

Approach to chronic obstructive pulmonary disease in primary care

David C. Todd MD FRCPC R. Andrew McIvor MD MSc FRCPC Stewart O. Pugsley MD FRCPC Gerard Cox MB FRCPC

ABSTRACT

OBJECTIVE To review the diagnosis, assessment of severity, and management of chronic obstructive pulmonary disease (COPD) and to address the systemic manifestations associated with COPD.

SOURCES OF INFORMATION PubMed was searched from January 2000 to December 2007 using the key words *COPD*, *practice guidelines*, *randomized controlled trials*, *therapy*, and *health outcomes*. The Canadian Thoracic Society guideline on management of COPD was carefully reviewed. The authors, who have extensive experience in care of patients with COPD, provided expert opinion.

MAIN MESSAGE Chronic obstructive pulmonary disease is a common systemic disease caused primarily by smoking. Spirometry is essential for diagnosis of COPD and should be integrated into primary care practice. Pharmacologic and nonpharmacologic therapy improves symptoms, capacity for exercise, and quality of life. Smoking cessation is the only intervention shown to slow disease progression. The systemic manifestations and comorbidity associated with COPD need to be identified and addressed to optimize health and quality of life.

CONCLUSION An evidence-based approach to managing COPD along with a primary care chronic disease management model could improve quality of life for patients with COPD.

RÉSUMÉ

OBJECTIF Faire le point sur le diagnostic, l'évaluation de la gravité et le traitement de la maladie pulmonaire obstructive chronique (MPOC), et en rappeler les manifestations systémiques.

SOURCES DE L'INFORMATION On a consulté PubMed entre janvier 2000 et décembre 2007, à l'aide des rubriques *COPD*, *practice guidelines*, *randomized controlled trials*, *therapy* et *health outcomes*. Les directives de la Société Canadienne de Thoracologie ont été soigneusement revues. Les auteurs ont fourni des opinions expertes tirées de leur longue expérience du traitement de la MPOC.

PRINCIPAL MESSAGE La maladie pulmonaire obstructive chronique est une affection systémique fréquente causée principalement par le tabagisme. La spirométrie est essentielle au diagnostic et elle devrait faire partie de la médecine de première ligne. Les traitements pharmacologiques et non pharmacologiques améliorent les symptômes, la capacité à l'effort et la qualité de vie. L'arrêt du tabac est la seule intervention qui puisse en ralentir la progression. Il importe d'identifier et de prendre en charge les manifestations systémiques de la MPOC et la comorbidité associée afin d'optimiser la santé et la qualité de vie.

CONCLUSION Une prise en charge de la MPOC fondée sur des preuves et associée à un modèle de traitement des maladies chroniques en médecine primaire pourrait assurer une meilleure qualité de vie aux patients souffrant de MPOC.

This article has been peer reviewed.
Cet article a fait l'objet d'une révision par des pairs.
Can Fam Physician 2008;54:706-11

Chronic obstructive pulmonary disease (COPD) is a systemic disorder caused mainly by smoking and is characterized by progressive irreversible, or partially reversible, airflow obstruction; systemic manifestations; and recurrent exacerbations.¹ Respiratory symptoms include dyspnea, wheezing, coughing, and sputum production. Systemic features include skeletal muscle dysfunction and hence limited ability to exercise,^{2,3} weight loss, depression and anxiety,⁴ osteoporosis,⁵ increased risk of cardiovascular disease⁶ including right heart failure, and polycythemia.

Most cases (85% to 90%) are due to cigarette smoking. Other causes include exposure to air pollutants and environmental toxins and hereditary factors, such as α_1 -antitrypsin deficiency. Reports indicate that at least 10% to 15% of smokers will be diagnosed with COPD based on conventional diagnostic strategies, although this is likely an underestimation of the proportion of smokers with COPD.

In Canada, COPD is a prevalent condition and is associated with substantial negative effects on health.⁷ Evidence from recent literature provides an approach to managing COPD that acknowledges the systemic manifestations of the disease and the many comorbidities that accompany it. Primary care providers have a unique opportunity to identify patients at risk through directed screening, to implement primary and secondary prevention strategies, and to provide care that encompasses a holistic approach to management. As the population ages, the burden of illness from COPD is expected to increase. Application of a simple approach to identifying and managing COPD could substantially improve patient care and the efficiency of practice.

Case description

A 58-year-old female smoker presents complaining of dyspnea associated with chronic cough and sputum production during the winter months. Her general health is good, and she is not taking any medications. She recently took early retirement to spend more time golfing but finds she is too short of breath to play more than 9 holes even though she now has the time. She gets breathless walking up a slight hill. She is 1.64 m tall, weighs 65 kg, and has a body mass index of 24. Results of respiratory and cardiac examinations are normal. Chest radiography shows hyperinflation. Office spirometry reveals moderate airflow obstruction.

