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Healthy living with COPD: a telehealth self-management program for patients with chronic obstructive pulmonary disease (COPD)

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Doctoral Project

HEALTHY LIVING WITH COPD:

A TELEHEALTH SELF-MANAGEMENT PROGRAM FOR PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

by

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But as it is written, eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love him.

1 Corinthians 2:9

DEDICATION

I would like to dedicate this work to my beautiful family for their pray and ongoing encouragement throughout the doctoral project and my wife, Hannah, who inspire and support my life accomplishment.

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable respiratory disease that was the third leading cause of death in 2019, accounting for 3.2 million people globally.

An exhaustive literature review indicates that treating COPD is a long, ongoing, multisystem process. Three central factors influencing COPD care and the resulting morbidity, including the heath care service model and access to care, professionals' knowledge and behaviors, and each patient's personal factors. Without proper care, shortness of breath and dyspnea progress leading to deterioration in activity tolerance and participation. The COVID-19 pandemic led to suspending or reducing outpatient and primary care services in Hong Kong and worldwide. The resulting restrictions in patient access to care lead to poor COPD management, including deterioration of quality of life, increased frequency of acute conditions, hospital readmission, and mortality.

Healthy Living With COPD is a 6-month telehealth-based self-management program for people with COPD. The theoretical basis of *Health Living With COPD* draws from two main models: the social cognitive theory and the electronic health-

enhanced chronic care model. It is designed to empower participants in managing their health and wellness by improving their access to, knowledge in, and self-efficacy for managing their health, wellness, and quality of life. The program has four essential components to generate clinical evidence: Self-management education, supervised health qigong (baduanjin), online health coaching, and virtual community.

This doctoral project includes a plan for the target audience, dissemination activities, and budget to magnify the program's visibility and enhance the implementation scale.

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LIST OF ABBREVIATIONS

6MWD ..... 6 Minute Walking Distance

ADL ..... activity of daily living

AECOPD ..... acute exacerbation of COPD

BCT ..... behavioral change technique

CAP ..... community-acquired pneumonia

CAT ..... COPD Assessment Test

CCM ..... chronic care model

CFL ..... complete feedback loop

CI ..... confidence interval

CMRADLQ ..... Chinese Manchester Respiratory ADL Questionnaire

COPD ..... chronic obstructive pulmonary disease

COPD-Q ..... Clinical COPD Questionnaire

CRQ ..... Chronic Respiratory Questionnaire

CRT ..... clustered randomized control trial

eCCM ..... electronic health-enhanced chronic care model

FEV1 ..... forced expiratory volume in 1 sec

FVC ..... forced vital capacity

GOLD ..... Global Initiative for Chronic Obstructive Lung Disease

HA ..... Hospital Authority

HADS ..... Hospital Anxiety and Depression Scale

HF ..... heart failure

HKD ..... Hong Kong dollar

HQG ..... health qigong

HRQoL ..... health-related quality of life

ICU ..... intensive care unit

IDM ..... integrated disease management

IRB ..... Internal Review Board

MCID ..... minimum clinically important difference

MD ..... mean difference

mMRC ..... Modified Medical Research Council Dyspnea Scale

PCOPD ..... COPD with community-acquired pneumonia

PCP ..... primary care physician

QoL ..... quality of life

RCT ..... randomized controlled trial

SCT ..... social cognitive theory

SF-36 ..... 36-Item Short Form Health Survey

SGRQ ..... St. George's Respiratory Questionnaire

SME ..... self-management education

SMI ..... self-management intervention

SpO2 ..... oxygen saturation

TDF ..... theoretical domains framework

CHAPTER ONE – Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease characterized by persistent respiratory symptoms and airflow limitation due to airway and/or alveolar abnormalities. These are usually caused by significant exposure to noxious particles or gases and influenced by host factors, including abnormal lung development (Global Initiative for Chronic Obstructive Lung Disease [GOLD], 2022). It is one of the world's most important causes of morbidity and mortality (Vogelmeier et al., 2017). In 2019, COPD was the third leading cause of death, accounting for 3.2 million people globally (World Health Organization, 2022), and the eighth leading cause of death in Hong Kong (Centre for Health Protection, 2019). Treating COPD has significant financial impacts on health care systems; it accounts for approximately 4% of all public hospital annual admissions in Hong Kong (Chan et al., 2011) and is a leading cause for hospital readmissions (Cakir & Gammon, 2010; Shah et al., 2015; Strassels et al., 2001; Sullivan et al., 2000). As a common diagnosis associated with hospital readmission within 30 days, COPD exhibits a great impact on hospital stays and heath care expenses in Hong Kong and worldwide (Cakir & Gammon, 2010; Chan et al., 2011).

The results of COPD lead to a vast reduction in functional status, including decreased exercise capacity, dyspnea, and fatigue. These have a progressive and negative impact on health-related quality of life and activities of daily living (ADL) (GOLD, 2022; Junkes-Cunha, 2016; Yohannes et al., 2000). People with COPD may become partially or totally limited in their ADL (Miller et al., 2005). They have reduced lung function with

limited energy expenditure and functional capacity to meet exertional demands. Because increased shortness of breath and dyspnea can induce fear of participating in daily activities, people with COPD may become progressively sedentary as their activity tolerance deteriorates over time.

The Influence of the COVID-19 Pandemic on COPD Care

In Hong Kong, Nurse and Allied Health Clinics–Respiratory Management has provided a multidisciplinary primary and secondary service for patients with COPD under the catchment of New Territories East Cluster, Hospital Authority since September 2009. The service has been suspended since February 2020 due to the COVID-19 infectious disease pandemic. Under the Hospital Authority's emergency response level, all outpatient services with a high risk of airborne or droplet transmission were suspended to meet the infectious control measures. Furthermore, patients with COPD were indecisive about joining the pulmonary education and training program in the clinic due to a higher risk of being infected.

The Role of Occupational Therapy in COPD Care

Occupational therapy is a profession concerned with "achieving health, well-being and participation in life through engagement in occupation" (American Occupational Therapy Association, 2020). As occupational therapists, we are skilled in evaluating and creating occupation-based interventions in all aspects of the domain and addressing the interrelationships of factors and the client within their contexts and environments. Therefore, the response to the functional limitations caused by COPD falls well within our professional domain and practice concerns in respiratory care.

Occupational therapists work with people who have COPD in several ways (Koolen et al., 2021; Peterson et al., 2011)

- Educating patients on the symptoms of breathlessness and fatigue
- Teaching proper breathing techniques while performing daily activities to help with shortness of breath
- Teaching methods and providing assistive devices to adapt the environment to undertake showing, dressing, and other ADLs
- Teaching energy conservation and work simplification techniques so people have the energy to do what they enjoy
- Improving upper-limb strength through exercise training
- Teaching ways to relax and manage stress while performing meaningful occupations

The coronavirus disease (COVID-19) is a newly discovered infectious disease that widely spreads globally. It became an ongoing pandemic with more than 77 million people infected and over 1.7 million dead from the disease (The Johns Hopkins Coronavirus Resource Center, 2020). The COVID-19 outbreak in Hong Kong started in January 2020 and experienced four waves. To control the spread of the disease, the government and hospital announced various preventive measures, such as suspending high-risk clinical procedures (e.g., spirometry, limited outpatient services with strict social distancing, closing public and community facilities, and requiring people to wear masks in public places; Hong Kong Special Administrative Region Government, 2021). These measures could be challenging for the population of older adults, especially those

with COPD. Excessive health stressors or worries of infection lead to isolation and physical inactivity. This could harm one's well-being, leading to serious health problems, such as the increased risk of chest infection, depression, anxiety, and somatic symptoms (Interagency Standing Committee, 2020; McCabe et al., 2017; Tansey et al., 2007).

Project Overview

Healthy Living With COPD is a telehealth-based, home-care program for individuals with COPD developed as part of this doctoral project. This theory-driven, evidence-based program combines primary-care occupational therapy for health promotion and prevention services. The *Healthy Living With COPD* program draws from evidence-based therapy approaches and principles that empower participants to manage their health and wellness. This 6-month program includes six sessions of self-management educational (SME) content, supervised-8-style online health qigong (HQG), weekly/biweekly online health coaching, and ongoing support and discussion in a virtual community. The project will raise awareness and seek continuous support in promoting respiratory care in the new era of primary-care settings.

Chapter 2 of this doctoral project reviews the theory and evidence explaining the problems of maintaining optimal COPD care and outcomes. An explanatory model constructed by the author outlines the complexities of COPD management, including patient characteristics, access to care, professionals' knowledge and awareness, and heath care service models contributing to poor health outcomes.

Chapter 3 reviews the evidence of the interventions' effectiveness in promoting the health and wellness of people with COPD and effective access to COPD care. The

synthesis of the evidence points to multiple benefits of SME programs, HQG, and telerehabilitation and serves as the foundation for the proposed program.

Chapter 4 includes a detailed description of the proposed program, *Healthy Living With COPD*, including a logic model and the key elements that informed the overall design and implementation considerations for primary-care settings in Hong Kong.

Chapter 5 presents the program evaluation plan aimed at measuring the program outcomes and outputs. Chapters 5, 6, and 7 present the program evaluation, funding, and dissemination plan. Conclusions are presented in Chapter 8.

Impact of the Project

Successful implementation and positive outcomes will promote the patient's self-efficacy in COPD self-management and enhance physical activity in daily activities. It is the author's hope that the pilot of *Healthy Living With COPD* will provide an impetus for transformation and expansion of occupational therapy services across all seven clusters under the catchment of the Hospital Authority throughout Hong Kong.

CHAPTER TWO – Project Theoretical and Evidence Base

Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease. However, it is one of the most prevalent causes of morbidity and mortality globally (Vogelmeier et al., 2017). It is the third leading cause of death in 2019, accounting for 3.2 million people globally (World Health Organization, 2022), and the eighth leading cause of death In Hong Kong (Centre for Health Protection, 2019).

The disease is characterized by persistent respiratory symptoms and airflow limitations due to airway and alveolar abnormalities. These are usually caused by significant exposure to noxious particles or gases and influenced by a host of factors, including abnormal lung development (Global Initiative for Chronic Obstructive Lung Disease [GOLD], 2022). It is a common diagnosis associated with unplanned hospital readmission within 30 days (Cakir & Gammon, 2010). The outbreak of COVID-19 led to the suspension or reduction of outpatient and primary care services for COPD worldwide. The resulting restrictions in patient access to care increased exacerbation and functional deterioration risks. This chapter aims to present and validate an explanatory model of the factors influencing optimal COPD care.

Explanatory Model of Factors Influencing COPD Care

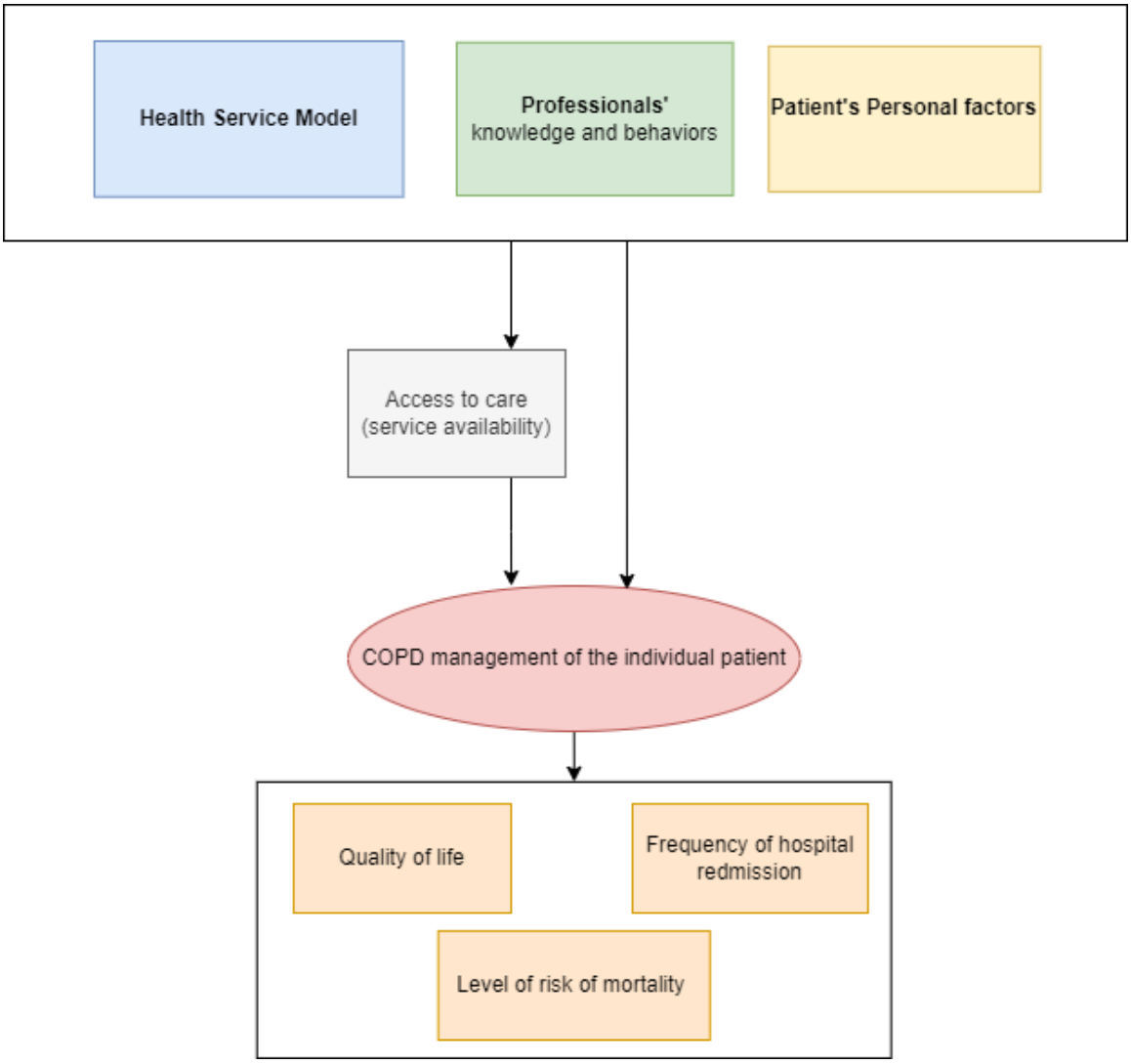
Figure 2.1 illustrates an explanatory model developed as part of this doctoral project based on published research on the main causal factors influencing COPD management. The model demonstrates that COPD management for individual patients is influenced by the health service model, professionals' knowledge and behaviors, and the

patients' personal factors. It is also mediated by access to care and service availability.

The effective (or ineffective) management of COPD influences the patient's quality of life (QOL), frequency of acute conditions, hospital readmission, and mortality. Evidence supporting the factors in the model (Appendix A) are further explained in the following sections. First is a review of the complexities of COPD management and the outcome of poor management at the individual level. Next is a discussion of the barriers to and factors that influence access to care and care quality, including the characteristics of people with COPD, professionals' knowledge and behaviors, and heath care service models. Finally, the health outcomes of poor COPD management, including reduced QOL, increased frequency of acute conditions, hospital readmission, and mortality, will be discussed.

Figure 2.1

Explanatory Model of Causal Factors Influencing COPD Management and Outcomes



COPD Management at the Individual Patient Level

The theoretical lens used to understand the best practice in COPD care is based on Vanfleteren et al.'s (2016) review and framework (Figure 2.2). This disease is a chronic condition that requires careful ongoing management. People with COPD deal with reduced lung function with limited energy expenditure and functional capacity for

meeting exertional demands. Increased shortness of breath and dyspnea often induce fear of participating in daily activities. People may become progressively sedentary as their activity tolerance deteriorates over time.

Figure 2.2

Comorbidities and treatment strategies in COPD (based on Vanfleteren et al., 2016)

Adapted from "Management of chronic obstructive pulmonary disease beyond the lungs," by C. F. Vanfleteren, M. A. Spruit, E. Wouters, and F. Franssen, 2016, *The Lancet: Respiratory Medicine, 4*(11), p.912 (https://doi.org/10.1016/S2213-2600(16)00097-7). Copyright 2016 by the Lancet Group.

Vanfleteren et al. (2016) explained in their expert review that COPD management goes well beyond the lungs. Common comorbidities include cardiovascular disease, osteoporosis, muscle wasting, underweight and obesity, metabolic disorders, and anxiety

and depression. In addition, the signs and symptoms of COPD are highly associated with the person's adherence to a health regimen, respiratory hygiene, cough etiquette, and environment and weather conditions (Bourbeau & Bartlett, 2008; Hansel et al., 2016; Nicholson, 2015).

Optimal COPD care includes an interprofessional team that can provide appropriate drug treatment, nutrition counseling and modulation, physical activity coaching, energy conservation, exercise training, self-management, and psychological counseling. The presence of co-occurring, chronic, noncommunicable diseases and other physical and psychological manifestations must be addressed to characterize and manage the needs of individual patients with COPD (Vanfleteren et al., 2016). The GOLD (2022) strategy document recommended guidelines for managing comorbidities, suggesting it should be personalized for the individual. Poot et al. (2021) emphasized the multiple components of enhanced COPD management. (See Appendix B for details.)

Access to COPD Care

A comprehensive literature search yielded four systematic reviews (Brundisini et al., 2013; Clari et al., 2018; Cox et al., 2017; May et al., 2016) and one literature review (Cooke et al., 2012) from Europe, North America, the Asia-Pacific region, and Australia. The findings confirmed the influence of access to care on COPD care (Appendix C) and identified sources that influence access to care. Cooke et al. (2012) summarized three factors affecting access to care for COPD patients—provider, system, and patients—and gave examples, such as appropriate management of COPD service, insurance coverage, and access to proper puff medications. Results of the systematic

reviews by Brundisini et al. (2013), Clari et al. (2018), and Cox et al. (2017) provided evidence of a myriad of factors that influence access to care, including the location of service provision, lack of transport service, wait time, burden of illness, health system resources, fragmented care with lack of communication, modalities of access to the services, and sanitary facilities with physical and architectural barriers.

The quality of the four systematic reviews of qualitative studies (Brundisini et al., 2013; Clari et al., 2018; Cox et al., 2017; May et al., 2016) was good with representative sampling. Several included studies were from the United Kingdom, whose health system is similar to the system in Hong Kong. However, its generalizability to the Chinese population was limited because most of the studies were conducted on the Western population.

Patient Personal Factors

A comprehensive literature search found one systematic review (Bhattarai et al., 2020) and five literature reviews (Bender et al., 2014; Blackstock et al., 2016; Cooke et al., 2012; Dekhuijzen et al., 2018; Nakken et al., 2015) that addressed sources of the patients' personal factors influencing COPD care. They demonstrate that patient nonadherence was multifactorial and influenced by the patient, clinician, and society (Bourbeau & Bartlett, 2008; Dekhuijzen et al., 2018).

Clinical inertia is broadly defined as "recognizing the problem but failing to act" (Philips et al., 2001). It includes patients' nonadherence to the prescribed treatment, therapeutic inertia (providers fail to initiate medications or to intensify treatment), and inappropriate therapy (Allen et al., 2009). Reasons for clinical inertia in managing

nonadherence can be classified into provider, patient, and system factors. Cooke et al. (2012) and Bhattarai et al. (2020) conducted systematic reviews of medication nonadherence among COPD patients; rates of nonadherence ranged from 22% to 93%. Most of the studies came from high-income countries.

Nakken et al. (2015) and Blackstock et al. (2016) identified six dimensions of medication nonadherence as outlined by the World Health Organization. These are:

1. Social/economic (e.g., illiteracy, transportation)
2. Health system (e.g., insurance coverage), dissatisfaction with the treating physician, and limited interaction between clinicians and patients
3. Therapy-related (e.g., polypharmacy)
4. Condition-related (e.g., fragility), severity of the disease, and concern about the medicine's harmful effects
5. Patient-related (e.g., self-efficacy, knowledge)
6. Informal caregiver (e.g., overprotection)

Low social and economic status and inadequate family and social support negatively affect most health conditions, including COPD (Barton et al., 2015; Lowe et al., 2018). People with COPD who live in remote places far from a health care center and do not have access to transportation may have limited ability to receive services (Stokes et al., 2019).

On the other hand, people's attitude, including perceptions of the COPD severity, influences their willingness to participate in the demanding health regiments required to manage COPD (Dekhuijzen et al., 2018). The severity of COPD cannot be merely

documented by subjective measures such as self-reported dyspnea at rest or with exertion, chronic cough with or without sputum production, or a history of wheezing: COPD severity must be regularly assessed for airflow obstruction by spirometry and combined with results from various subjective and objective evaluations (Johns et al., 2014). In addition, Blackstock et al. (2016), Bender (2014), and Bhattarai et al. (2020) pointed out the importance of psychological issues, such as anxiety, social isolation, and inadequate social support and depression, as factors contributing to nonadherence.

Finally, the presence of an informal caregiver is an essential factor influencing COPD care (Marques et al., 2021; Nakken et al., 2015). The company of an informal caregiver provides practical help and emotional support in COPD management. However, informal caregiving may lead to anxiety, depression, social isolation, and a changed relationship with the patient. Nevertheless, the research suggested that overprotective caregivers can make patients more dependent.

The quality of the systematic review by Bhattarai et al. (2020) was good, and it included original studies from the Asia-Pacific region. The five literature reviews (Bender et al., 2014; Blackstock et al., 2016; Cooke et al., 2012; Dekhuijzen et al., 2018; Nakken et al., 2015) provided qualitative evidence about the effect an informal caregiver's presence, dimensions, and factors associated with nonadherence. It used informal or subjective methods to collect and interpret studies, so the findings may be biased.

A variety of patient factors influences the care of their COPD and supported their inclusion in the proposed explanatory model. Based on the evidence, Bhattarai et al.

(2020) proposed solutions to medication nonadherence, including addressing the patient's belief in the medication, better understanding of their disease and drug therapy, confidence in the health care professionals' expertise, reducing the number of inhaler devices and the dosing regimen, repeating instructions, and reinforcing the potential for better QOL and satisfaction with their inhaler devices and less frequent exacerbation. Cooke et al. (2012) and Dekhuijzen et al. (2018) suggested a coordinated, multifaceted approach to improving COPD care and adherence, including the use of health informatics, changes in provider workflow, application of objective and performance measures, stimulating patient empowerment, and education and training. Bender et al. (2014) and Dekhuijzen et al. (2018) suggested mobile telephone technology and electronic monitoring and devices as alternative solutions. Informal caregivers should be involved because the solutions could improve QOL for patients and their informal caregivers and save heath care costs.

Professional Awareness and Knowledge of COPD Management Among Health Professionals

Professionals' awareness and knowledge play an essential role in the referral to and delivery of appropriate and effective treatment. A comprehensive literature search yielded one qualitative study (Banfi et al., 2018), one literature review (Cooke et al., 2012), and two cross-sectional surveys (Davis et al., 2014; Menezes et al., 2015) from around the world demonstrating the influence of professionals' knowledge and behaviors on the quality of COPD care.

The findings support the proposition that professionals' knowledge and—even

more so, their behaviors—are key to improving best-practice care and management of COPD. The positive doctor–patient relationship, including listening and understanding, can also help patients adhere more to treatment, improve their lifestyle, resume activities interrupted because of failing health, and improve their QOL.

Evidence from Cooke et al. (2012) suggested that provider factors may affect the appropriate management of COPD, including understanding and attitudes toward the disease and awareness of guidelines. Davis et al. (2014) conducted an international cross-sectional survey that indicated a gap when physicians adopted the guidelines in COPD treatment choice. In another cross-sectional study, Menezes et al. (2015) concluded that the health care system delivery and direct costs to patients affected physicians' decisions in multiple countries. There is a gap between physicians and patients regarding the causal role of smoking in COPD. The survey highlighted that 78% of physicians agreed with the statement, "Smoking is the cause of most cases of COPD" (Menezes et al., 2015). However, fewer patients (38%) agreed on that causal linkage.

The evidence presented here supports the connection between professionals' knowledge and behaviors and COPD care as it appears in the explanatory model. Although the quality of the literature review was lower, the evidence Cooke et al. (2012) provided recommended a multifaceted approach to enhancing the clinical inertia in managing COPD. The review evidence supports the influence of professionals' knowledge and behaviors factors underpinned in the explanatory model.

Based on the evidence, solutions should address a multifaceted approach (Cooke et al., 2012), a positive doctor–patient relationship (Banfi et al., 2018), local health

system and delivery, direct costs to patients, the causal role of smoking in COPD (Menezes et al., 2015), and adoption of guidelines in COPD treatment choice (Davis et al., 2014).

Heath Care Service Model and Access to Care

The service model of heath care management and administration can act as a barrier to facilitating COPD care. Current infection control measures guide the setup of service provision locations. Places that are not up to infection control standards cannot provide care, which inhibits access to care. Inconsistent COPD care and referral pathways; fragmented COPD services, interventions, and resources; multidisciplinary teams not working; and miscommunication were the identified barriers under the catchment of current service provision (Ogunbayo et al., 2017).

A comprehensive literature search yielded five meta-analyses (Cox et al., 2021; Janjua, Banchoff et al., 2021; Janjua, Carter et al., 2021; Poot et al., 2021; Schrijiver et al., 2022), one systematic review (Roberts et al., 2018), and one critical review (Lemmens et al., 2013) that evaluated that the effectiveness of different health service models on the effectiveness of COPD care. The findings confirmed that integrated disease management (IDM) programs contributed to efficient quality care. These programs included different heath care professionals, such as family and respiratory physicians, nurses, physiotherapists, and occupational therapists.

Poot et al. (2021) summarized the meta-analysis of 52 worldwide randomized controlled trials on IDM. Those authors indicated various components of care that enhanced COPD management, including organizational, professional, patient-directed,

and financial interventions. The quality of two cross-sectional studies by Davis et al. (2014) and Menezes et al. (2015) were good with representative sampling. However, there was limited generalizability to Asia counties and developing countries because fewer physicians or respiratory specialists were from these counties. However, services promoted regular meetings with family physicians and health professionals and referred all COPD patients to attend the self-management program as mandatory. These types of services facilitate effective care and reduce the risk of acute exacerbation (Park et al., 2020). In addition, introducing telehealth services and normalizing COPD self-management into routine practice would enhance coordinated COPD primary and secondary management in Hong Kong.

Health Outcomes

Suboptimal management of COPD reduces patients' QOL and increases their risk of acute exacerbation of COPD (AECOPD), leading to hospital admission and readmission—and increase their risk of mortality. A comprehensive literature search yielded six meta-analyses (Alqahtani et al., 2020; Axson et al., 2020; J. Guo et al., 2020; Jiang et al., 2015; Yu et al., 2021) and one systematic review (Njoku et al., 2020) from around the world that addressed sources of morbidity and mortality from COPD care. The findings demonstrated high morbidity and mortality rates resulting from poor COPD care, including a high crude fatality rate of COVID-19 (7.4%), 1.45 times more likely with severe complications with current smokers (Alqahtani et al., 2020). Evidence from Axson et al. (2020) highlighted that patients with comorbid COPD and heart failure are at a 1.61 times higher risk of all-cause mortality and 2.01 times for COPD-related hospitalization

than COPD patients without heart failure. The adjusted risk ratio is 1.01 for 30 days and 1.11 for 1 year of COPD rehospitalization. Njoku et al. (2020) suggested that the prevalence of COPD-related readmission varied from 2.6 to 82.2% at 30 days and 25.0–87.0% at 12 months post discharge.

J. Guo et al.'s (2020) meta-analysis showed that 24% of patients had one or more severe exacerbation in the previous year. Moderate and severe exacerbations were associated with worsening from baseline in health-related QOL (HRQoL) and lung function in patients with COPD. Contradictory evidence was found in Jiang et al.'s (2015) systematic review and meta-analysis. This publication suggested that COPD does not associate with increased mortality in hospitalized community-acquired pneumonia (CAP), longer hospital stays, more frequent intensive care unit (ICU) admissions, or greater need for mechanical ventilation. In Yu et al.'s (2021) systematic review and meta-analysis, the coexisting CAP and acute COPD exacerbation were associated with higher mortality, longer hospital stays, more need for mechanical ventilation, and more ICU admissions in hospitalized COPD patients. Still, CAP was not associated with more extended ICU stay or a higher readmission rate.

Evidence Quality Appraisal

The meta-analysis and systematic review were good, including several morbidities and mortality studies from Asia-Pacific and China. The systematic review by Alqahtani et al. (2020) analysis of epidemiological and cross-sectional studies about the prevalence of COPD and COVID-19 was 2% (95% CI, 1%–3%). Variations in COPD-related readmission rates reported by Njoku et al. (2020) and Axson et al. (2020) may

reflect variations in the local context, such as the availability of community-based services to care for exacerbations of COPD.

The evidence presented here supports the danger of morbidity and mortality related to poor COPD care as it appears in the explanatory model. The key factors that increase the risk of mortality include a history of COVID-19 infection, current smoker, presence of heart failure, one or more moderate or severe exacerbations in the previous year, poor baseline HRQoL, and lung function.

Summary and Conclusions

Based on the evidence, solutions should address a multifaceted, innovative delivery format supporting rural patients attending training (Brundisini et al., 2013; Cooke et al., 2012), addressing personal and health care system environment barriers in access to care (Clari et al., 2018; Cox et al., 2017) and patient and caregiver values (May et al., 2016).

The evidence presented here supports the solid causal connection between the factors of health service models, professionals' knowledge, and client factors on access to care and the effectiveness of COPD care as it appears in the explanatory model. A review of effective solutions for effective access to COPD care is reviewed in the next chapter.

CHAPTER THREE – Overview of Current Approaches and Methods

Introduction

This doctoral project aims to improve the community's access to care and efficacy in self-managing chronic obstructive pulmonary disease (COPD), a chronic, preventable, and treatable disease. It is characterized by progressive airflow limitation and inflammation. Suboptimal clinical management is associated with increased unplanned hospital readmission within 30 days (Cakir & Gammon, 2010) and reduced health status and wellness.

Chapter 2 of this academic paper presented an explanatory model of the sources of complexity in effective COPD care. This chapter presents a critical review of authoritative evidence of interventions to promote the health and wellness of people with COPD. The evidence is organized according to three key ingredients: telerehabilitation, health qigong (HQG), and self-management education (SME) programs. Full details of the supportive evidence can be found in Appendix C.

Self-Management Educational Programs Influence the Health Status of Patients With COPD

A comprehensive literature search yielded eight meta-analyses and systematic reviews (Helvaci & Gel Metin, 2020; Jolly et al., 2018; Lenferink et al., 2017; Newham et al., 2017; O'Connell et al., 2021; Schrijver et al., 2022; Song et al., 2021; Wang et al., 2017), one systematic review (Shnaigat et al., 2021), three literature reviews (Barrecheguren & Bourbeau, 2018; Bourbeau & Echevarria, 2020; Cravo et al., 2022), and one scoping review (Nohra et al., 2020) from around the world (most from developed

and Western countries, including the United States, the United Kingdom, and the Netherlands). These studies confirmed the positive influence of an integrated, SME program on the health status of patients with COPD. Furthermore, COPD self-management interventions (SMIs) were deemed safe and unlikely to cause harm (Schrijver et al., 2022).

Bourbeau et al. (2020) summarized three SMI models of care across the continuum of exacerbations: (a) chronic care and SMIs with an action plan, (b) domiciliary care for severe exacerbation and its impact on readmission prevention, and (c) a discharge care bundle for management beyond the acute exacerbation. All three interventions aim to improve quality outcomes, enhance patient well-being, and reduce exacerbation complications such as hospital admissions/readmissions. Interventions should focus on controlling costs by avoiding hospitalizations. The authors recommended that future models of care should be personalized—providing patient education aimed at behavioral changes, identifying and treating comorbidities, and including outcomes that measure the quality of care. A COPD written action plan for adherence can be further used and enhanced with telehealth technologies in a specialized clinic experienced in COPD self-management. A complete feedback loop (CFL) process should be implemented to constantly assess whether the desired outcomes are being achieved for a patient with personalized self-management in COPD (Barrecheguren & Bourbeau, 2018; Bourbeau & Farias, 2018). The program durations typically ranged from 1 month to at least 2 years (Jolly et al., 2018).

