

HOLISTIC MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN PRIMARY CARE

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is a major respiratory illness in Malaysia that is mainly preventable and treatable but unfortunately remains largely undiagnosed. Primary care providers play a vital role in screening the population at risk, making an early diagnosis and initiating prompt and appropriate therapy including smoking cessation to improve symptoms and quality of life of the COPD patient. Measures to prevent and treat exacerbations are also important to prevent further rapid decline in lung function and to reduce morbidity and mortality associated with the disease.

Keywords: Chronic obstructive pulmonary disease, primary care, management.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is defined as "A preventable and treatable disease with some significant extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases".¹

COPD is a major cause of morbidity and mortality throughout the world. By 2020, COPD is expected to be the third commonest cause of death and ranked fifth as the cause of loss of disability adjusted life years (DALYs) according to the baseline projections made in the Global Burden of Disease Study.² Although other major diseases such as cardiovascular diseases and stroke has shown a decline in mortality rate in the past 20 years, COPD mortality has continued to rise and will continue to do so as the cigarette consumption increases especially in the developing countries. Studies have shown that 20% of smokers will be diagnosed with COPD but this is likely an underestimation as relatively few will have undergone basic spirometry.³ The Third National Health and Morbidity Survey (NHMS III) conducted in 2006 showed that the prevalence of male ever smokers was 57.6% and in female 2.5%.⁴ Based on model projections, the prevalence of moderate to severe COPD in Malaysia is 4.7% which translates to 448,000 cases.⁵ COPD is significantly underdiagnosed and

typically the diagnosis is made when the disease is already advanced and the patient already has significant symptoms such as progressive breathlessness.

Among patients with suspected airflow obstruction, many doctors do not consider the diagnosis of COPD unless the patient is male, older, have significant respiratory symptoms and generally looks unwell in appearance. Patients who do not fit this description are often labelled as having asthma. The majority of COPD patients are managed in primary care setting and adequate treatment will improve their symptoms and quality of life. Since the condition is common among chronic smokers above 40 years of age and the abnormal inflammatory response is not limited to the lungs, it is not unusual for patients to have other co-morbidities, which may have therapeutic implications.

Role of primary care

To achieve the holistic management of COPD in primary care, changes have been made to the recently published Malaysian Clinical Practice Guideline (CPG) on Management of COPD⁶ and the revised Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines.¹ The majority of COPD patients are seen in primary care, therefore primary care providers play an important role in early identification of patients at risk, managing COPD and its complications and preventing COPD exacerbations.

However, there are various obstacles in the local setting that may hinder this role. Doctors often regard COPD as a self inflicted disease and little can be done for the patient apart from stopping smoking. Many smokers with underlying airflow obstruction present to primary care providers with early symptoms of COPD which they may describe as a 'smokers cough' or with other ailments such as chest infection.⁷ Primary care providers have the unique opportunity to make the diagnosis earlier, provide support for smoking cessation initiatives and potentially halt the rapid decline in their lung function. The diagnosis should be confirmed with spirometry, a simple and cheap test to detect airflow obstruction. Nevertheless, many health care providers do not have access to such test, which can identify patients who require more aggressive intervention.

CASE STUDY

A 66-year-old gentleman presented with progressive dyspnoea for the past six months. He felt breathless walking uphill and had to stop after walking around 100 metres. He also had a productive cough for the last nine months. He had a smoking history of 40 pack-years. He had no other past medical history and is not on any medication. He is 1.65 m tall and weighs 55 kg and had a body mass index of 20 kg/m².

Screening and diagnosis

The patient above should be screened for COPD in view of his symptoms and history of smoking. All patients above 40 years old with a history of smoking, presenting with chronic cough, sputum production and breathlessness should be screened for COPD. Other differential diagnoses that should be considered based on his clinical history are included in Table 1. A post-bronchodilator ratio of forced expiratory volume in one second over forced vital capacity (FEV1/FVC ratio) of less than 0.7 confirms the presence of airflow limitation that is not fully reversible and is currently widely accepted as the diagnosis criteria for COPD.¹

Screening of smokers and ex-smokers revealed a prevalence of COPD of 7.4% to 18%.⁸ Many patients with COPD present to their doctors with advanced disease and significant

dyspnoea at the time of diagnosis. Early diagnosis with successful smoking cessation intervention reduces the decline in lung function which is the hallmark of the disease and improves the chances of COPD patients enjoying a better quality of life. Spirometry is inexpensive and should be viewed as an important objective measurement for lung function in a patient with COPD, similar to blood pressure measurement in hypertension or HbA_{1c} measurement in diabetes.

