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A Conceptual Paper Applying the Precede-Proceed Model to Person-Centred COPD Care: A Timely Resource for Patients, Clinicians, Health Organisations and Healthcare Policymakers

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a progressive and irreversible obstructive lung condition. Its aetiology involves complex, cumulative interactions between genetic, lifestyle, and environmental factors throughout an individual's lifespan. COPD impacts quality of life and economy in significant and diverse ways. This conceptual paper analyses the benefits of applying the Precede-Proceed Model to the clinical assessment, care, treatment, and evaluation of COPD patients in acute and community settings. The model provides a robust, systematic framework for addressing the multifaceted challenges of COPD management. Given COPD's complex aetiology, which encompasses genetic predispositions, lifestyle choices, and environmental exposures, a comprehensive approach to intervention is essential. Hence, there is a critical need for healthcare professionals, researchers, policymakers, and patient advocacy groups to innovate and implement novel strategies to confront the escalating and persistent public health challenge posed by COPD. This comprehensive approach integrates aspects of COPD assessment and care that are adaptable across diverse healthcare settings, including home-based care, community interventions, acute care environments, and policy development. Employing the Precede-Proceed Model to holistically address COPD offers the potential to improve the quality of life and functional capacity of individuals with COPD, as well as the global economy, by identifying related non-bio-

medical blind spots, such as the psychological, social, and economic determinants of patient well-being.

Keywords

COPD, Precede-Proceed Model, Health Promotion, Self-Efficacy, Person-Centred Care

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) causes restricted airflow and breathing difficulties, characterised by air trapping, shortness of breath, and phlegm production [1]. The significant impacts of COPD on quality of life highlight the importance of exploring how to use health promotion and health education to improve COPD patients' understanding and coping with the chronic condition. Hence, there is a critical need for healthcare professionals, researchers, policymakers, and patient advocacy groups to innovate and implement novel strategies to confront the escalating and persistent public health challenge posed by COPD.

In this conceptual paper, we discuss the application of the Precede-Proceed Model to the clinical assessment, care, treatment, and evaluation of COPD patients in acute and community settings. We begin by providing a concise overview of COPD, including its definition, aetiology, and predisposing factors. Subsequently, we elaborate on the significant health, economic, and social burden of COPD. The discussion then transitions to a detailed practical application of the Precede-Proceed Model to the assessment, care, treatment and evaluation of COPD patients.

2. Background

2.1. Chronic Obstructive Pulmonary Disease (COPD)

Global Initiative for Chronic Obstructive Lung Disease (GOLD) defined COPD as "a heterogeneous lung condition characterised by chronic respiratory symptoms (dyspnoea, cough, sputum production and/or exacerbation) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive airflow obstruction" [2]. Notably, COPD has also been described as a common, preventable and treatable disease that continues to be undiagnosed or diagnosed late in many quarters, leading to inappropriate or no treatment at all, hence leaving the patients in a disadvantaged position [3].

The causes and predisposing factors of COPD include genetic factors (such as alpha-1 antitrypsin deficiency), smoking and/or vaping (including passive smoking and/or vaping), premature birth and early life respiratory/lung development issues, asthma and chronic bronchitis, environmental factors (such as occupational exposures to irritants), socio-economic factors, frequent respiratory tract infections, gender, race and ethnicity [2]. COPD results from a series of dynamic

and cumulative gene-environment interactions over a lifetime [4].

2.2. COPD Burden

Globally, COPD has consistently and increasingly been a leading cause of morbidity and mortality [2]. COPD is one of the most probable causes of death, accounting for about 3 million deaths in 2013 [2] [5]. It is estimated that there will be nearly 600 million people living with COPD in 2050 and over 5.4 million annual deaths from COPD and related conditions by 2060 [2]. Notably, COPD represents a significant global economic, healthcare, and lifestyle burden that impacts individuals, the public sector, and societies [4]. Similarly, COPD represents a substantial financial burden on nations' economies. In the United States and European Union, for example, COPD gulps an estimated $40 billion and €38.6 billion annually, respectively [2].

