดินใน 6 นาที: ..... เมตร

The modified Borg Scale

0	ไม่เหนื่อยเลย
0.5	แทบไม่เหนื่อย
1	เหนื่อยน้อยมาก
2	เหนื่อยเล็กน้อย
3	เหนื่อยปานกลาง
4	เหนื่อยค่อนข้างมาก
5	เหนื่อยมาก
6	
7	เหนื่อยมากๆ
8	
9	เหนื่อยมากเกือบที่สุด
10	เหนื่อยมากที่สุดจนทนไม่ไหว

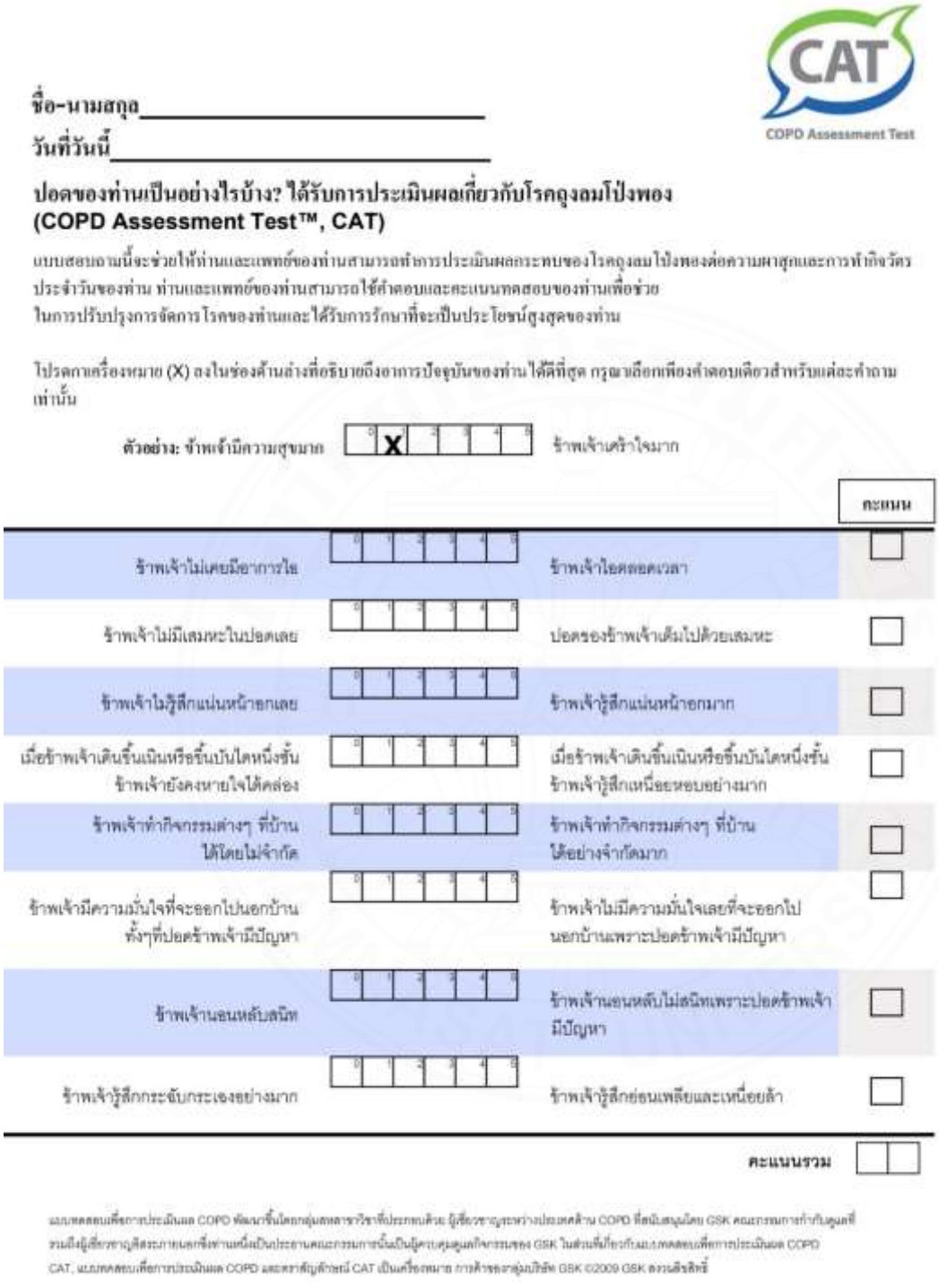
ส่วนที่ 2 แบบประเมินประสบการณ์อาการ

1. แบบประเมินภาวะหายใจลำบาก (modified Medical Research Council Dyspnea Scale, mMRC)