A study from a general practice looked at 125 patients diagnosed as COPD without spirometry. When spirometry was performed, only 49% patients had COPD and 51% had normal or other lung diseases emphasizing the vital role of spirometry in confirming the diagnosis.⁹ If spirometry is unavailable, symptoms such as progressive shortness of breath and chronic cough in a smoker or ex-smoker with low peak expiratory flow rate, can be used to help with the diagnosis. However, peak flow readings have poor specificity,¹⁰ therefore the patient should be referred to the nearest centre where spirometry is available to confirm the diagnosis.

Chest X-ray is useful to exclude other diagnoses and detect presence of significant co-morbidities. Radiological changes associated with COPD include signs of hyperinflation with the presence flattened diaphragm, increase in lung volume and hyperlucency of lungs, elongated heart and bullae. Computed tomography scanning is not routinely recommended unless there is diagnostic uncertainty.

Blood tests such as full blood count, fasting plasma glucose, serum albumin and fasting serum lipids is useful to detect other common co-morbidities.

Classification of severity and prognosis

Once the diagnosis is confirmed, the severity of the COPD should be assessed. The severity of COPD depends on the forced expiratory volume in one second (FEV1), level of disability and the presence of complications and co-morbidities. The Malaysian CPG on Management of Chronic Obstructive Pulmonary Disease⁶ classified the severity of COPD based on lung function and symptoms since the availability of spirometric assessment is limited in primary care (Table 2).

While FEV1 provides a good objective measurement of lung function, it relates poorly to the degree of disability. Therefore, other measures such as degree of dyspnoea and capacity for exercise which are more predictive of mortality than FEV1 should be used to establish the severity of disease in primary care.¹¹ The BODE index is a multidimensional tool that is based on airflow obstruction (FEV1), exercise tolerance measured by the distance walked in six minutes, degree of dyspnoea based on Medical Research Council (MRC) grade (Table 3)¹² and body mass index (Table 4). The Body-Mass Index, Airflow Obstruction, Dyspnoea and Exercise Capacity Index (BODE)

Table 1: Differential diagnoses of COPD

Asthma
Broncheictasis
Pulmonary tuberculosis
Congestive cardiac failure
Lung cancer
Diffuse parenchymal lung disease (Interstitial lung disease)
Pulmonary vascular disease

Table 2: Classification of COPD severity based on spirometric impairment and symptoms according to the Malaysian CPG on Management of COPD⁶

COPD stage	Severity	Classification by post bronchodilator spirometric values	Classification by symptoms and disability
I	Mild	FEV1/FVC <0.70 FEV1 ≥80% predicted	Shortness of breath when hurrying on the level or walking up a slight hill (MMRC 1)
II	Moderate	FEV1/FVC <0.70 50% ≤FEV1 <80% predicted	Walks slower than people of the same age on the level because of breathlessness; or stops for breath after walking about 100 m or after a few minutes at own pace on the level (MMRC 2 to 3)
III	Severe	FEV1/FVC <0.70 30% ≤FEV1 <50% predicted	Too breathless to leave the house or breathless when dressing or undressing (MMRC 4)
IV	Very severe	FEV1/FVC <0.70 FEV1 <30% predicted or FEV1 <50% predicted plus chronic respiratory failure*	Presence of chronic respiratory failure* or clinical signs of right heart failure

Note: MMRC: Modified Medical Research Council dyspnea scale; *Respiratory failure: arterial partial pressure of oxygen (PaO₂) less than 8.0 kPa (60 mmHg) with or without arterial partial pressure of CO₂ (PaCO₂) greater than 6.7 kPa (50 mmHg) while breathing air at sea level.

score is useful in establishing prognosis and severity of disease, predicts risk of hospitalisation for COPD patients and is responsive to intervention.¹³ COPD patients with a high score are at higher risk of mortality and should be considered for more aggressive therapy and closer follow up.