A substantial proportion of patients with stable COPD who present in the outpatient settings report limiting symptoms such as depression, suboptimal physical activity, pain, and other respiratory-specific concerns [6]. In addition, studies have shown that the limiting and debilitating impacts of COPD hinder the productivity and quality of life of persons with COPD [7]-[9]. The National Research Council [10] reports that people reach their most productive age around 40. The economic impact of COPD cannot be fully captured by the costs of diagnosing and treating the condition, especially given that lost economic productivity and social contributions cannot be adequately quantified [2] [7].

2.3. The Precede-Proceed Model

The Precede-Proceed Model is one of the planning models used in health promotion [11]. Lael-Monfared *et al.* [12] demonstrated how the Precede-Proceed framework can be employed to appraise, plan and implement effective health education and promotion strategies. Several clinical applications of the model highlight its growing relevance beyond public health settings [13]-[15].

The model is a comprehensive planning tool that works backwards from desired outcomes (in this case, reduced COPD exacerbations and improved quality of life among people with COPD) to identify the necessary steps to achieve the outcomes. The model consists of nine phases, divided into two main parts: Precede (predisposing, reinforcing, and enabling constructs in educational/environmental diagnosis and evaluation) and Proceed (policy, regulatory, and organisational constructs in educational and environmental development). The model provides a robust, systematic framework for addressing the multifaceted challenges of COPD management. Given COPD's complex aetiology, which encompasses genetic predispositions, lifestyle choices, and environmental exposures, a comprehensive approach to intervention is essential.

2.4. Implications for Practice and Policy

The Precede phase of the model facilitates a thorough understanding of the deter-

minants of COPD progression and patient well-being by systematically assessing social, epidemiological, and educational/ecological factors. The Identification of predisposing factors (e.g., knowledge deficits, attitudes), enabling factors (e.g., access to resources, skills), and reinforcing factors (e.g., social support, healthcare provider feedback) that collectively impact health behaviours and environmental conditions related to COPD provides valuable insights to patients, clinicians, and healthcare policymakers.

The Proceed phase establishes a structured pathway for developing, implementing, and evaluating targeted interventions. These interventions can encompass policy, regulatory, and organisational aspects. As shown in Figure 1, this holistic approach ensures that interventions extend beyond symptom management to addressing underlying behavioural, environmental, and policy drivers, thereby fostering improved quality of life and functional outcomes for individuals with COPD across diverse healthcare settings.