Telemedicine can be an adjunct to self-management approaches, assisting proper

heath care coaching (Bourbeau & Echevarria, 2020). Cravo et al. (2022) recommended the following keys to success in COPD self-management plans:

- better education for health care professionals on disease management and consultation skills;
- new targets and priorities for patient-focused outcomes;
- skills-gap audits to identify barriers to self-management;
- best-practice sharing within primary care networks and ongoing professional development;
- enhanced initial consultations to establish optimal self-management from the outset; and
- negotiation and sharing self-management plans at the point of diagnosis.

Helvaci and Gok Metin (2020) listed the content of the self-management program, including intervention strategies and common assessment and training tools. Helvaci and Gok Metin's self-management program's content mostly included anatomical structures of respiratory ways and lungs, pathophysiology, common symptoms, progress and disease stages, conventional medications, exacerbation management, daily exercises, and breathing retraining. It also focused on energy conservation techniques, lifestyle changes, smoking cessation, coping with anxiety and stress, training family caregivers, and nutritional issues. Jolly et al. (2018) recommended that the self-management program identify support that helps people self-manage and adapt to life with mild/moderate COPD, reducing the impact of this slowly progressive condition in primary or community settings. O'Connell et al. (2021) identified self-management support

preferences as helping people engage with self-management support and facilitating better self-management, including types of support, support relationships, and accessibility.

Substantial evidence concluded that SMIs with a COPD exacerbation action plan were associated with improved health-related (HRQoL) and reduced emergency department visits over 12 months (Lenferink et al., 2017; Newham et al., 2017; Schrijver et al., 2022; Song et al., 2021; Wang et al., 2017). It suggested that effective interventions include iterative interactions between participants and heath care professionals using behavioral change techniques. Applying SMIs elicits participants' motivation, confidence, and competence to positively adapt their health behaviors and cultivate better coping skills to manage their disease (Schrijver et al., 2022). Newham et al. (2017) conducted a systematic review and meta-analysis and coded intervention descriptions for behavioral change techniques, addressing (a) symptoms, (b) physical activity, and (c) mental health. Self-management interventions should target not only symptom management but also mental health issues, including social support and reducing negative emotions.

Shnaigat et al. (2021) emphasized including health literacy in training. Health literacy drives the self-management program and significantly improves patients' disease knowledge and physical activity levels. Nohra et al. (2020) conducted a scoping review and identified four main components in COPD patients' self-management programs: initiation stage of the intervention, educational sessions, support, and monitoring methods. The common characteristics of the intervention included:

- Initiation intervention sessions could have a positive impact because they test the patients' motivation for the intervention; they could contribute to better outcomes in self-management programs.
- Action plans engaged patients in managing their disease.
- Educational materials helped patients in the self-management process.
- Phone calls are intended to motivate, engage, and accompany patients throughout the intervention.

In conclusion, Song et al. (2021) recommended SMIs with e-health blended with face-to-face interventions to reduce the disease burden with significant positive effects on various health-related outcomes. Bourbeau & Echevarria (2020) suggested comparing the rate of 30-day hospital readmission and the number of hospital admissions in the past 12 months due to acute exacerbation for high-risk patients with COPD to monitor the quality of care for COPD.

Evidence Quality Appraisal:

The quality of the eight meta-analyses and systematic reviews of randomized controlled trials (RCTs) was good with representative sampling. The literature and scoping review quality were low, with limited information on the included studies. However, the reviews gave updated guidance, characteristics, components, and information on effective SMIs.

Health Qigong for Patients With COPD

Health qigong is a "mind-body exercise" (Forge & Ralph, 2005) that enforces a state of relaxed mind' rhythmic, deep, and slow breathing, sometimes with the use of the

diaphragm; and motion coordinated with breathing. Health qigong is an integration for a state of balance/homeostasis by regulating the body, breathing, and mind. It is an innovative way to promote self-management and positive health outcomes for COPD patients (Cao et al., 2020; C. Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Tong et al., 2019). A comprehensive literature search yielded 10 meta-analyses and systematic reviews (Cai et al., 2022; Cao et al., 2020; C. Guo et al., 2020; J. B. Guo et al., 2016; Li et al., 2019; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), mostly from China but also from the United States and the United Kingdom. The findings confirmed the positive influence of HQG on the health status of patients with COPD care.

Regularly practicing HQG was found to promote the health status of patients with COPD (C. Guo et al., 2020). Results of several meta-analyses provided evidence of the contributions of HQG on reducing anxiety and depression (C. Guo et al., 2020; Li et al., 2019). Substantial evidence showed that HQG practice enhanced lung function (C. Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), minimized the perceived severity of dyspnea (Ngai et al., 2016; Zhang et al., 2022), and promoted physical fitness (C. Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022). The improved physical and psychosocial health further uplifted the patient's immunity (Ng et al., 2011; Xiao & Zhuang, 2015) and quality of life (QOL; C. Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Tong et al., 2019; Zhang et al., 2022).

Evidence Quality Appraisal

The quality of the 10 meta-analyses and systematic reviews of RCTs was good. Several studies did not address various types of HQG or yoga, which might also attribute benefits. However, their generalizability to the Chinese population was good. The intensity and duration of HQG varied across the studies.

Telerehabilitation for Effective COPD Care

Evidence suggested that self-management programs can be delivered effectively via telerehabilitation, increasing accessibility and adherence (Janjua, Banchoff et al., 2021; McCabe et al., 2017; Selzler et al., 2018; Shaw et al., 2020). A comprehensive literature search found seven meta-analyses and systematic reviews (Bonnevie et al., 2021; Cox et al., 2021; Janjua, Banchoff et al., 2021; Janjua, Carter et al., 2021; McCabe et al., 2017; Michaelchuk et al. 2022; Shaw et al., 2020) and one literature review (Selzler et al., 2018) from the United States, the United Kingdom, and the Netherlands. The findings confirmed the positive influence of telerehabilitation for patients with COPD.

Evidence from the intervention programs showed that primary pulmonary rehabilitation, or maintenance rehabilitation, delivered via telerehabilitation or home-based exercise therapy provided using advanced telehealth technology for people with COPD achieved outcomes similar to traditional center-based pulmonary rehabilitation. No safety issues were identified (Bonnevie et al., 2021; Cox et al., 2021; Janjua, Banchoff et al., 2021). Home-based telehealth pulmonary rehabilitation had similar effects to outpatient pulmonary rehabilitation programs and more significant results than usual care for people with COPD (Michaelchuk et al., 2022). Telerehabilitation promoted

the program completion rate (Cox et al., 2021; Janjua, Banchoff et al., 2021) and was beneficial as an additional health resource, depending on individual needs based on professional assessment (Janjua, Carter et al., 2021).

Multicomponent telerehabilitation interventions with asynchronous remote monitoring were not better than usual care but provided short-term benefits for QOL and resulted in fewer hospital readmissions for any cause (Janjua, Carter et al., 2021). The introduction of smart technology added a significant positive effect on activity level, self-management, and subsequent HRQoL in terms of symptoms and health status compared to participants who received face-to-face, digital, and/or written support for self-management of COPD (McCabe et al., 2017). However, the improvement may not be sustained over a long duration without continued intervention.

Shaw et al. (2020) recommended a standardized outcome-reporting framework for digital health interventions in COPD self-management. Monitoring devices such as pulse oximeters and pedometers linked to mobile apps can facilitate activity monitoring and compliance with the action plan.

Living Well With COPD Self-Management Program

The Living Well With COPD (2016) program, initially written in English and adapted to telerehabilitation, is evidence of one COPD self-management telerehabilitation program. It originated from an international open-design clinical trial, the COMET (Bourbeau et al., 2016; Kessler et al., 2018). The clinical trial included a multicomponent, home-based, self-management program and coaching by a case manager based on the Living Well With COPD program, home telemonitoring, care

coordination, and medical management. It included standardized reference guides and resources for patients and practitioners. The Chinese version (So, 2015) s is available and implemented extensively at all hospital occupational therapy departments in Hong Kong. The program is feasible to deliver in a telerehabilitation format, ready for review, and culturally adaptable to the Chinese population.

Evidence Quality Appraisal

The quality of the seven meta-analyses and systematic reviews of RCTs was good with representative sampling. Several included studies did not clearly describe the framework of the telerehabilitation program, and the frequency and duration varied across trials. However, their generalizability to the Chinese population was good, with the Chinese version of the Living Well With COPD self-management program (So, 2015) delivered widely in local hospital settings in Hong Kong.

Intervention Frequency and Duration

Janjua, Carter et al. (2021) conducted a meta-analysis and suggested that most telehealth interventions for patients with COPD range from 13 to 52 weeks. Significant heterogeneity of HQG types was included in the trials of pulmonary rehabilitation programs. To produce a substantial health effect after regular practice of HQG, most trainings ranged from 6 to 12 weeks, with each session lasting at least 30 min (Cai et al., 2021; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019).

Patient–Professional Relationship and Psychological Factors

Apart from symptom management, Newham et al. (2017) conducted a systematic meta-analysis and recommended that SMIs focus on mental health issues, including

social support and reducing negative emotions. Banfi et al. (2018) conducted a qualitative study using the narrative medicine approach to explore the keys to improving the management and QOL of patients with COPD. A positive relationship, including listening and understanding, was key to improving clinical care and management of COPD. The relationship quality impacted the adherence and effectiveness of therapies and resumption of activities. It is also strictly linked to successful smoking cessation, achieving a "therapeutic alliance," and commitment to pharmacological or rehabilitation treatments. A productive relationship helps patients adhere more to treatment, improve their lifestyle, resume activities interrupted because of failing health, and improve their QOL. Furthermore, Blackstock et al. (2016), Bender (2014), and Bhattarai et al. (2020) highlighted the importance of psychological issues such as anxiety, social isolation, and inadequate social support and depression as leading to medication nonadherence and poor COPD management.

My doctoral project will adopt the electronic health-enhanced chronic care model (eCCM; Gee et al., 2015), emphasizing the importance of an integrated approach to improve chronic disease management and care. The model is based on the theoretical chronic care model (CCM) developed by Wagner et al. (1996), which is one of the best models and comprehensive evidence for chronic disease prevention and intervention (Coleman et al., 2009). The eCCM includes eight interdependent and interactive parts: the e-community and an informatics framework, health system enhancements, delivery system design enhancements, self-management support enhancements, clinical decision-support enhancements, clinical information systems enhancements, the addition of e-

health education to the CCM, and communication and addition of the CFL. The matrix of interaction would improve the delivery of clinical service qualitatively. The eCCM program is further discussed in Chapter 4.

Conclusions

Evidence points to the many benefits of SME programs, HQG, and telerehabilitation to deliver effective interventions for patients with COPD. The telehealth delivery format can enhance access to COPD care and address the limitation of the existing health service model, as presented in the explanatory model in Chapter 2. Self-management education programs are safe and unlikely to cause harm (Schrijver et al., 2022). Several meta-analyses and systematic reviews recommended a training intensity and duration for telehealth self-management programs and supervised HQG training to achieve significant health-improvement effects. The ongoing support, communication, and CFL of productive information technology between health professionals and participants via social media would enhance the professionals' knowledge and awareness and activate patients to manage their health and wellness. As depicted in the explanatory model, effective interventions are expected to improve patients' QOL and reduce the frequency of hospital readmission and risk of mortality. Therefore, these ingredients—a structured self-management program that promotes the patient's efficacy through therapeutic alliance and ongoing support, delivered via telehealth, and augmented with HQG practice—will be integrated into the proposed program, presented in the following chapter.

CHAPTER FOUR – Description of the Proposed Program

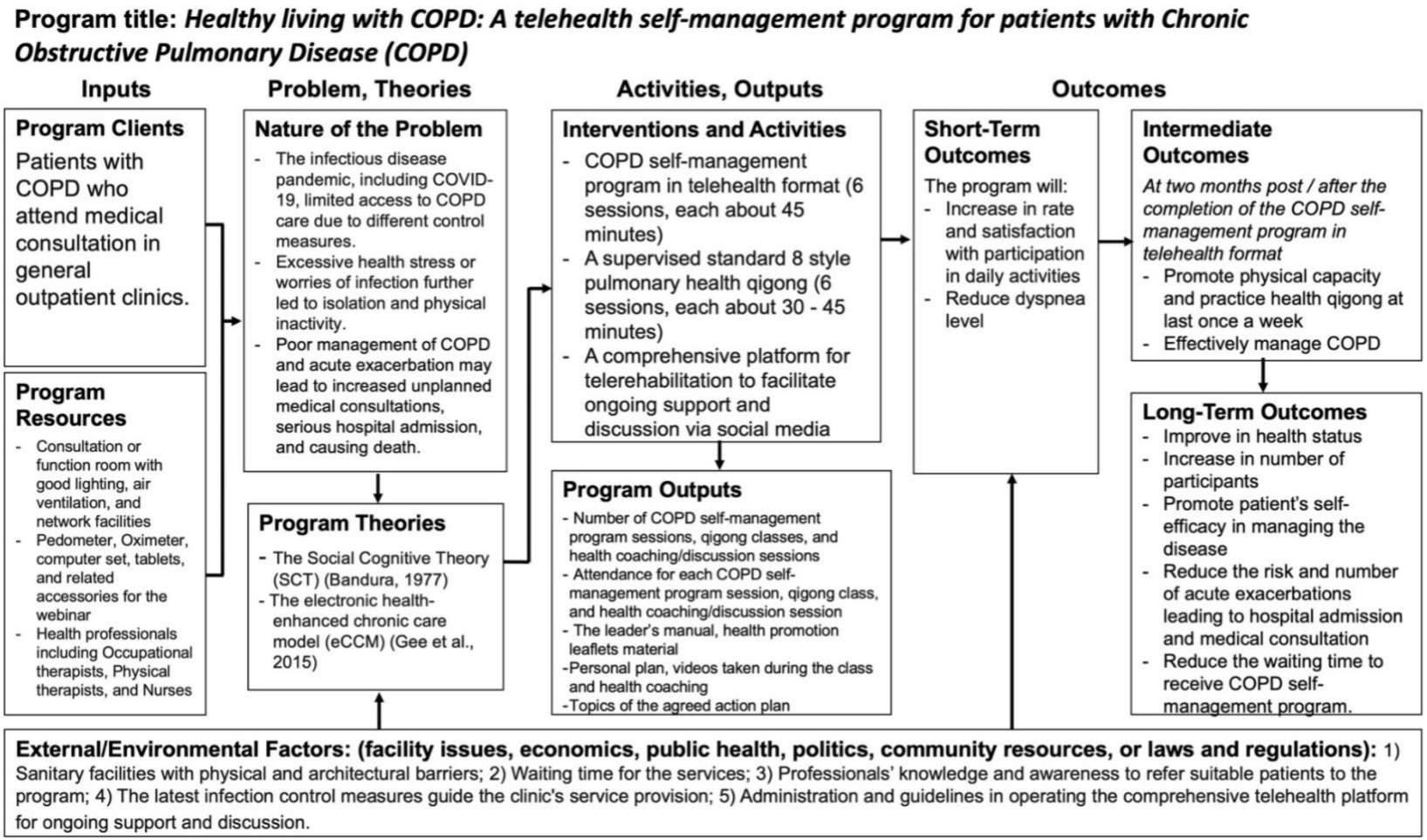
Introduction

This chapter aims to provide the background, evidence, theoretical base, and guidelines for implementing *Healthy Living With COPD*, a telehealth self-management program for people with chronic obstructive pulmonary disease (COPD). This program aims to empower participants to manage their health and wellness by improving their access to, knowledge in, and self-efficacy for managing their health, wellness, and quality of life (QOL). The *Healthy Living With COPD* program draws from evidence-based therapy approaches and principles explicitly designed for patients with COPD. In addition to developing self-management skills, the program provides health-supervised online health qigong (HQG), health coaching, and psychosocial support for the best outcomes. Chapter 3 provided an evaluative synthesis of the benefits of self-management education (SME) programs, HQG, and telerehabilitation. The active ingredients of effective programs were enhanced access to COPD care and reduced limitations in the existing health service model. Successful implementation and positive results promote the patient's self-efficacy in COPD self-management, enhancing being physically active in daily activities.

A logic model of the proposed program is found in Figure 4.1. It presents the nature of the problem, guiding theories, inputs (participants and resources), outputs, and outcomes. In addition, the model reviews environmental factors. All components are explained in the following sections.

Figure 4.1

Program Logic Model



Nature of the Problem

Infectious disease pandemics, including COVID-19, have limited access to COPD care due to their control measures. The resulting restrictions in patient access to care increases exacerbation and functional deterioration risks. Excessive health stressors or worries of infection further lead to isolation and physical inactivity. Thus, poor management of COPD and its acute exacerbation may lead to increased unplanned medical consultations, serious hospital admission, and death. The explanatory model presented in Chapter 2 (Figure 2.1) illustrated the main causal factors that influence the management and quality of COPD care: COPD management of the individual patient, external and internal factors influencing people with COPD, professionals' knowledge and awareness, and the health care services model. The program presented in this chapter addresses the urgent need to enhance COPD care and access and promote the health and well-being of participants with COPD.

Guiding Theories and Approaches of the Proposed Intervention

The theoretical basis of *Health Living with COPD* draws from two main models: the social cognitive theory (SCT; Bandura, 1977) and the electronic health-enhanced chronic care model (eCCM; Gee et al., 2015).

Social Cognitive Theory

The goal of SCT (Bandura, 1977) is to explain how people regulate their behavior through control and reinforcement to achieve goal-directed behavior that can be maintained over time. The SCT considers the unique way individuals acquire and retain behavior while considering the social environment in which the behavior will be

performed (LaMorte, 2019). The theory posits that learning occurs in a social context with dynamic and reciprocal interaction, environment, and behavior. A person's past experiences influence reinforcements, expectations, and expectancies, shaping whether a person will engage in specific behavior and its meaning (Bandura, 1977). All these concepts were integrated into *Healthy Living With COPD* to promote participants' mastery and self-efficacy in self-management knowledge and the skills they need for their personalized goals.

Electronic Health-Enhanced Chronic Care Model

The eCCM uses e-health tools and concepts to manage chronic health conditions (Gee et al., 2015). The original CCM (Wagner et al., 1996) drew on social learning/cognitive theory, especially self-efficacy. The model points out the essential elements of a health care system that encourage high-quality care, which has two significant components: community and health system. Patients play a central role in the model of care and are responsible for their health. The model involves longitudinal, preventative, community-based, and integrated approaches to developing care plans and support (World Health Organization, 2016). The eCCM expanded the community aspects to include online communities and health-related social networks. An informatics framework was established to develop patient portal systems/personal health records and add other e-health modules, including social networking, gaming, and e-visits. The model includes five key interdependent components: (a) self-management support, (b) delivery system, (c) clinical decision support, (d) clinical information system, and (e) e-health education (Figure 4.2).

Figure 4.2

Electronic Health-Enhanced Chronic Care Model (based on Gee et al., 2015)

Adapted from "The eHealth Enhanced Chronic Care Model: A Theory Derivation Approach" by P. M. Gee, D. A. Greenwood, D. A, Paterniti, D. Ward and L. M. Miller, 2015, *Journal of Medical Internet Research, 17*(4), p.912 (https://doi.org/10.2196/jmir.4067). Copyright 2015 by the Journal of Medical Internet Research.

Regarding the eCCM, patients with COPD will be invited to join the proposed intervention, which supports them through proactive care (delivery system design). They will undergo 6 months of guideline-based treatments (decision support), including SME, supervised HQG training in telehealth format, and ongoing support via social media. A proactive team will be formed with doctors, nurses, physiotherapists, and occupational therapists experienced in pulmonary rehabilitation and respiratory care. They will arrange regular online discussions with patients and establish an agreed-upon action plan to promote health and wellness in managing COPD. With the support of a proactive team, the patients will be highly informed, activated, and more ready to be engaged, informed, and confident in self-managing their chronic disease and illness.

The proactive team will use an integrative panel to monitor the patient's progress (clinical information system). Health professionals of the proactive team will be more confident using e-health to facilitate education and self-management support. A complete feedback loop (CFL) of productive information technology cultivates ongoing support and interaction, as Gee et al. (2015) proposed. The successful CFL establishment between patients and health professionals promotes the health status of patients with COPD. Integrating the eCCM, the proposed intervention would improve the integrated chronic disease management and care. Ultimately, it will further enhance the quality of clinical service delivery.

Program Clients

Patients with COPD who attend medical consultations in general outpatient clinics will be invited to join the program. Patients aged 40 or older who received

spirometry with a clinical diagnosis of COPD by Global Initiative for Chronic Obstructive Lung Disease (2022) guidelines living in the community (rural or urban area) will also be included. They will be excluded if they have a plan to leave Hong Kong in the upcoming 6 months and cannot receive medical consultations in general outpatient clinics.

Program Resources

Case Managers

Health professionals, including occupational therapists, physical therapists, and nurses with experience in pulmonary rehabilitation, will be invited to receive training from the program developer to deliver the intervention and as case managers. The program developer will ask health professionals for at least 3 years of working experience by sending a recruitment email via the university-hospital system.

Physical Spaces

The program requires a consultation or function room with good lighting, air ventilation, and network facilities.

Online Platform

To facilitate the webinar and program delivery, a computer or tablet set up with a webcam and video conferencing software is needed.

Medical Devices

All participants will need to possess pedometers, oximeters, computers, tablets, webcasting, and related accessories required to prepare for the course.

Written Materials

Health promotion pamphlets, action plan templates, and information will be provided to participants attending the training in telehealth format.

Interventions and Activities

The *Healthy Living With COPD* process is based on the principles of SCT. The dynamic and reciprocal interaction between environment and behaviors includes ongoing support and discussion between case managers and participants. At the start of the program, the case managers will facilitate the participants to recall their experiences on the five topics: managing acute exacerbation and exertional dyspnea, medication management, smoking cessation, physical activity, and symptom and emotional control.

The case managers will facilitate identifying barriers to daily activities related to COPD. They will discuss the participants' values and the importance of engaging in healthy and active lifestyles. Participants will be facilitated to develop an agreed-upon action plan with the health professionals and regularly review the outcomes. They will encourage participants to practice overcoming barriers to a specific behavior in small steps. Educational videos or pamphlets will be shared so that participants can have a role model. The case managers will give verbal persuasion and reinforcement to reduce the participants' stress and empower their competence in overcoming barriers. They will employ the five core self-management skills (Lorig & Holman, 2003) and the SMART model (Doran, 1981) to set goals and write action plans with the participants.

In the first two discussion sessions, the case managers will discuss an action plan for confidence in managing exacerbations using a rescue pack and skills on breathing

control and body positioning. Other action-plan and goal-setting topics include a review of the present situation in medication management, smoking, physical activity, and barriers to achieving goals.

The *Healthy Living With COPD* program includes six weekly online sessions. Appendix B presents an overview of the intervention program. Each session includes 45 min of self-management psychoeducation and 30 min of supervised standard-8-style pulmonary HQG. The program will be delivered using a comprehensive telerehabilitation platform for ongoing support and discussion via social media before, after, and between sessions. Patients can participate in the virtual community, share their difficulties encountered in daily activities, and complete the agreed-upon action plan. Case managers will join the virtual community, share their comments, and encourage participants to engage in their action plans. Please refer to Appendices D (program education content) and E (leader's manual) for more program description details.

COPD Self-Management Program in Telehealth Format

Healthy Living With COPD aims to improve patients' disease knowledge and physical activity levels, including health literacy in training (Shnaigat et al., 2021). The program is based on the theoretical constructs of SCT (Bandura, 1977): Knowledge, situational perception, environment, self-efficacy, goal-setting, and emotional coping. The Chinese version of the Living Well With COPD self-management program (So, 2015) is available and implemented extensively at all hospital occupational therapy departments in Hong Kong. The goal of the COPD self-management program is to develop a partnership between patients with health professionals and foster their self-

management of COPD signs and symptoms in daily activities. It also empowers their early management of any worsening of the disease. Appendix D outlines the content of the education.

Standard-8-Style Pulmonary Health Qigong (Baduanjin)

Standard-8-Style, or baduanjin HQG is a "mind-body exercise" (Forge & Ralph, 2005) that enforces a relaxed state of mind; rhythmic, deep, and slow breathing, sometimes with the use of the diaphragm; and motion coordinated with breathing. Traditional Chinese medicine believes that gentle exercise, which incorporates the mind, breathing, and body, helps cultivate and promote *qi* circulation within the human body, ultimately improving overall health. It is integration for a state of balance/homeostasis with regulation of the body, breathing, and mind.

Baduanjin was found to be effective in promoting the health status of patients with COPD (C. Guo et al., 2020), reducing anxiety and depression (Guo et al., 2020; Li et al., 2019), enhancing lung function (Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), minimizing the perceived severity of dyspnea (Ngai et al., 2016; Zhang et al., 2022), promoting physical fitness (C. Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), uplifting immunity (Ng et al., 2011; Xiao & Zhuang, 2015), and enhancing the QOL (Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Tong et al., 2019; Zhang et al., 2022). Baduanjin is one of the most popular HQG in Hong Kong (Cheung et al., 2021), which the Chinese Health Qigong Association advocates under the General Administration of Sports of

China (Lu et al., 2020). Cao et al. (2020) and Tong et al. (2019) suggested that regularly practicing baduanjin for 6 months or more would significantly improve exercise capacity, lung function, and QOL among patients with COPD.

The program developer, a certified HQG instructor, will create the lesson plans. An online supervised standard 8-style pulmonary (baduanjin) HQG will be organized. Participants will receive 20 to 30 min of supervised online HQG (baduanjin) training in each session, delivered after the COPD self-management program. The occupational therapist can monitor heart rate, oxygen saturation (SpO2), and blood pressure via mobile devices.

Telehealth Intervention

Telehealth intervention will be used to facilitate activity monitoring and action plan compliance with the application (Shaw et al., 2020). Telehealth is defined as services that include any intervention in which clinical information is transferred remotely between the patient and the health care provider, regardless of the technology used to record or transmit the information (Hanlon et al., 2017). Such interventions offer increased accessibility and adherence (Janjua, Carter et al., 2021; McCabe et al., 2017; Selzler et al., 2018; Shaw et al., 2020). Telerehabilitation has similar effects to outpatient pulmonary rehabilitation programs, more significant results than usual care for people with COPD (Michaelchuk et al., 2022), and promotes the program completion rate (Cox et al., 2021; Janjua, Banchoff et al., 2021). Such interventions are beneficial as additional health resources, depending on individual needs based on professional assessment (Janjua, Carter et al., 2021).

The proposed intervention will be delivered in a hybrid mode; the practitioner will deliver the telehealth components synchronously. Before the intervention starts, introductory computer literacy training will be arranged for patients with COPD to set up web learning and health monitoring at home. Such training empowers the patients to participate in the telehealth program with a smartphone or tablet. The hybrid program consists of in-person consultation and remote home program delivery.

A comprehensive telehealth platform will be set up to support training delivery, online discussion, skills demonstration, and practice via Zoom or Google Meet software. Patients can review the prescribed video training via the mobile application Hospital Authority (HA) Go (https://www3.ha.org.hk/hago), and practitioners can monitor and modify training progress via the HA Go.

Health professionals will organize regular online health coaching with participants via the platform and social media. Health coaching aims to engage patients in healthy behaviors and manage COPD exacerbation signs and symptoms. The case managers will lead the health coaching with discussions on five topics: managing acute exacerbation and exertional dyspnea, medication management, smoking cessation, physical activity, and symptom and emotional control. They will facilitate patients in identifying and prioritizing their health concerns. The case managers (health professionals) will enable the participants to recall their experiences and past management of acute exacerbations of COPD. The case managers will encourage them to prioritize and understand the necessary steps to engage in that behavior. They will be facilitated to develop an agreed-upon action plan with the health professionals and

regularly review the outcome. The first agreed-upon action plan will be set up with the participants. Meanwhile, the case managers will give verbal persuasion and reinforcement to support them in pursuing a behavior. This workflow will be repeated, and the case managers will prompt the participants to set up a new agreed-upon action plan at the midpoint.

Educational videos or pamphlets will be shared so participants can have a role model. A continuous productive feedback loop will be cultivated if they have questions about the training or acute exacerbation management. Health coaching will be arranged weekly and biweekly after the patients complete the COPD SME and supervised HQG baduanjin training. Once that is accomplished, they will be encouraged to another agreed-upon action plan in the long term with their case manager. They will also be invited to share their barriers and successful experiences with other participants during the training program or on the telehealth platform.

Furthermore, the continuous productive feedback loop will further cultivate a virtual community between patients and case managers. It will promote mutual social support and self-confidence in managing their health and wellness. Patients are encouraged to raise questions in the virtual community, and they and the case managers are welcome to share their experiences or helpful information in the group.

Program Outputs

The program outputs include the number of COPD self-management program sessions, HQG classes, and health coaching/discussion sessions. Attendance and number

of health promotion materials distributed, including online education, HQG classes, and health coaching, will be captured. Finally, the leader's manual, promotional leaflets, health promotion materials, personal plan, and videos taken during the class and health coaching and topics of the agreed-upon action plans will be compiled and used for future learning and research.

Program Outcomes

Short-Term Goals

The short-term outcomes include the number of patients completing the program and access to COPD care. Participants will

- Participants will show increased rates of and satisfaction with participation in daily activities.
- Participants will show decreases in dyspnea (saturation of peripheral oxygen at rest and rating of perceived dyspnea).

Intermediate Goals

- Participants will independently practice HQG at least once a week.
- Participants will effectively manage their COPD.

Long-Term Goals

1. Participants will show improved health status compared between baseline, immediately after the training, and after 3 months
2. Data will show that the course promotes patients' self-efficacy in managing the disease, reduces the risk and number of acute exacerbations leading to hospital admission and medical consultation, and reduces the wait time to

receive the COPD self-management program.

3. 70% or more of the participants will complete their agreed-upon action plan for COPD self-management by the end of the six sessions program.
4. 80% of participants will improve their self-efficacy in managing COPD.
5. The wait time of new and subsequent persons with COPD awaiting intervention is reduced by 20% after 6 months.
6. The number of participants in the COPD self-management program increases 20% from the previous year.

External/Environmental Factors

Several external or environmental factors may affect the successful delivery of *Healthy Living With COPD.* As listed in Table 4.1, these include the availability of sanitary facilities with physical and architectural barriers in the clinic, wait time for services, and professionals' knowledge and awareness to refer suitable patients to the program. Further, the latest infection control measures guiding the clinic's service provision and administration and guidelines for operating the comprehensive telehealth platform for ongoing support and discussion will affect the successful implementation of the program externally. Table 4.2 highlights several potential external or environmental barriers and challenges in delivering *Healthy living With COPD*. Some possible solutions to overcome the obstacles are listed.

Table 4.1

Anticipated Barriers and Challenges in Delivering Healthy Living With COPD

Potential barrier	Possible solution to barrier
Available sanitary facilities; physical/architectural barriers in clinics	• Support and coordination from clinic-in-charge to rectify potential physical barriers
Increased waiting time	• Recruit more health professionals to join the project • Discuss with team to arrange more sessions for new cases
Professionals' knowledge/ awareness to refer suitable patients	• Send invitation email to health professionals via university-hospital system with a brief summary of the program • Arrange a webinar to introduce the program and significance
Latest infection control guidelines and measures	• Closely communicate with doctor/clinic-in-charge on latest infection control arrangement • Remind patients on social media to attend in-clinic consults/evals
Inadequate administration/ guidelines for comprehensive telehealth platform	• Encourage all health professionals to attend the briefing workshop prior to participating in the intervention case manager role
Lack of case managers	• Recruit nurses, occupational therapists, or physiotherapists by sending an invitation email via the hospital's internal email system • Invite Family Medicine Department Chief of Service to nominate health professionals to join the team
Lack of budget/finance	• Apply for grants to fund the program • Partner with Health Qigong Association of Hong Kong, China to support the training.
Lack of rooms	• Seek support and coordination from Hospital Chief Executives or Chief of Service • Explore suitable indoor multipurpose rooms in community centers
Fair computer literacy	• Encourage all participants to attend the COPD self-management training's first session and seek support from their case manager
Charging fee issue	• Seek support from Hospital Finance Manager for the payment • Encourage participants to use electronic payment
Monitoring compliance	• Develop an electronic platform via the HA Go mobile app or WeChat to allow participants to record their progress • Encourage participants to share photos about their action plan in the closed virtual community; other participants/case managers can review, encourage, and motivate them to engage in the agreed action plan

Summary and Conclusions

Healthy Living With COPD is a 6-month telerehabilitation program that promotes effective self-management of COPD and is accessible to a wide population. It is guided by Bandura's (1977) social learning theory, eCCM, and current best practices in COPD care. The program includes four key components: educational content, HQG, personal coaching, and a supportive virtual community. Substantial evidence recommended the chosen training intensity and duration, as presented in Chapter 3.