In addition to BODE score, the COPD Assessment Test (CAT) (<http://www.catestonline.org>) is a new self administered questionnaire designed to measure the effects of COPD on patients' health. It provides a reliable measure of overall COPD severity from the patient's perspective and how this changes over time. It also facilitates communication between the patient

and doctor to improve their mutual understanding of the impact of COPD on the patient's life. The CAT is very simple to administer, consisting of eight questions addressing respiratory symptoms and also general complaints and can easily be done by the patient while waiting to see the doctor.

Many COPD patients also have other systemic manifestations and co-morbidities such as cor pulmonale, anaemia, low body-mass index (BMI) (<25 kg/m²), coronary artery disease, osteoporosis, depression and anxiety.¹ Identifying and managing these conditions are vital as many patients die of other causes than respiratory failure. This should ideally be

Table 3: Modified Medical Research Council dyspnea scale¹²

Dyspnea grade description	
0	Breathless only with strenuous activity or exercise
1	Troubled by shortness of breath when hurrying on level ground or walking up a slight hill
2	Walks slower than people the same age on level ground owing to breathlessness OR has to stop for breath while walking at his or her own pace on level ground
3	Stops for breath after walking about 100 m or after walking for a few minutes on level ground
4	Too breathless to leave the house OR breathless when dressing or undressing

Table 4: Points used to calculate the BODE index score¹³

Points on the BODE index variable	0	1	2	3
FEV1 (% of predicted)	≥65	50-64	36-49	≤35
Distance walked in 6 min (m)	≥350	250-349	150-249	≤149
Medical Research Council dyspnea scale score (0-4)	0-1	2	3	4
Body mass index	>21	≤21		

provided in a comprehensive way, rather than a fragmented care from different health professional.

Approach to management

While disease prevention is the ultimate goal, once COPD have been diagnosed, the effective management is aimed at the following goals:^{1,6}

- Prevent disease progression (smoking cessation)
- Relieve symptoms
- Improve exercise tolerance and daily activities
- Improve health status
- Reduce the frequency and severity of exacerbations
- Prevent and treat complications
- Reduce mortality

These goals should be achieved with minimal side effects from treatment and at an affordable cost.

It is crucial for the doctors treating the COPD patient to be positive and supportive. Patients with COPD should be seen regularly to monitor disease progression and to detect complications early. Although none of the existing medications have been shown conclusively to reduce the rapid decline in lung function which is the characteristic hallmark of the disease, current inhaled medications such as long acting bronchodilators, inhaled corticosteroids and the combination of both of these inhalers have been shown to improve symptoms, quality of life and reduce the rate of exacerbations.^{14,15}

While FEV1 provides an objective assessment of lung function, it may not accurately reflect patients' current day-to-day disability. Significant symptoms of COPD may be present when there is relatively little lung function abnormality. Furthermore, only modest changes in FEV1 may be associated with clinically significant gains in health status and patient's well-being. Therefore individual patient goals are important to measure the effectiveness of interventions for each patient.

Exacerbations are important events for the COPD patients. Patients with frequent exacerbations have poorer quality of life, more rapid decline in lung function and increased mortality.^{16,17}

Non-pharmacological therapy

Smoking cessation is the most important step that can be taken in this patient. Smoking cessation counselling should be offered to all patients who continue to smoke. Smoking cessation aids such as nicotine replacement therapy and non-nicotine replacement therapy such as bupropion (contraindicated in patients with seizure disorders) and the newer varenicline combined with counselling have been shown to increase the success rate of smoking cessation.¹⁸

Education and self management programmes may reduce the number of unscheduled clinic visits, emergency room visits and hospitalizations.¹⁹ All COPD patients should be given some form of education regarding their disease depending on their severity. Information leaflets or booklets on COPD are now widely available and should be given to the patient during their clinic visit. All COPD patients should be encouraged to maintain an active lifestyle. Components of the education program are outlined in Table 5.