คำชี้แจง: คำถามเหล่านี้เกี่ยวกับอาการหายใจลำบากในกิจกรรมของคุณ โปรดทำเครื่องหมายในช่องที่ตรงกับคุณ (หนึ่งช่องเท่านั้น)

mMRC ระดับ 0.	รู้สึกหายใจหอบ ขณะออกกำลังกายอย่างหนักเท่านั้น	
mMRC ระดับ 1.	หายใจหอบเมื่อเดินอย่างเร่งรีบบนพื้นราบ หรือเมื่อเดินขึ้นที่สูงชัน	
mMRC ระดับ 2.	เดินบนพื้นราบได้ช้ากว่าคนอื่นที่อยู่ในวัยเดียวกันเพราะหายใจหอบ หรือต้องหยุดเพื่อหายใจ เมื่อเดินตามปกติบนพื้นราบ	
mMRC ระดับ 3.	ต้องหยุดเพื่อหายใจ หลักจากเดินได้ประมาณ 100 เมตร หรือหลังจากเดินได้สักพัก บนพื้นราบ	
mMRC ระดับ 4.	หายใจหอบมากเกินกว่าที่จะออกจากบ้าน หรือหอบมากขณะแต่งตัว หรือเปลี่ยนเครื่องแต่งตัว	

2. แบบประเมินผลกระทบของโรค (COPD Assessment Test, CAT)



ชื่อ-นามสกุล_____

วันที่วันนี้_____

ปอดของท่านเป็นอย่างไรบ้าง? ได้รับการประเมินผลเกี่ยวกับโรคถุงลมโป่งพอง (COPD Assessment Test™, CAT)

แบบสอบถามนี้จะช่วยให้ท่านและแพทย์ของท่านสามารถทำการประเมินผลกระทบของโรคถุงลมโป่งพองต่อความผาสุกและการทำกิจวัตรประจำวันของท่าน ท่านและแพทย์ของท่านสามารถใช้คำตอบและคะแนนทดสอบของท่านเพื่อช่วยในการปรับปรุงการจัดการโรคของท่านและได้รับการรักษาที่จะเป็นประโยชน์สูงสุดของท่าน

โปรดกาเครื่องหมาย (X) ลงในช่องด้านล่างที่อธิบายถึงอาการปัจจุบันของท่านได้ดีที่สุด กรุณาเลือกเพียงคำตอบเดียวสำหรับแต่ละคำถามเท่านั้น

ตัวอย่าง: ข้าพเจ้ามีความสุขมาก [0] [X] [2] [3] [4] [5] ข้าพเจ้าเศร้าใจมาก

			คะแนน
ข้าพเจ้าไม่เคยมีอาการไอ	[0] [1] [2] [3] [4] [5]	ข้าพเจ้าไอตลอดเวลา	
ข้าพเจ้าไม่มีเสมหะในปอดเลย	[0] [1] [2] [3] [4] [5]	ปอดของข้าพเจ้าเต็มไปด้วยเสมหะ	
ข้าพเจ้าไม่รู้สึกแน่นหน้าอกเลย	[0] [1] [2] [3] [4] [5]	ข้าพเจ้ารู้สึกแน่นหน้าอกมาก	
เมื่อข้าพเจ้าเดินขึ้นเนินหรือขึ้นบันไดหนึ่งชั้น ข้าพเจ้ายังคงหายใจได้คล่อง	[0] [1] [2] [3] [4] [5]	เมื่อข้าพเจ้าเดินขึ้นเนินหรือขึ้นบันไดหนึ่งชั้น ข้าพเจ้ารู้สึกเหนื่อยหอบอย่างมาก	
ข้าพเจ้าทำกิจกรรมต่างๆ ที่บ้านได้โดยไม่จำกัด	[0] [1] [2] [3] [4] [5]	ข้าพเจ้าทำกิจกรรมต่างๆ ที่บ้านได้อย่างจำกัดมาก	
ข้าพเจ้ามีความมั่นใจที่จะออกไปนอกบ้านทั้งๆที่ปอดข้าพเจ้ามีปัญหา	[0] [1] [2] [3] [4] [5]	ข้าพเจ้าไม่มีความมั่นใจเลยที่จะออกไปนอกบ้านเพราะปอดข้าพเจ้ามีปัญหา	
ข้าพเจ้านอนหลับสนิท	[0] [1] [2] [3] [4] [5]	ข้าพเจ้านอนหลับไม่สนิทเพราะปอดข้าพเจ้ามีปัญหา	
ข้าพเจ้ารู้สึกกระฉับกระเฉงอย่างมาก	[0] [1] [2] [3] [4] [5]	ข้าพเจ้ารู้สึกอ่อนเพลียและเหนื่อยล้า	
		คะแนนรวม	