This chapter presented the logic model, program overview and operation, and mitigation of potential barriers. Apart from the 6-month telerehabilitation program, *Healthy Living With COPD* include telehealth intervention to cultivate healthy behavior, activity monitoring, and compliance with the agreed-upon action plan. The case manager will arrange health coaching with the patients using the five core self-management skills (Lorig & Holman, 2003) and the SMART model (Doran, 1981). The program outline of *Healthy Living With COPD* is presented Appendix D. To enhance further learning and research, program outputs, including the leader's manual (Appendix E), promotional leaflets, health promotion materials, personal plans, videos taken during the class, and health coaching and topics of the agreed-upon action plan will be documented. The short- and long-term outcomes were discussed and presented in Figure 4.1. To ensure the successful delivery of *Healthy Living With COPD,* potential barriers and challenges, including external and environmental factors, are suggested and practical solutions to overthrow the obstacles are shown in Table 4.1. The plan of program evaluation research and findings dissemination are discussed in the next chapter.

CHAPTER FIVE – Program Evaluation Research Plan

Program Scenario and Stakeholders

The *Healthy Living With COPD* program is a 6-month telehealth-based home program, including a self-management education (SME) program, a supervised standard-8-style online pulmonary health qigong (HQG) class, online health coaching, and discussion with participants. This doctoral project aims to effectively study a pilot telehealth self-management program for patients with chronic obstructive pulmonary disease (COPD) in hopes of improving access to care by offering best practices in COPD care via telehealth in the person's home. After the baseline evaluation, introductory computer literacy training will be arranged for patients with COPD to set up web learning/health monitoring at home.

The telehealth COPD SME program has six sessions, each lasting about 45 min for 6 weeks. The content originated from the Living Well With COPD (2016) self-management program, COMET, an international open-design clinical trial (Bourbeau et al., 2016; Kessler et al., 2018). The Chinese version of the Living Well With COPD self-management program(So, 2015) is available and implemented extensively at all hospital occupational therapy departments in Hong Kong.

A supervised standard-8-style online pulmonary HQG (baduanjin) will be organized. It will be delivered after the COPD self-management program, and each session will last about 30 to 45 min after the educational program. The standard and requirements of HQG baduanjin follow the standards advocated by the Chinese Health Qigong Association under the General Administration of Sports of China (General

Administration of Sports of China, 2018; Lu et al., 2020). The occupational therapist can monitor heart rate, SpO2, and blood pressure via mobile devices.

Health professionals will organize regular weekly/biweekly online health coaching with participants. After the 6-week SME program and supervised standard-8-style online pulmonary HQG, the health coaching will continue biweekly (Appendix D). Patients will attend the program at home with a computer, tablet, or smartphone. A virtual community will be organized via social media. Patients are encouraged to raise questions in the virtual community. Patients and case managers are welcome to share their experiences or valuable information.

The case managers will lead the health coaching with a discussion on five topics: managing acute exacerbation and exertional dyspnea, medication management, smoking cessation, physical activity, and symptom and emotional control. Participants will be facilitated to develop an agreed-upon action plan with the health professionals and regularly review the outcome. Educational videos or pamphlets will be shared so that participants can have role models. The health professionals will give verbal encouragement and reinforcement to support them in pursuing a behavior. The program will be hosted in the meeting room of general outpatient clinics with network and computer facilities.

The primary stakeholders are adults with COPD participating in the program. Additional stakeholders include caregivers of patients with COPD, health professionals involved in the program, the clinic-in-charge, hospital chief executives, and the Department of Family Medicine Chief of Service, who oversee the clinics under the

catchment of the New Territories East Cluster.

Vision for the Program Evaluation Research

The program evaluation research plan described herein will evaluate the feasibility of the telehealth self-management program for improving access to COPD care and minimizing the risk of unplanned medical consultations, serious hospital admissions, and death. Frequent COPD exacerbations requiring hospital admission are associated with higher mortality (Soler-Cataluña et al., 2005). If the telehealth program is feasible and practical among patients with COPD, the successful experience and positive outcome will promote the patient's self-efficacy in COPD self-management and enhance physical activity. It may also provide an impetus for the transformation and expansion of occupational therapy services across all seven clusters under the catchment of the Hospital Authority throughout Hong Kong. Figure 5.1 suggests a case scenario for *Healthy Living With COPD* and how it facilitates access to COPD care.

Figure 5.1

Case Scenario for Healthy Living With COPD

David is in charge of a primary care clinic on an outlying island of Hong Kong. The clinic provides primary care services to residents living in the surrounding islands. Recently, he noted more patients with COPD called and needed emergency and helicopter services due to shortness of breath and low blood oxygen levels with acute exacerbation. David was aware of the *Healthy Living With COPD* program. He learned how to set up and deliver the program remotely for about 100 patients living in the outlying islands. Participants could attend the training from home and reduce the number of visits to the clinics. After the 6-month intervention program, David noted an increased number of participants engaged in an active and healthy lifestyle, practicing health qigong. They had increased confidence in COPD disease and acute exacerbation self-management. Furthermore, fewer participants reported requiring emergency and helicopter service and hospital admission.

As a short-term goal, the program will increase the rate of and satisfaction with participation in daily activities. Participants' perceived dyspnea will improve, as measured by saturation of peripheral oxygen at rest and rating of perceived dyspnea. As an intermediate outcome, patients will independently practice HQG once a week and effectively self-manage their COPD signs and symptoms.

The program will further improve health status compared to baseline, immediately after the training, and after 3 months. Patients' self-efficacy in managing the disease will be uplifted. The risk and number of acute exacerbations leading to hospital

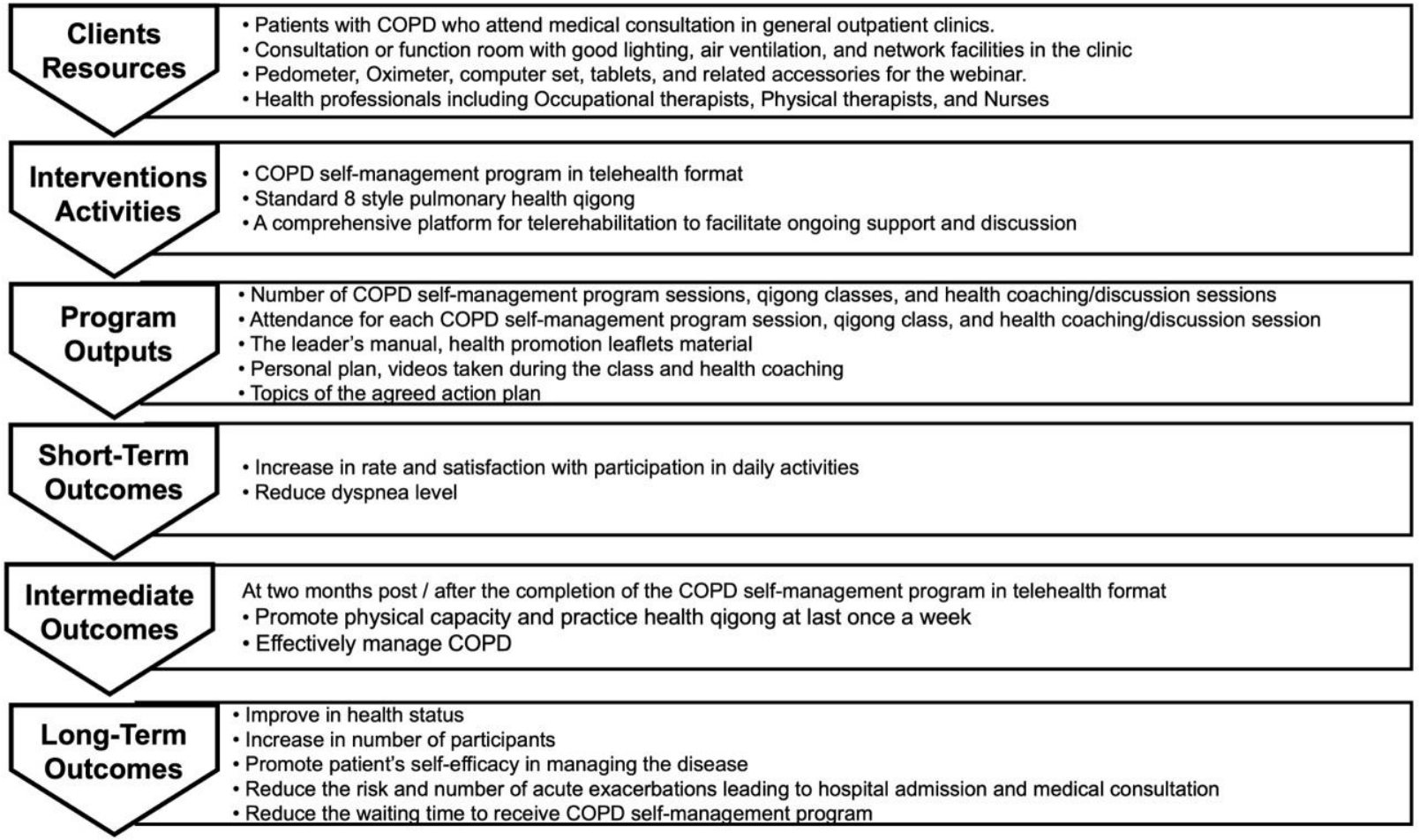
admissions and medical consultations and the wait time to receive the COPD self-management program will be significantly reduced in the long term. It is expected that 70% or more of the participants will complete their agreed-upon action plan for COPD self-management by the end of the six sessions program; 80% will improve their self-efficacy in managing COPD by 10%. Furthermore, the wait time for new and subsequent persons with COPD awaiting intervention is expected to be reduced by 20% after 6 months. It is anticipated that there will be a 20% increase in participants in the COPD self-management program from the previous year.

Simplified Logic Model for Use with Stakeholders

The stakeholders will receive a simplified version of the logic model designed for this program (Figure 5.2). It will facilitate the stakeholders' understanding of the program and its potential impact. The model provides a laconic description of the program's expected inputs and outputs and the intended short-, intermediate-, and long-term outcomes.

Figure 5.2

Simplified Logic Model for the Healthy Living With COPD Program



Engagement of Stakeholders

In the program evaluation research, different levels of stakeholders will be invited to participate, including the hospital chief executives and administrators, the clinic-in-charge, and the Department of Family Medicine Chief of Service, who oversees the clinics under the catchment of the New Territories East Cluster. One clinic-in-charge, a family medicine specialist physician, will be invited and listed in the Internal Review Board (IRB) application submitted to the teaching university-hospital for endorsement and approval. Table 5.1 summarizes the organizing stakeholder information.

Table 5.1

Matrix for Organizing Stakeholder Information

Stakeholder or stakeholder group	Type of involvement	Possible role	Specific interest
Researcher	Plan, implement, reflect	• Design evaluation plan • Oversee/ coordinate logistics • Administer program activities/ data collection	• Successful program implementation, data supporting program effectiveness, answering evaluation questions
Hospital chief executives Department of Family Medicine Chief of Service (oversees clinics under the catchment of the New Territories East Cluster) Clinic-in-charge	Reflect, feedback	• Consult on methodology, logistics, space arrangement, patient recruitment	• Program effectiveness in promoting COPD care/ access to care; compare to conventional face-to-face • Data to support future service models and health service planning (wait time, number of patients who attended program, operation cost)

Stakeholder or stakeholder group	Type of involvement	Possible role	Specific interest
Health professionals participating in the program	Implement, reflect, feedback, recruit	• Administer program activities/ data collection	• Program effectiveness/ outcomes in promoting COPD self-management
Patients with COPD who attend the program Caregivers of patients with COPD	Reflect, feedback	• Participate in program activities	• Experience engaging in active, healthy lifestyles • Improved health and wellness • Self-efficacy in managing COPD signs, symptoms, and exacerbation
All stakeholders	Reflect	• Participate in program activities	• Program duration/ frequency • Contextual change in practices impacting access to COPD care and management

An informal meeting with the Chief of Service and the clinic-in-charge will be organized at the initial stage to seek their consensus and support. Then, several meetings will be scheduled with the hospital chief executives and administrators, Chief of Services, and clinic-in-charge for their support to launch the program and for resources. Several focus groups will be organized with health professionals, "expert" patients with COPD, and patients' caregivers to seek their opinions on program refinement prior to implementation.

Participating health professionals participating will be responsible for administering program activities. They will also be involved in implementing the program evaluation plan and data collection, examining program effectiveness, and outcomes in promoting COPD self-management. Patients with COPD and their

caregivers will be asked to comment on the delivery of the program, their experiences engaging in active and healthy lifestyles, and their health and wellness improvement. The self-efficacy of participants in managing COPD will also be measured, which is the primary outcome of the program evaluation.

Stakeholders directly involved in the program, including health professionals, patients with COPD who attend the program, and the patients' caregivers, will be invited to examine the program evaluation results. Additionally, the Chief of Service and the clinic-in-charge will review the results of the formative and summative evaluations to determine the most beneficial and favorable training elements and practical intervention strategies for the participants. The program's findings will be used to compare its effectiveness with the conventional face-to-face delivery mode. These data will support future service models and health service planning, including waiting time, the number of patients who attended the program, and operation costs.

Preliminary Exploration and Confirmatory Process

At the initial stage, informal discussions with the hospital chief executives, Chief of Service, and clinic-in-charge will be organized to establish productive communication and collaboration, including chatting in the lobby and corridors. The draft of the logic model and related research evidence will be sent via email to get their understanding and involvement in the initiative.

In view of the latest infection control guidelines, some subsequent meetings may need to be arranged virtually. A panel (in-person or virtual) will be arranged with the hospital chief executive, hospital administrators, and the Department of Family Medicine

and Chief of Service. The proposal for *Healthy Living With COPD* will be presented at the regular meeting with supporting health promotion theory, research evidence, and measurable objectives to seek their support of the initiative. The hospital admission statistics for patients with COPD will be prepared to report the increasing trend of hospital readmission in the past few years. During the infectious disease pandemic, many patients with COPD had limited access to medical consultation and could not attend clinical service. An increased number of patients with poor COPD management and requiring further referral medical consultation was observed. The findings from the interviews with patients with COPD and their caregivers will be compiled to highlight the barriers to seeking medical consultation during the COVID-19 pandemic due to service restrictions and access to care.

A concise PowerPoint file will be organized to introduce the telehealth self-management program briefly, targeting an innovative model of care to enhance access and promote COPD care for the patients. The evidence-based systematic review will support the positive benefits of telehealth and supervised home-based telehealth HQG. A budget plan including the required hardware, spacing, and staffing to facilitate the clinic's program delivery and ongoing support by case managers from nurses, physiotherapists, and occupational therapists will be prepared for discussion.

The author will further discuss the initiative with team members, including doctors, nurses, occupational therapists, and physiotherapist colleagues with working experience in pulmonary rehabilitation or COPD care. The initiative and planning issues will be discussed to develop an innovative model of care to enhance access and promote

COPD care for patients. A consensus on the framework, content, staffing, resource, finding, and working timetable of the new COPD self-management program in telehealth format will be achieved.

Program Evaluation Research Questions by Stakeholder Group

Different stakeholders will have distinct interests and focuses for the program evaluation research. Table 5.2 highlights possible research questions from key stakeholders that could be answered through the research findings.

Table 5.2
Research Questions by Stakeholder Group

Stakeholders/ stakeholder group	Type of program evaluation research question
Researcher	**Summative** ● How will implementing the program impact the patients' self-efficacy in disease self-management after the program? ● Will implementing the telehealth program provide a similar effect as the existing face-to-face COPD self-management program? **Formative** ● What are the most/least favorite topics and arrangements after participating in the self-management education (SME) program?
Hospital chief executive Department of Family Medicine Chief of Service (oversees clinics under the catchment of the New Territories East Cluster) Clinic-in-charge	**Summative** ● Will implementing the program impact wait time for new and subsequent cases of persons with COPD awaiting intervention? ● How will implementing the program impact the number of patients participating in the COPD self-management program? ● Will implementing the telehealth program provide an effect similar to the face-to-face COPD self-management program? ● What is the operation cost of implementing the program? **Formative** ● Are participants satisfied with the arrangement of a SME program in a telehealth format?
Health professionals	**Summative** ● Will implementing the program impact the patients' self-efficacy in managing COPD? ● Will implementing the program impact emotional well-being, health-related quality of life (HRQoL), physical capacity, function

Stakeholders/ stakeholder group	Type of program evaluation research question
	in daily activities, dyspnea, and risk and number of acute exacerbations leading to hospital admission and medical consult? ● Will implementing the program impact patients engaging in active lifestyle and wellness, reflected by percent of participants with agreed and completed action plans? **Formative** ● Did any challenges arise in delivering telehealth training? ● What are facilitators/barriers in delivering education and telehealth health qigong (HQG) and ongoing health coaching via social media?
Patients with COPD who attend the program Caregivers of patients with COPD	**Summative** ● Will implementing the program impact the patients' self-efficacy in managing COPD? ● Will implementing the program impact emotional well-being, HRQoL, physical capacity, function in daily activities, dyspnea, and risk/number of acute exacerbations leading to hospital admission and medical consult? ● Will implementing the program impact patients engaging in active lifestyle and wellness, reflected by percent of participants with agreed and completed action plan? **Formative** ● What are the essential steps in managing exertional dyspnea? ● What are the challenges in managing acute exacerbations? ● What are the precautions before practicing HQG? ● What are the most/least important topics discussed in the SME program?
All stakeholders	**Summative** ● What is the implementation timeline? How long to see results? ● What are the best duration/frequency of supervised healthy qigong? **Formative** ● Do any contextual change practices impact access to COPD care and management?

Research Design

Formative Design

For formative program evaluation research, focus group interviews will be arranged with health professionals, patients, and patients' caregivers. They will be asked about their experiences and comments on the COPD self-management program in telehealth format. At the end of the program, they will fill out a satisfaction survey with open-ended questions. Responses to the focus group interviews and satisfaction surveys will provide a basis for refining the content of COPD self-management programs in telehealth format, which is culturally adapted to the Chinese population. It will also help in examining the feasibility of implementing *Healthy Living With COPD* among community-living patients and understanding computer literacy issues in delivering its fundamental components. Furthermore, their comments will validate or add context to the summative program evaluation research described next.

Summative Design

The summative program evaluation research will follow a clustered randomized control trial (CRT) design consisting of two arms—the intervention arm and the usual-care arm. A CRT was chosen because the program will be delivered to patients with regular medical follow-up in general outpatient clinics. It would minimize potential information bias and cross-contamination among patients between the two arms and from the same clinic. Patients with COPD who have regular medical follow-up in the clinics under the usual-care arm will receive six conventional sessions of face-to-face COPD self-management. The clinical evaluation will be arranged for patients in the two arms at

baseline, immediately postintervention, and 3 months after the intervention. They will receive the same summative assessment during their visit.

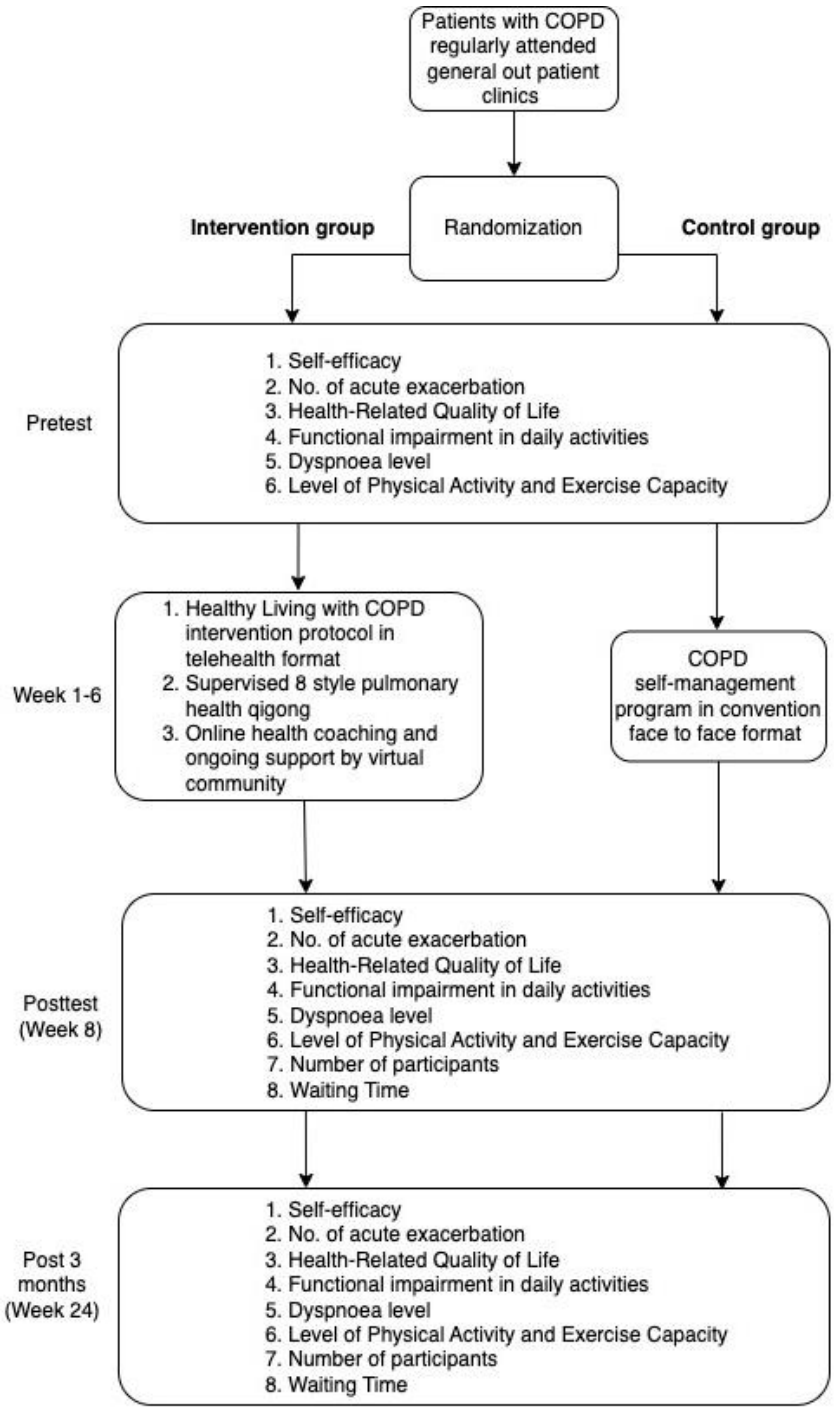
The independent variable is the *Healthy Living With COPD* program. The dependent variables are self-efficacy, health-related quality of life (HRQoL), physical capacity, functional impairment in daily activities, and dyspnea level (Figure 5.3). A set of questionnaires that will be validated will be prepared to examine the program's effectiveness; Chinese versions are available. Vital signs such as blood pressure, heart rate, and oxygen level at rest will be documented. Meanwhile, the number of acute exacerbations leading to hospital admission and medical consultation will be compared. The number of participants who attended the COPD self-management program and their wait time before and after launching the program will also be analyzed.

Randomization

The unit of randomization is clinics under the catchment of New Territories East Cluster, Hospital Authority, Hong Kong. The list of clinics will be sorted geographically and alphabetically. For every clinic in the odd rows, the computer would generate a random number of 1 or 2. For every clinic in the even rows, the alternative number to the previous row would be assigned. Finally, clinics with a random number of 1 would be allocated to the usual-care arm; clinics with a random number of 2 would be under the intervention arm.

Figure 5.3

The CONSORT diagram of Health Living with COPD



Methods

Patients with COPD will be recruited from clinics under the catchment of New Territories East Cluster, Hospital Authority, Hong Kong. Ambulatory patients with stable COPD will be invited to join the program. A checklist of inclusion and exclusion criteria will be disseminated to allow health professionals to identify suitable participants.

Confidentiality

Confidentiality will be ensured by following the IRB's ethical research protocol. Ethical approval from the Research Ethics Committee of the Joint CUHK-NTEC Clinical Research Ethics Committee will be obtained. The study will conform to the World Medical Association Declaration of Helsinki. A written bilingual participant information sheet will be given to all individuals before recruiting them into the study. Written informed consent will be obtained from each participant, and they may withdraw from the study at any time without penalty. Patient data, such as past medical history, vital signs, and questionnaires, will be password protected. Only outpatient codes can be identified in the related questionnaire. All data used in the study will be kept in a password-protected computer in the clinic and managed by the principal investigator. Add data will be anonymized before statistical analysis and print outs will be stored in a locked cabinet.

Formative Data Collection

Two sessions of focus group interviews will be arranged. One session will be organized for health professionals; the other will include patients and their caregivers. An on-site focus group will be placed in the general outpatient clinic to maximize the

effectiveness of qualitative information gathering. A synchronized Zoom meeting will be arranged with the focus group if traveling or transportation concerns arise. A productive interaction and atmosphere is expected to discuss the formative components of the program evaluation project.

Data on attendance, the number of health coaching/discussions, the number of completed agreed-upon action plans, and patient satisfaction will be collected after the program. The percentage of participants with completed and agreed-upon action plans will be compared between the two groups.

Methods for Formative Data Management and Analysis

The focus group will be conducted in Cantonese. All focus group discussions will be recorded and transcribed verbatim. The doctor in charge, who has extensive experience in pulmonary rehabilitation in general outpatient clinics, will be consulted to clarify any discrepancies or questions relative to the transcripts.

The content will be first transcribed in Chinese using Google Live Transcribe. It will then be translated into English by Google Translate. To ensure language equivalence and meaning, students studying translation will be invited to back-translate the English script into Chinese. After checking the transcripts, the final version in English will be ready for qualitative analysis with NVivo.

A phenomenological approach will be used to investigate the essence of the topics in the educational program and health coaching (Creswell & Poth, 2018). All transcripts will be read thoroughly to ensure familiarity with the content, and a second read-through will be conducted to identify major themes. The transcripts will be analyzed line-by-line

using an inductive coding process that segments the transcripts into small meaning units, which can be labeled and categorized (Thomas, 2006). Upper-level categories will be determined based on the research questions, and NVivo coding will be conducted to highlight recurrent categories. Through repeated examination and comparison, overlapping codes and categories will be consolidated into themes encompassing similar concepts (Thomas, 2006). The codes, categories, themes derived from the data, and supporting interview quotes will then be organized into a coding table for data analysis (Green & Thorogood, 2014).

Summative Data Collection

Participants in both arms of the randomized controlled trial will be invited to clinics to complete a set of questionnaires at baseline, program completion, and 3 months after the program. The validated standardized Chinese version of the questionnaire includes demographics, socioeconomic status, exercise habits, and risky health behavior. Vital signs, such as blood pressure, heart rate, oxygen level at rest, and daily step count will be documented and recorded via the electronic health platform (HA Go app).

Independent Variable. The independent variable is the 6-month telehealth-based home program. Participants in the intervention arm will receive 1.5 hr of training, including a SME program, a supervised standard-8-style online pulmonary HQG, and online health coaching and discussion with participants. Participants in the usual-care arm will receive a face-to-face SME program. The setting will be the meeting room or consultation room in the clinic.

Dependent Variables. There are six dependent variables.

Self-efficacy. Self-efficacy is the perceived level of preparedness to use different skills to manage chronic illness. The Self-Efficacy to Manage Chronic Disease Scale (Lorig et al., 2001) will be used. It is made up of six items on a visual analog scale, ranging from 1 (*not at all confident*) to 10 (*totally confident*). It is a valid and reliable instrument to evaluate self-efficacy in managing different chronic diseases.

Number of Acute Exacerbations Leading to Hospital Admission and Medical Consultation. This is defined as the number of hospital admissions and medical consultations due to acute exacerbations of COPD. The researchers will validate the records with clinical notes, hospital discharge summaries, and medication prescriptions.

Health-Related Quality of Life. Health-related quality of life refers to an individual's or a group's perceived physical and mental health over time. The COPD Assessment Test (CAT; Jones et al., 2009) will be used to measure HRQoL. The CAT is a patient-completed questionnaire assessing all aspects of the impact of COPD (cough, sputum, breathlessness, chest tightness, confidence, activity, sleep, and energy levels). There are eight questions on a 1-to-5 point scale.

Functional Impairment in Daily Activities. The functional impairment in daily activities among patients with COPD will be measured by the Chinese Manchester Respiratory Activities of Daily Living Questionnaire (CMRADLQ; Siu et al., 2021). It has 21 items in four activities, including mobility, kitchen, domestic, and leisure activities. The rating scales are in six categories scored from 0 to 105, where 105 indicates the absence of physical disability. It has been translated into Chinese with

pictorial enhancements to facilitate self-administration. It is a validated and reliable functional assessment tool to measure functional status among patients with COPD in the Chinese population.

Dyspnea Level. The dyspnea level in daily activities is measured by the Modified Medical Research Council Dyspnea Scale (mMRC; Fletcher et al., 1959). It is a 5-point scale (0 to 4) and considers a single dimension (i.e., physical tasks such as walking) that provokes breathlessness.

Level of Physical Activity and Exercise Capacity. Daily step count is used to evaluate participants' level of physical activity or exercise capacity by a pedometer. Peripheral blood SpO2 at rest and fluctuation will be measured by pulse oximetry. They have been widely used in pulmonary rehabilitation. Shaw et al. (2020) conducted a meta-analysis on the effectiveness of COPD self-management mobile applications. Monitoring devices such as pulse oximeters and pedometers linked to mobile apps can facilitate activity monitoring and compliance with the action plan.

Methods for Summative Data Management and Analysis

Quantitative data obtained from the questionnaire, pedometers, and pulse oximetry will be collected through an online portal or Google Forms. Participants will access a Google Form from an electronic device with a secure internet connection. All statistical analyses will be conducted with IBM SPSS (Version 29.0) for Windows. Validation rules will be set up accordingly to avoid errors during data entry. Data cleansing will be performed to identify abnormal values, which will be corrected after the original records are referred to if any discrepancies are found to different criteria: the

Global Initiative for Chronic Obstructive Lung Disease stage, COPD combined assessment group (ABE groups), Self-Efficacy for Managing Chronic Disease 6-Item Scale, mMRC scale, CMRADLQ score, and CAT scores. Demographic data and data regarding the COPD severity by spirometry will be presented descriptively and compared with a chi-square test. Analysis of variance will be used to compare differences in self-efficacy with different outcomes between groups and changes at baseline, immediately postintervention, and 3 months after the program.

Anticipated Strengths and Limitations

One anticipated strength of the CRT is to minimize potential information bias and cross-contamination among patients between the two arms. It will reduce information bias among patients who attend medical consultations at the same clinic. The design is helpful for group-level interventions and minimizes confounding factors. It will also help make causal inferences of the treatment efficacy of the telehealth self-management program for patients with COPD.

There are potential limitations to the *Healthy Living With COPD* program. The CRT involves greater complexity in the design. To achieve the same statistical power, more patients must be recruited from the clinics. Patients with low health and computer literacy may encounter difficulties attending the training or accessing the virtual community. For this reason, patients can call for hotline support or arrange a time to visit the case managers during the clinic opening hours to address problems with online learning. Recall bias relative to the vital signs, compliance to an action plan, or HQG should not be neglected. A pictorial online form will be constructed to motivate patients'

participation in recording and managing their own health records. In addition, the frequency and length of the educational program and health coaching may not be optimal. A 6-week program may not be sufficient for the patients to complete an agreed-upon action plan for cultivating healthy behavior.

For this reason, the case managers are responsible for setting up a practical and feasibility action plan using the SMART model (Doran, 1981). Information bias should be considered for patients in the two groups who have medical consultations at different clinics in the same district. To minimize the contamination between groups, patients will be recruited from one clinic in each district and allocated randomly into the two groups.