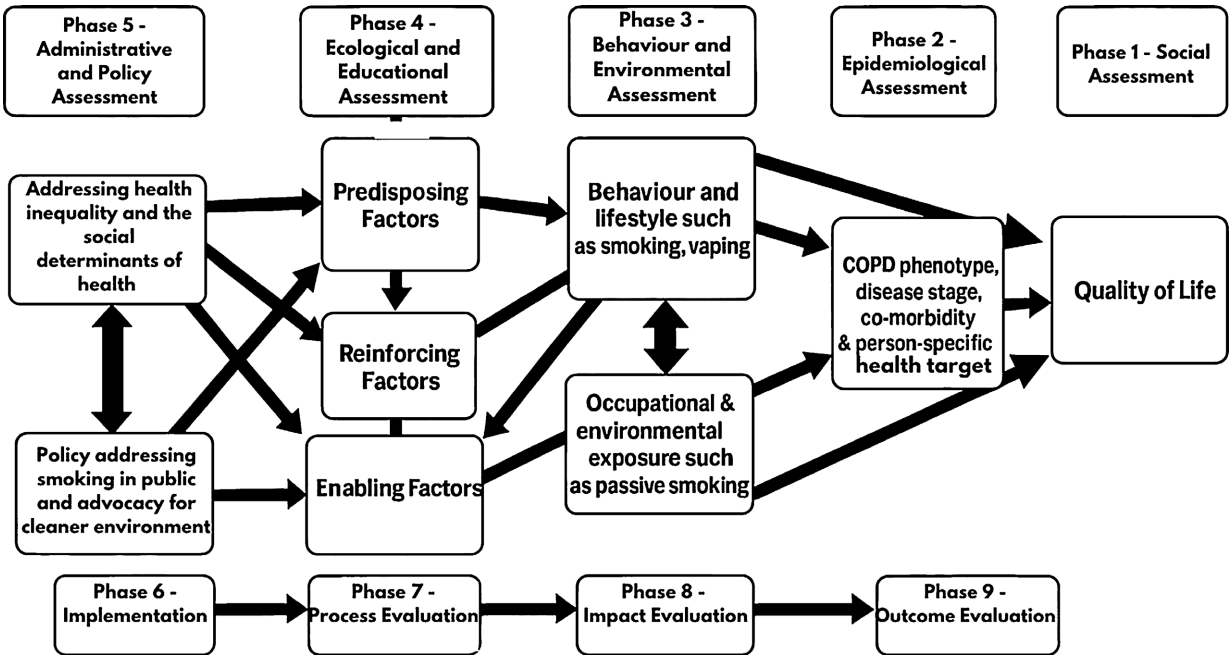

Figure 1. Precede-proceed model and COPD, adapted from [16].

3. Discussion: Applying the Precede-Proceed Model in Practice

Phase 1: Social assessment: Identify the person's social problems and needs, focusing on their quality of life. This phase involves understanding the person's perceptions and concerns.

The degree and quality of social interaction among people living with COPD includes their capacity to perform role-related tasks, participation in their usual social and family engagements and ability to work or return to employment (whatever that may be—professional/vocational role as in middle aged adults or family role as in grandparents), sustain social engagement and relationships, de-

spite their disease condition and progression [2] [17] [18]. Brien *et al.* [8] observed how COPD often impacts these roles and relationship functions, especially among those with advanced disease.

When treating each person as unique, clinicians, carers, and patients have to assess each patient's social capacity and limitations. This assessment will be integral to the patient's care and self-management plans.

Phase 2: Epidemiological assessment: Identify and prioritise the patient's health problems. This phase involves analysing medical data and patients' health indicators to determine the most pressing health issues.

Detailed health, birth/neonatal, childhood, family, smoking, occupational and social history is integral to COPD diagnosis, staging and management [2] [3] [19]. Likewise, physical assessment using the Jarvis model also helps clinicians conduct thorough patient examinations [20] [21]. The Jarvis assessment model includes four stages: physical examination, palpation, auscultation, and percussion [21].

COPD-specific assessments, such as the modified Medical Research Council (mMRC) and DECAF scores, are equally essential for assessing COPD patients [2] [22]. mMRC is a dyspnoea scale that measures the severity of breathlessness and the impact on patients' functional status [2]. The scale is graded 0 - 4, with 0 being breathlessness only with strenuous exercise and 4 being breathless when dressing or undressing, or too breathless to leave the house. DECAF stands for dyspnoea, eosinopenia, consolidation, acidaemia, and atrial fibrillation [22]. DECAF is used in hospitals and emergency departments to predict the risk of inpatient mortality in patients with COPD. A score of 0 to 1 suggests a low risk of inpatient mortality; a score of 2 indicates an intermediate risk; and a score of 3 or higher indicates a higher risk of inpatient mortality. Also, a 6-minute walk test can help assess their ability to cope with exertion.

Arterial blood gas is another crucial assessment tool for assessing and managing COPD patients [23]. A low PaO_2 (typically below 8 kPa), high $PaCO_2$ (above 6.1 kPa) and a decreased pH (indicating acidosis) are not uncommon among COPD patients. Also, laboratory investigations' results, such as elevations in CRP and white cell count, suggest exacerbation, while sputum culture and sensitivity testing and eosinophil count may be essential for treatment options [24]. Chest x-ray, CT scan, spirometry, and pulmonary function tests can track COPD progression and rule out other conditions such as pleural disease, pulmonary fibrosis, and cardiac comorbidities [2].