แบบทดสอบเพื่อการประเมินผล COPD พัฒนาขึ้นโดยกลุ่มสหสาขาวิชาชีพประกอบด้วย ผู้เชี่ยวชาญระหว่างประเทศด้าน COPD ที่สนับสนุนโดย GSK คณะกรรมการกำกับดูแลที่รวมถึงผู้เชี่ยวชาญสิ่งระบายนอกซึ่งท่านหนึ่งเป็นประธานคณะกรรมการนั้นเป็นผู้ควบคุมดูแลกิจกรรมของ GSK ในส่วนที่เกี่ยวกับแบบทดสอบเพื่อการประเมินผล COPD CAT, แบบทดสอบเพื่อการประเมินผล COPD และตราสัญลักษณ์ CAT เป็นเครื่องหมาย การค้าของกลุ่มบริษัท GSK ©2009 GSK สงวนลิขสิทธิ์

3. แบบประเมินความเหนื่อยล้าแบบหลายมิติ (Multidimensional Assessment of Fatigue Scale, MAF)

<u>คำแนะนำ</u>: คำถามเหล่านี้เกี่ยวกับความเหนื่อยล้าและผลกระทบของความเหนื่อยล้าต่อกิจกรรมของคุณในแต่ละคำถามต่อไปนี้ วงกลมล้อมรอบตัวเลขที่แสดงได้ใกล้เคียงมากที่สุดว่า " คุณรู้สึกอย่างไรในช่วง 7 วันที่ผ่านมา"
ตัวอย่างเช่น สมมติว่า คุณชอบนอนตื่นสายจริง ๆ คุณอาจจะวงตัวเลขที่อยู่ใกล้กับคำว่า "มาก" ตรงปลายเส้นมากกว่าเหมือนดังต่อไปนี้:

ตัวอย่าง: ตามปกติแล้ว คุณชอบนอนตื่นสายเพียงใด

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

ตอนนี้ กรุณาทำรายการต่อไปนี้โดยอิงกับ <u>ช่วง 7 วันที่ผ่านมา</u>

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1. คุณรู้สึกเหนื่อยล้าเพียงใด

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

หากไม่เหนื่อยล้า ให้หยุดตรงนี้

2. คุณรู้สึกเหนื่อยล้ารุนแรงเพียงใด

1	2	3	4	5	6	7	8	9	10

เล็กน้อย รุนแรง

3. ความเหนื่อยล้าทำให้คุณมีความทุกข์เพียงใด

1	2	3	4	5	6	7	8	9	10

ไม่มีความทุกข์ มีความทุกข์มาก

แบบประเมินความเหนื่อยล้าแบบหลายมิติ (MAF) (ต่อ)

วงกลมล้อมรอบตัวเลขที่แสดงได้ใกล้เคียงมากที่สุดว่า "ความเหนื่อยล้ารบกวนความสามารถในการทำกิจกรรมต่อไปนี้ของคุณมากน้อยเพียงใด **ในช่วง 7 วันที่ผ่านมา**" สำหรับกิจกรรมที่คุณไม่ได้ทำ ด้วยเหตุผลนอกเหนือจากความเหนื่อยล้า (เช่น คุณไม่ทำงาน เพราะว่าคุณเกษียณแล้ว) ทำเครื่องหมายถูกในช่องว่าง

ในช่วง 7 วันที่ผ่านมา ความเหนื่อยล้ารบกวนความสามารถของคุณมากน้อยเพียงใดในการ:

(หมายเหตุ: ทำเครื่องหมายถูกในช่องว่างทางซ้ายมือของแต่ละตัวเลข หากคุณไม่ได้ทำกิจกรรม)