Conclusion and Implications

The *Healthy Living With COPD* program is a 6-month telehealth-based home program that improves access to care by offering best practices in COPD care via telehealth in the person's home. In the chapter, the program evaluation research plan discussed in evaluating the feasibility and effectiveness of the telehealth self-management program. In the short-term goal, the program will increase in rate and satisfaction with participation in daily activities. Their perceived dyspnea will be improved, as measured by saturation of peripheral oxygen at rest and rating of perceived dyspnea. In the intermediate, the patient will independently practice HQG once a week and effectively self-manage their COPD sign and symptoms. It will empower patients' self-efficacy in managing the disease in the long term. Different levels of stakeholders will be engaged to seek their initial consensus and support. Stakeholders directly involved in the program will be invited to examine the formative and summative program evaluation results. The

most beneficial and favorable training elements and practical intervention strategies for the participants will be identified and supported for future service models and health service planning.

Positive outcomes from this project can inform and inspire the clinical effectiveness of COPD self-management programs in telehealth format in primary care. Ongoing dissemination activities are needed so stakeholders, from hospital chief executives, health administrators, and patients to caregivers, can become aware of and experience the importance of the program in promoting respiratory care in the new era in primary care settings. The findings dissemination plan of program evaluation research will be discussed in the next chapter.

CHAPTER SIX – Dissemination Plan

Brief Description of the Proposed Program

The *Healthy Living With COPD* program is a 6-month telehealth-based home program, including a self-management educational program, a supervised standard-8-style online pulmonary health qigong (HQG) class, and online health coaching and discussion with participants. After the baseline evaluation, introductory computer literacy training will be arranged for patients with chronic obstructive pulmonary disease (COPD) to set up web learning and health monitoring at home.

The telehealth COPD self-management program includes six 45-min sessions. The session content originated from the Living Well With COPD (2016) self-management program, COMET, an international open-design clinical trial (Bourbeau et al., 2016; Kessler et al., 2018). The Chinese version of the Living Well With COPD self-management program (So, 2015) is available and implemented extensively at all hospital occupational therapy departments in Hong Kong. In addition, each session will include 30 min of supervised standard-8-style online pulmonary HQG (baduanjin). The requirements of HQG baduanjin follow the standards advocated by the Chinese Health Qigong Association under the General Administration of Sports of China (General Administration of Sports of China, 2018; Lu et al., 2020). Furthermore, the program instructor (an occupational therapist) can monitor heart rate, oxygen saturation, and blood pressure via mobile devices during the practice.

The *Healthy Living With COPD* program will be hosted in the meeting room of general outpatient clinics with supporting network and computer facilities. Patients will

attend the program at home via personal computers, tablets, or smartphones. Health professionals will organize a regular weekly/biweekly online meeting with participants. In addition, a comprehensive telehealth platform will be organized via social media. The platform supports training delivery, online discussion, skills demonstration, and practice. The case managers will lead the health coaching with a discussion on five topics: managing acute exacerbation and exertional dyspnea, medication management, smoking cessation, physical activity, and symptom and emotional control. Participants will be mentored to develop an agreed-upon action plan with the health professionals and regularly review the outcomes. Educational videos or pamphlets will be shared so that participants can have role models. The health professionals will give verbal encouragement and reinforcement to support them in pursuing a behavior. The project is expected to raise awareness and promote respiratory care in primary care settings.

Dissemination Goals

The dissemination plan is organized into long- and short-term goals and is further differentiated by target audience.

Long-Term Goal

Healthy Living With COPD will be promoted to the Chinese population as a standardized service framework in primary-care settings. It will be advocated in all general outpatient clinics under the catchment of the Hospital Authority in Hong Kong and disseminated to primary-care settings in the Greater Bay Area of mainland China.

Short-Term Goals

- The program will inform occupational therapists and health professionals about the overall design, costs, strategies, practical elements, and implementation considerations in promoting COPD care globally. At least 100 health professionals and administrators will implement the telehealth program in the first year.
- Health professionals will increase their awareness of *Healthy Living With COPD* and refer patients with COPD to attend the program.
- Patients and their family caregivers will learn about the program from their health professionals and other media. At least 100 patients with COPD will enroll in the program in the first year.

Target Audiences

The first step to achieving the long-term goal of *Healthy Living With COPD* in promoting access to COPD care and patient self-efficacy in managing the disease is to enroll people into the program. Thus, dissemination is an essential step. The target audiences for dissemination include patients with COPD, their caregivers, health professionals involved in the program, the clinic-in-charge, hospital chief executives, and the Department of Family Medicine Chief of Service, who oversees the clinics under the catchment of the New Territories East Cluster.

The primary stakeholders are adults with COPD participating in the program. If patients are aware of the program and how to enroll, they can benefit from the enhanced workflow of COPD care in primary-care settings, with its extensive application of

telehealth technologies. Patients can reduce the number of physical clinic visits and attend COPD self-management programs with a team of multidisciplinary health professionals. The goal is to increase their awareness, QOL, and participation in the COPD self-management program.

The secondary stakeholders include caregivers of patients with COPD, health professionals involved in the program, the clinic-in-charge, hospital chief executives, and the Department of Family Medicine Chief of Service, who oversees the clinics under the catchment of the New Territories East Cluster.

Health professionals and occupational therapists may benefit from the positive findings of this project and integrate the successful experience into their future respiratory care or pulmonary rehabilitation. The goal is to expand *Healthy Living With COPD* to all primary clinics in the seven clusters under the catchment of the Hospital Authority. The clinic-in-charge, hospital chief executives, hospital administrators, and Department of Family Medicine Chief of Service may recognize the enhanced access to COPD care and the benefits of *Healthy Living With COPD* in primary and secondary prevention.

Effective dissemination efforts can encourage further collaboration opportunities with other health professionals and promote COPD self-management in primary health care. Such collaborations will foster health professionals, academics, and researchers in telehealth, disease self-management, and primary and respiratory care to advance the knowledge and explore the best practice model in COPD care via telehealth in the person’s home.

Key Messages

Key messages regarding the distinct value and goals of *Healthy Living With COPD* are developed for the primary and secondary audiences.

For Patients With COPD

Healthy Living With COPD is a theory-driven, evidence-based program that combines primary-care occupational therapy for health promotion and prevention services. It facilitates patients to engage in active and healthy lifestyles, improving health and wellness. Elements of the COPD self-management program in telehealth format enhance access to care and foster self-efficacy in managing COPD signs, symptoms, and exacerbations. Improved primary-care access will significantly minimize unplanned episodic medical consultations, emergency visits, and hospitalizations.

For Caregivers of Patients With COPD

The program will enhance patients' self-confidence in managing their health and wellness and lead to reducing their care burden. Informal caregivers should be involved because the program could improve medication nonadherence and QOL for the patients and their informal caregivers and save heath care costs (Bender et al., 2014; Blackstock et al., 2016; Cooke et al., 2012; Dekhuijzen et al., 2018; Nakken et al., 2015).

For Health Professionals

For the clinic-in-charge, hospital chief executives, hospital administrators, and Department of Family Medicine Chief of Service, the telehealth program is expected to provide comparative clinical effectiveness to the conventional face-to-face interventions. The role of health professionals and occupational therapists in COPD primary care will

be expanded. It is expected that additional resources will be arranged to facilitate the delivery of COPD self-management programs in a telehealth format. The data will support future service models and health service planning, including wait time, the number of patients who attended the program, and operation costs. The findings will further strengthen contextual change in practices impacting access to COPD care and management.

Messenger for *Healthy Living With COPD*

Dr. Maria Leung is the Chief of Service of the Department of Family Medicine, New Territories East Cluster of Hospital Authority. Dr. Leung oversees all physicians and operations within the Family Medicine Department under the catchment of the New Territories East Cluster. Before taking up the position of Chief of Service, she led the Nurse and Allied Health Clinic–Respiratory Management Service for more than 10 years. She is also a crucial member of the Family Medicine Central Coordinating Committee, advocating for revision of the service framework for patients with COPD.

Ms. Caroline Chiu is the Operation Manager of the Department of Family Medicine, New Territories East Cluster of the Hospital Authority. Ms. Chiu has worked in the Department of Family Medicine for over 30 years and has worked closely with the author for more than 10 years. She has extensive clinical experience with COPD from primary to tertiary care. She now oversees all nursing personnel, finance, inventory, and administrative functions for the Family Medicine Department. She is dedicated to shaping and promoting the benefits of multidisciplinary COPD self-management among nurse case managers and allied health professionals. She is open-minded to attempting

different service models and evidence-based interventions to sustain clinical service quality. Over the past years, the author has collaborated on several research studies and published conference proceedings with Dr. Leung and Ms. Chiu.

Finally, patients who successfully complete the program can become effective messengers to communicate their personal experiences and outcomes directly to other potential patients. They can disseminate knowledge formally or informally, in-person, and via social media for additional outreach.

Dissemination Activities

Adults with COPD participating in the program are the primary stakeholders. The positive results of the program evaluation will be shared in promoting participants' self-efficacy in engaging in active and healthy lifestyles. An infographic with a one-page topic outline will be prepared to improve their understanding of how *Healthy Living With COPD* promotes their health-related QOL. A snapshot of important findings will also be ready with diagrams and figures. This information will be shared in clinic waiting rooms and through electronic or social media communications.

Caregivers of patients with COPD and health professionals involved in the program will be encouraged to understand how *Healthy Living With COPD* improves participants' health and wellness, including patients' improved self-efficacy in managing COPD signs, symptoms, and exacerbations. A brief with the "cohesive paragraph" will be prepared highlighting the program implementation progress and evaluation results at baseline and immediately after the program.

A formal report with a two-page executive summary will be put together for the

clinic-in-charge, hospital chief executives, and Department of Family Medicine Chief of Service. An evaluation presentation will be arranged during the regular hospital management meeting. It is an excellent opportunity to share the most beneficial and favorable training elements and practical intervention strategies for the participants from the results of the formative and summative evaluations. Furthermore, the successful experience of the COPD self-management program in enhancing access to COPD care and as an alternative to conventional face-to-face delivery of COPD care will be disseminated. It is expected that the findings of the formal reports will support future local COPD service models and health service planning.

For scholarly dissemination, it is anticipated that *Healthy Living With COPD* pilot findings will be submitted to one peer-reviewed journal and at least one local conference proceeding. A manuscript will be prepared and submitted to the *International Journal of Chronic Obstructive Pulmonary Disease.* A call for papers on "Promoting Optimized Health Care for Individuals with COPD in the Era of Telehealth" has been received via email. The guest editors welcome submissions across the evidence spectrum, ranging from studies of component technologies (e.g., sensors, algorithms, and software) to research articles, database articles, software articles, study protocols, reviews, matters arising, and comments. It is expected that research findings will foster clinical experience sharing on care models and practice on COPD self-management in the era of telehealth.

An abstract will be submitted to the annual scientific meetings of the Hong Kong Thoracic Society and the American College of Chest Physicians. Medical and health professionals with experience in respiratory care will attend the conference. It is a golden

opportunity to promote the significance of *Healthy Living With COPD* in enhancing access to care and improving patient's self-efficacy in managing their health and wellness.

Budget

The dissemination budget consists of all activities required to promote the key messages to the target audiences (Table 6.1).

Table 6.1
Dissemination Budget

Item	Cost Detail	Cost (HKD) Year 1	Cost (HKD) Year 2	Total
Design and printing	1. Copies of 1-page infographic for adults with COPD participating in the program (HKD$5 x 150 copies)	750	-	750
	2. Copies of 2-page brief for caregivers of patients with COPD and health professionals involved in the program (HKD$5 x 150 copies)	1,500	-	1,500
	3. Output for poster presentation	-	500	500
	4. Formal report (HKD50 x 50 copies)		2500	2500
Conference proceeding	Attend local Hospital Authority Convention, Hong Kong Thoracic Annual Scientific Meeting, or Primary Care Conference	-	2,000	2,000
Article processing charges	Manuscript submission and other charges (e.g. editing) to overseas journals	-	10,000	10,000
Total		**2,250**	**15,000**	**17,250**

Note. As of April 5, 2023, 1.00 USD = 7.8500 HKD (bloomberg.com).

Evaluation

Evaluation of dissemination activities will be measured by tracking:

- at least 100 patients with COPD referred and attending *Healthy Living With COPD*

- at least 100 health professionals and administrators make referrals to the telehealth program
- 300 copies of health promotion materials will be distributed, including the online education and HQG class and health coaching
- 500 video views of the HQG baduanjin
- 50 copies of the formal report with a two-page executive summary will be disseminated to stakeholders, including the clinic-in-charge, hospital chief executives, and Chief of Service in the Department of Family Medicine

Conclusion

The chapter discusses the dissemination plan of the 6-month telehealth-based *Healthy Living With COPD* home program. The long-term goal is to cultivate evidence of telehealth in promoting access to COPD care and self-efficacy in managing the disease. The short-term goal is to inform potential program recipients and caregivers, occupational therapists, and health professionals about the program to encourage enrolment. The messages will include information about benefits and overall design, costs, strategies, practical elements, and implementation considerations in promoting COPD care in different settings and countries. It is the author's hope that the telehealth program will become preferred alternative to in-person COPD self-management programs worldwide. The target audience, dissemination activities, and budget have been outlined to magnify the visibility of the program to enhance the scale of implementation.

CHAPTER SEVEN – Funding Plan

This chapter describes the requirement, costs, and relevant funding sources for implementing *Healthy Living With COPD*. The program draws from evidence-based therapy approaches and principles that empower participants to manage their health and wellness. This 6-month program includes six sessions of self-management educational content, a supervised standard-8-style online health qigong (HQG), weekly/biweekly online health coaching, and ongoing support and discussion in a virtual community. In addition, the project aims to raise awareness and seek continuous help in promoting respiratory care in the new era in Hong Kong and globally primary care settings.

Available Local Resources and Program Requirement

Several local resources and supports are identified to develop and implement the initiative, mainly physical space, telehealth delivery hardware and software, and personnel. A communication channel will be set up with the Chief of Service at the clinic to ensure physical space for in-person or remote consultations, educational sessions, and HQG sessions delivered in person and remotely via telehealth. The track will strengthen the collaboration in facilitating the program delivery, including room reservations and alternatives in program implementation. The room will need good lighting, air ventilation, and Internet network facilities to host the telehealth program. It should be appropriate for hybrid mode (live and telehealth) if indicated.

Health professionals, including occupational therapists, physical therapists, and nurses with experience in pulmonary rehabilitation and primary care, will be recruited by sending an invitation email through the hospital system. They will be assigned as case

managers of the patients to facilitate their engagement with the program. They will also be the educators of the self-management program.

Program Implementation Budget

A project proposal is provided to consolidate the financial resources in implementing *Healthy Living With COPD* sustainability, including workforce and hardware costs. The following tables illustrate the resources required for the various program elements and associated costs. Health professionals will provide the item or service voluntarily. A research therapist is required to support administration and coordination work.

The estimated value of in-kind resources to support the *Healthy Living With COPD* provision is outlined in Table 7.1. The items and estimated amounts are per agency per year. A research therapist is a primary cost required to support administration and coordination work. They must prepare the participants' and leaders' manuals, patient evaluations, and data collection. They will also liaise with case managers and patients with chronic obstructive pulmonary disease (COPD) and provide ongoing support to online learning, health coaching, and virtual community. Case managers with experience in respiratory care will be recruited as case managers voluntarily. The staff calculation is conservative based on one health professional leading one patient group of *Healthy Living With COPD* voluntarily. It is estimated that salary costs in Year 1 will be $480,000, including medical insurance and mandatory provident fund. Year 2 is expected to require the same, provided time allocation.

Table 7.1

Estimated Value of In-Kind Resources for 1 Year

Budget item	Unit	Value (HKD)	Total (HKD)
Room / space for the program	No addl. Cost	0	0
Internet broadband	No addl. Cost	0	0
Participants' manuals	100	25	2,500
Leaders' manuals	10	50	500
Pedometers	100	100	10,000
Portable oximeters for ambulatory monitoring	10	3,500	35,000
Disposable fingertip sensor	200	250	50,000
Computer set for the webinar	1	15,000	15,000
Computer accessories for the webinar	1	2,000	2,000
Tablet for the webinar	2	5,000	10,000
Smartphone for the webinar	2	5,000	10,000
Phone card with data for the webinar	2	500	1,000
Full time research therapist	1	480,000	480,000
Dissemination budget (Table 6.1)	1	8,625	8,625
Total estimated in-kind value		520,050	624,625

Note. As of April 5, 2023, 1.00 USD = 7.8500 HKD (bloomberg.com).

The Cost Estimation of Healthy Living With COPD

The cost calculations for *Healthy Living With COPD* are based on offering 10 groups of five participants in each group in the first year and 10 groups of

10 participants in the second year. The cohorts can be run concurrently on different days and times. Efficiencies are expected to be gained in the second year, allowing for more participants should the demand support expansion. The expense of hardware and consumables are fixed in the second year onward. More patients will be recruited as the workflow is rectified. Therefore, the average cost per patient will be lower.

The program costs are discussed with a description and rationale. A dissemination budget (Chapter 6) is reserved to ensure smooth and efficient delivery of *Health Living With COPD*. A research therapist is required to liaise with case managers and patients with COPD and provide ongoing support to online learning, health coaching, and the virtual community. The research therapist must prepare the participants' and leaders' manuals, patient evaluations, and data collection. They also need to support ambulatory blood oxygen monitoring with portable oximeters for the patients. They will prepare the cloud drive of COPD health education videos, brochures, and pamphlets, facilitating case managers to share with the patients. They will also support clinical evaluations, data management, and analysis at baseline, immediately postintervention, and 3 months after the intervention. Volunteer support for some of these tasks may be possible from health professionals with experience in respiratory care or pulmonary rehabilitation. That support would lower the program costs and ensure the smooth delivery of the program with support from experienced case managers.

Hardware and Consumable Costs

To support the delivery of telehealth services and virtual community, a budget should be reserved for the hardware installation or consumable items. Two sets of tablets

and smartphones are required for two health professionals to support the patient group simultaneously. One set of desktop computers is needed to support the *Healthy Living With COPD* administrative and coordination work. A budget for computer accessories is reserved to enhance the learning outcome by installing stands, lighting, and a microphone for live broadcast webinars.

All patients participating in *Healthy Living With COPD* will be invited to assess their blood oxygen saturation level in practicing HQG and activities of daily living tasks with portable oximeters. Two sets of disposable fingertip sensors will be arranged for each patient. The data will be compared between baseline and after intervention. Meanwhile, each patient will receive a pedometer to assess their physical capacity and daily walking steps. The program funding will support the cost of pedometers.

Potential Funding Sources

Table 7.2 summarizes potential funding sources, from the government to charity foundations. Additional funding support may be available from the Health Bureau of the Hong Kong Special Administrative Region Government (2023). The Health and Medical Research Fund aims to build research capacity and encourage, facilitate, and support health and medical research to inform health policies, improve population health, strengthen the health system, enhance heath care practices, advance the standard and quality of care, and promote clinical excellence through the generation and application of evidence-based scientific knowledge in health and medicine. It also provides funding support to evidence-based health promotion projects that help people adopt healthier lifestyles by enhancing awareness, changing adverse health behaviors, or creating a

conducive environment that supports good health practices. It would be valuable to support outcomes research on the effectiveness of *Health Living with COPD* to improve access to care by offering best practices in COPD care via telehealth in the person's home. The program meets the high-priority funding research areas and theme, including chronic respiratory diseases (B-001), primary health care (C-003), and telehealth and advanced technology (E-003). Further detail can be obtained from the website (https://rfs1.healthbureau.gov.hk/images/HMRF/ResearchAreas_Themes.pdf). Local small funding opportunities from the district council will be explored to support the hardware and consumable costs.

Table 7.2
Potential Funding Sources

Name	Funding objective	Maximum funding amount (HKD)	Application deadline
Health and Medical Research Fund	To provide funding support to evidence-based, health-promotion projects that help people adopt healthier lifestyles by enhancing awareness, changing adverse health behaviors, or creating a conducive environment that supports good health practices	1.5 million	Late March of every year
Jockey Club Charities Trust	To improve the quality of life of the people of Hong Kong and meet future community and social needs	Varied	Year-round
Li Ka Shing Foundation	To empower people, foster change, and develop a better society through meaningful action	Varied	Year-round

The nongovernmental funding source will be explored to support COPD care in the community. The Jockey Club Charities Trust is one of the largest charitable trusts in Hong Kong (Hong Kong Jockey Club, 2023). It aims at improving the quality of life of the people of Hong Kong and meeting future community and social needs. *Healthy Living With COPD* meets the charity fund's focus and principal support areas. The Li Ka Shing Foundation is another large-scale charity fund prioritizing support for education and health care initiatives (Li Ka Shing Foundation, 2023). The foundation's mission is empowering people, fostering change, and developing a better society through meaningful action. It supports local medical and rehabilitation initiatives and subsidizes several innovative projects in mainland China, the United States, and worldwide.

Conclusion

This chapter illustrates the costs of delivering *Healthy Living With COPD* and identifies relevant funding sources for implementing the program in the first 2 years, with 10 groups of five participants in each group in the first year and 10 groups of 10 participants in the second year.

The total estimated value of in-kind resources is HKD623,375, including one full-time research therapist, dissemination budget, manuals, computer hardware, and portable oximeters for ambulatory monitoring at home. The items and estimated amounts are per agency per year. Detail of the dissemination budget was discussed in Chapter 6.

For external funding, this author will first apply for the Health and Medical Research Fund from the Hong Kong Special Administrative Region government, which meets the high-priority funding research areas and themes. The author will also apply to

other large-scale nongovernmental funding sources, including the Jockey Club Charities Trust and Li Ka Shing Foundation, to support the telehealth initiative. A sufficient financial incentive will elicit stakeholders to improve COPD care in primary care.

CHAPTER EIGHT – Conclusion

Introduction

This doctoral paper presented *Healthy Living With COPD*, a telehealth-based self-management program for people with chronic obstructive pulmonary disease (COPD). The program was designed for patients with COPD receiving care in general outpatient clinics. The program goal is to empower participants to manage their health and wellness by improving their access to, knowledge of, and self-efficacy in managing their health, wellness, and quality of life (QOL).

Suboptimal COPD management without proper care, including shortness of breath and dyspnea, lead to deterioration in activity tolerance and participation. Three central factors influence COPD care and the resulting morbidity: the heath care service model and access to care, professionals' knowledge and behaviors, and each patient's personal factors. The COVID-19 pandemic led to suspending or reducing outpatient and primary care services in Hong Kong and worldwide. The resulting restrictions in patient access to care led to poor COPD management, including deterioration of QOL and increased frequency of acute conditions, hospital readmissions, and mortality.

Three key ingredients for best outcomes were identified from the evidence and guidelines of the most authoritative sources on promoting the health and wellness of people with COPD. First, self-management education (SME) programs are safe, effective, and unlikely to cause harm (Schrijver et al., 2022). Several meta-analyses and systematic reviews recommended a training intensity and duration of telehealth self-management program and supervised health qigong (HQG) training to achieve a

significant health improvement effects (C. Janjua et al., 2021; Jolly et al., 2018; Cai et al., 2022; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019).

Second, the telerehabilitation delivery format mitigates access to care issues and enables a broader outreach for delivery of self-management programs in patients' homes. In addition, ongoing support, communication, and feedback using productive information technology between health professionals and participants via social media can enhance the professionals' knowledge and awareness and activate patients in managing their health and wellness.

Third, regular practice of HQG was found to promote the health status of patients with COPD (Guo et al., 2020). It enhanced lung function (Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), minimized the perceived severity of dyspnea (Ngai et al., 2016; Zhang et al., 2022), and promoted physical fitness (Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022). The improved physical and psychosocial health further uplifted immunity (Ng et al., 2011; Xiao & Zhuang, 2015) and QOL (Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Tong et al., 2019; Zhang et al., 2022).

The theoretical basis of *Health Living With COPD* draws from two main models: the social cognitive theory (Bandura, 1977) and the electronic health-enhanced chronic care model (Gee et al., 2015). The 6-month program draws from evidence-based therapy approaches and principles explicitly designed for patients with COPD. In addition to educational content, the program provides health-supervised online HQG, health

coaching, and psychosocial support for the best outcomes. It has four essential components to generate clinical evidence: SME, supervised HQG (baduanjin), online health coaching, and virtual community. The program will be delivered using a comprehensive telerehabilitation platform to provide training, ongoing support, and discussion via social media before, after, and between sessions. Its multidisciplinary team approach includes collaboration among occupational therapists, physical therapists, and nurses with pulmonary rehabilitation experience as the case managers who address patients' needs.

Importance of Evaluating *Healthy Living With COPD*

The program evaluation research plan aims to evaluate the feasibility and effectiveness of the *Healthy Living With COPD* program. A comparative clustered randomized controlled trial design will evaluate changes within and between groups in respiratory functions, HQG practice, and self-efficacy in managing COPD signs and symptoms, health-related QOL, physical capacity, functional impairment in daily activities, dyspnea level, and the number of acute exacerbations leading to hospital admission and medical consultation. Data collection will take place preparticipation, immediately post participation, and at a 3-month follow-up.

Dissemination Plan

A dissemination plan was developed to inform potential program recipients, caregivers, occupational therapists, and health professionals to encourage program enrollment and contribute to the knowledge base on best practices in COPD care. The dissemination plan includes publishing project outcomes through scholarly publications

(manuscript and conference presentations), social media (infographic on the program and testimonials), and an executive summary for hospital chief executives and the Department of Family Medicine Chief of Service. The dissemination messages will include information about benefits and overall design, costs, strategies, practical elements, and implementation considerations in promoting COPD care in different settings and countries.

Funding Plan

The total estimated value of in-kind resources is HKD623,375, including one full-time research therapist, dissemination budget, manuals, computer hardware, and portable oximeters for ambulatory monitoring at home. The costs include implementing *Healthy Living With COPD* for the first 2 years, with 10 groups of five participants in each group in the first year and 10 groups of 10 participants in the second year.

The project developer will first apply for the Health and Medical Research Fund from the Hong Kong Special Administrative Region government for external funding, which meets the high-priority funding research areas and themes. The author will apply other large-scale nongovernmental funding sources, including the Jockey Club Charities Trust and the Li Ka Shing Foundation, to support the telehealth initiative. A sufficient financial incentive will elicit stakeholders to improve COPD care in primary care.

Reflections and Future Directions

The project provides a detailed intervention program for COPD patients that can be implemented in primary care settings. *Healthy Living With COPD* aims to address the service gap by improving access to COPD care and knowledge of and self-efficacy in

managing their health, wellness, and QOL.

The infectious disease pandemic led to the inception of the telehealth-based *Healthy Living With COPD*. Public health or social security events may also be considered the best alternatives to COPD care in the community and primary care settings. Successful implementation of the care model and positive outcomes will provide an impetus to transform and expand occupational therapy services across all seven clusters under the catchment of the Hospital Authority throughout Hong Kong. The author also believes that *Healthy Living With COPD* is the preferred alternative to in-person COPD self-management programs worldwide. The author learned that an evidence-based program must be combined with effective interventions and implementation strategies to achieve a positive outcome. A vigorous literature review and examination are essential in planning the program. Meanwhile, this doctoral project inspired the author's motivation to devote a life career to promoting COPD care in the local community and worldwide. It also furnished the author's knowledge and skills as a clinical leader and academic journey in public health and primary care.

APPENDIX A– Literature Review of Evidence Influencing COPD Care

A1. Is there evidence of the sources that influence access to care for COPD patients?

Author (year) title	Type	Participant characteristic/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Brundisini et al. (2013) Chronic disease patients' experiences with accessing health care in rural and remote areas: A systematic review and qualitative meta-synthesis	Systematic review/ qualitative meta-synthesis	People aged >18 years with chronic obstructive pulmonary disease (COPD) diagnosis; rural-specific context	12 qualitative studies: 4 from Canada (not Ontario), two in Ontario, five in the US, and one from the UK	Three themes identified: geography, availability of health care professionals, and rural culture	Qualitative metasynthesis to integrate findings across primary research studies. Used a staged coding process similar to grounded theory; studies' findings were broken into their parts (key themes, categories, concepts) and gathered across studies to regroup and relate to each other thematically.	• Geographic distance from services poses access barriers worsened by transportation problems/weather conditions • Limited availability of health care professionals (plus low education/lack of peer support) increases feelings of vulnerability • Patients may feel culturally marginalized in the urban health care context, especially if health literacy is low	• People who live in rural areas may feel more vulnerable and more easily harmed by health problems or experiences with the health care system. • Service provision location should consider transportation issues. • Patients appreciate long-term relations with clinicians and care personalized by familiarity with the patient. • People may mitigate feelings of vulnerability and community belonging if they can attend training locally in rural areas via an innovative delivery format.

Author (year) title	Type	Participant characteristic/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Clari et al. (2018) The unmet needs of people with chronic obstructive pulmonary disease: A systematic review of qualitative findings	Systematic review of qualitative studies	People aged >18 years with COPD diagnosis at any stage and without cognitive impairment	Included 8 qualitative studies: three in the UK, two in Australia, one each in the US, Canada, and Malaysia. Most data were collected in community settings; only two were from hospitals	Three synthesized findings combined in nine categories. People with COPD have unmet: (1) needs for information about the disease; (2) physical, psychological and social needs due to the disease symptoms and treatments; (3) care needs	Studies' findings f were extracted and identified with alphanumeric codes. Letters corresponded to an included study and numbers to the progressive findings retrieved from the study. All extracted findings were classified as unequivocal or credible concerning the quality of evidence	• People with COPD have unmet care needs and they expressed difficulty accessing heath care professionals and services. • Highlighted factors include assessing dedicated heath care services, lack of transport serviced, fragmented care with lack of communication, modalities of access to the services, and sanitary facilities with physical and architectural barriers	In the care of people with COPD and self-management programs, unmet health needs should be correctly identified and addressed.
Cooke et al. (2012) Review: Clinical inertia in the management of chronic obstructive pulmonary disease	Literature review	Patients with a diagnosis of COPD	English, published US studies and discussed subacute management of COPD between January 1, 2000, and April 1, 2010.	Reasons behind clinical inertia in the management of COPD: provider, patient, and system factors	Qualitatively summarized evidence of clinical inertia leading to suboptimal management of COPD	• Provider factors may affect appropriately managing COPD (e.g., understanding and attitude toward the disease and awareness of guidelines) • System factors (e.g., insurance coverage) may limit aspects of COPD care • Patient factors include medication nonadherence, understanding the disease, symptom severity, and access to medications	The authors recommended a multifaceted approach to improving COPD care, including using health informatics, changes in provider workflow, and application of objective and performance measures, such as spirometry.

Author (year) title	Type	Participant characteristic/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Cox et al. (2017) Pulmonary rehabilitation referral and participation are commonly influenced by environment, knowledge, and beliefs about consequences: a systematic review using the theoretical domains framework (TDF)	Systematic review of qualitative/ quantitative studies	People aged >18 years with COPD diagnosis and their health care professionals	Included 22 studies from Europe, 13 in Asia-Pacific region, 11 in North America, and 1 each in Africa and the Middle East. Participants were people with COPD (*n* = 23 studies), heath care professionals (*n* = 18), or combined (*n* = 7)	All identified items were mapped to the TDF. The highest numbers represented were (in order) "environmental context and resources," "knowledge," "beliefs about consequences," and "social influences." Barriers/ facilitators to referral, uptake, attendance, or completion of pulmonary rehabilitation across TDF domains were summarized	Outcome data were extracted on barriers/ enablers of pulmonary rehabilitation referral and participation. Extracted data items were mapped to the 14 TDF domains	• Factors that influence referral, update, attendance, or completion of pulmonary rehabilitation were mapped. • The most frequent domain was environmental (e.g., wait time, burden of illness, travel, transport, and health system resources. Other frequently represented domains were heath care professionals' knowledge and easily accessible referral procedures.	The most common personal and heath care system environmental factors that would challenge access to care for patients with COPD were consolidated
May et al. (2016) Experiences of long-term life-limiting conditions among patients and carers: What can we learn from a meta-review of systematic reviews of qualitative studies of chronic heart failure (HF), chronic obstructive pulmonary disease	Systematic review of qualitative studies	Patients, caregivers, or carers with experience in CHF, COPD and CKD and aged >18 years	Included 13 systematic reviews articles concerning COPD. Most (*n* =7) from Europe, 3 in Australia, and two from North America	Related attributions and explanations were grouped: (1) socio-economic disadvantages; (2) system behavior; (3) disease progression and symptoms; (4) self-management regimes; (5) burdens for patients and caregivers (6) hospital admissions	Formal data for analysis were each study's Discussion/ Conclusion sections and qualitative content analysis. Attributions were identified on (1) patient/ caregivers' experiences of illness and journeys through care, (2) heath care practices experiences, (3) evaluation of	Patients' and caregivers' help-seeking and decision-making were shaped by their degrees of (1) structural advantage (socioeconomic status, spatial location, health service quality); (2) interactional advantage (cognitive advantage, affective state, interaction quality); (3) structural resilience (adaptation to adversity, competence in managing	In developing a new COPD management program, the authors proposed measurable constructs and domains of patient and caregiver values that may represent promising targets, especially for patients who experiencing a long-term life-limiting condition

Author (year) title	Type	Participant characteristic/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
and chronic kidney disease?					illness and heath care practices	care, and caregiver response to demands)	

A2: Is there evidence of a patient's personal factors that influence COPD care?