According to Buttery *et al.* [25] and Fabbri *et al.* [26], the majority of persons living with COPD have at least one other health concern, which ranges from hypertension, diabetes, asthma, cardiac failure, cancer, obstructive sleep apnoea, depression, to musculoskeletal issues. Therefore, it is essential to assess a patient's co-morbid cases and other treatment plans in place, and how these may interfere with their coping with COPD. For instance, shortness of breath may be due to COPD or other comorbidities. A thorough assessment at this phase will guide a person-centred care plan and appropriate referral to relevant services/specialists.

Phase 3: Behavioural and environmental assessment: Identify the behavioural and environmental factors impacting their coping with COPD. This phase involves understanding the behaviours and conditions that need to change to improve health outcomes.

Analysing behavioural and environmental factors will enable healthcare professionals to identify patterns associated with the patient's coping with, or otherwise affected by, COPD. A good example is smoking and/or vaping (including passive smoking and/or vaping). Smoking is the leading cause of preventable illnesses, with the average smoker dying at least 10 years earlier than non-smokers. Smoking has a significant impact on smokers' quality of life [27]. Hence, among COPD clients who smoke or vape, quitting smoking and vaping is the single most rewarding step to improve their quality of life. Likewise, second-hand smoking is responsible for an estimated 1.2 million premature deaths globally each year [28] [29].

Also, air quality is linked to lung health [2]. Hence, it is essential to avoid passive smoking or vaping and ensure an environment free from smoke, fumes and dust. Occupational exposure to dust and fumes is also a necessary factor to investigate. Similarly, unwholesome health behaviours such as illicit substance use, excessive alcohol use and so on have been highlighted among some persons living with COPD [30] [31]. Clinicians must elicit this information and educate patients accordingly.

Phase 4: Ecological and educational assessment: Analyse the predisposing, reinforcing, and enabling factors influencing the identified behaviours and conditions. This phase involves understanding the underlying causes of the health problems.

Healthcare professionals should remember that several cultural, religious, family, social, economic, housing, and attitudinal factors underpin each patient's health-seeking behaviour, access to, and acceptance of healthcare interventions. For example, affordability of inhalers is an *enabling* factor, family support is a crucial reinforcing factor, and poor access to information or education, unaffordability and culture are predisposing factors. Therefore, clinicians eliciting each patient's viewpoints on these factors will guide their person-centred intervention and strategies to enhance patients' acceptance of and coping with COPD.

However, multiple factors play different roles in COPD outcomes; hence, a multidisciplinary approach and the addressing of socio-economic determinants of health are crucial [2] [32]. Notably, education is a significant enabling and reinforcing factor. Thus, patients, carers, and relatives should be educated on strategies to help them cope with COPD. Education on smoking cessation and ensuring a smoke-free environment and referral to smoking-cessation services have continued to prove helpful [2]. Abrahamsen *et al.* [33] reported the crucial role of education on the benefits of maintaining physical activity that matches the patient's pace and ability, as well as referral to pulmonary rehabilitation and COPD support groups. In addition, education on adequate sleep, sleep hygiene, healthy

diet and optimal hydration should be encouraged [34].

Tools such as the COPD Assessment Test (CAT) are valuable for monitoring patients' disease progression and guiding pharmacological and non-pharmacological interventions [34]-[36]. By scoring each question 0 - 5 (0 being the best and 5 the worst), the desired outcome is a score between 0 and 10, while 11 - 20 is considered mild. Scores above 20 are concerning and may need intervention; however, if ever above 30, patients and their relatives are advised to contact their GP or go to the hospital. COPD patients who monitor their CAT score are in a position to track where they are on the journey and what improvements to prioritise. In addition, patients are educated about the benefits of adhering to treatment and when to contact their GP or present to the emergency department. Education on safety measures relating to oxygen use and storage is essential for patients requiring long-term or ambulatory oxygen.