☐ **4. ทำงานบ้าน**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

☐ **5. ทำอาหาร**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

☐ **6. อาบน้ำ**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

แบบประเมินความเหนื่อยล้าแบบหลายมิติ (MAF) (ต่อ)

(หมายเหตุ: ทำเครื่องหมายถูกในช่องว่างทางซ้ายมือของแต่ละตัวเลข หากคุณไม่ได้ทำกิจกรรม)

☐ **7. แต่งตัว**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

☐ **8. ทำงาน**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

☐ **9. เยี่ยมเยียนหรือพบปะสังสรรค์หรือสมาคมกับเพื่อน ๆ หรือครอบครัว**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

☐ **10. มีกิจกรรมทางเพศ**

1	2	3	4	5	6	7	8	9	10

ไม่เลย มาก

MAF - Thailand/Thai - Version of 25 Jul 14 - Mapi.

ID8210 / MAF_AU1.0_tha-TH.doc

แบบประเมินความเหนื่อยล้าแบบหลายมิติ (MAF) (ต่อ)

(หมายเหตุ: ทำเครื่องหมายถูกในช่องว่างทางซ้ายมือของแต่ละตัวเลข หากคุณไม่ได้ทำกิจกรรม)

☐ **11. มีส่วนร่วมในกิจกรรมสันทนาการ/กิจกรรมยามว่าง**

1 2 3 4 5 6 7 8 9 10

ไม่เลย มาก

☐ **12. เดินซื้อของและทำธุระ**

1 2 3 4 5 6 7 8 9 10

ไม่เลย มาก

☐ **13. เดิน**

1 2 3 4 5 6 7 8 9 10

ไม่เลย มาก

☐ **14. ออกกำลังกาย นอกเหนือจากการเดิน**

1 2 3 4 5 6 7 8 9 10

ไม่เลย มาก

15. ตลอด 7 วันที่ผ่านมา คุณรู้สึกเหนื่อยล้าบ่อยแค่ไหน

4	ทุกวัน
3	เกือบทุกวัน แต่ไม่ทุกวัน
2	บางครั้งบางคราว แต่ไม่เกือบทุกวัน
1	แทบไม่มีสักวัน

16. ความเหนื่อยล้าของคุณเปลี่ยนแปลงเพียงใดในช่วง 7 วันที่ผ่านมา

4	เพิ่มขึ้น
3	มีความเหนื่อยล้าขึ้น ๆ ลง ๆ
2	ยังเหมือนเดิม
1	ลดลง

4. แบบประเมินคุณภาพการนอน (Pittsburgh Sleep Quality Index, PSQI)

คำชี้แจง: แบบสอบถามนี้ใช้ประเมินคุณสมบัติการนอนส่วนใหญ่ของท่าน**ในช่วง 1 เดือนที่ผ่านมา** กรุณาตอบคำถามเหล่านี้ให้ตรงกับความเป็นจริงของ**ช่วงเวลา 1 เดือนที่ผ่านมา** และกรุณาตอบคำถามให้ครบทุกข้อ

1. ใน 1 เดือนที่ผ่านมา ส่วนใหญ่ท่านเข้านอนในเวลาใด

เวลาที่เข้านอนปกติ คือ _____

2. ใน 1 เดือนที่ผ่านมา เมื่อท่านเริ่มเข้านอน ท่านใช้เวลากี่นาที ท่านถึงจะหลับจริง

จำนวนนาที _____

3. ใน 1 เดือนที่ผ่านมา ท่านมักจะตื่นนอนเวลาใด

เวลาตื่นนอนปกติ คือ _____

4. ใน 1 เดือนที่ผ่านมา ส่วนใหญ่ท่านจะหลับได้จริง รวมได้กี่ชั่วโมง (อาจจะไม่เท่ากับจำนวนชั่วโมงที่ผู้ป่วยอยู่บนเตียง) จำนวนชั่วโมงที่หลับได้จริง _____ ต่อคืน

5. ใน 1 เดือนที่ผ่านมา ท่านมีปัญหาในการนอนหลับบ่อยแค่ไหน เนื่องจาก.....	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
5.1 ไม่สามารถหลับได้ภายใน 30 นาที				
5.2 ตื่นกลางดึกหรือตื่นเช้ามากกว่าปกติ				
5.3 ต้องตื่นเข้าห้องน้ำระหว่างการนอน				
5.4 หายใจไม่สะดวก				
5.5 ไอหรือกรนเสียงดัง				
5.6 รู้สึกหนาวหรือเย็นเกินไป				
5.7 รู้สึกร้อนเกินไป				
5.8 ฝันร้าย				
5.9 มีอาการปวด				