Author / year/ title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Bender (2014) Nonadherence in chronic obstructive pulmonary disease patients: What do we know and what should we do next?	Literature review	Patients with COPD diagnosis	Literature on reasons for non-adherence to prescribed treatments and possible approaches to improve overall care	Factors associated with non-adherence Possible approaches to improving overall care	Qualitatively summarized evidence of consequences/ reasons for nonadherence among patients with COPD and interventions to improve adherence	• Depression is a contributing factor to nonadherence. Few studies addressed polypharmacy in patients with multiple comorbidities. • Collaborative care approach will likely provide most potential for improving overall care, including managing depression and enhancing adherence, as suggested by Fromer (2011). • The key components = patient-centered medical home linked with other community resources, including clinical information systems, decision-support, and self-management support	The application of mobile telephone technology as a potential intervention should highly consider overcoming barriers of non-adherence, incredibly engaging patients in a discussion of their self-care.
Bhattarai et al. (2020) Barriers and strategies for improving medication adherence among people living with COPD: A systematic review	Systematic review	Patients of any age or sex with COPD diagnosis or health care professionals involved in managing COPD	Systematic search of medical databases using keywords for English publications from January 2003 to December 2019. 38 studies: 20 cross-sectional and 18 cohort studies; 15 in Europe, 11 in North America, 4 in Asia-Pacific, 3 each in Asia and the Middle East, 1 in Africa and	Pharmacy claims data (n = 18) Self-report measurement scales (n = 18) Electronic monitoring (n = 1) No data or not reported (n = 1)	Details included study design, population characteristics, classification of nations based on economy, methods to assess adherence, definition and rates of nonadherence, typed of therapy, time since therapy initiation, methods to assess barriers/	• Nonadherence rates=22%–93% • 30 reported barriers to adherence, 24 enablers, 16 both. • Most (33) were conducted in high-income nations. Article quality=47-90% • Medication-taking behavior influenced by subjects' beliefs about medication, experiences of satisfaction with medication effectiveness, concerns about side effects, personal	• Medication adherence among people with COPD was low. Most studies highlighted depression and subjects' concern about harmful effects of the medicine as significant dissatisfaction. Severity of the disease, dissatisfaction with treating physician,

Author / year/ title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
			international collaboration		facilitators to medication adherence, and study findings. Assessed for quality with STROBE checklist	circumstances, habits, health status, and relationships with health care providers	and limited interaction between clinicians and patients were barriers to medication adherence. • Authors suggested enablers to medication adherence: o Patient's belief in the medication o Better understanding of their disease/drug therapy o Patient's confidence in practitioners' expertise o Fewer inhaler devices/ reduced dosing regimen o Repeated instruction on the use of inhaler devices o Better quality of life (QOL), less frequent exacerbations, and satisfaction with their inhaler devices
Blackstock et al. (2016) Why don't our patients with chronic obstructive pulmonary disease listen to	Literature review	Patients with COPD diagnosis	Literature on reasons for non-adherence to pharma/ non-pharma treatments according to agreed suggestions from health care provider	Factors associated with nonadherence	Qualitatively summarized evidence of consequences/ prescribed therapies for nonadherence in patients with	5 dimensions affect adherence, as outlined by the WHO: • 1. socio-economic (e.g., illiteracy, transportation, excess medication, treatment cost)	Different strategies should be considered for improving patient adherence. These include: • customize and simplify learning and intervention regimes,

Author / year/ title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
us? The enigma of nonadherence					COPD and patient-centered approaches to improving adherence in COPD	• 2. health system (e.g., patient–provider relationship, insufficient knowledge, and training for providers) • 3. therapy-related (e.g., polypharmacy and treatment complexity) • 4. condition-related (e.g., fragility, activity limitation). • 5. patient-related (e.g., knowledge, self-efficacy, cognitive ability, concern over side effects, motivation, attitudes, cultural beliefs, perceptions, psychological issues)	• identify barriers to adherence and address them, • 3. ensure patient support structures are in place, and • 4. improving self-efficacy
Cooke et al. (2012) Review: Clinical inertia in the management of chronic obstructive pulmonary disease	Literature review	Patients with COPD diagnosis	English, published US, discuss sub-acute management of COPD between January 1, 2000, and April 1, 2010,	Reasons behind clinical inertia in managing COPD: provider, patient, and system factors	Qualitatively summarized evidence of clinical inertia leading to suboptimal management of COPD	• Provider factors may affect appropriately managing COPD (e.g., understanding and attitude toward disease and awareness of guidelines) • System factors (e.g., insurance coverage) may limit aspects of COPD care • Patient factors (e.g., medication nonadherence, understanding the disease, symptom severity, access to medications	The authors recommended a multifaceted approach to improving COPD care, including using health informatics, changes in provider workflow, and application of objective and performance measures, such as spirometry
Dekhuijzen et al. (2018) Addressing the impact and unmet needs of nonadherence in asthma and chronic obstructive	Literature review	Patients with COPD diagnosis	Literature on reasons for/ impact of suboptimal adherence and summaries of key studies showing that improved adherence can reduce exacerbation,	Factors associated with nonadherence	• Qualitatively summarized evidence of multiple causes/effects. Clinical/ economic impacts of adherence in asthma and COPD	• Quoted Bourbeau & Bartlett's (2008) study that patient adherence in COPD is multifactorial and influenced by the patient, clinician, and society. Pieces of evidence confirmed improved adherence can reduce exacerbation, inhaled	To address nonadherence of patients with asthma and COPD, a coordinated approach, adherence-enhancing intervention strategies should consider, including stimulating

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pulmonary disease: Where do we go from here?			inhaled corticosteroid use (in cases of better inhaler technique), hospital admissions, and treatment costs		• Strategies to help ensure optimal adherence	corticosteroid use (in cases of better inhaler technique), hospitalizations, and treatment costs • Quoted Lareau & Yawn's (2010) study describing interventions for three types of nonadherence: erratic, unwitting, and intelligent	patient empowerment, education, training, and use of electronic monitoring and devices
Nakken et al. (2015) Informal caregivers of patients with COPD: Home sweet home?	Literature review	Informal caregivers of patients with COPD	Current knowledge of informal caregivers of patients with COPD and impact of COPD on their lives and perceptions of patient's health status	Role of informal caregivers Impact on informal caregivers' perceptions of the patient's health	Qualitatively summarized evidence of the role and influence of the informal caregiver of patients with COPD	• To achieve optimal QOL and limit care costs, there is an inevitable shift of COPD care from hospital to home care • Presence of an informal caregiver is important to provide practical help and emotional support. • Overprotective caregivers can make patients more dependent. Informal caregiving may lead to anxiety, depression, social isolation, and changed relationship with the patient • Caregivers' subjective burden is a major determinant of the impact of caregiving	• Patients with COPD and their informal caregivers face multiple limitations daily. Apart from optimizing drug therapy, home environment and management are cornerstones in COPD management. • The proposed COPD telehealth program should involve informal caregivers if possible. They could improve the QOL of both patients and their informal caregivers and save heath care costs

A3: Is there evidence that professionals' knowledge and behaviors influence COPD care?

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Banfi et al. (2018) Narrative medicine to improve the management and quality of life of patients with COPD: The first experience applying parallel chart in Italy	Qualitative study using narrative medicine approach	50 Italian pulmonologists: 76% specialized in respiratory diseases, 12% internal medicine, 12% other disciplines; 244 patients with different severities of COPD	Narratives collected through Typeform online surveys platform and at the end of the survey period. Participants wrote parallel chart after at least two visits and could choose to write it immediately after the visitor later in the privacy of their homes	Relationships with patients Age Smoking Pharma treatments Activities Relationships with patients' family members Physicians' experience of the parallel chart	Physicians invited to attend seminar on narrative medicine and write at least 5 parallel charts, following a semistructured narrative plot representing a chronological series of events. Narratives were analyzed using the grounded theory approach for qualitative interpretation of texts. Thematic analysis with three narrative clusters: disease-, illness-, and sickness-centered	• 50% of doctor–patient relationships started as tricky; younger age and smoking were main risk factors. • Relationship quality impacted adherence, effectiveness of therapy, and resumption of activities. • Doctor–patient relationship not influenced by gender. • Positive relationships are strictly linked to success in smoking cessation, a "therapeutic alliance," and adherence to pharma or rehab treatments. • Relationship quality directly understands patient's symptoms and possible targets for improvement. • Most doctors reported learning empathy, strength, positivity, and importance of family in care management via the parallel chart	Positive relationships are key to improving clinical care and managing COPD (e.g., listening and understanding). It can help patients be more adherent to treatment, improve their lifestyles, resume activities interrupted because of failing health. and improve their QOL

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Cooke et al. (2012) Review: Clinical inertia in the management of chronic obstructive pulmonary disease	Literature review	Patients with a diagnosis of COPD	English, published US studies, discussed subacute management of COPD between January 1, 2000, and April 1, 2010	Reasons behind clinical inertia in the management of COPD: provider, patient, and system factors	Qualitatively summarized evidence of clinical inertia leading to suboptimal management of COPD	• Provider factors may affect appropriate management of COPD (e.g., understanding and attitude toward the disease and awareness of guidelines). • System factors (e.g., insurance coverage) may limit aspects of COPD care • Patient factors include medication nonadherence, understanding the disease, symptom severity, and access to medications	Authors recommended multifaceted approach in improving COPD care, including using health informatics, changes in provider workflow, and application of objective and performance measures, such as spirometry
Davis et al. (2014) Continuing to confront COPD International Physician Survey: Physician knowledge and application of COPD management guidelines in 12 countries	Cross-sectional survey	1,307 primary care physicians (PCP) and respiratory specialists from 12 countries who regularly consult with COPD, emphysema, or chronic bronchitis	Survey conducted online, by telephone, or face-to-face according to cultural preferences in each country	Physicians' knowledge of COPD-management guidelines, diagnosis and treatment practices for COPD, and beliefs about COPD risk, natural history, and treatment effectiveness	Standardized questionnaire developed and translated to local languages in-country and reviewed by independent translators and a local Glaxo Smith Kline advisor for accuracy and cultural relevance; about 20-min duration	• Physicians used spirometry routinely (PCPs 82%, respiratory specialists 100%) to diagnose COPD and often validated patient-reported outcome measures (PCPs 67%, respiratory specialists 81%). • Fewer PCPs concorded treatment options with Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines: 38% of PCPs vs. 67% of respiratory specialists as 1st- or 2nd-choice treatment option for GOLD B-type patients, 40% vs. 38% for GOLD C, and 57% vs. 58% for GOLD-D-type patients	• High awareness of COPD-management guidelines among PCPs and respiratory specialists. • Gap when PCPs adopt guidelines in COPD treatment choice. • More research needed to understand barriers to implementing recommendations and rationale for alternative treatment choices

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Menezes et al. (2015) Continuing to confront COPD International Surveys: comparison of patient and physician perceptions about COPD risk and management	Cross-sectional survey	1,307 physicians (PCP to respiratory specialists) from 12 countries who regularly consult with COPD, emphysema, or chronic bronchitis) 4,343 patients with COPD aged 40 or older identified through systematic screening of population samples	Physician survey conducted online, by telephone, or face-to-face according to cultural preferences in each country Patient survey conducted by telephone or face-to-face with eligible patients Described physicians' attitudes/ beliefs about COPD prognosis and treatment and compared physician to patient perceptions concerning multiple aspects of COPD	Physician beliefs about COPD prognosis and treatment Different COPD perceptions between physician and patient	Physician survey were translated into local languages in-country and conducted online, by telephone, or face-to-face; it covered knowledge/ behavior around diagnosing and treating COPD and beliefs about COPD risk and prognosis. Patient surveys conducted via telephone or face-to-face interviews. Respondents indicated their level of agreement on perceptions of COPD	• Most (79%) PCPs responded that the long-term health outlook for patients with COPD improved over the past decade, primarily due to introduction of better medications • Some (39%) PCPs and patients (46%) agreed/ strongly agreed • Patient access to medication remains an issue in many countries Strong concordance between physicians and patients regarding COPD management practices, including use of spirometry (86% PCPs, 76% patients reported they using/ undergoing spirometry test) and smoking cessation counseling (76% PCPs reported counseling their smoking patients at every clinic visit; 71% of smoking patients stated they received counseling in the past year) • Higher percentage of physicians than patients agreed that "smoking is the cause of most cases of COPD" (78% vs. 38%)	• Physicians highlighted patients' access to preferred treatment and compliance with treatment as problematic in many regions • Differences in health care delivery/direct costs to patients between countries; only 1/3 of PCPs felt their patients had no problems accessing preferred treatments • Poor inhaler technique and patient education/ understanding of disease were the two most common reasons for non-compliance • Gap between physicians and patients about the causal role of smoking in COPD

A4: Is there evidence that health service models/management influences the effectiveness of COPD care?

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Cox et al. (2021) Telerehabilitation for chronic respiratory disease	Meta-analysis	People with a diagnosis of COPD. Compared effectiveness of telerehab with (1) traditional in-person (center-based) pulmonary rehabilitation and (2) no rehabilitation controls	Nine studies (32 reports) with 1,904 participants, using five models of telerehab: 8 studies conducted in Europe, 1 in Korea. Studies described ways to use technology to deliver pulmonary rehab (e.g., via phone, mobile apps, video-conferencing in a virtual group, through websites)	Exercise capacity: 6-min Walking Distance (6MWD) (m) Breathlessness: Chronic Respiratory Questionnaire (CRQ) dyspnea domain, Modified Medical Research Council Dyspnea Scale (mMRC) Quality of life: CRQ total score, St. George's Respiratory Questionnaire (SGRQ), COPD Assessment Test (CAT)	Searched Cochrane Airways Trials Register, the Cochrane Central Register of Controlled Trials; six databases including MEDLINE and Embase; and three trials registries to November 30,2020. All randomized controlled trials (RCTs) and controlled clinical trials of telerehab for delivery of pulmonary rehab were eligible, but intervention had to include exercise training and >50% delivered by telerehab	• Probably little or no difference between telerehabilitation and in-person pulmonary rehabilitation for exercise capacity measured as 6MWD, QOL measured with the SGRQ total score, or breathlessness on the CRQ dyspnea domain score. • Participants were more likely to complete a telerehab program (93% completion rate vs. 70% in-person; 95% confidence interval (CI) 90%–96%) • Compared to no rehabilitation control, trials of primary telerehab and when delivered as maintenance rehab may increase exercise capacity on 6MWD • No adverse effects of telerehab noted beyond reported for in-person or no rehabilitation	• Primary pulmonary or maintenance rehabilitation delivered via telerehab for people with chronic respiratory disease achieves outcomes similar to traditional center-based pulmonary rehabilitation, with no safety issues identified. • Clinical effect of telerehab for individuals with chronic respiratory diseases other than COPD, the duration of benefit of telerehab beyond the intervention period, and the economic cost of telerehab should be further examined
Janjua, Banchoff et al. (2021)	Meta-analysis	People with a diagnosis of COPD.	Included 14 studies (1,518 participants) 13–52 weeks	Impact on health behavior: 6MWD	• Identified RCTs the Cochrane Airways Trials	• For primary pulmonary rehabilitation, probably little/no difference between telerehab and in-	• Suggests that primary pulmonary or maintenance rehabilitation

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Digital interventions for the management of chronic obstructive pulmonary disease		Included RCTs to assess the benefits and harms of digital interventions for managing COPD and apply behavioral change technique (BCT) taxonomy to describe and explore intervention content	duration; participants had mild to very severe COPD Digital technology interventions included 3 mobile phone, 1 smartphone app, and 5 web- or Internet-based studies. One in Belgium and Spain, 2 in Canada, 1 each in China, four European countries, Korea, Taiwan, and UK, 2 in the Netherlands, and in US	Self-efficacy: PRAISE and SEMCD total Health-related QOL (HRQoL): CRQ total: SGRQ total or CAT Dyspnea symptoms: CRQ dyspnea Exacerbations: mean number of exacerbations	Register (date of the last search was April 28, 2020) and other trials at web-based clinical trials registers • Included RCTs comparing digital technology interventions with/without routine supported self-management to usual care or control treatment for self-management. • Multi-component interventions (one was digital self-management) compared with usual, standard, or control treatment	person pulmonary rehab for exercise capacity measured by 6MWD • May be little/no difference for QOL measured with SGRQ or for breathlessness on CRQ dyspnea domain score. • Participants were more likely to complete telerehab (93%) than in-person (70%; (95% CI 90%–96%) • Compared to no rehabilitation control, trials of primary telerehabilitation may increase exercise capacity on 6MWD and may also increase 6MWD when delivered as maintenance rehabilitation. No adverse effects of telerehabilitation were noted over and above any reported for in-person rehabilitation or no rehabilitation	delivered via telerehab for chronic respiratory disease achieves outcomes similar to traditional center-based pulmonary rehabilitation, with no safety issues identified. • Telerehab would promote the program completion rate and increase participants' exercise capacity
Janjua, Carter et al. (2021) Telehealth interventions: Remote monitoring and	Meta-analysis	People with COPD diagnosis Included RCTs to assess the effectiveness of telehealth	Included 29 studies: 4 each in Denmark and Spain, 3 each in the UK, US, and Australia, 2 each in the	Exacerbations Quality of life Dyspnea symptoms	Identified 29 studies (5,654 participants; male 36%–96%; female 4%–61%) from Cochrane	• Remote monitoring plus usual care: Very uncertain evidence suggests remote monitoring + usual care may have little/no effect on the number of people experiencing	• Multi-component interventions with asynchronous remote monitoring are no better than usual care but may provide short-term

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
consultations for people with chronic obstructive pulmonary disease (COPD)		interventions that allow remote monitoring and consultation and multicomponent interventions to reduce exacerbations and improve QOL, while reducing dyspnea symptoms, hospital service use, and death among people with COPD	Netherlands and Italy, 1 each in China, Ireland, and Taiwan; 3 were multinational Interventions included remote monitoring or consultation plus usual care, remote monitoring or consultation alone, and multi-component interventions from all care settings	Hospital service utilization Mortality	Airways Trials Register, US National Institutes of Health Ongoing Trials Register, World Health Organization International Clinical Trials Registry Platform, and the IEEEX Xplore Digital Library. The latest search was conducted in April 2020.	exacerbations at 26 or 52 weeks. • May be little/no difference in effect on the QOL (SGRQ) at 26 weeks or hospitalization (all-cause or COPD-related) • COPD-related hospital re-admissions probably reduced at 26 weeks (hazard ratio 0.42, 95% CI 0.19–0.93) • May be little/no difference in deaths between intervention and usual care • No evidence for dyspnea symptoms or adverse events • Remote monitoring alone: Very uncertain evidence suggests remote monitoring may have little/no effect on number of people with exacerbations at 41 weeks • May be little/no effect on QOL (SGRQ total at 17 weeks or CAT at 38 and 52 weeks) • May be little/no effect on dyspnea symptoms on the CRQ-SAS at 26 weeks • May be no difference in effects on number of people admitted to the hospital or deaths. No	benefit for QOL and result in fewer re-admissions to hospital for any cause • Telehealth interventions may be beneficial as an additional health resource depending on individual needs based on professional assessment • Further research studies are needed to examine the long-term benefits for people with COPD

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						evidence for adverse events. • Multicomponent interventions with remote monitoring or consultation component: Very uncertain evidence suggests multi-component interventions may have little/no effect on number of people with exacerbations at 52 weeks. Quality of life at 13 weeks may improve per SGRQ total score but not at 26 or 52 weeks. CAT scores may improve at a mean of 38 weeks, but the evidence is uncertain, and interventions vary. • May be little/no effect on number of people admitted to the hospital at 33 weeks. Multicomponent interventions are likely to result in fewer people re-admitted at a mean of 39 weeks. May be little/no difference in death at mean 40 weeks or effect on people experiencing adverse events. No evidence for dyspnea symptoms	

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Lemmens et al. (2013) Chronic care management for patients with COPD: A critical review of available evidence	Critical review 37 papers: 8 systematic reviews, 20 RCTs, 2 controlled clinical trials, 2 controlled before–after studies, 5 pre–post studies	People aged >18 years with a diagnosis of COPD	Included chronic care programs included varied from self-management support, disease management to integrated care programs: 11 included primary studies in Europe (UK, Spain, Belgium), 9 in North America, 7 from Australia/ New Zealand, 2 in Hong Kong. Intervention format was outpatient in community or primary care clinics (15 studies), home-based (9), telephone or web-based (4), and skilled nursing facility (1)	Quality of life Number of hospital admissions Emergency department visits Mortality	Data collected from reviews were analyzed descriptively. Data collected from primary studies analyzed descriptively and meta-analyzed to predict differences in changes in process and outcome measures between intervention and control groups over time. RevMan (5.0.2) was used for the meta-analysis using a random model to test the Cochran Q $\chi 2$ test heterogeneity. Computed pooled risk ratios and 95% Cis	• Positive results on QOL and hospitalization. Inconclusive effects on emergency department visits, and no effects on mortality. No significant improvement on pooled effects on the variables. Metaregression showed the number of components of chronic care management programs explained present heterogeneity for hospitalizations and emergency department visits. Four components showed significant effects on hospitalizations, two components had significant effects on emergency department visits	COPD chronic care management has potential to improve outcomes of care, especially hospitalizations, emergency department visits, and QOL. At least two components should be included to optimize clinical care management
Roberts et al. (2018) A systematic review of the content and delivery of	Systematic review	People aged >18 years with COPD diagnosis	Included 14 studies: 6 survey, 5 quasi-experimental, 3 RCTs; 5 each from the US and	Pulmonary rehabilitation educational session topics	Developed a data extraction template specifically for the reviews. Used a narrative	• The five most common PR educational content topics across all studies were: • 1. Anxiety/depression and stress management	• Structural educational content within PR should consist of multi-components.

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education in pulmonary rehabilitation [(PR)] programs			Europe, 3 from UK, and 1 from Australia	Style of educational delivery Outcome measure tools used	synthesis approach to compare and describe educational topics included in the PR studies and their delivery methods	• 2. Early recognition of signs of infection • 3. Dyspnea and symptom management • 4. Nutrition • 5. Techniques using inhalers and nebulizers. • 6 studies reported use of lectures, and all reported significant use of supplementary educational materials such as handouts, manuals, written action plans, booklet, and leaflets. • Only 4 studies used tools to measure knowledge on COPD. Others looked at understanding, self-efficacy around self-management skills, impact of education on perceived ability to self-manage, and confidence levels around being able to self-manage in the future	• Interactive and participatory approach of lectures should be considered to share information with adult learners effectively. • Outcome measure tools should be included to ensure educational content is reviewed and improved regularly.
Poot et al. (2021) Integrated disease management [(IDM)] interventions for patients with chronic obstructive pulmonary disease	Meta-analysis	People with COPD diagnosis; mean age = 67.1 years (*SD* 9.27); *M* = 67.2 (*SD* 9.26) in the usual care group; total 21,086 COPD patients randomized in 52 studies, with 29–8,171 patients per study	Included 52 studies from 19 countries; 9 used cluster-RCT (CRT) design, with general practices or heath care regions as randomization unit: 4 from China, 3 from US, 1 from	The dominant components of IDM Outcomes: dyspnea scales, HRQoL, maximum and functional exercise capacity, number of	Used covidence to extract data and assess risk of bias for each study; analyzed results the studies in RevMan 5, using random-effects modeling. Used forest plots to	• IDM probably improves HRQoL but common effect did not exceed the MCID of four points • IDM probably leads to large improvement in maximum and functional exercise capacity. The number of participants with respiratory-related admissions and emergency department	• IDM programs by different heath care providers are highlighted to provide more efficient care of better quality • Different care components should be included to improve care for patients with

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
			Canada; 9 were performed in northwestern Europe, 5 in southern Europe, 3 in Western Asia, and 1 in Australia	participants with respiratory-related admissions, emergency department visits, hospital days per person admitted	compare results across trials. When possible, results were related to the minimum clinically important difference (MCID) for the111especttive variable	visits were reduced. A slight reduction in all-cause hospital admissions and fewer hospital days per person admitted noted. Statistically significant improvement noted on the Medical Research Council Dyspnea Scale • No differences between groups reported for mortality, courses of antibiotics/prednisolone, dyspnea, and depression and anxiety scores	COPD, including organizational, professional, patient-directed, and financial interventions
Schrijver et al. (2022) Self-management interventions for people with chronic obstructive pulmonary disease	Meta-analysis	People with COPD diagnosis Included RCTs to evaluate effectiveness of COPD self-management interventions (SMIs) compared to usual care in terms of HRQoL and respiratory-related hospital admissions and evaluate safety of COPD SMIs compared to usual care in for respiratory-related and all-cause mortality.	Included 27 studies (6,008 participants) from Europe (15), North America (8), Asia (1), and Oceania (*n* = 4); and 1 conducted in both Europe and Oceania	HRQoL Respiratory-related hospital admissions Respiratory-related mortality All-cause mortality All-cause hospital admissions Health status: dyspnea Emergency Department visits Health status: anxiety and	Searched the Cochrane Airways Trials Register, CENTRAL, MEDLINE, EMBASE, trials registries and reference lists of included studies until January 2020. RCTs and CRTs published since 1995. Self-management interventions had to include at least two intervention components and an iterative process between	• Self-management interventions likely to improve HRQoL, as measured by SGRQ total score (lower score represents better HRQoL) with a mean difference from usual care of -2.86 points. Pooled mean difference (*MD*) of -2.86 did not reach the four-point SGRQ MCID • Self-management intervention participants at a slightly lower risk for at least one respiratory-related hospital admission • The number needed to treat to prevent one respiratory-related hospital admission over a mean of 9.75 months' follow-up was 15 (95% CI	• Self-management interventions for people with COPD associated with improved HRQoL and lower probability of respiratory-related hospital admissions • COPD SMIs are safe and unlikely to cause harm • COPD SMIs should include iterative interactions between participants and heath care professionals who use BCTs. It elicits participants'

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
		Tried to evaluate effectiveness of COPD SMIs compared to usual care in terms of other health outcomes and heath care utilization and effective characteristics of COPD SMIs.		depression COPD exacerbations	participant and heath care provider(s) in which goals were formulated and feedback given on self-management actions by participant	8–399) for participants with high baseline risk and 26 (95% CI 15–677) for participants with low baseline risk. No differences observed in respiratory-related and all-cause mortality	motivation, confidence, and competence to positively adapt their health behavior(s) and develop skills to manage their disease better

A5: What is the evidence of morbidity and mortality resulting from poor COPD care?

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Alqahtani et al. (2020) Prevalence, severity and mortality associated with COPD and smoking in patients with COVID-19: A rapid systematic review and meta-analysis	Systematic review and meta-analysis	Patients with a diagnosis of COPD and COVID-19	Reviewed literature from COVID-19 inception to March 2020; summarized potential severity/ mortality risks caused by COVID-19 in patients with COPD and smokers. Included 14 studies in China and 1 from North America 15 studies met inclusion criteria (2,473 confirmed COVID-19 patients). All studies were included	Prevalence rate of COPD patients with the COVID Prevalence rate of smokers with COVID Mortality rate Risk of severe disease	Identified eligible studies from MEDLINE and Google Scholar from inception to March 16, 2020. Eligible studies investigated epidemiological and clinical characteristics and features of COVID-19 and prevalence of chronic diseases, specifically COPD	• Crude case fatality rate of COVID-19 was 7.4%. Pooled prevalence rates of COPD patients and smokers in COVID-19 cases were 2% (95% CI 1%–3%) and 9% (95% CI 4%–14%), respectively. • COPD patients were at higher risk of more severe disease (risk of severity = 63%, compared to patients without COPD 33.4% [calculated RR, 1.88 (95% CI 1.4– 2.4)]. This was associated with higher mortality (60%). • 22% of current smokers and 46% of ex-smokers had severe complications. Calculated RR showed current smokers were 1.45 times more likely [95% CI 1.03–2.04] to have severe complications than former and never smokers. Current smokers also had a higher mortality rate of 38.5%	• COVID-19 infection was associated with substantial severity and mortality rates in COPD • Compared to former and never smokers, current smokers were at greater risk of severe complications and higher mortality rate • The telehealth COPD program should include effective preventive measures to reduce COVID-19 risk, as well as smokers

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
Axson et al. (2020) Hospitalization and mortality in patients with comorbid COPD and HF: A systematic review and meta-analysis	Systematic review and meta-analysis	Patients with a COPD diagnosis of and with/ without HF	English literature published between 1980 and 2018 to assess impact of comorbid HF on hospitalization, re-hospitalization, and mortality of COPD patients 28 studies included: 12 each in Europe and North America, 2 each in Asia and multicontinents	Prevalence of hospitalization, re-hospitalization, and mortality of patients with comorbid COPD-HF compared with patients with COPD alone	Identified eligible studies from MEDLINE and Embase using predefined search strategy for RCTs and observation studies (cohort and case-control). Included studies needed to involve an exposed participant group with both COPD and HF. diagnoses and a comparator group of unexposed individuals diagnosed with COPD but not HF	• Meta-analysis not possible for hospitalization, rehospitalization, and inpatient mortality outcomes due to insufficient data. • Risk of all-cause mortality was 1.61 times higher in COPD patients with HF than in COPD patients without HF. Roberts et al. (2011) reported a crude risk ratio of 1.75 all-cause inpatient mortality compared COPD patients with HF with those without HF. • Schwab et al. (2017) reported adjusted rate ratios for all-cause hospitalization of 1.56 and for COPD-related hospitalization of 2.01, where hospitalization included attendance at A&E and/or admission to inpatient care. • Yeatts et al. (2013) reported an adjusted risk ratio for 30-day COPD-related rehospitalization of 1.01 and for 1 year COPD-related rehospitalization of 1.11	• Substantial evidence that HF comorbidity increases COPD-related rehospitalization and all-cause mortality of COPD patients. • Patients with different HF types should be identified early. Tailored intervention should be considered for better HF and COPD care

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
J. Guo et al. (2020) Moderate and severe exacerbations have a significant impact on health-related quality of life, utility, and lung function in patients with chronic obstructive pulmonary disease: A meta-analysis	Meta-analysis	Patients with COPD diagnosis	Reviewed literature on impact of moderate/ severe exacerbations of COPD on HRQoL, utility, and lung function in patients with COPD Seven RCTs with 18,746 COPD patients: 4 from multiple countries, 2 from the US, 1 from the UK	History of exacerbations SGRQ total score (measured using either the SGRQ or COPD specific SGRQ-C tools) CAT score EuroQoL-5 dimensions-5 level (EQ-5D-5L) Post-bronchodilator forced expiratory volume in 1 sec (FEV1)	Searched Cochrane Library, PubMed, EMBASE, and Web of Science databases to October 10, 2019. The search terms and procedures were chronic obstructive pulmonary disease, exacerbation, QOL OR utility OR lung function Assessed individual impacts of moderate and severe exacerbations Outcomes measured at specific time points across 12-month study period for all patients and subsets with no or ≥1 severe exacerbations in the year before study entry	• 4,483 (24%) patients had ≥1 severe exacerbation in the previous year. • Moderate/severe exacerbations associated with worsening from baseline in HRQoL per SGRQ, CAT, EQ-5D-5L, and FEV1 measures • Increased rate of exacerbations by one event per year was associated with a worsening of SGRQ score [95% CI] by 1.88 [1.72, 2.04] points per moderate event and 2.92 [2.48, 3.36] points per severe event, and with a worsening in the CAT score [95% CI] of 0.85 [0.77, 0.92] points per moderate event and 0.74 [0.53, 0.94] points per severe event. • Severe exacerbations had a greater impact than moderate exacerbations on EQ-5D-5L score, with increased rate of exacerbations by one event per year leading to estimated changes from baseline [95% CI] of −0.02 [-0.02, −0.01] and −0.03 [-0.04, - 0.02] per	Moderate/ severe exacerbations have substantial, lasting impact on HRQoL, utility, and lung function in patients with COPD. For the telehealth COPD program, targets should focus on minimizing the occurrence of risk of COPD exacerbation.