Table 5: Components of COPD education programme

- Smoking cessation
- Brief explanation of aetiology and pathophysiology of COPD
- Natural course of COPD
- Rationale for using inhalers and effective inhaler technique
- Early recognition and self management plan in acute exacerbation of COPD
- Strategies to alleviate dyspnoea
- Advise on regular structured physical activity
- For patients with more severe disease – Information on long term oxygen therapy, complications of COPD and advance directives and/or end of life issues

Many patients with COPD have progressive dyspnoea which limits their physical activity. This in turn will promote muscle deconditioning and aggravate dyspnoea resulting in further limitation of activities. As the vicious cycle continues, patients become socially isolated, and may have an increased risk of depression and anxiety.²⁰ Pulmonary rehabilitation aims to break this vicious circle by improving exercise capacity and conditioning. Pulmonary rehabilitation has been shown to improve exercise tolerance, reduce dyspnoea, reduce exacerbations and improve quality of life.²⁰ Patients with low BMI and peripheral muscle deconditioning might benefit more from pulmonary rehabilitation than patients whose exercise capacity is limited primarily by their impaired lung function. Despite its tremendous benefits, not many centres in Malaysia provide pulmonary rehabilitation service. Nevertheless, patients should be encouraged to perform continuous regular exercise at home. This is supported by a recent study which showed an improvement in exercise tolerance and quality of life in COPD patients who perform unsupervised respiratory exercise.²¹ Although the optimal type of exercise at home for the various stages of severity of COPD have not been studied extensively, COPD patients may benefit from regular exercises as shown in Table 6.

Although the number of studies evaluating the usefulness of influenza and pneumococcal vaccines for COPD patients are still limited, vaccinations in the elderly population have been shown to reduce pneumonia and hospitalisation and deaths

Table 6:

- **Stretching/Flexibility exercises.** Stretching the arms and legs daily especially before and after exercise. This helps to prepare muscles for activity and increases flexibility. Apart from stretching of the limbs other examples include gardening, dancing, tai chi, or vacuuming
 - **Endurance or aerobic exercises.** Involves a steady physical activity using large muscle groups. For example, walking, jogging or cycling. This should be done at least three times a week for at least 30 minutes a day. If the patient is unable to complete the 30 minutes at one session, this can be broken down into shorter time frames, for example three 10 minutes sessions.
 - **Strengthening exercises.** Repeated muscle contractions until the muscles become tired. For example lifting weights, carrying groceries or laundry, climbing stairs or repetitive sit-stand position. Strengthening activities for the upper body will help increase the strength of the respiratory muscles.
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by 30-40%.²² Annual influenza vaccines can reduce serious illness and death in COPD patients by about 50%.²³

Long term oxygen therapy of more than 15 hours per day should also be considered if the patient is hypoxaemic ($PO_2 < 7.3$ kPa or PO_2 7.3-8 kPa with cor pulmonale or polycythaemia) as it has been shown to improve survival.²⁵ This long term oxygen therapy should be delivered by an oxygen concentrator. A careful assessment should be made by a respiratory physician as oxygen therapy is not without any hazards. Excessive oxygen therapy in COPD patients can precipitate carbon dioxide retention. The aim is to increase the baseline PO_2 to at least 8 kPa or oxygen saturation of at least >90% at rest. Oxygen therapy at home should not be prescribed in patients who continue to smoke because of the risk of fire and burns to the face.

Pharmacological therapy

None of the existing medications in COPD have been shown to modify the long term rapid decline in lung function which is the hallmark of the disease. Therefore, the medication is used to control and prevent the symptoms, reduce exacerbations, improve exercise tolerance and improve the quality of life of the COPD patient.

Bronchodilators are central to symptomatic management of COPD. Short acting bronchodilator therapy (salbutamol and ipratropium) are given for quick relief of symptoms.²⁶ Regular treatment with long acting bronchodilators such as β_2 -agonists (e.g. salmeterol, formoterol) and anticholinergics (tiotropium) improves lung function, increase exercise capacity, reduce exacerbations and improve quality of life.^{14,15} Oral methylxanthines (theophylline) are relatively weak bronchodilators and, because its potential toxicity, is less preferred since inhaled bronchodilators are available. Recent understanding of the mechanism of dyspnoea in COPD shows that the long-acting tiotropium exerts its beneficial effects by reducing dynamic hyperinflation and the resulting increased labour of breathing, improving the sensation of dyspnoea and exercise capacity.¹⁴ The choice of long-acting bronchodilators depends on the availability of the medication and the patient's

response. By combining bronchodilators with different mechanisms, this may increase the degree of bronchodilatation and improvement in symptoms.