Phase 5: Administrative and policy assessment: Identify the policies, resources, and organisational structures to support persons living with COPD. This phase involves ensuring that the necessary support systems are in place.

Clinicians are strategically placed as patients' advocates. Access to care and affordability remain major concerns for many patients, especially in low and middle-income countries [37]. While the economic burden of COPD continues to soar, it is expedient that lives and humanity be prioritised and thus addressing socio-economic disadvantages among people living with COPD is crucial. Support needs to be in place to ensure that patients who cannot afford their inhalers are not left without care. Addressing the social determinants of health, bridging socio-economic gaps, and ensuring early, easy, and affordable access to COPD management in the community remain significant approaches to reducing exacerbations, COPD-related hospital admissions, and bed days.

Also, diverse barriers specific to each clinical setting and healthcare organisation, such as long waiting times, ambiguous instructions, and disjointed communication, impact service users' optimal access to essential services. Thus, integrated care and bridging the community-acute hospital gap should be reinforced where available and be a policy priority where they are not. In addition, smoking in public places continues to be a menace, thus making other members of the public passive smokers [38]-[40]. Advocacy against smoking in public will ensure healthier lungs and reduce carbon emissions, to which smoking contributes [39] [41]. Thus, advocacy for policies that promote cleaner and healthier environments cannot be overemphasised.

Phase 6: Implementation: Develop and implement person-centred interventions based on each patient's assessments. This phase involves pharmacological and non-pharmacological approaches.

Pharmacological management is based on the COPD disease grouping according to the GOLD algorithm [2], summarised in **Chart 1**.

Group A: Where mMRC is 0 - 1, CAT is between 0 and 10, and there is 0 - 1 exacerbation, not leading to hospitalisation. Patients in this category are to receive

only bronchodilators. While long-acting bronchodilators are preferred, patients may be given short-acting bronchodilators if they have occasional shortness of breath.

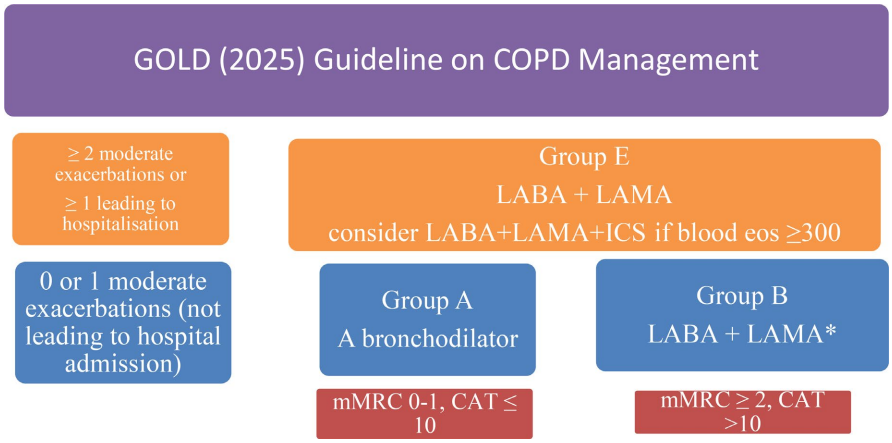

Chart 1. GOLD [2] guideline on COPD inhaled treatment.

Group B: Where mMRC is 2 or greater, CAT is greater than 10, and there is 0 - 1 exacerbation, not leading to hospitalisation. Patients in this category will receive combination therapy with a long-acting bronchodilator (LABA) and a long-acting muscarinic antagonist (LAMA). Patients may be given short-acting bronchodilators to relieve their shortness of breath.

Group E: Patients who have two or more exacerbations or one or more hospitalisations over the last 12 months should be considered for triple therapy of inhaled corticosteroid (ICS), long-acting bronchodilator (LABA) and long-acting muscarinic antagonist (LAMA) if blood eosinophils are greater than 300. Of note, this group replaces the groups C and D from previous versions of the GOLD guideline.