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
						each moderate event and per each severe event, respectively	
Jiang et al. (2015) Is COPD associated with increased mortality and morbidity in hospitalized pneumonia? A systematic review and meta-analysis	Systematic review and meta-analysis	Patients with COPD diagnosis	Reviewed literature on whether COPD is associated with increased mortality/ morbidity in patients hospitalized with community-acquired pneumonia (CAP) 11 cohort and case-control (257,958 patients): 10 conducted in Europe (7 in Spain and 1 each in Germany, Switzerland, the Netherlandd), and 1in the US	Mortality (in-hospital or 30 days) Length of hospital stay Intensive care unit (ICU) admission Need for mechanical ventilation	Identified eligible studies from EMBASE (Ovid), PubMed, Web of Science, international clinical trial registry website published between 2003 and 2014. The search strategy combined subject headings and text words investigating the impact of COPD on CAP	• COPD was not associated with increased mortality in hospitalized CAP patients (RR, 1.20; 95% CI 0.92–1.56; P = 0.19; I2 = 55%) in cohort studies and was associated with reduced mortality in case-control studies (RR, 0.82; 95% CI: 0.74–0.90; P < 0.0001; I2 = 80%). COPD was not associated with longer hospital stay (*MD* = 0.11; 95% CI: −0.42 to 0.64; P = 0.68; I2 = 21%), more frequent ICU admission (RR, 0.97; 95% CI: 0.70–1.35; *P* = 0.87; I2 = 65%), and more need for mechanical ventilation (RR 0.91, 95% CI: 0.71– 1.16; P = 0.44; I2 = 4%)	• COPD may not be associated with increased mortality/ morbidity in patients hospitalized with CAP • More prospective population-based cohort studies are needed to confirm increased risk of mortality/ morbidity in hospitalized pneumonia • Results may be compared further with another similar systematic review and meta-analysis by Yu et al. (2021)
Njoku et al. (2020) Risk factors and associated outcomes of hospital readmission in	Systematic review	Patients with COPD diagnosis	Reviewed literature published between January 2000 and June 2019 with readmission/re-hospitalization of COPD defined as >one admission due	Prevalence of COPD-related readmission Risk factors for COPD readmission, including socioeconomic risk,	Identified eligible studies from Medline, Scopus, Embase, CINAHL, and IPA, Google, Google Scholar, and manual	• Prevalence of COPD-related readmission varied from 2.6–82.2% at 30 days, 11.8–44.8% at 31–90 days, 17.9–63.0% at 6 months, and 25.0–87.0% at 12 months postdischarge	• Before index admission, hospitalization in previous year was key predictor of COPD-related readmission. High prevalence of

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
COPD: A systematic review			to COPD/ exacerbation of COPD and studies analyzing the contribution of risk factors, predictors, or causes for acute exacerbation of COPD (AECOPD) leading to readmission/ re-hospitalization The studies were conducted in 30 countries, with three in multiple countries: Most (15) were in the US, Spain (13), and Canada (9)	patient-related clinical, provider, and system factors Outcomes associated with COPD readmission, including patient-related outcomes, health care utilization	screening of reference lists. Four key terms (COPD, readmission, risk factors, consequences) were developed as "concepts" based on reviewing the previous systematic reviews and studies relevant to the topic	• Differences in reported factors associated with readmissions may reflect variations in local context (e.g., availability of community-based services to care for exacerbations of COPD). Prior to index admission, hospitalization in the previous year was the key predictor of COPD-related readmission. • Comorbidities (especially asthma, living in a deprived area, and living in or discharged to a nursing home) were associated with readmission. • Relative to those without readmissions, readmitted patients had higher in-hospital mortality rates, shorter long-term survival, poorer QOL, longer hospital stays, increased recurrence of subsequent readmissions, and accounted for greater heath care costs.	COPD-related readmission varied 2.6%– 82.2% at 30 days, 25.0–87.0% at 12 months postdischarge • In designing the telehealth self-management program, there should be a special focus on interventions to minimize the risk of COPD-related readmissions associated with comorbidities highlighted by the authors
Yu et al. (2021) Pneumonia Is associated with increased mortality in	Systematic review and meta-analysis	Hospitalized COPD patients with CAP (PCOPD) and those with AECOPD	Reviewed literature on the association between CAP and mortality/ morbidity in COPD patients	Mortality rate Length of hospital stay	Identified eligible studies from MEDLINE and EMBASE from inception to	• 18 studies met the inclusion criteria, with 91,209 patients total (28,480 hospitalized COPD patients with	• CAP was associated with higher mortality/ morbidity, longer hospital stays, more

Author (year) title	Type of report	Participant characteristics/ selection	Study site/ context	Variables/ measures	Procedure	Key findings	Application
hospitalized COPD patients: A systematic review and meta-analysis			hospitalized for acute worsening of respiratory symptoms. 18 studies: 17 cohort and 1 case-control with sample sizes from 54 to 52,520: 10 conducted in Europe, 7 in Asia, 1 in North America	Need for mechanical ventilation ICU admission Length of ICU stay Readmission rate	December 31, 2019. Separate searches conducted in the Web of Science and Cochrane Library, clinicaltrials.gov The search strategy combined medical subject headings and text words including pulmonary disease, chronic obstructive or COPD or chronic obstructive pulmonary disease and pneumonia (PCOPD) or CAP	PCOPD and 62,729 with AECOPD • Presence of coexisting CAP associated with higher mortality (RR = 1.85; 95% CI:1.50–2.30; $p < 0.00001$), longer length of hospital stay (*MD* = 1.89; 95% CI: 1.19–2.59; p < 0.00001), more need for mechanical ventilation (RR = 1.48; 95% CI: 1.32– 1.67; p < 0.00001), and more ICU admissions (RR = 1.58; 95% CI: 1.24–2.03; $p = 0.0002$) in hospitalized COPD patients. CAP was not associated with longer ICU stay (*MD* = 5.2; 95% CI: −2.35 to 12.74; $p = 0.18$) or higher readmission rate (RR = 1.02; 95% CI 0.96–1.09; $p = 0.47$)	need for mechanical ventilators, and more ICU admissions among hospitalized COPD patients • Exacerbation and pneumonia are two most-common reasons for admission among patients with COPD • Action plans and education on management of exacerbation and pneumonia should be included in the telehealth self-management program • Results may be compared further with another similar systematic review and meta-analysis by Jiang et al. (2015)

APPENDIX B– Components of Integrated Disease Management That Enhanced COPD Management (Poot et al., 2021)

1. Education/self-management: education, self-management, personal goals and/or action plan, exacerbation management.
2. Exercise: (home) exercise training and/or strength and/or endurance training.
3. Psychosocial component: cognitive-behavioral therapy, stress management, other psychological assessment and/or treatment.
4. Smoking cessation.
5. Medication: optimization of medication regimen/prescription of medication adherence.
6. Nutrition: dietary intervention.
7. Follow-up and/or communication: structural follow-up and/or communication, nurse case management, optimal diagnosis.
8. Multidisciplinary team: active participation and formation of teams of professional caregivers from different disciplines, revision of professional roles, integration of services, local team meetings.
9. Financial intervention: fees/payments/grants for providing integrated disease management services

APPENDIX C– Evidence of Interventions to Promote the Health and Wellness of People With COPD

C1: Is there evidence that integrated, self-management education programs influence the health status of patients with COPD?

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
Barrecheguren & Bourbeau (2018) Self-management strategies in chronic obstructive pulmonary disease: A first step toward personalized medicine	Literature review Patients with a diagnosis of chronic obstructive pulmonary disease (COPD) The author reviewed the literature regarding conceptual definition, effectiveness of SMIs and self-management strategies in COPD as the first step toward personalized medicine: What, how, and to whom?	Time for SMIs Effective components and strategies of self-management Delivery of SMI Qualitatively summarized evidence of components and skills to target in self-management primarily. Summarized evidence on affective components of SMI and how to deliver the intervention.	Outlined self-management strategies with the figure to enhance the illustration as the first step toward personalized medicine. Design of SMI should target health behavior and disease management of COPD, health behavior, and disease management. Contents and components of the program will vary to adapt to the patient's situation and factors such as disease severity, comorbidities, and access to health care. The proportion of disease management by health care providers increased with severity. Decision will be guided not only to aim at patient self-management but to ensure patient safety. Education and an action plan for exacerbation and case management are effective components in COPD self-management. Experienced case managers are essential for the effectiveness of any SMI. They also help uplift quality control and competence in solving possible problems. Self-management in primary care with a more personalized approach would increase the likelihood benefitting patients with COPD,	The individual patient's needs, preferences, and personal goals should inform the design of any intervention with a behavioral component. A complete feedback loop (CFL) process must be implemented to constantly assess what works/does not work, aiming at achieving the desired. outcomes for a given patient. The article provide a suggested framework of telehealth self-management program for patients with mild to moderate COPD.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
			especially those with mild-to-moderate COPD. Although they have relatively low risk of exacerbations, they may need SMI to focus on healthy behavior. Quoted the successful experience of COPD self-management program, *Living Well With COPD* (2016) for patients with severe COPD. The intervention included education sessions, training on inhalation techniques, a written action plan for exacerbation treatment, and instructions for physical activity. The rates on visits to the emergency room and hospital admission reduce rates on visits to the emergency room and hospital admission.	
Bourbeau & Echevarria (2020) Models of care across the continuum of exacerbations for patients with chronic obstructive pulmonary disease	Literature review Patients with a diagnosis of COPD Review literature on approaches to reduce exacerbations and complications across the continuum of a COPD exacerbation event, emphasizing reducing readmissions.	Chronic care management and self-management Domiciliary care for patients with COPD exacerbation Discharge care bundle Summarized models of care across continuum of exacerbations (1) chronic care and SMIs with the action plan, (2) domiciliary care for severe exacerbation and the impact on readmission prevention and (3) discharge care	Chronic care management and self-management: Require interaction between patients and heath care professional(s) with the application of behavior change techniques (BCTS) to elicit patient motivation, confidence, and competence (Effing et al., 2016). Telemedicine can be an adjunct to self-management approaches assisting proper heath care coaching. COPD written action plan adherence can be further enhanced with the use of telehealth technologies in a specialized clinic with experience in COPD self-management (Farias et al., 2019). Several randomized controlled trials (RCTs) demonstrated that SMI would improve health care quality and control costs. Domiciliary care: Refers to the hospital at home services, including social support and rehabilitation services and a higher intensity of care, with more substantial reduction in time	All three interventions aim to improve quality outcomes, enhance patient well-being, and reduce exacerbation complications such as hospital admissions. Intervention should focus on controlling costs by avoiding hospitalizations. Best care and practices may consider 30-day hospital admissions as a starting point to improve the quality of care in COPD. Future models of care should be personalized:

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
		bundle for management beyond the acute exacerbation episode.	spent in hospital care. From the hospital's perspective, it will reduce 30-day readmission rates. It will also save heath care costs and avoid risks associated with inpatient stays. Discharge care bundle: COPD discharge bundles improve quality of care and reduce hospital readmissions. The bundle payments for care may improve COPD hospitalizations. However, the benefit between infrequent (light users) and frequent (high users) admissions varied. This may be explained by the delay effect of components of the discharge care planning. Patients with severe COPD and multiple readmissions may require more in-depth heath care plans and greater resources and services tailored to their specific needs to generate a measurable effect on readmission rates.	Provide patient education aimed at behavior changes, identifying and treating co-morbidities, and including outcomes that measure quality of care. To achieve personalized self-management in COPD, a CFL process should be implemented and constantly assessed whether the desired outcomes are in fact being achieved for a given patient.
Cravo et al. (2022) The importance of self-management in the context of personalized care in COPD	Literature review Patients with a diagnosis of COPD Reviewed literature on the importance of self-management in the context of protocol-based care to personalized care in COPD and discussed the role of digital SMIs and the importance of addressing health	History and evolution of self-management Applicability and implementation of self-management programs Barriers to efficient self-management care in COPD Transitioning from protocol-based care to personalized care in COPD Reducing Health inequality in the	Reflecting on the importance of self-management in the context of symptom monitoring and provision of educational support, including information from patient organizations and charities, the authors discuss the ideal components of a self-management plan for COPD and provide six key recommendations for its implementation: (1) better education for health care professionals on disease management and consultation skills; (2) new targets and priorities for patient-focused outcomes; (3) skills gap audits to identify barriers to self-management;	The pilot telehealth COPD program should cover the six key recommendations and integrating within the routine of heath care services. Improving shared-care management of COPD using better education of health care personnel, identification of skills gaps, and sharing of heath care resources to improve access to patient-centered self-management are the

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	inequalities in COPD treatment.	treatment of COPD and the increased role of digital health Summarized evidence on the history and evolution of self-management, assessed current applicability and implementation of self-management multidisciplinary support programs, and reflected on how effective these are for clinical and humanistic outcomes. Proposed a more personalized care approach and ideal components of a self-management plan for COPD with six key recommendations.	(4) best-practice sharing within primary care networks and ongoing professional development; (5) enhanced initial consultations to establish optimal self-management from the outset; (6) negotiating and sharing self-management plans at the point of diagnosis	keys to success in COPD self-management. Total duration of the intervention and the correlation of intervention duration with the number of strategies delivered are important aspects of the sustainability of SMIs within primary care.
Helvaci & Gok Metin (2020) The effects of nurse-driven self-management programs on chronic obstructive pulmonary disease: A	Systematic review and meta-analysis Patients with a diagnosis of COPD Included RCTs on effects of nurse-driven self-management programs for physical/	Physical health: COPD Assessment Test (CAT), Peak Expiratory Flow, Nijmegen Clinical Screening Instrument, Clinical COPD Questionnaire (COPD-Q), Borg Dyspnea Scale, Modified Medical Research Council	All studies involved telephone calls in the intervention strategies. Seven of 12 arranged face-to-face or individual sessions with participants. The follow-up period ranged from 3 to 24 months. The content of self-management programs included anatomical structures of respiratory ways and lung, pathophysiology, common symptoms, progress and disease stages (n = 12), conventional medications (n = 12), exacerbation management (n = 12), daily exercise (n = 9), and	The authors concluded that patients who attended the nurse-driven self-management program improved health status, QOL, and psychosocial health in the COPD population. The authors listed the content of the self-management program,

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
systematic review and meta-analysis	psychosocial health variables among patients with COPD. Patients in the usual-care group received traditional health care or standard information about COPD. 12 studies (2,121 participants): three each in the United Kingdom and China, two in the Netherlands, and one each in the United States, Australia, Iceland, and Korea	Dyspnea Scale (mMRC), 6-Minute Walking Distance (6MWD), and Patient Activation Measure. Psychosocial health: St. George Respiratory Questionnaire (SGRQ), EuroQol-5Dimension, Chronic Respiratory Questionnaire (CRQ), Hospital Anxiety and Depression Scale (HADS), COPD Self-Efficacy Scale, Pulmonary Rehabilitation Adapted Index of Self-Efficacy, COPD Knowledge Questionnaire, and 36-Item Short Form Health Survey (SF-36). The authors searched PubMed, Cochrane Controlled Register of Trials (CENTRAL), Cumulative Index to Nursing and Allied Health Literature (CINAHL), ScienceDirect and Medline FOR studies published between	breathing retraining (n = 9). Seven studies focused on lifestyle changes, seven gave training on smoking cessation, and seven trained patients in coping with anxiety/stress. Only one included family caregivers, teaching about nutritional issues, and only one trained the participants on energy conservation techniques. Education booklets (n = 5) and written materials (n = 4) were the most adopted tools to train patients. Apart from phone calls, home visits, diaries, pedometers, and telemonitoring were used to follow the symptom severity and regular exercise. Results indicated significant difference in physical health scores based on the CAT and 6MWD tests in the intervention groups compared with control groups. Regarding psychosocial health findings, quality of life (QOL) increased, and the HADS scores decreased following self-management programs. All studies were of good quality (5–8 points) according to the Modified Jadad Scale.	intervention strategies, and common assessment and training tools.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
		January 2010 and December 2019		
Jolly et al. (2018) Systematic review of the effectiveness of community-based self-management interventions [(SMIs)] among primary care COPD patients	Systematic review and meta-analysis Patients with a diagnosis of COPD Included RCTs in which the SMIs had to be delivered entirely within primary care with no secondary or tertiary care attendance. Interventions had to comprise at least two of the following: (a) smoking cessation; (b) self-recognition of symptoms and self-treatment of exacerbations; (c) exercise or physical activity component; (d) advice on diet; (e) advice on medication; (f) advice on coping with breathlessness. Interventions could be delivered verbal,	Health-related QOL (HRQoL) Anxiety/depression Health care utilization The authors searched the MEDLINE, MEDLINE in Process, EMBASE all via OVID, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Library (Wiley) CDSR, DARE, NHSEED and HTA databases, Science Citation Index (ISI), PEDro, PsycINFO (OVID) and Cochrane Airways specialized register from inception to September 2017, with no language restrictions.	Interventions were heterogeneous; durations ranged from 1 month to at least 2 years. Interventions varied from focusing on exacerbation management and responding to participants' self-management queries to comprehensive programs, including information about educational materials, physical activity advice, smoking cessation, breathing, and medication management. Results of the systematic review suggested no differences in HRQoL, anxiety, or depression at final follow-up. Supported SMIs delivered in the community to patients from primary care did not appear to be effective. Further research was recommended to identify effective SMIs suitable for primary care populations, particularly those with milder diseases.	The heterogeneity of the different populations and interventions fails to establish SMIs' effectiveness in primary care. It is recommended to identify the support that will help people self-manage and adapt to life with mild/moderate COPD to reduce the impact of this slowly progressive condition in primary or community settings.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	telephone, face-to-face, written, or audiovisual material (or combination). Included 12 (10,647 participants): seven RCTs individually randomized and five trials were cluster RCTs (CRTs); four carried out in the United Kingdom, two in Australia, and one each in the Netherlands, Sweden, Germany, US, China, and New Zealand			
Lenferink et al. (2017) Self-management interventions including action plans for exacerbations versus usual care in patients with chronic obstructive pulmonary disease	Systematic review and meta-analysis Patients with a diagnosis of COPD Included RCTs evaluating an SMI for people with COPD that included an action plan for acute exacerbation of COPD (AECOPD). To be eligible, the intervention had to	HRQoL Respiratory-related hospital admissions. Number of all-cause hospital admissions Use of (other) heath care facilities (e.g., number of emergency department visits, all-cause and respiratory-related hospitalization days in total and per patient, number of general practitioner,	Over 12 months, SMIs that include a COPD exacerbation action plan were associated with improvements in HRQoL, as measured with the SGRQ, and a lower probability of respiratory-related hospital admissions. No excess all-cause mortality risk was observed, but exploratory analysis showed a low but significantly higher respiratory-related mortality rate for self-management than usual care. Subgroup analyses showed significant improvements in HRQoL in SMIs with a smoking cessation program compared to studies without a smoking cessation program.	The proposed telehealth SMI should include COPD exacerbation improvements in HRQoL. Tailored COPD self-management action plans should consider comorbidities when used in the wider population of people with COPD. They have comorbidities and their adherence to action plans over time.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	include a written action plan for AECOPD and an iterative process between participant and heath care provider(s) in which feedback was provided. Included 22 studies (3,854 participants): Most carried out in Western and developed countries; only one from an Asia country (South Korea). Follow-up time ranged from 2 to 24 months; content of the interventions varied.	nurse, and specialist visits. Rescue medication use Health status Number of COPD exacerbations All-cause mortality Self-efficacy Days lost from work The authors searched the Cochrane Airways Trials Register published since 1995.		
Newham et al. (2017) Features of self-management interventions for people with COPD associated with improved health-related	Systematic review and meta-analysis Patients with a diagnosis of COPD Included RCTs delivered in primary, secondary, tertiary, outpatient, or community care if they (a) targeted	HRQoL measured by SGRQ Classification of intervention content and intervention delivery features The authors searched the two databases of systematic reviews: Cochrane Database of	Intervention descriptions were coded for BCTs that targeted self-management behaviors to address (a) symptoms, (b) physical activity, and (c) mental health. Patients receiving SMIs reported improved HRQoL and made fewer emergency department visits compared to patients who received usual care. Patients receiving SMIs targeting mental health alongside symptom management had greater	The systematic review and meta-analysis concluded that SMIs could be effective at improving HRQoL and reducing emergency department visits. Content of the SMI should target not only symptom management alone but also

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
quality of life and reduced emergency department visits: A systematic review and meta-analysis	patients with COPD diagnosed by clinician/health care practitioner or agreed spirometry criteria, i.e., forced expiratory volume in 1 sec (FEV1)/forced vital capacity (FVC),70%), (b) compared the SMI to a comparison group receiving usual-care during the study period, and (c) had a HRQOL as an outcome measure. Included 26 studies (3,518 participants) with COPD, all carried out in Western countries	Systematic Reviews 2016, Database of Abstracts of Reviews of Effects 2015, Ovid MEDLINE® In-Process & other nonindexed citations and Ovid MEDLINE® 2015 with a systematic review filter available from CADTH.	improvement of HRQoL, and fewer emergency department visits than patients receiving SMIs focused on symptom management alone. Within-group analyses showed that HRQoL was significantly improved in (a) studies with COPD patients with severe symptoms, (b) single-practitioner-based SMIs but not SMIs delivered by a multidisciplinary team, (c) SMIs with multiple sessions but not single session SMIs, and (d) individual- and group-based SMIs.	mental health issues, including social support, and reducing negative emotions.
Nohra et al. (2020) Effective components of self-management programs for chronic obstructive	Scoping review Patients with a diagnosis of COPD aged 40 year or older Aimed to identify effective components of a	Components in self-management programs for COPD patients The authors searched Cochrane, Medline, and CINHAL, PRISMA; published up to 12 years before	There are four main components in self-management programs COPD patients: initiation stage of the intervention, educational sessions, support, and monitoring methods. Other components include group education, sessions, individual training, phone calls, action plan, educational material, daily diary, and text messaging. The authors highlighted common characteristics	Essential and effective components of self-management programs suggested. The initiation stage of the intervention, educational sessions, support, and monitoring methods. The scoping review highlighted the

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
pulmonary disease patients: scoping review	self-management program for COPD patients, which may affect QOL, emergency visits, and rehospitalization rates. Included 16 programs in English or French (including the scoping review): eight had a follow-up of 1 year, four had 6 months, and the others had 6 weeks, 10 months, 15 months, and 2 years. Five studies were undertaken in the United Kingdom, and one each in the United States, Australia, Canada, Sweden, Italy, Germany, Norway, Romania, Spain, Netherlands, and China; two were qualitative; two were pilot RCTs, and six were observational and	November 2019	of intervention: - The initiation intervention sessions adopted in several studies can have a positive effect because they tested the patients' motivation for the intervention, a factor that could contribute to a better outcome of self-management programs - Action plans engaged patients in the management of their disease - Educational materials helped patients in the self-management process - Phone calls were intended to motivate, engage, and accompany patients throughout the intervention	usefulness of an action plan in engaging patients in managing their chronic diseases.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	experimental studies.			
O'Connell et al. (2021) Self-management support preferences of people with asthma or chronic obstructive pulmonary disease: A systematic review and meta-synthesis of qualitative studies	Systematic review and meta-synthesis of qualitative studies Patients with a diagnosis of COPD Aimed to explore self-management support preferences of people with asthma and/or COPD Included 15 studies in English, all conducted in Western developed countries: six in the United Kingdom, five in Norway, two in Canada, and one each in Australia and Denmark	Preferences of people with asthma or COPD for self-management support The authors searched the Applied Social Sciences Index and Abstracts (ASSIA), CINAHL, MEDLINE, PsycINFO, Psychology and the Behavioral Sciences, and Social Science Citation Index (SSCI) limited to articles published between May 2008 and April 2018. The search was also limited to articles available in the English language.	Three themes were identified: 1. *Types of support* described the range of supports valued by participants in the studies, particularly education provided by competent heath care professionals; 2. *Support relationship* highlighted the importance of a collaborative relationship with one's heath care professionals, which were characterized by communication, trust, and continuity over time. 3. *Accessibility* identified the considerations of participants relating to physically accessible, prompt support provided in a format preferred by the individual.	The three identified self-management support preferences help people to engage with and facilitate better self-management.
Schrijver et al. (2022) Self-management interventions for people with chronic obstructive	Meta-analysis People with a diagnosis of COPD Included RCTs to evaluate the effectiveness of COPD SMIs compared to usual	HRQoL Respiratory-related hospital admissions Respiratory-related mortality All-cause mortality All-cause hospital	Self-management interventions likely to improve HRQoL, as measured by the SGRQ total score (lower score represents better HRQoL) with a mean difference (MD) from usual care of -2.86 points. The pooled MD of -2.86 did not reach the four-point SGRQ minimal clinically important difference (MCID). Self-management intervention participants were	Self-management interventions for people with COPD are associated with improvements in HRQoL and lower probability of respiratory-related hospital admissions.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
pulmonary disease	care for HRQoL and respiratory-related hospital admissions, and safety of COPD SMIs compared to usual care regarding respiratory-related and all-causes mortality. Aimed to evaluate effectiveness of COPD SMIs compared to usual care for other health outcomes and heath care utilization and evaluate effective characteristics of COPD SMIs. Included 27 studies (6,008 participants): 15 in Europe, eight in North America, four in Oceana, one in Asia, and one in both Europe and Oceania.	admissions Health status: dyspnea Emergency department visits Health status: Anxiety/ depression COPD exacerbations The authors searched the Cochrane Airways Trials Register, CENTRAL, MEDLINE, EMBASE, trials registries, and reference lists of included studies up to January 2020 for RCTs and CRTs published since 1995. Self-management interventions had to include at least two intervention components and an iterative process between participant and heath care provider(s) in which goals were formulated and feedback given on self-management actions by the participant.	at a slightly lower risk for at least one respiratory-related hospital admission. The number needed to treat to prevent one respiratory-related hospital admission over a mean of 9.75 months' follow-up was 15 (95% confidence interval (CI) 8 to 399) for participants with high baseline risk and 26 (95% CI 15 to 677) for participants with low baseline risk. No differences were observed in respiratory-related and all-cause mortality.	COPD SMIs are safe and unlikely to cause harm. COPD SMIs should include iterative interactions between participants and heath care professionals who use BCTs. It elicits participants' motivation, confidence, and competence to positively adapt their health behavior(s) and develop skills to manage their disease better.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
Shnaigat et al. (2021) Effectiveness of health literacy interventions on COPD self-management outcomes in outpatient settings: A systematic review	Systematic review Patients with a diagnosis of COPD Included RCTs conducted in outpatient settings, including primary care, outpatient clinics or community; had at least one health literacy measure, measured COPD self-management outcomes, were peer reviewed, and published in English. Included 10 trials (1,947 participants): three conducted in the United States, two each in Sweden and the United Kingdom, and one each from Demark, the Netherlands, and Japan.	COPD knowledge and health literacy Physical activity Self-efficacy Dyspnea Smoking cessation Medication adherence and use The authors searched the Science Citation Index, Academic Search Complete, Social Sciences Citation Index, CINAHL Plus, APA PsyInfo, MEDLINE, Complementary Index, Scopus, and ScienceDirect from 2008 until February 2020.	The review found that health literacy interventions led to moderate improvements in physical activity levels (four of seven trials) and COPD knowledge (three of six trials). No RCT significantly improved medication adherence, which warrants further study. Inconclusive findings on other COPD self-management outcomes, such as smoking cessation, medication adherence, dyspnea, mental health, hospital admissions, and HRQoL.	No included study was conducted on the Chinese population. Health literacy should be included in the training that drives the self-management program. It significantly improves patients' disease knowledge and physical activity levels.
Song et al. (2021) Blended self-management	Systematic review and meta-analysis Patients with a diagnosis of COPD	Number of BCTs used Exercise capacity Dyspnea	Blended SMIs combining e-health with face-to-face interventions can help reduce the disease burden; showed small improvement in exercise	Blended SMIs had mixed effects on health-related outcomes, with the strongest evidence found

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
interventions to reduce disease burden in patients with chronic obstructive pulmonary disease and asthma: Systematic review and meta-analysis	or asthma aged (≥ 18 years old) Included RCTs where interventions were blended SMIs (e-health + face-to-face components). Compared effectiveness of e-health intervention with/without usual care; face-to-face with/without usual care; or only usual care. Outcome of trials includes health-related effectiveness or process outcomes. Included 15 trials (1,477 participants): five were conducted in China, two each in the United States and Denmark, one each in Canada, England, Spain, Germany, and Australia, and one in both Spain and Belgium.	Lung function QOL Admission rate Asthma control (only in asthma studies) The authors searched the PubMed, Web of Science, COCHRANE Library, Emcare, and Embase from 2008 until February 2020.	capacity and significant improvement in QOL; and reduced admission rate. The interventions reduced exacerbation frequency. A large effect was found on BMI but was inconclusive because only one study was included. Two of three studies found a moderate medication adherence effect, and one study reported a mixed effect. One study reported a large self-management ability effect, and no effect was reported in that study. No effect was found on other process outcomes. The meta-analysis of asthma studies found that blended intervention had a small improvement in lung function and QoL and a moderate improvement in asthma control. A large effect was found on BMI and exercise capacity.	for exercise capacity, QoL, and hospital admission rate. The interventions resulted in small effects on lung function and QoL and a moderate effect on asthma control in patients with asthma. Adoption of blended SMIs are feasible for the upcoming doctoral projects.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
Wang et al. (2017) Effectiveness of disease-specific self-management education [(SME)] on health outcomes in patients with chronic obstructive pulmonary disease: An updated systematic review and meta-analysis	Systematic review and meta-analysis Patients with a diagnosis of COPD Included RCTs that explored the most recent evidence on SME use for COPD patients. Explored most recent evidence on the use of SME for COPD patients. Included 24 trials (13,297 participants), most in Western counties (the United Kingdom, the Netherlands, New Zealand, and the United States); 22 were published in English and two in Chinese.	QOL COPD-related hospital admission rate COPD-related emergency department visit rate Smoking status Pulmonary functions Emotional status Breathlessness status. COPD Knowledge Nutritional status Mortality rate The authors searched the PubMed, EMBase, ENTRAL, CINAHL, PsycINFO, Web of Science, Science Direct, Foreign Medical Journal Service (FMJS), and China National Knowledge Infrastructure (CNKI), Wanfang Data (WF), and Chinese Biomedical Literature Database (CBM) from inception to July 2016	Patients with COPD receiving SME showed better QOL. Significant reductions in COPD-related hospital admissions and emergency department visits were identified in the SME group. SME may positively affect the reduction of COPD patients' emotional distress. No significant reduction in smoking rate and mortality rate was observed between groups. No clear evidence supports the improvement of pulmonary functions, dyspnea, and nutritional status in COPD patients with the use of SME.	The systematic review and meta-analysis consolidate the importance of SME, which is a useful strategy to improve QOL and disease-specific knowledge in patients with COPD. Self-management education also reduces respiratory-related hospital admissions and emergency department visits in COPD patients. Two studies included the Chinese population and examined the effectiveness of SME.

C2: Is there evidence that health qigong influences the health status of patients with COPD?