	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
5.10 เหตุผลอื่นๆ ที่รบกวนการนอนของท่าน โปรดระบุ ..... จากเหตุผลข้อ 5.10 ในระหว่างเดือนที่ผ่านมา ผู้ป่วยมีปัญหาการนอนเนื่องจากสาเหตุต่างๆ ข้างต้นนี้บ่อยแค่ไหน				
	ดีมาก	ค่อนข้างดี	ค่อนข้างแย่	แย่มาก
6. ใน 1 เดือนที่ผ่านมา ท่านคิดว่าคุณภาพการนอนโดยรวมของท่านเป็นอย่างไร				
	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
7. ใน 1 เดือนที่ผ่านมา ท่านต้องใช้ยานอนหลับ (ทั้งที่ซื้อเองและ/หรือ ตามที่แพทย์สั่ง) เพื่อที่จะช่วยให้นอนหลับบ้างหรือไม่				
8. ใน 1 เดือนที่ผ่านมา ท่านมีอาการง่วงนอนขณะขับรถ ขณะรับประทานอาหารหรือขณะมีกิจกรรมทางสังคมอื่นๆบ้างหรือไม่				

9. ใน 1 เดือนที่ผ่านมา ท่านคิดว่ามีปัญหาการนอนแค่ไหนจากการทำงานไม่สำเร็จเนื่องจากขาดความกระตือรือร้น				
	ไม่มี	นอนคนละห้อง	นอนห้องเดียวกันแต่คนละเตียง	นอนเตียงเดียวกัน
10. มีใครพักร่วมห้องกับท่านหรือไม่				
	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
10.1 กรนเสียงดัง				
10.2 หยุดหายใจขณะหลับ				
10.3 ขากระตุกขณะหลับ				
	ไม่มีเลย	มีน้อยกว่าสัปดาห์ละครั้ง	สัปดาห์ละ 1-2 ครั้ง	สัปดาห์ละ 3 ครั้งขึ้นไป
10.4 สับสนในช่วงนอน				
10.5 ผู้ป่วยมีอาการกระสับกระส่ายระหว่างนอน (โปรดระบุ)				

5. แบบประเมินอาการวิตกกังวลและซึมเศร้า (Hospital Anxiety and Depression Scale Questionnaire, HADS)

คำชี้แจง: แบบสอบถามชุดนี้มีจุดมุ่งหมายที่จะช่วยให้ผู้ดูแลรักษาท่าน เข้าใจอารมณ์ความรู้สึกของท่านในขณะเจ็บป่วยได้ดีขึ้น กรุณาอ่านข้อความแต่ละข้อ และทำเครื่องหมายถูก ในช่องคำตอบที่ใกล้เคียงกับความรู้สึกของท่าน **<u>ในช่วง 1 สัปดาห์ที่ผ่านมา</u>** มากที่สุด และกรุณาตอบทุกข้อ

1. ฉันรู้สึกตึงเครียด			8. ฉันรู้สึกว่าตัวเองคิดอะไร ทำอะไร เชื่องช้าลงกว่าเดิม		
		เป็นส่วนใหญ่			เกือบตลอดเวลา
		บ่อยครั้ง			บ่อยมาก
		เป็นบางครั้ง			เป็นบางครั้ง
		ไม่เป็นเลย			ไม่เป็นเลย
2. ฉันรู้สึกเพลิดเพลินใจกับสิ่งต่างๆที่ฉันเคยชอบได้			9. ฉันรู้สึกไม่สบายใจ จนทำให้ปั่นป่วนในท้อง		
		เหมือนเดิม			ไม่เป็นเลย
		ไม่มากเท่าแต่ก่อน			เป็นบางครั้ง
		มีเพียงเล็กน้อย			ค่อนข้างบ่อย
		เกือบไม่มีเลย			บ่อยมาก
3. ฉันมีความรู้สึกกลัว คล้ายกับว่ากำลังจะมีเรื่องไม่ดีเกิดขึ้น			10. ฉันปล่อยเนื้อปล่อยตัว ไม่สนใจตนเอง		
		มี และค่อนข้างรุนแรงด้วย			ใช่
		มี แต่ไม่มากนัก			ไม่ค่อยสนใจเท่าที่ควร
		มีเพียงเล็กน้อย และไม่ทำให้กังวลใจ			ใส่ใจน้อยกว่าแต่ก่อน
		ไม่มีเลย			ยังใส่ใจตนเองเหมือนเดิม