Inhaled corticosteroid (ICS) is recommended in symptomatic patients despite receiving adequate bronchodilator therapy, those with FEV1 of less than 50% predicted and have recurrent exacerbations.¹ Although treatment with ICS does not modify the long term decline in lung function in patients with COPD, regular treatment with ICS reduce exacerbation rates and improve health status.²⁷ Combination inhalers of long-acting β_2 -agonist and ICS have been shown to increase lung function, reduce exacerbations, improve health related quality of life and improve symptoms compared with monotherapy treatment.¹⁵

Exacerbations are important events for the COPD patients as it is associated with further rapid decline in lung function, poorer quality of life and increased risk of mortality.^{16,17} Following an exacerbation, patients may take several weeks to return to their normal baseline condition. Exacerbations are usually defined clinically by increases in dyspnoea, cough, wheeze, sputum volume or purulence. Patients usually present to their primary care providers and the majority can be treated as outpatient.

Patients should initially increase their usual short acting β_2 -agonists bronchodilator therapy until the exacerbation resolves, e.g. salbutamol 2-4 puffs every 3-4 hours and short-acting anticholinergic therapy (ipratropium bromide) may be added until the symptoms improves.²⁸ If the inhalers are inadequate to relieve the acute symptoms, nebulisers can be given on as needed basis for several days if a nebuliser is available. There is evidence that the use of spacer device with metered dose inhaler has a similar effect as nebulised bronchodilators for exacerbations of COPD.¹

Patients with an exacerbation and significant dyspnoea should be treated with oral prednisolone as it has been shown to improve oxygenation, reduce recurrent exacerbations and reduce length of time in hospital.²⁹ Although there is a lack of studies looking at the optimal dose and length of treatment of

Table 7: Indications for hospital assessment or admission for acute exacerbations of COPD

Significant increase in symptoms despite initial medical treatment
Underlying severe COPD
Development of new physical signs e.g. cyanosis, cor pulmonale
Reduce conscious level
Haemodynamic instability
Significant co-morbidities
Insufficient home support

oral prednisolone, a dose of 30-40 mg for 7-10 days for patients not requiring hospitalisation seems adequate. Antibiotics should be given to patients with increases in sputum volume and purulence indicating an infective exacerbation of COPD. Simple first-line antibiotics should be used and the choice of antibiotics should depend on the local antibiotic policy and the pattern of local pathogens.³⁰ Patients with severe acute exacerbations of COPD require admission to hospital for more intensive treatment and monitoring due to the severe narrowing of the airways. Indications for prompt hospital assessment or admission for acute exacerbations of COPD are outlined in Table 7.

Case resolution

The patient was counselled regarding smoking cessation. His spirometry confirmed moderate airflow obstruction. He was started on inhaled long-acting anticholinergic (tiotropium) once daily and inhaled short-acting β_2 -agonists bronchodilator (salbutamol), 2 puffs as required. He was given verbal information and a leaflet regarding COPD, his inhaler technique assessed and advised to exercise regularly. He was followed up three months later when he reported that his cough and exercise capacity had improved but still required to take his salbutamol when he walks quickly. He was started on combination inhaler (inhaled corticosteroids and long-acting β_2 -agonists) and was given influenza vaccination. Subsequent follow up revealed that the patient's symptoms and exercise capacity continued to improve.

CONCLUSION

COPD is a common respiratory disease with significant morbidity and mortality. Primary care providers play a significant role in detecting early disease in the population at risk to prevent further deterioration in lung function and quality of life. The severity of COPD should be assessed and the treatment goals should be individualised to achieve normal activity as much as possible. Treatment is directed to improve symptoms, reduce exacerbations and improve quality of life. Patients with COPD should have regular follow up to ensure response to treatment and to detect complications or other comorbidities as the usual course is progressive deterioration in symptoms and lung function.

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PSA screening increased prostate cancer detection but has no effect on prostate cancer mortality

Djulbegovic M, Beyth RJ, Neuberger MM, *et al.* Screening for prostate cancer: systematic review and meta-analysis of randomised controlled trials. *BMJ*. 2010;341:c4543.

<http://www.bmj.com/content/341/bmj.c4543.full.pdf>

This systematic review of six randomised controlled trials found that screening was associated with an increased probability of receiving a diagnosis of prostate cancer (relative risk 1.46, 95% confidence interval 1.21 to 1.77; $p < 0.001$) and stage 1 prostate cancer (1.95, 1.22 to 3.13; $P = 0.005$). There was no significant effect of screening on death from prostate cancer (0.88, 0.71 to 1.09; $p = 0.25$) or overall mortality (0.99, 0.97 to 1.01; $p = 0.44$).