Medication review and optimisation are completed in each encounter by evaluating patients' medications, monitoring for drug-drug interactions, and assessing inhaler compliance and technique. Also, oxygen delivery rates are adjusted to meet the requirements of oxygen-dependent patients. Vaccination for Coronavirus disease 2019 (COVID-19), Respiratory syncytial virus (RSV), Influenza, Pertussis, Pneumonia and Shingles is crucial for COPD patients to prevent and minimise the severity of exacerbations [2].

Overall, the guideline recommends reassessing patients after initiation of therapy to determine whether treatment objectives are being met. The recommended sequences are reviewing symptoms, assessing inhaler technique and adjusting treatment options.

Non-pharmacological approaches are pivotal in the management of COPD [2] [32]. These approaches include smoking-cessation programs and pharmacological aids such as Nicorette inhalers and patches. Also, deep breathing exercises, tripod positioning, chest-clearing measures such as the active breathing cycle, and devices such as the Acapella, flutter valve, or positive expiratory pressure (PEP)

are recommended to improve sputum clearance.

Phases 7 - 9: Evaluation: Process, impact, and outcome evaluation can be conducted at the individual, hospital/community service, and societal levels. These phases involve assessing the implementation process, measuring the immediate effects of the interventions, and determining the long-term consequences.

Impact evaluation can be assessed at the individual level by appraising patients' self-reported COPD Assessment Test score, the number of general practitioner (GP) visits due to COPD-specific complaints, and the number of COPD exacerbations they experienced in the past 12 months, compared with the preceding year before applying this comprehensive tool [35] [36]. Outcome evaluation can be monitored by assessing the pattern of the COPD Assessment Test's score over the last 12 months, the eight questions/symptoms considered to be central to COPD—cough, phlegm, chest tightness, breathlessness, functional limitation, socialising, sleep quality and energy-fatigue continuum; highlighting and addressing the questions both individually and collectively [36]. The uptake of relevant specialist services related to enabling and preventive factors, such as smoking and vaping cessation services and COPD support groups [33], can be used to appraise process evaluation.

In the hospital/community setting, impact evaluation can be conducted by comparing records of GP visits, emergency department visits, admissions, and hospital bed days related to COPD with data from 12 months prior to the model's implementation. At the societal level, process and impact evaluation can be conducted by analysing workplace and environmental policies, especially those related to a cleaner environment and smoking in public places. Although overall outcome evaluation will take time and may be difficult to appraise, it can be assessed using organisational metrics, such as hospital readmission rates and patient-reported quality-of-life scores among persons with COPD. At the national and global levels, analysing trends in COPD incidence and prevalence, and the financial costs of managing COPD and COPD-related conditions, can also help monitor the outcomes of interventions.

Given the increasing burden of COPD, the 2050 and 2060 mortality and economic predictions [2], stagnating the current COPD statistics and trends will represent significant health and economic wins while also offering platforms for future interventions.

4. Conclusions

Chronic Obstructive Pulmonary Disease (COPD) is a progressive and irreversible obstructive lung condition. Its aetiology involves complex, cumulative interactions among genetic, lifestyle, and environmental factors throughout an individual's lifespan. COPD profoundly impacts patients' quality of life and represents a substantial, yet largely preventable, global economic, healthcare, and societal burden.

This paper uses the Precede-Proceed Model to focus on an innovative, comprehensive, and readily applicable framework for assessing, educating, and managing individuals with COPD. Planning and implementing COPD assessment and care

using the Precede-Proceed Model ensures integration, efficiency and adaptability across diverse healthcare settings, including home-based care, community interventions, acute care environments, and policy development.

Improving the quality of life and functional capacity for individuals with COPD necessitates an innovative approach to health education. This approach must extend beyond the biomedical aspects of the disease to encompass the psychological, social, and economic determinants of patient well-being.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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