4. ฉันสามารถหัวเราะและมีอารมณ์ขันในเรื่องต่างๆ			11. ฉันรู้สึกกระสับกระส่าย เหมือนกับจะอยู่นิ่งๆไม่ได้		
		เหมือนเดิม			เป็นมากทีเดียว
		ไม่มากนัก			ค่อนข้างมาก
		มีน้อย			ไม่มากนัก
		ไม่มีเลย			ไม่เป็นเลย
5. ฉันมีความคิดวิตกกังวล			12. ฉันมองสิ่งต่างๆในอนาคต ด้วยความเบิกบานใจ		
		เป็นส่วนใหญ่			มากเท่าที่เคยเป็น
		บ่อยครั้ง			ค่อนข้างน้อยกว่าที่เคยเป็น
		เป็นบางครั้ง แต่ไม่บ่อย			น้อยกว่าที่เคยเป็น
		นานๆครั้ง			เกือบจะไม่มีเลย
6. ฉันรู้สึกแจ่มใสเบิกบาน			13. ฉันรู้สึกผวาหรือตกใจขึ้นมาอย่างกระทันหัน		
		ไม่มีเลย			บ่อยมาก
		ไม่บ่อยนัก			ค่อนข้างบ่อย
		เป็นบางครั้ง			ไม่บ่อยนัก
		เป็นส่วนใหญ่			ไม่มีเลย
7. ฉันสามารถทำตัวตามสบาย และรู้สึกผ่อนคลาย			14. ฉันรู้สึกเพลิดเพลินไปกับการอ่านหนังสือ ฟังวิทยุ หรือดูโทรทัศน์ หรือกิจกรรมอื่นๆ ที่เคยเพลิดเพลินได้		
		ได้ดีมาก			เป็นส่วนใหญ่
		ได้โดยทั่วไป			เป็นบางครั้ง
		ไม่บ่อยนัก			ไม่บ่อยนัก
		ไม่ได้เลย			น้อยมาก

The Instrument for Inclusion Criteria

แบบประเมินการประเมินความสามารถเชิงปฏิบัติดัชนีจุฬาเอดีแอล (The Chula Activity of daily living index : CAI)

1. Walking outdoor (เดินหรือเคลื่อนที่นอกบ้าน)
   - 0 เดินไม่ได้
   - 1 ใช้รถเข็น และช่วยตัวเองได้ หรือต้องการคนประคอง 2 ข้าง
   - 2 ต้องการคนช่วยพยุง หรือไปด้วยตลอด
   - 3 เดินได้เอง (รวมทั้งที่ใช้เครื่องช่วยเดิน เช่น walker)
2. Cooking (ทำหรือเตรียมอาหาร/ หุงข้าว)
   - 0 ทำไม่ได้
   - 1 ต้องการคนช่วยในการทำ หรือจัดเตรียมบางอย่างไว้ล่วงหน้า จึงจะทำได้
   - 2 ทำเองได้
3. Heavy house work (ทำความสะอาดถูบ้าน/ ซักรีดเสื้อผ้า)
   - 0 ทำไม่ได้/ ต้องมีคนช่วย
   - 1 ทำได้เอง
4. Money exchange (ทอนเงิน/ แลกเงิน)
   - 0 ทำไม่ได้/ ต้องมีคนช่วย
   - 1 ทำได้เอง
5. Public transport (เช่น การใช้บริการรถเมล์ รถสองแถว)
   - 0 ไม่สามารถทำได้
   - 1 ทำได้แต่ต้องมีคนช่วยดูแลไปด้วย
   - 2 ไปมาได้เอง

APPENDIX F

A Booklet, The Diary Log, Video clips, and a Line official Account of a Symptom Management Program

A Booklet

2

คำนำ

3

สารบัญ

A Daily log


แบบบันทึกการปฏิบัติกิจกรรมการเดินสมาธิ การหายใจแบบห่อปาก และการนับจำนวนก้าวเดินในแต่ละวันเมื่ออยู่ที่บ้าน


แบบฝึกประสบการณ์อาการที่พบบ่อยในผู้ป่วยโรคปอดอุดกั้นเรื้อรังด้วยตนเองเมื่ออยู่ที่บ้าน