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
Cai et al. (2022) Tai chi for anxiety and depression symptoms in cancer, stroke, heart failure, and chronic obstructive pulmonary disease: A systematic review and meta-analysis	Meta-analysis and systematic review Patients with a diagnosis of COPD, cancer, stroke, or heart failure (HF). Randomized controlled trials with any form of tai chi as the intervention in the experimental group, and the control group receiving regular exercise/usual care. Types of control groups included in the study, such as blank (still receiving routine medical care such as drugs), sham qigong, rehabilitation, balance rehabilitation training, aerobic training, usual medical care, education, and cognitive behavioral therapy. Included 25 eligible (1,819 participants) The included studies were from five countries: 14 in China, eight in the	FVC, FEV1, FEV1%, FEV1/FVC, 6MWD, CAT; SGRQ, CRQ, HAD, SAS and SDS The authors searched Chinese electronic databases (China National Knowledge Infrastructure, China Science and Technology Journal Database, Wanfang Database, and Sinomed and English electronic databases (Cochrane Library, PubMed, and Web of Science) for relevant studies from inception until October 2020.	Not all studies mentioned the frequency or duration of sessions or intensive training. Most were around 12 weeks. Combined analysis of the four diseases showed statistically significant differences between the tai chi and control groups for anxiety symptoms and depressive symptoms. No statistically significant differences were found for depressive symptoms in COPD or cancer. Sensitivity analysis showed that most meta-analysis results had good stability, but those for anxiety symptoms in COPD were unstable.	Tai chi has a positive effect on anxiety and depression, especially for patients with cancer, stroke, and HF. Multiple comorbidity of chronic health conditions may give additional psychological impact to patients in daily living. Further research is needed to explore the health benefits among patients with COPD.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	United States, and one each in the United Kingdom, Japan, and Australia. Four styles of tai chi/ health qigong (HQG) mentioned in the included articles: 15 used Yang style, two used Chen style, one article used Wuchian Chuan, Yunshou, sitting style and short form (first third) style, and three did not mention the style used.			
Cao et al. (2020) Baduanjin exercise for chronic obstructive pulmonary disease: an updated systematic review and meta-analysis	Meta-analysis and systematic review Patients with a diagnosis of mild to very severe COPD Randomized controlled trials (RCTs) that baduanjin HQG as an intervention in addition to routine treatment Routine treatment with or without exercises as control group. The routine treatment was drug therapy, routine	Pulmonary function Cardiorespiratory assessment QOL The authors searched six databases, including EMBASE, PubMed, Cochrane Library, China Knowledge Resource Integrated Database, Chinese Biomedical Database, and Wanfang Database (from inception to March 2020) without	Compared with any other type of treatment alone, baduanjin exercise combined other treatment revealed good efficacy in improving exercise capability on 6MWD, FEV1, forced volume vital capacity, the ratio of FEV1 to FCX, and the QOL in COPD patients regarding the SGRQ and COPD-Q. All included trials had unclear risk of bias of incomplete outcome data for each main outcome. There was no evidence of reporting bias in any of the included studies. The randomization and concealment allocation were not described in detail in some of the studies, which could lead to	Baduanjin exercise could improve exercise capacity, pulmonary function, and QOL for patients with COPD. The purposed doctoral project would adopt HQG baduanjin. The evidence supports that regular practice would promote participants' health status and QOL.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	activities, and breathing training. Included 31eligible trials (3,045 participants): Most studies were from China, one was from Hong Kong. Trials using baduanjin style were included.	restriction to regions, publication, or languages.	potential risk of selection bias, performance bias, and detection bias.	
J. B. Guo et al. (2016) Tai chi for improving cardiopulmonary function and quality of life in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis	Meta-analysis and systematic review Patients with a diagnosis of COPD Randomized controlled trials (RCTs) with tai chi as an intervention in addition to routine treatment Other types of routine treatments could consist of drug therapy, routine activities, and respiratory training. Included 15 eligible trials (1,354 participants), most from China; three were from Hong Kong.	FV	The time duration of tai chi program ranged from 30 to 60 min each session, for 6 weeks to 4 months. Six trials did not provide training frequency or duration of tai chi. Compared with the control group, tai chi was more effective in improving exercise capacity on 6MWD and pulmonary functions on FEV1 and FVC. Concerning QOL, tai chi was better than the control group for the CRQ dyspnea, fatigue, and total scores.	Tai chi may improve exercise capacity in the short, mid, and long terms. However, no significant long-term differences in pulmonary function and QOL were observed for patients with COPD. The meta-analysis did not include trials with baduanjin style.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	One study respectively from Australia and America. There are four styles of tai chi / HQG mentioned in the included articles. Seven used short form, four used Yang style, and one article used Chen style. One did not mention the style used.			
C. Guo et al. (2020) Effects of tai chi training on the physical and mental health status in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis	Meta-analysis and systematic review Patients with a diagnosis of COPD Randomized controlled trials (RCTs) with tai chi or tai chi qigong as an intervention in addition to routine treatment Routine treatment with or without exercises as control group. The routine treatment was medical treatment, and the exercises included respiratory exercises and physical exercises. Included 13 eligible trials (906 participants), most from China; three	Lung function Exercise capacity Health status Quality of life Mental status The authors searched several English and Chinese databases: Cochrane Library, Joanna Briggs Institute database, Embase, PubMed, Web of Science, Cumulative Index to Nursing and Allied Health Literature, China National Knowledge Infrastructure,	The average time duration of tai chi program was 53.4 min each session, 4.13 sessions a week for a total of 4.13 months. Compared with control groups, tai chi groups improved some lung function, enhanced 6MWD and CRQ scores, and decreased COPD-Q, SGRQ, and HADS scores. Compared with exercise groups, tai chi groups statistically enhanced the 6MWD scores.	Regular tai chi produces physical and mental health of patients with COPD. It may represent an appropriate alternative or complement to standard rehabilitation programs. The meta-analysis provided a health benefit reference on the frequency and duration of tai chi.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	were from Hong Kong and one each from Australia and America. Different styles of tai chi/ HQG were mentioned in the articles: four used short form Yang style, four used simple and modified 24 form, two used Sun style or 13-form, and three did not mention the style used.	Wanfang database, China Biology Medicine disc. They combined subject words and free words to search for available literature from the establishment of the library until August 28, 2018.		
Li et al. (2019) Mind-body exercise for anxiety and depression in COPD patients: A systematic review and meta-analysis	Meta-analysis and systematic review Patients with a diagnosis of COPD aged 45 to 85 years. Randomized controlled trials (RCTs) with tai chi, HQG, or yoga as the main intervention in addition to routine treatment. Routine treatment with or without exercises as control group. The routine treatment was nonexercise or the exercise was not tai chi, HQG, or yoga.	QoL, CES-D, HADS, SSAI, BDI, SATI, SAS SDS, HAMA, and HAMD The authors searched PubMed, the Cochrane Library, EMBASE, Web of Science and Google Scholar, Chinese National Knowledge Infrastructure, Wanfang, and Baidu Scholar for available literature published between January 1982 and June 2019.	Mind–body exercise (tai chi, HQG, yoga) had significant benefits on COPD patients with anxiety and depression. Subgroup analyses indicated for anxiety, 30–60 min exercise sessions for 24 weeks of HQG or yoga had a significant effect on patients with COPD older than 70 years with more than a 10-year disease course. For depression, 2–3 times a week, 30–60 min each time of HQG had a significant effect on patients with COPD patients older than 70 years and with less than a 10-year disease course.	Regular mind–body exercise could reduce levels of anxiety and depression in those with COPD.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	Studies included at least one measure of anxiety and depression outcome. Included 13 eligible trials (906 participants), most from China; two were from America and one each from India and Australia; 10 were tai chi/HQG and three were yoga trials. Different of tai chi/HQG styles were mentioned: one used a combination of four styles, two used wuqinxi, one each used sun-style, liuzijue, baduanjin. And taijiquan; two did not mention the style used. Three studies used follow-up assessments to determine if long-term beneficial effects of mind–body exercise on anxiety and depression.			
Liu et al. (2021) The effect of tai chi on the pulmonary rehabilitation	Meta-analysis and systematic review Patients with a diagnosis of COPD aged 54 to 79 years.	Lung function Exercise capacity HRQoL The authors searched PubMed, the	The duration and frequency of each tai chi session varied among the studies. Pooled data showed the tai chi group was associated with a significant improvement in exercise capacity (6MWD), lung function (FEV1	Tai chi may have the potential to reduce dyspnea, enhance exercise capacity, and improve QOL for COPD patients. It has superior effects to those of breathing and walking exercises in

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
of chronic obstructive pulmonary disease: a systematic review and meta-analysis	Randomized controlled trials (RCTs) with tai chi as the main intervention in addition to routine treatment. Eight studies were published in English journals, and 15 studies were published in Chinese journals. The duration of most interventions was 1–3 months, five studies lasted 4–6 months, and the other two lasted 12 months. Included 23 eligible trials (1,663 participants), most from China: one each from the United States and the United Kingdom, and three from Hong Kong; 14 adopted the simplified 24-form Yang style of tai chi, two adopted the 13-form qigong style, and one each adopted the Chen, five-form Yang, 21-form Sun, or five-form Sun styles of tai chi; three did	Cochrane Central Register for Controlled Trials, Embase, China National Knowledge Infrastructure, and Wangfang Data electronic databases (up to September 2019).	predicted %), HRQoL (SGRQ and CRQ scores) relative to the blank control population. When compared with breathing exercises, the 6MWD was significantly enhanced with tai chi. Finally, when compared with breathing and walking exercises, tai chi was associated with significant improvement in 6MWD and SGRQ scores.	promoting exercise capacity and psychosocial functions. It might also promote greater exercise capacity relative to breathing exercises alone.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	not mention the style chosen.			
Ngai et al. (2016) Tai chi for chronic obstructive pulmonary disease (COPD)	Meta-analysis and systematic review Patients with a diagnosis of COPD aged 61 to 74 years old. Randomized controlled trials (RCTs) which tai chi, was the main intervention as an intervention in addition to routine treatment. The authors attempted to compare (1) tai chi versus usual care; (2) tai chi and breathing exercise versus breathing exercise alone; and (3) tai chi and exercise versus exercise alone. Studies published in English or French journals were included. The duration of the programs ranged from 6 weeks to 6 months and the frequency between two and seven times a week. Each session reached 30 to 90 min.	Level of dyspnea Functional exercise capacity Pulmonary function Quality of life status The authors searched the PubMed, CINHAL and ScienceDirect online databases from inception to January 2017.	Benefits were observed on lung function and functional exercise capacity but benefit was clearly stated neither on QOL nor on dyspnea. Pulmonary function: The long-term studies showed a significant and clinical improvement. Vital capacity improved in all studies (from 130 to 190 mL). Level of dyspnea: Improvement of dyspnea was observed in all studies but the intergroup comparison was significantly different in only 50% of the studies. Quality of Life: Benefits on QOL were observed in 60% of the studies within intervention group and between intervention and control groups. Quality of life associated with symptoms showed better improvement. Functional exercise capacity: The walked distance improved by more than 25 m for 6MWT. The improvement observed in the long-term studies was more important than in the short term studies.	The meta-analysis highlighted the benefit of complementary therapies on lung function and functional exercise capacity. There was a great disparity in the choice of the therapies and in the programs proposed to the patients. The meta-analysis cannot conclude the superiority of one of these complementary therapies nor about the length of an optimal program. There are no standardization of frequency or duration about eh length of an optimal program for yoga and different styles of tai chi or qigong.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	Ninety percent of the studies mentioned clearly the teachers and their qualifications. A total of 18 eligible trials involved 1,893 participants. Majority studies were from China. Six was conducted in Hong Kong respectively. None of the studies evaluate the effect of yoga were from Hong Kong. Six studies evaluated the effects of yoga and the others focused on tai chi or qigong separately or combined. Two studies adopted Sun style of tai chi; one used liuzijue; one used yi jin jing; one used baduanjin; the others did not mention the style used.			
Rychler et al. (2019) Efficacy of yoga, tai chi and qi gong on the main	Meta-analysis and systematic review Patients with a diagnosis of COPD aged 40 to 80 years old.	Lung function Quality of life Level of dyspnea Functional exercise capacity	Benefits were observed on lung function and functional exercise capacity. The long-term studies showed a significant and clinical improvement in lung function. Improvement of dyspnea was observed in all studies but the	Complementary therapies such as yoga and qigong provide long term benefits for patients with COPD. Patients. The MCID of the different outcomes was only reached after 3

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
symptoms of chronic obstructive pulmonary disease: A systematic review.	Randomized controlled trials (RCTs) included which tai chi or yoga was adopted and evaluated the lung function, dyspnea, QOL or functional exercise capacity among patients with COPD. The duration of the programs ranged from 6 weeks to 6 months and the frequency between two and seven times a week. Each session reached 30 to 90 min. A total of 18 eligible trials involved 1,893 participants. Six studies evaluated the effects of yoga. The other studies focused on tai chi or qi gong separately or combined. Majority tai chi studies were from China. Two were conducted in Hong Kong respectively. None of the studies evaluate the effect of yoga were from Hong Kong.	The authors searched the PubMed, CINHAL and ScienceDirect online databases from inception to January 2017.	intergroup comparison was significantly different in only 50% of the studies. Benefits on QOL were observed in 60% of the studies within intervention group and between intervention and control groups. For functional exercise capacity, the improvement observed in the short-term studies was less important than in the long term studies.	months. Yoga and qigong produced a slow but increasing effect with time. The generalization of the results to each complementary therapy is difficult due to the heterogeneity of the protocols used in the studies and no statistical analysis was performed. The studies included mainly patients from Asian countries which limit generalizability the findings to western population.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	Two studies adopted Sun style of tai chi; one used liuzijue; one used yi jin jing; the others did not mention the style used.			
Tong et al. (2019) The therapeutic effects of qigong in patients with chronic obstructive pulmonary disease in the stable stage: A meta-analysis.	Meta-analysis and systematic review Patients with a diagnosis of stable COPD. Randomized controlled trials (RCTs) were included if patients had participated in qigong exercises longer than 6 months after diagnosis. The authors excluded trials excluded if qigong was combined with other similar energy practices, such as yoga techniques and meditation. Among the 10 studies, four studies were published in English journals, and six studies were published in Chinese journals, two of which were dissertations. A total of 10 eligible trials involved 993 participants.	6MWD FEV1 FEV1/FVC FEV1/predicted Monitored Functional Task Evaluation CAT for exercise SF-36 for General Health, and SF-36 for Mental Health The authors searched the EMBASE, PubMed, Web of Science, Cochrane, WangFang data, China National Knowledge Infrastructure, and VIP Database for Chinese Technical Periodicals, without the upper-limit time until October 8, 2017, without any language restrictions.	Qigong can improve COPD patients in lung function, exercise capacity and QOL who were in the stable stage. Statistical improvements occurred in the 6MWD; FEV1; FEV1/FVC; FEV1/predicted; Monitored Functional Task Evaluation; CAT for exercise; SF-36 for General Health. The subgroup analysis suggested all types of HQG associated with improvement in 6MWD (functional exercise capacity), where baduanjin resulted in the best improvement. For lung function, yi jin jing and baduanjin resulted in good effect in the FEV1, FEV1/FVC, and FEV1/predicted. No significant effects were noted in liuzijue and reproduced qigong. The random effects analysis of FEV1/predicted was conducted that yi jin jing and baduanjin resulted in a significant improvement after the training.	Qigong exercises could promote COPD rehabilitation over a period of 6 months as assessed by the 6MWD, FEV1, FEV1/FVC, FEV1/predicted, Functional Task Evaluation, SF-36 for General Health, and CAT for exercise in stable COPD patients. baduanjin and yi jin jing could significantly improve lung function. The two styles of qigong an increase the strength of the respiratory muscles, reduce the pulmonary residual volume, promote efficiency in gas exchange, and slow the decrease in lung function (Ng et al., 2011; Guang-wei et al., 2015; Xiujun et al., 2016; Giardino et al., 2003; Yasuma and Hayano, 2004). No significant improvement noted in liuzijue, one possible reason may be due to in sufficient upper limb movement. The continuity of reproduced qigong movement of may be lost when selecting movements from yi

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	Majority studies were from China. One was conducted in Hong Kong respectively. The qigong exercises used were baduanjin in five studies, liuzijue in two studies, and yi jin jing in two studies. One study used reproduced qigong derived from the aforementioned three types of qigong and wuqinxi.	The authors limited the styles of qigong recommended by the Health Qigong Administrative Center of the General Administration of Sport of China (Beijing, China). The authors chose the 36-week timepoint and different types of qigong to establish subgroups analysis.		jin jing, wuqinxi, liuzijue, and baduanjin. Qigong can regulate immune responses to enforce the body's natural self-healing ability so that patients do not become sick as easily and can recover faster (Ng et al., 2011; Xiao and Zhuang, 2015). No qigong clinical studies has been conducted in Western countries. There was apparent heterogeneity because of the differences in the four selected types of qigong.
Zhang et al. (2022). Effect of pulmonary rehabilitation in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis of randomized controlled trials	Meta-analysis and systematic review Patients with a diagnosis of stable COPD. Randomized controlled trials (RCTs) were included if patients received pulmonary rehabilitation had participated in yoga, tai chi, conventional physical exercises, such as walking, jogging, swimming, and cycling. A total of 39 eligible trials involved 2,397 participants.	Lung function – FEV1 , FEV1/FVC, FEV1 predicted Quality of life: SGRQ score Level of dyspnea – modified British Medical Research Council score Functional exercise capacity – 6-min walk test The authors searched the PubMed, Embase, and Cochrane Library until August 2021	This is the largest meta-analysis to investigate the efficacy of pulmonary rehabilitation in patients with COPD, Patients who received pulmonary rehabilitation program had significant improvement in the 6-min walk test (6MWT), SGRQ score, and the modified British Medical Research Council score as compared to those who received usual care. Yoga and tai chi showed significant improvement in the FEV1% predicted value. However, no significant difference was detected in the modified Borg score, FVC, and FEV1/FVC predicted value between the pulmonary rehabilitation and usual care groups.	Pulmonary rehabilitation program improved the exercise capacity, QOL, and dyspnea in patients with COPD. Regular yoga and tai chi showed a significant improvement in the FEV1% predicted value. There are significant heterogeneity of different types of pulmonary rehabilitation programs. The duration of treatment regimens was inconsistent in different studies. The sample size in the current review might not be sufficient to exclude any significant experimental errors.

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
	The studies included in the meta-analysis have been con- ducted in China (19.4%, 7/36), the USA (13.9%, 5/36), Australia (11.1%, 4/36), Turkey (8.3%, 3/36), India (8.3%, 3/36), Sweden (5.6%, 2/36), the UK (5.6%, 2/36), Denmark (5.6%, 2/36), Spain (5.6%, 2/36), Netherlands (5.6%, 2/36), Brazil (5.6%, 2/36), Ireland (2.8%, 1/36), Japan (2.8%, 1/36), Indonesia (5.6%, 1/36), Thailand (2.8%, 1/36), and Germany (2.8%, 1/36).	and limited to English publication.		

C3: Is there evidence that telerehabilitation influences the effectiveness of COPD care?

Author (year) title	Method, context, participants	Variable/procedure	Key findings	Application
Bonnevie et al. (2021) Advanced telehealth technology improves home-based exercise therapy for people with stable chronic obstructive pulmonary disease: A systematic review	Meta-Analysis People with a diagnosis of COPD. No exacerbation in the previous 4 weeks A total of 15 eligible trials involved 1,522 participants received home-based exercise therapy delivered using advanced telehealth technology (ATT-ET) and no exercise therapy (ET).	Exercise capacity: 6MWD (m) Quality of life: CRQ, COPD-Q, or SGRQ Functional dyspnea: CRQ-Dyspnea The authors searched MEDLINE, CENTRAL, Science Direct, Scopus, PEDro, Greylist and OpenGrey from inception to May 2020 for relevant studies. Additional hand searching was performed through the abstracts of the European Respiratory Society congress (2011 to 2019) and the American Thoracic Society congress (2009 to 2019). Trials were only eligible if the authors assessed the effects of initial home-based ET delivered using ATT.	ATT-ET improved exercise capacity and probably improved QOL and functional dyspnea. ATT-ET had a similar effect as in/outpatient ET on functional dyspnea and a similar or better effect on the QOL but its relative effect on exercise capacity was very uncertain. ATT-ET had a similar effect as home-based ET without ATT on exercise capacity and similar or better effects on QOL and functional dyspnea. ATT-ET had effects on most secondary outcomes that were similar to or better than each comparator, such as health status, anxiety, and depression, and self-efficacy.	ATT-ET provide (1) similar benefit to in/outpatient ET and (2) similar to or better than home-based ET without ATT, especially exercise capacity, functional dyspnea, and QOL.
Cox et al. (2021) Telerehabilitation for chronic respiratory disease	A total of nine studies (32 reports) with 1,904 participants using five different models of telerehabilitation.	Exercise capacity: 6MWD (m) Breathlessness: CRQ dyspnea domain, mMRC Quality of life: CRQ total score, SGRQ, CAT The authors searched the Cochrane Airways Trials Register, and the Cochrane	There was probably little difference between telerehabilitation and in-person pulmonary rehabilitation for exercise capacity measured as 6MWD. There may also be little or no difference in the QOL measured with the SGRQ total score or for breathlessness on the CRQ-dyspnea domain score.	Primary pulmonary rehabilitation, or maintenance rehabilitation, delivered via telerehabilitation for people with chronic respiratory disease, achieves outcomes similar to traditional center-based pulmonary rehabilitation, with no safety issues identified.

	Eight studies were conducted in Europe and one in Korea. The studies described various ways to use technology to deliver pulmonary rehabilitation, including over the telephone, mobile phone applications, via video-conferencing in a virtual group, and websites.	Central Register of Controlled Trials; six databases, including MEDLINE and Embase; and three trials registries, up to 30 November 2020. All RCTs and controlled clinical trials of telerehabilitation for the delivery of pulmonary rehabilitation were eligible for inclusion. The telerehabilitation intervention required exercise training, with at least 50% of the rehabilitation intervention being delivered by telerehabilitation.	Participants were more likely to complete a telerehabilitation program, with a 93% completion rate (95% CI 90% to 96%) than a 70% completion rate for in-person rehabilitation. Compared to no rehabilitation control, trials of primary telerehabilitation may increase exercise capacity by 6MWD and may also increase 6MWD when delivered as maintenance rehabilitation. No adverse effects of telerehabilitation were noted over and above any reported for in-person rehabilitation or no rehabilitation.	The clinical effect of telerehabilitation for individuals with chronic respiratory diseases other than COPD, the duration of benefit of telerehabilitation beyond the period of the intervention, and the economic cost of telerehabilitation should be further examined. .
Janjua et al. (2021) Digital interventions for the management of chronic obstructive pulmonary disease	Meta-Analysis People with a diagnosis of COPD. The authors included RCTs to assess the benefits and harms of digital interventions for managing COPD and apply the BCT taxonomy to describe and explore intervention content. Fourteen studies were included in the meta-analyses (1,518 participants), ranging from 13 to	Impact on health behavior: 6MWD Self-efficacy: PRAISE and SEMCD total HRQoL: CRQ total: SGRQ total or CAT Dyspnea symptoms: CRQ dyspnea Exacerbations: mean number of exacerbations The authors identified RCTs from the Cochrane Airways Trials Register (date of the last search 28 April 2020). They also found other trials at web-based clinical trial registers.	There was probably little or no difference between telerehabilitation and in-person pulmonary rehabilitation for exercise capacity measured as 6MWD for primary pulmonary rehabilitation. There may be little or no difference in the QOL measured with the SGRQ or for breathlessness on the CRQ-dyspnea domain score. Participants were more likely to complete a telerehabilitation program, with a 93% completion rate (95% CI 90% to 96%) than a 70% completion rate for in-person rehabilitation. Compared	This meta-analysis suggests that primary pulmonary rehabilitation, or maintenance rehabilitation, delivered via telerehabilitation for chronic respiratory disease achieves outcomes similar to traditional center-based pulmonary rehabilitation, with no safety issues identified. Telerehabilitation would promote the program completion rate and increase participants' exercise capacity.

	52 weeks in duration. Participants had mild to very severe COPD. Digital technology interventions included mobile phones (three studies), smartphone applications (one study), and web or Internet-based (five studies). One study was conducted in Belgium and Spain, two in Canada, one in China, one across four European countries, one in Korea, two in the Netherlands, one in Taiwan, one study was conducted in the UK, and four studies in USA.	The authors included RCTs comparing digital technology interventions with or without routine supported self-management to usual care, or control treatment for self-management. Multicomponent interventions (one component was digital self-management) compared with usual care, standard care, or control treatment were included.	to no rehabilitation control, trials of primary telerehabilitation may increase exercise capacity by 6MWD and may also increase 6MWD when delivered as maintenance rehabilitation. No adverse effects of telerehabilitation were noted over and above any reported for in-person rehabilitation or no rehabilitation.	
Janjua et al. (2021). Telehealth interventions: Remote monitoring and consultations for people with chronic	Meta-Analysis People with a diagnosis of COPD. The authors included RCTs to assess the effectiveness of	Exacerbations Quality of life Dyspnea symptoms Hospital service utilization Mortality	*Remote monitoring plus usual care:* Very uncertain evidence suggests that remote monitoring plus usual care may have little to no effect on the number of people experiencing exacerbations at 26 or 52 weeks. There may be little to no	Multicomponent interventions with asynchronous remote monitoring are no better than usual care but may provide short-term benefits for QOL and may result in fewer re-admissions to the hospital for any cause.

obstructive pulmonary disease (COPD)	telehealth interventions that allow remote monitoring and consultation and multicomponent interventions for reducing exacerbations and improving QOL while reducing dyspnea symptoms, hospital service utilization, and death among people with COPD. 29 studies were included in the meta-analysis. Four studies were conducted in Denmark, four in Spain; three each in the UK, Australia, and the USA; and ach in the Netherlands, and Italy. One study each was conducted in China, Ireland, and Taiwan. Three were multinational studies. Interventions included remote monitoring or	The authors identified 29 studies in the review (5,654 participants; male proportion 36% to 96%; female proportion 4% to 61%) from the Cochrane Airways Trials Register. Additional sources searched included the US National Institutes of Health Ongoing Trials Register, the World Health Organization International Clinical Trials Registry Platform, and the IEEEX Xplore Digital Library. The latest search was conducted in April 2020.	difference in effect on the QOL (SGRQ) at 26 weeks or on hospitalization (all-cause or COPD-related). COPD-related hospital re-admissions are probably reduced at 26 weeks (hazard ratio 0.42, 95% confidence interval (CI) 0.19 to 0.93). There may be little to no difference in deaths between intervention and usual care. The authors found no evidence for dyspnea symptoms or adverse events. *Remote monitoring alone:* Very uncertain evidence suggests that remote monitoring may have little to no effect on the number of people experiencing exacerbations at 41 weeks. There may be little to no effect on the QOL (SGRQ total at 17 weeks, or CAT at 38 and 52 weeks). There may be little to no effect on dyspnea symptoms on the CRQ-SAS at 26 weeks. There may be no difference in effects on the number of people admitted to the hospital or on deaths. The authors found no evidence for adverse events. *Multicomponent interventions with remote monitoring or consultation component:* Very uncertain evidence suggests that multicomponent interventions	Telehealth interventions may be beneficial as an additional health resource depending on individual needs based on professional assessment. Further research studies are needed to examine the long-term benefits for people with COPD.

	consultation plus usual care, remote monitoring or consultation alone, and multicomponent interventions from all care settings.		may have little to no effect on the number of people experiencing exacerbations at 52 weeks. Quality of life at 13 weeks may improve, as seen in SGRQ total score but not at 26 or 52 weeks. CAT scores may improve at a mean of 38 weeks, but the evidence is uncertain, and interventions vary. There may be little to no effect on the number of people admitted to the hospital at 33 weeks. Multicomponent interventions are likely to result in fewer people being re-admitted to the hospital at 39 weeks. There may be little to no difference in death at 40 weeks. There may be little to no effect on people experiencing adverse events. The authors found no evidence for dyspnea symptoms.	
McCabe et al. (2017) Computer and mobile technology interventions for self-management in chronic obstructive pulmonary disease	Meta-Analysis People with a diagnosis of COPD. The authors included RCTs that measured effects of remote and Web 2.0-based interventions defined as technologies including personal	HRQoL Number of hospital admissions and acute exacerbations. Level of physical activity as measured by daily step counts The authors identified RCTs from the Cochrane Airways Trials Register (date of the last search November 2016). They also hand-searched respiratory journals and meeting abstracts. A total of 1580	The effect of smart technology on self-management and subsequent HRQoL in terms of symptoms and health status was significantly better than when participants received face-to-face/digital and/or written support for self-management of COPD at Week 4, Month 4, and Month 6. Hospitalization and exacerbations did not differ	No firm conclusions can be drawn from interventions aimed at facilitating, supporting, and sustaining self-management in people with COPD and delivered via smart technology. This improvement may not be sustained over a long duration. The three studies are at high risk of bias, with poor quality, and is insufficient for advising heath care professionals,

	computers (PCs) and applications (apps) for mobile technology, such as iPad, Android tablets, smart phones, and Skype, on behavioral change toward self-management of COPD. Comparator interventions included face-to-face and/or hard copy/ digital documentary educational/self-management support. 3 studies were included in the meta-analysis. Two studies were conducted in Netherlands, one in USA and Puerto Rico.	randomized participants were included and 557 participants met the inclusion criteria. 319 received smart technology to support self-management, and 238 received face-to-face verbal/written or digital information and education about self-management.	between groups in the single study that reported these outcomes at 12 months. The activity level of people with COPD at Week 4, Month 4, and Month 6 was significantly higher when smart technology was used than when face-to-face/digital and/or written support was provided. Participant engagement in this study was not sustained between 4 and 12 months.	service providers, and members of the public with COPD about the health benefits of using smart technology as an effective means of supporting, encouraging, and sustaining self-management.
Michaelchuk et al. (2022) Design and delivery of home-based telehealth pulmonary rehabilitation programs in	Meta-Analysis People with stable COPD. The authors included uncontrolled pre/post studies	6MWD Program completion/attendance CRQ CAT score mMRC	Aerobic exercise commonly involved walking (n = 14) and cycling (n = 11) and most programs included resistance training (n = 25). Exercise progressions and emergency action plans were inconsistently reported.	Telehealth PR programs (HTPR programs) had similar effects to outpatient PR programs and greater effects than usual care for people with COPD.

COPD: A systematic review and meta-analysis	(*n* = 16, 50%) and RCTs (*n* = 14, 44%). Groups included in the trials consisted of Home-based telehealth pulmonary rehabilitation (HTPR) only (*n* = 13, 41%), HTPR versus usual care (*n* = 10, 31%), HTPR versus outpatient Pulmonary Rehabilitation (PR) (*n* = 7, 22%), HTPR versus education only (*n* = 1, 3%), and HTPR versus both outpatient PR and usual care (*n* = 1, 3%). 13 studies were included in the meta-analysis. 13 studies came from many countries in Europe, North America, Australia, and China. Only 6% of studies reported race and no studies reported participant ethnicity.	The authors identified uncontrolled pre/post studies and RCTs from Medline, Embase, Scopus, CINAHL, and the Cochrane library (from inception to June 2020 and updated to July 2021). A total of 1993 participants included. Most trials included exercise and education (*n* = 17, 53%) and the remaining trials included exercise alone (*n* = 15, 47%). The most common form of telecommunication during HTPR programs was video conferencing (*n* = 13, 41%), followed by telephone (*n* = 12, 38%).	Meta-analysis demonstrated HTPR was comparable to outpatient PR and had a greater effect than usual care for the modified Medical Research Council dyspnea scale and CAT score. Neither HTPR nor outpatient PR impacted sedentary time or step count.