A Video Clip of Walking Meditation

Video Clip of Walking Meditation Training

Video Clip for Using a Pedometer Promotes Walking in Daily Life

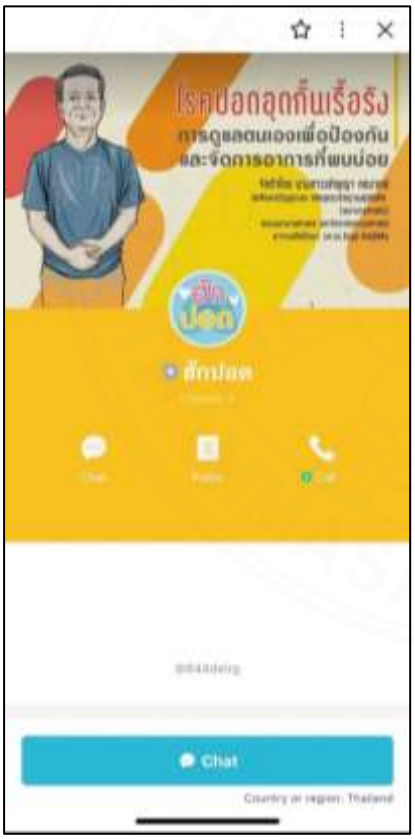
Video Clip of Pursed Lip and Effective Cough

Video Clip of Position to Alleviate Dyspnea During Exertion

Video Clip of Proper Posture While Doing Activities

Video Clip for Demonstrating the Appropriate Technique for Administering Bronchodilators

Line Official Account



BIOGRAPHY

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Work Experiences

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2003-2005:	Registered Nurse, Internal Medicine Ward (Male 1), Khonkaen Hospital

Publications

1. Kochamat, A., Hornboonherm, P., Wongpiriyayothar, A., & Sittipakorn, S. (2018). Relationships between dyspnea and fatigue in the elderly patients with chronic obstructive pulmonary disease (COPD). *Journal of Science and Technology Mahasarakham University*, *14*, 564–572.
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9. Kochamat, A., Hornboonherm, P., Wongpiriyayothar, A., & Eungpinithpong, W. (2010). The Trendall Fatigue Tool: An application in a patient with COPD in northeast Thailand. *The Malaysian Journal of Nursing*, *1*(3), 34–39. (A part of the Master's degree thesis title: Effects of modified Thai Massage on reducing fatigue in patients with chronic obstructive pulmonary disease)

แบบฟอร์มการอนุญาตให้บัณฑิตวิทยาลัย
พิมพ์วิทยานิพนธ์/ สารนิพนธ์ เพื่อเผยแพร่ทางวิชาการ

เขียนที่ คณะพยาบาลศาสตร์ มหาวิทยาลัยธรรมศาสตร์
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ข้าพเจ้า (~~นาย, นาง,~~ นางสาว) .....อภิญญา.....**นามสกุล** .....คชมาตย์

คณะ พยาบาลศาสตร์ **สาขา** พยาบาลศาสตร์

เลขทะเบียนนักศึกษา 6214320092.

ซึ่งเป็นผู้จัดทำวิทยานิพนธ์/ สารนิพนธ์ เรื่อง

(ภาษาไทย) ผลของโปรแกรมการจัดการอาการต่อประสบการณ์อาการและการทำหน้าที่ทางกายภาพในผู้ใหญ่โรคปอดอุดกั้นเรื้อรัง

(ภาษาอังกฤษ) The Effects of a Symptom Management Program on Symptom Experience and Physical Function in Adults with Chronic Obstructive Pulmonary Disease

ยินยอมให้ บัณฑิตวิทยาลัย มหาวิทยาลัยธรรมศาสตร์ จัดพิมพ์ หรือมอบอำนาจให้บัณฑิตวิทยาลัยอนุญาตให้บุคคลอื่นจัดพิมพ์วิทยานิพนธ์/ สารนิพนธ์ ของข้าพเจ้าเพื่อเผยแพร่ผลงานวิทยานิพนธ์/สารนิพนธ์ฉบับเต็มในรูปอิเล็กทรอนิกส์ได้ โดยลิขสิทธิ์วิทยานิพนธ์/ สารนิพนธ์ยังเป็นของข้าพเจ้า

ลงชื่อ .....

(นางสาวอภิญญา คชมาตย์)