Selzler et al. (2018) Telehealth pulmonary rehabilitation: A review of the literature and an example of a nationwide initiative to improve the accessibility of pulmonary rehabilitation	Literature review People with a diagnosis of COPD. The authors review the literature and share Canada's nationwide initiative to improve the accessibility of pulmonary rehabilitation. The authors review telehealth technology's application to deliver heath care services to chronic respiratory patients and describe how a team of clinician-researchers proposes to address accessibility challenges through telehealth technology while ensuring program quality and evaluating the effectiveness of a new PR program.	A nationwide initiative to improve the accessibility of pulmonary rehabilitation The authors summarize the nationwide accessibility challenges of pulmonary rehabilitation in Canada.	To improve PR access across Canada, ensuring a high standard of program quality and established self-management practices, a team of clinicians and researchers has developed and begun implementing a nationally standardized PR program that can be delivered across different practice settings, including remote satellite sites via telehealth PR. The program has adapted the Living Well with COPD (2016) self-management program and includes standardized reference guides and resources for patients and practitioners. A progressive and iterative process will evaluate the success of program implementation and outcomes.	The Chinese version of Living Well with COPD (So, 2015) self-management program is available which is feasible to deliver in telerehabilitation format. The program should be reviewed and cultural adaptation to the Chinese population.
Shaw et al. (2020) Are COPD self-management	Meta-Analysis People with a diagnosis of COPD.	Physical function - 6-min walk test Quality of life	The trials identified in this systematic review do not yet provide strong evidence for	A standardized outcome-reporting framework for digital health interventions in COPD

mobile applications effective? A systematic review and meta-analysis	The authors included RCTs in which the intervention group received a mobile device application to support their COPD self-management. A mobile device application was defined as a contained program that served a specific function relating to COPD and personal health on a portable electronic device (including smartphones and tablet computers). For inclusion, self-management was defined as patient management of their symptoms and medication regimes related to the condition and coping with the emotional and lifestyle impacts of the disease.	Dyspnea Fatigue Physical activity Self-efficacy Anxiety and depression The authors identified RCTs from Medline, EMBASE, Cochrane Library, CINAHL, and the Science Citation Index were searched from inception to 12th April 2019. The total number of participants was 1,447 from 13 trials.	implementing mobile digital health interventions for COPD. The number of exacerbations, QOL, physical function, dyspnea, physical activity, and self-efficacy were reported. Evidence for effectiveness was inconsistent between studies, and the pooled effect size for physical function and QoL was not significant. Eight of the interventions were smartphone-based, using custom applications whereby participants entered COPD symptom data and received custom or automated feedback based on their responses. Heath care professional involvement through active monitoring of entered data, clinical advice, or intervention on deteriorating observations was noted in seven trials. Eleven trials delivered the intervention through a smartphone, and two utilized a mobile tablet device. Five trials provided participants with a monitoring device such as a pulse oximeter and a pedometer, which linked to the applications to provide additional data.	self-management is recommended. The telehealth intervention may consider smartphone or tablet-based. Monitoring devices such as a pulse oximeter and a pedometer linked to the mobile apps will facilitate activity monitoring and action plan compliance.

	11 studies were included in the meta-analysis. Most of the studies came from Netherlands and United Kingdom. Two studies were from China, and one study was from Hong Kong	

APPENDIX D – Program Outline: Health Living With COPD

Initial evaluation and consultation—in person at the general outpatient clinic				
Week	**Educational content (synchronous)**	**Health qigong (synchronous)**	**Individual health coaching/case management**	**Virtual community**
1	• Understanding COPD • Dyspnea management and breathing control in daily activities I • Exploring the impact of dyspnea on activities of daily living (ADL), work, and leisure • Developing and integrating a plan of action into your life • COPD and computer literacy	• Introduction of health qigong baduanjin • Evidence-based health benefits and safety precaution • Warm-up and cool-down exercise • Styles 1 and 2	• Meet with the case manager • Identify and prioritize health concerns • Set up an agreed action plan • Integrated breathing control strategies	• Individual patients can raise questions in the virtual community. Patients and case managers are welcome to share their experiences or valuable information.
2	• Smoking cessation • Dyspnea management, position, and breathing control in daily activities II • COPD and occupational lifestyle redesign • Observing happiness and life satisfaction	• Style 3	• Review the action plan implementation • Discuss and set up a new action plan if accomplished • Integrating weekly educational content into plan (smoking	• Case managers post prompts or questions about smoking cessation, positioning in managing dyspnea, lifestyle redesign, or increasing happiness

			cessation, positioning in managing dyspnea, lifestyle redesign or increasing happiness)	
3	• Dyspnea management, position, and breathing control in daily activities III • Energy conservation and coordinated breathing techniques in ADL • Environmental control and home air quality	• Styles 4 and 5	• Review action plan implementation o • Discuss and set up a new action plan if accomplished • Integrating weekly educational content into plan (energy conservation and coordinated breathing techniques)	• Case managers post prompts or questions about Energy conservation and coordinated breathing techniques
4	• Managing stress and anxiety • Seven steps in problem-solving • Self-monitoring symptoms • Occupational lifestyle redesign and interest exploration	• Style 6	• Review action plan implementation • Discuss and set up a new action plan if accomplished	• Case managers post prompts or questions about self-monitoring symptoms or

			• Integrating weekly educational content into plan (self-monitoring symptoms or problem-solving techniques)	problem-solving techniques
5	• Five ways to well-being • Relaxation techniques in daily living	• Styles 7 and 8	• Review action plan implementation • Discuss and set up a new action plan if accomplished • Integrating weekly educational content into plan (interest exploration or relaxation techniques)	• Case managers post prompts or questions about interest exploration or relaxation techniques
6	• Health literacy • Communication with health professions • Community resources and support • COPD and a balanced diet	• Whole set practice and revision	• Review action plan implementation • Discuss and set up a new action plan if accomplished	• Case managers post prompts or questions about interest exploration or relaxation techniques

			• Integrating weekly educational content into plan (balanced diet or communication skills)	
8-9	• Post evaluation: in-person at the clinic			
10–22	• The case manager will arrange biweekly online health coaching (six sessions) • Patients and case managers are welcome to share their experiences or helpful information			
23-24	• Three months post evaluation: in-person at the clinic			

APPENDIX E– Leader's Manual

HEALTHY LIVING WITH COPD

A telehealth self-management program for patients with Chronic Obstructive Pulmonary Disease (COPD)

Manual created by:
Damian SIU, MPH, HKROT

INTRODUCTION

This manual outlines the plan to implement Healthy living with COPD: A telehealth self-management program for patients with COPD. It aims at improving access to care for COPD and patients' self-efficacy in managing the disease and health-related quality of life.

This manual provides Healthy living with COPD coaches with the information needed to set up the program in telehealth format, supervised health qigong, the case manager roles, and the theory and framework guiding the program.

WHO

The Healthy living with COPD is designed for patients with COPD who attend medical consultation in general outpatient clinics to improve their access and self-efficacy in managing their health and wellness, and quality of life. The infectious disease pandemic, including COVID-19, limited access to COPD care due to different control measures, which is an injustice to receive appropriate services promoting better disease self-management. Excessive health stress or worries of infection further led to isolation and physical inactivity.

Poor management of COPD and acute exacerbation may lead to increased unplanned medical consultations, serious hospital admission, and causing death. Frequent COPD exacerbations requiring hospital admission are associated with higher mortality (Soler-Cataluña et al., 2005).

Supporting patients with COPD by encouraging active participation in COPD self-management is essential. They will be motivated to participate in the virtual community

BEHAVIORAL FACTORS

*Factors intrinsic to patients with COPD (personal and interpersonal)

What you need to know:

- Active smokers tend to develop more severe COPD (personal).
- Patients with COPD deal with reduced lung function with limited energy expenditure and functional capacity for meeting exertional demands of physical activity in ADLs (personal).
- Increased shortness of breath and dyspnea would induce fear in participating in daily activities(personal).
- They may depend on their caregivers if patients are mood on the low side, have reduced confidence in managing the disease, have excessive worries, and are nervous about managing the dyspnea or SOB in daily activities (personal).
- Fair medication adherence and inhaler use techniques were independent risk factors moderating the shortness of breath and dyspnea in daily activities and exercise capacity (personal).
- Fair COPD management skills and knowledge would reduce health status and quality of life after hospitalization and increase hospital readmission risk (personal).
- People's perception of the COPD severity influences their willingness to participate in the demanding health regimens required to manage COPD (personal).
- Inadequate family and social support in participating in the telehealth training. (interpersonal).
- Computer and health literacy may limit their motivation in participating in the training and virtual community (personal).

ENVIRONMENTAL FACTORS

*Factors extrinsic to patients with COPD (social and physical environmental factors)

What you need to know:

- Sanitary facilities with physical and architectural barriers (physical).
- The location of clinics service provision with limited access to transportation (physical).
- Waiting time for the services (social).
- Professionals' knowledge and awareness to refer suitable patients to the program (social).
- The latest infection control measures guide the clinic's service provision (physical).
- Administration and guidelines in operating the comprehensive telehealth platform for ongoing support and discussion (social).

WHY THIS PROGRAM?

Healthy Living with COPD aims at improving access to care by offering best practices in COPD care via telehealth in the participant's home. Successful implementation and positive outcomes will promote the patient's self-efficacy in COPD self-management and occupational justice, which also enhance being physically active in daily activities.

DESIRED OUTCOMES AND BENEFITS (4P 4R)

- **P**romote patient's self-efficacy in managing the disease
- **P**romote Health-Related Quality of Life and Occupational justice
- **P**romote physical capacity
- **P**romote access to COPD care and more patients will receive the service
- **R**educe the risk and number of acute exacerbations leading to hospital admission and medical consultation
- **R**educe functional impairment in daily activities
- **R**educe dyspnea level
- **R**educe the waiting time to receive COPD self-management program

MEASURABLE OBJECTIVES

1. By the end of the initiative, 70% or more of the participants completed their agreed action plan for COPD self-management.
2. After the COPD self-management program, 80% of participants will improve their self-efficacy in managing COPD by 10%.
3. A 20% increase in participants in the COPD self-management program from the previous year.
4. The waiting time of new and subsequent cases of persons with COPD awaiting intervention is reduced by 20% after six months.

WHAT FRAMEWORK GUIDES THE PROGRAM?

Participatory Occupational Justice Framework (POJF)

- Supporting patients with COPD by engaging in active, meaningful, and desired occupations are the primary goal of Healthy Living with COPD.
- The collaborative enabling process of the POJF assisted with developing the program from beginning to end(Whiteford et al., 2017).
- The POJF's more cyclical model with the continuous reevaluation of the program can result in a constant evolution of ideas to improve sustainability (Whiteford et al., 2017).
- The six processes of the POJF fit best with the intended outcomes of Healthy living with COPD (Whiteford et al., 2017).
- The chart below lists examples using POJF to support the initiative.

Processes	How it will support the content / design ideas
Raise consciousness of occupational injustices	• Raise the initiative during the regular meeting with the hospital chief executive and Chief of Services of Family Medicine. • Prepare hospital admission statistics to report the increasing trend of hospital re-admission in the past few years.
Engage collaboratively with partners	• Identify and create a network of collaborators, including doctors, nurses, and physiotherapist colleagues with experience in respiratory care • Looking for an innovative model of care to enhance access and promote COPD care for the patients. Invite health professionals as case managers for the program participants.
Mediate agreement on a plan	• Arrange a meeting with team members to seek a consensus on the framework, content, staffing, resource, funding, and working timetable of the new COPD self-management program in telehealth format.
Strategize resource finding	• Explore suitable rooms to facilitate training on-site and webinars. • Arrange additional computers and accessories to enhance learning outcomes. • Seek hospital funding for equipment purchases.
Support implementation and continuous evaluation of the plan	• Collaborate and support the program implementation and as case managers for the participants. • Provide ongoing support and discussion to support participants in an agreed action plan. • Conduct outcome evaluation at baseline, after the COPD self-management program and 6 months after the program.
Inspire advocacy for sustainability or closure	• Encourage team members to support the initiative continuously. • Submit an oral or poster presentation at the coming Hospital Authority Convention and publish the initiative's findings in local or overseas COPD journals. • Share the result during the meeting with the hospital governance committee and Occupational Therapists working in other clusters. • Extend the COPD care model to other clusters in Hong Kong and overseas.

WHAT HEALTH PROMOTION THEORY GUIDES THE HEALTHY LIVING WITH COPD?

The Social Cognitive Theory (SCT)

- The SCT (Bandura, 1977) posits that learning occurs in a social context with dynamic and reciprocal interaction, environment, and behavior.
- The case managers will facilitate the participants to recall their past experiences on the three topics: managing acute exacerbation and exertional dyspnea, smoking cessation, and increasing physical capacity. The past SCT experiences influence reinforcements, expectations, and expectancies. These will encourage the participants to acquire relevant self-management knowledge and skills and engage in a specific behavior. It also facilitates their understanding of the necessary engaging in that behavior.
- *Healthy Living with COPD* includes education, monitoring, and assessment of progress, taught skills and supervised health qigong training in telehealth format to increase self-efficacy.
- The self-management education content originated from the "Living Well with COPD" self-management program, an international open-design clinical trial, the COMET (Bourbeau et al., 2016; Kessler et al., 2018). The Chinese version of the "Living Well with COPD" (So, 2015) self-management program is available and implemented extensively at all hospital occupational therapy departments in Hong Kong.

The Social Cognitive Theory and the Healthy Living with COPD program development

SCT constructs	How SCT support the design of the program
Knowledge	• The COPD self-management program in telehealth format, together with fact sheets to enhance participants' disease knowledge and skills.
Outcome expectation	• A comprehensive telehealth platform will be developed to support training delivery, online discussion, skills demonstration, and practice. The patient can share their experience, raise questions and brainstorm possible solutions via Social Media.
Outcome expectancies	• Ongoing support and discussion will be arranged via social media between participants and health professionals.
Situational perception	• The case manager (health professional) will facilitate the participants to recall their past experiences and management of acute exacerbation of COPD (Awareness of the behavior and environment). The case manager will discuss and rectify any misperceptions with the participants.
Environment	• The COPD self-management program in telehealth format will discuss physical or social circumstances that will increase their risk of acute exacerbation. Other situations will be discussed, including exertional dyspnea, reduced physical activities, or smoking cessation. • It also builds social support between the participants and the case managers and provides access to the health systems if indicated.
Self-efficacy	• Participants will acquire relevant self-management knowledge and skills by attending the COPD self-management program. • It also facilitates their understanding of the necessary steps to engage in that behavior. The case managers will give verbal persuasion and reinforcement to support them in pursuing a behavior. The ongoing support and discussion will promote their self-efficacy in managing their own health and wellness.
Self-efficacy in overcoming impediments	• The case managers will facilitate the participants to practice overcoming barriers of a specific behavior in small steps. Educational videos or pamphlets will be shared to that participants can have a role model. The case managers will also give verbal persuasion and reinforcement to reduce their stress and empower their competence in overcoming barriers.
Goal setting or self-control	• The case managers will employ the five core self-management skills (Lorig and Holamn, 2003) and the SMART model (Doran, 1981) to set goals and written action plans with the participants.
Emotional coping	• Participants can share their concerns or worries associated with acquiring a new behavior during the discussion with case managers or other participants in the group via social media. • Meanwhile, they will learn and practice breathing relaxation exercises or health qigong (mind-body exercise) in attending the COPD self-management program.

THE HEALTHY LIVING WITH COPD PROGRAM

Patients who have a regular medical follow-ups in general outpatient clinics will be invited to join the Healthy Living with COPD program. It is a six months telehealth-based home program, including a self-management educational program, a supervised standard 8-style online pulmonary health qigong and online health coaching and discussion with participants.

Participants will attend evaluation at baseline and after the program. An introductory computer literacy training will be arranged for patients with COPD to set up web learning/health monitoring at home. The Telehealth COPD self-management program has six sessions, each lasting about 45 minutes. The content originated from the "Living Well with COPD" self-management program, an international open-design clinical trial, the COMET (Bourbeau et al., 2016; Kessler et al., 2018). The Chinese version of the "Living Well with COPD" (So, 2015) self-management program is available and implemented extensively at all hospital occupational therapy departments in Hong Kong.

A supervised standard 8-style online pulmonary health qigong will be organized. It will be delivered after the COPD self-management program and each session will last about 30 minutes. The OT can monitor heart rate, SpO2 and blood pressure via mobile devices.

Health professionals will organize a regular weekly/biweekly online meeting with participants. A comprehensive telehealth platform will be organized via social media. It supports the training delivery, online discussion, skills demonstration and practice. Participants will be facilitated to develop an agreed action plan with the health professionals and regularly review the outcome. Educational videos or pamphlets will be shared to that participants can have a role model. The health professionals will give verbal persuasion and reinforcement to support them in pursuing a behavior.

Initiative Design/ Content Idea	Theoretical Grounding	Supporting Evidence (from peer-reviewed literature)
COPD self-management program in telehealth format	SCT construct: Knowledge, situational perception, environment, self-efficacy, goal setting, emotional coping POJF process: raise awareness	• Aim to improve patients' disease knowledge and physical activity levels, with the inclusion of health literacy in training (Shnaigat et al., 2021). • Improve health-related quality of life and reduce Emergency Department visits over 12 months (Lenferink et al., 2017; Newham et al., 2017; Schrijver et al., 2022; Song et al., 2021; Wang et al., 2017). • Reduce the disease burden with significant positive effects on different health-related outcomes (Song et al., 2021). • Reduce the rate of 30-day hospital readmission and the number of hospital admissions in the past 12 months due to acute exacerbation for high-risk patients with COPD (Bourbeau et al., 2020).
Standard 8 style pulmonary health qigong	SCT construct: self-efficacy, goal setting, emotional coping POJF process: raise awareness	• Promote the health status of patients with COPD (Guo et al., 2020). • Reduce anxiety and depression (Guo et al., 2020; Li et al., 2019). • Enhance lung function (Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Reychler et al., 2019; Tong et al., 2019; Zhang et al., 2022) • Minimize the perceived severity of dyspnea (Ngai et al., 2016; Zhang et al., 2022). • Promote physical fitness (Guo et al., 2016; Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Reychler et al., 2019; Tong et al., 2019; Zhang et al., 2022). • Uplift immunity (Ng et al., 2011; Xiao and Zhuang, 2015). • Enhance the quality of life (Guo et al., 2016; Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Tong et al., 2019; Zhang et al., 2022).
A comprehensive platform for telerehabilitation	SCT construct: self-efficacy, goal setting, emotional coping, outcome expectations, Outcome expectancies, situational perception, environment and Self-efficacy in overcoming impediments POJF process: engage collaborative, mediate agreement, support implementation & continuous evaluation	• Increase accessibility and adherence (Janjua et al., 2021; McCabe et al., 2017; Selzler et al., 2018; Shaw et al., 2020). • Telerehabilitation has similar effects to outpatient pulmonary rehabilitation programs and more significant results than usual care for people with COPD (Michaelchuk et al., 2022). • Promote the program completion rate (Cox et al., 2021; Janjua et al., 2021a) • Beneficial as an additional health resource depending on individual needs based on professional assessment (Janjua et al., 2021b). • Facilitate activity monitoring and action plan compliance with the application (Shaw et al., 2020).

BRIEF ADMINISTRATIVE ASSESSMENT

Administration and Policy	For Healthy Living with COPD
Resources – personnel	• Health professionals including Occupational therapists, Physical therapists, and Nurses to implement the program.
Resources – materials	• Pedometer, Oximeter, computer set, tablets, and related accessories for the webinar.
Resources – physical space	• Consultation or function rooms with good lighting, air ventilation, and network facilities in the clinic.
Facilitators to program implementation	• Health professionals with experience in pulmonary rehabilitation and primary care.
Policies, and regulations that influence or impact program development or implementation	• The latest infection control guidelines and requirements defer community members' willingness to join the program.
Budget considerations	• Manpower for program assistants. • Computer set, tablets, and related accessories for webinars. • Pedometer, Oximeter for community members.
Time Frame	• The Healthy Living with COPD will run for 1.5 hours each session for six weeks, including the supervised health qigong training. Evaluation will be arranged at baseline, post-intervention and 3 months after the intervention. Ongoing support and discussion will be arranged after the baseline assessment via social media. The schedule and duration will be determined between the case managers and participants.

PROGRAM EVALUATION PLAN

Formative (process) evaluation components

- The survey, interview, or focus groups of the participants, health professionals will be arranged to determine if the program is implemented as planned, and challenges, possible solutions, or recommendations to improve the care delivery
- Attendance, number of health coaching/discussion, compliance of agreed action plan will be recorded and evaluated over the intervention.

Summative (impact and outcome) evaluation components

- The clinical evaluation will be arranged at baseline, post-intervention, and three months after the intervention, assessing their self-efficacy, Health-Related Quality of Life, physical capacity, functional impairment in daily activities, and dyspnea level.
- The number of acute exacerbations leading to hospital admission and medical consultation, the number of participants who attended the COPD self-management program, and their waiting time will be compared.

CRITICAL REVIEW OF *HEALTHY LIVING WITH COPD*

Substantial evidence concluded the COPD self-management interventions were deemed safe and unlikely to cause harm (Schrijver et al., 2022), and positively influence the health status of patients with COPD (Barrecheguren et al. 2018; Bourbeau et al., 2020; Cravo et al., 2022; Helvaci et al., 2020; Jolly et al., 2018; Lenferink et al., 2017; Newham et al., 2017; Nohra et al., 2020; O'Connell et al., 2021; Schrijver et al., 2022; Shnaigat et al., 2021; Song et al., 2021; Wang et al., 2017). It also increases accessibility and adherence (Janjua et al., 2021; McCabe et al., 2017; Selzler et al., 2018; Shaw et al., 2020), positively influencing patients with COPD. The supervised Health Qigong in telehealth format is an innovative way to promote self-management and positive health outcomes for COPD patients (Cao et al., 2020; Guo et al., 2016; Guo et al., 2020; Liu et al., 2021; Tong et al., 2019). Both theoretical frameworks (POJF and SCT) not only strengthen the program development but also support patients with COPD living remotely from the clinics or with traveling difficulties to the clinics benefits from the program.

The optimal frequency and duration of the self-management program and supervised health qigong training is unclear. Other confounding factors, including types and weekly home health qigong training compliance, need further research. Apart from symptom management, Newham et al. (2017) conducted a systematic meta-analysis and recommended that self-management intervention should also focus on mental health issues, including social support and reducing negative emotions.

In addition, theories or models related to chronic care may be considered to enhance the theoretical background of the program, including the Chronic Care Model (CCM) developed by Wagner et al. (1996) and the electronic health-enhanced chronic care model (eCCM) (Gee et al., 2015). The two theories emphasize the importance of an integrated approach to improve the quality of chronic disease management and care.

POTENTIAL BARRIERS AND POSSIBLE SOLUTIONS

Potential barriers	Possible solutions to barriers
Lack of case managers	• Recruit nurses, occupational therapists or physiotherapists by sending an invitation email via the hospital's internal email system • Invite Chief of Service of the Department of Family Medicine to nominate heath professionals to join the team
Lack of budget/finance	• Apply for grants to fund the program • Partner with Health Qigong Association of Hong Kong, China to support the training.
Lack of rooms	• Seeks support and coordination from Hospital Chief Executives or Chief of Service. • Explore suitable indoor multi-purpose rooms in community centers.
Fair computer literacy	• Encourage all participants to attend the first session of the COPD self-management training and seek support from their case manager.
Charing fee issue	• Seek support from Hospital Finance Manager for the payment • Encourage participants to use electronic payment
Monitoring compliance	• Develop an electronic platform via HA Go mobile app or WeChat to allow participants to record their progress • Encourage participants to share their photos in related to their action plan in the closed virtual community. Other participants and case managers can review and encourage to motivate them to engage in the agreed action plan.

CONCLUSION

In summary, this manual provided an overview of Healthy living with COPD, including:

- Who the program is designed for (patients with COPD)
- Why the program is important for patients with COPD and enhancing access to COPD care
- Desired outcomes and goals
- Guiding framework, theory and evidence-base of the Healthy living with COPD
- Components of the Healthy living with COPD
- Possible barriers and challenges of the program with possible solutions

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APPENDIX F – Executive Summary

Healthy Living With COPD: A Telehealth Self-Management Program for Patients With Chronic Obstructive Pulmonary Disease (COPD)

Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable respiratory disease that was the third leading cause of death in 2019, accounting for 3.2 million people globally (World Health Organization, 2022). This chronic condition requires careful ongoing management. Patients with COPD have reduced lung function with limited energy expenditure and functional capacity. Shortness of breath and dyspnea progress without proper care, leading to deterioration in activity tolerance and participation. A 6-month telehealth-based self-management program for people with COPD was developed to improve patients' access to, knowledge of, and self-efficacy in managing their health, wellness, and quality of life (QOL).

Factors Associated With Suboptimal COPD Management

An exhaustive literature review indicated that treating COPD is a long, ongoing, and multisystem process. Three central factors influence COPD care and its resulting morbidity: the service model and access to care, professionals' knowledge and behaviors, and each patient's personal factors. The COVID-19 pandemic led to the suspension or reduction of outpatient and primary care services in Hong Kong and worldwide. The resulting restrictions in patient access to care led to poor COPD management, including deterioration of QOL and increased frequency of acute conditions, hospital readmission, and mortality.

Previous Evidence-Based Solutions for Effective Access to COPD Care

Three key ingredients for best outcomes were identified from the evidence and guidelines from the most authoritative sources on promoting the health and wellness of people with COPD. First, self-management education (SME) programs are safe, effective, and unlikely to cause harm (Schrijver et al., 2022). Several meta-analyses and systematic reviews recommended a training intensity and duration of telehealth self-management program and supervised health qigong (HQG) training to achieve significant health-improvement effects (Janjua, Banchoff et al., 2021; Jolly et al., 2018; Cai et al., 2021; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019). Second, the telerehabilitation delivery format mitigates access to care issues and enables a broader outreach for delivery of self-management programs in patients' homes. In addition, ongoing support, communication, and feedback using productive information technology between health professionals and participants via social media can enhance the professionals' knowledge and awareness and activate patients in managing their health and wellness. Third, regular practice of HQG was found to promote the health status of patients with COPD (C. Guo et al., 2020). It enhanced lung function (C. Guo et al., 2020; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022), minimized the perceived severity of dyspnea (Ngai et al., 2016; Zhang et al., 2022), and promoted physical fitness (Guo et al., 2020; J. B. Guo et al., 2016; Liu et al., 2021; Ngai et al., 2016; Rychler et al., 2019; Tong et al., 2019; Zhang et al., 2022). The improved physical and psychosocial health further uplifted immunity (Ng et al., 2011; Xiao & Zhuang, 2015) and QOL (Guo et al., 2020; J. B. Guo et al.,

2016; Liu et al., 2021; Ngai et al., 2016; Tong et al., 2019; Zhang et al., 2022).

The Proposed Program: Healthy Living With COPD

Healthy Living With COPD is a 6-month telehealth-based self-management program for patients with COPD. The program was designed for patients with COPD receiving care in general outpatient clinics. The program's primary goal is to empower participants to manage their health and wellness by improving their access to, knowledge of, and self-efficacy in managing their health, wellness, and QOL. The theoretical basis of *Healthy Living With COPD* draws from two main models: the social cognitive theory (Bandura, 1977) and the electronic health-enhanced chronic care model (Gee et al., 2015). This program draws from evidence-based therapy approaches and principles explicitly designed for patients with COPD. In addition to educational content, the program provides health-supervised online HQG, health coaching, and psychosocial support for the best outcomes. It has four essential components to generate clinical evidence: SME, supervised HQG baduanjin, online health coaching, and virtual community. The program will be delivered using a comprehensive telerehabilitation platform for delivering training and ongoing support and discussion via social media before, after, and between sessions.

The program will use a multidisciplinary team approach, including collaboration among occupational therapists, physical therapists, and nurses with pulmonary rehabilitation experience as the case managers who address the patients' needs. An online platform and supportive devices on the instructor's end and the patient's end is needed to facilitate the program delivery. All participants will need pedometers, oximeters,

computers, tablets, webcasting, and related accessories. Written materials, including health promotion pamphlets and action plan templates, will be provided to participants.

Program Evaluation Plan

The program evaluation research plan aims to evaluate the feasibility and effectiveness of the *Healthy Living With COPD* program. A comparative clustered randomized controlled trial design will evaluate changes within and between groups in respiratory functions, HQG practice, and self-efficacy in managing COPD signs and symptoms, health-related QOL, physical capacity, functional impairment in daily activities, dyspnea level, and the number of acute exacerbations leading to hospital admissions and medical consultations. Data collection will take place preparticipation, immediately post participation, and at a 3-month follow-up.

Dissemination Plan

A dissemination plan was developed to inform potential program recipients, caregivers, occupational therapists, and health professionals to encourage enrollment in the program and contribute to the knowledge base on best practices in COPD care. The dissemination plan includes the publication of project outcomes through scholarly publications (manuscript and conference presentations), social media (infographics on the program and testimonials), and an executive summary for hospital chief executives and the Chief of Service in the Department of Family Medicine. The dissemination messages will include information about the program's benefits and overall design, costs, strategies, practical elements, and implementation considerations in promoting COPD care in various settings and countries.

Funding Plan

The total estimated value of in-kind resources is HKD623,375, including one full-time research therapist, dissemination budget, manuals, computer hardware, and portable oximeters for ambulatory monitoring at home. These costs include implementing *Healthy Living With COPD* for the first 2 years, with 10 groups of five participants in each group in the first year and 10 groups of 10 participants in the second year.

For external funding, the project developer will first apply for the Health and Medical Research Fund from the Hong Kong Special Administrative Region government, which meets the high-priority funding research areas and themes. The developer will then apply to other large-scale nongovernmental funding sources, including the Jockey Club Charities Trust and the Li Ka Shing Foundation, to support the telehealth initiative. A sufficient financial incentive will elicit stakeholders to improve COPD care in primary care.

Conclusion

In conclusion, successful implementation and positive outcomes will promote patients' self-efficacy in COPD self-management and enhance their physical activity. The author hopes that the pilot of *Healthy Living With COPD* will provide an impetus to transform and expand occupational therapy services across all seven clusters under the catchment of the Hospital Authority throughout Hong Kong. It will also become the preferred alternative to in-person COPD self-management programs worldwide. The target audience, dissemination activities, and budget have been outlined to magnify the program's visibility and enhance the implementation scale.

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APPENDIX G – Fact Sheet

BOSTON UNIVERSITY

Healthy Living With COPD: A telehealth self-management program for patients with chronic obstructive pulmonary disease (COPD)

Chi Hong Damian Siu, MPH, HKROT, FRSPH
OTD Candidate

Healthy Living With COPD is a telehealth-based self-management program for patients with COPD. It aims to empower participants in managing their health and wellness by improving their access to, knowledge in, and self-efficacy in managing their health, wellness, and quality of life.

The Fact

COPD is a common, preventable, and treatable respiratory disease that was the third leading cause of death in 2019, accounting for 3.2 million people globally (World Health Organization, 2022). Patients with COPD have reduced lung function with limited energy expenditure and functional capacity. Without proper care, shortness of breath and dyspnea progress leading to deterioration in activity tolerance and participation.

Factors associated with Suboptimal COPD management

An exhaustive literature review indicates that treating COPD is a long, ongoing, multisystem process. Three central factors influence COPD care and the resulting morbidity. These are the heath care service model and access to care, professionals' knowledge and behaviors, and each patient's personal factors. The COVID-19 pandemic led to the suspension or reduction of outpatient and primary care services in Hong Kong and worldwide. The resulting restrictions in patient access to care led to poor COPD management, including deterioration of quality of life, increased frequency of acute conditions, hospital readmission, and mortality.

[File:Peter Parks/AFP]

Previous Evidence-Based Solutions for Effective Access to COPD Care

Three key ingredients for best outcomes were identified from evidence and guidelines from the most authoritative sources on promoting the health and wellness of people with COPD.

1. Self-management education programs
2. Telerehabilitation delivery format
3. Regular practice of health qigong (HQG)

Theoretical basis of Healthy Living With COPD

This program draws from evidence-based therapy approaches and principles explicitly designed for patients with COPD. It draws from two main models: the Social Cognitive Theory (Bandura, 1977) and the Electronic Health-Enhanced Chronic Care Model (Gee et al., 2015).

The proposed solution: *Healthy Living With COPD*

Healthy Living With COPD is a 6-month program that has four essential components to generate clinical evidence: Self-management education, supervised health qigong baduanjin, online health coaching, and virtual community.
The program will be delivered using a comprehensive telerehabilitation platform for training, ongoing support, and discussion via social media before, after, and between sessions.

A multidisciplinary team approach will be used, including collaboration among occupational therapists, physical therapists, and nurses with experience in pulmonary rehabilitation, as the case managers who address the need of patients.

https://k.sina.com.cn/article_2049389352_7a2733280400175rz.html

Impact on Future Occupational Therapy Practice

- Successful implementation and positive outcomes will promote the patients' self-efficacy in COPD self-management and enhance physical activity.
- The program will provide an impetus for the transformation and expansion of primary care OT services across all seven clusters under the catchment of the Hospital Authority throughout Hong Kong.
- It will become the preferred alternative to in-person COPD self-management programs worldwide.

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