Sources of information

PubMed was searched from January 2000 to December

2007 using the key words *COPD*, *practice guidelines*, *randomized controlled trials*, *therapy*, and *health outcomes*. The Canadian Thoracic Society's guideline on management of COPD was reviewed extensively, and some of the references published before 2003 were gathered from this document. The approach we describe was developed based on the clinical experience of the authors and is supported by evidence when referenced. Generally, the recommendations on pharmacologic and nonpharmacologic therapy are based on data from randomized controlled trials (level I evidence).

Screening and diagnosis

Screening can be carried out with simple office spirometry. All smokers and ex-smokers 40 years old and older should be screened. Screening with spirometry is underused in primary care, and health care providers should consider developing a way of identifying smokers and ex-smokers in their practices in order to ensure that these patients are offered screening for COPD. Ways to identify these patients include flagging charts or using computerized reminders, particularly during periodic health visits. A recent prospective observational study that screened 818 smokers older than 40 with no known diagnosis of COPD found a prevalence of COPD of 18.9%.⁸ More than 40% of those with COPD had moderate to severe impairment in lung function. These results are consistent with those of other studies that have reported a prevalence of COPD of 7.4% to 18% in general practice.^{9,10} Preliminary results from the multinational Burden of Obstructive Lung Disease (BOLD) study demonstrated a prevalence of COPD of 10.7% based on a forced expiratory volume of air in 1 second (FEV₁) of <80% and an FEV₁-forced vital capacity ratio of <0.7.¹¹ Spirometry is inexpensive and is supported financially through most provincial health care programs. Although the cost-effectiveness of office spirometry has not been established,¹² the early diagnosis it provides will identify patients who require more aggressive interventions aimed at smoking cessation and allow implementation of pharmacologic and nonpharmacologic therapy.

A diagnosis of COPD requires a postbronchodilator FEV₁-forced vital capacity ratio of <0.7. If this parameter normalizes over time, then the diagnosis must be withdrawn and an alternative diagnosis considered.¹

Classification of severity and prognosis

Once the diagnosis is confirmed, patients should be carefully evaluated to identify factors contributing to the disease, the effect of COPD on their lives, and prognosis (Table 1). Potential systemic manifestations of the disease must be identified, as they might strongly influence decisions about treatment. These systemic manifestations include pulmonary hypertension and cor pulmonale, coronary artery disease, hypercapnia, osteopenia or osteoporosis, peripheral muscle dysfunction and low

Dr Todd is an Assistant Professor of Medicine, **Dr McIvor** is a Professor of Medicine, **Dr Pugsley** is an Associate Clinical Professor of Medicine, and **Dr Cox** is a Professor of Medicine, all at McMaster University in Hamilton, Ont.

Table 1. Initial evaluation of patients diagnosed with chronic obstructive pulmonary disease

INVESTIGATION	TARGET MEASUREMENT
Dyspnea	Medical Research Council dyspnea grade (disease severity)
Exposure history	Smoking, airborne pollutants
Family history	α_1 -Antitrypsin deficiency
Examination	Body mass index, edema, side effects of corticosteroids
Spirometry	Confirm diagnosis
Chest x-ray scan	Rule out other causes or comorbidity
Arterial blood gas test (if FEV ₁ is < 40% of predicted)	Assess for hypoxemia and hypercapnia
Exercise testing	6-min walk test or cardiopulmonary exercise test
Sputum induction	Evaluate for eosinophilic or neutrophilic bronchitis
Bone densitometry	Assess for osteopenia and osteoporosis
Echocardiogram	Assess cardiac function and pulmonary hypertension
Screening for depression or anxiety	Look for comorbid psychiatric symptoms

FEV₁—forced expiratory volume of air in 1 second.

body mass index, depression and anxiety, and concomitant eosinophilic bronchitis.

Traditionally, the severity of COPD has been classified based on the degree of reduction in FEV₁. While FEV₁ is a useful measure, it does not accurately predict capacity for exercise¹³ or survival as well as other measures, such as formal laboratory-based exercise testing or symptoms of dyspnea.¹⁴ Measures other than FEV₁ should be used to establish disease severity in primary care practice. These measures include evaluating the degree of dyspnea using the modified Medical Research Council (MRC) dyspnea scale¹⁵ or BODE index.

Dyspnea is a frequent symptom in COPD, and a simple classification scheme modified from the MRC dyspnea scale (Table 2¹⁵) can assist in identifying the severity of disease.¹ The scale can be easily and efficiently applied in an office setting.

Chronic obstructive pulmonary disease is a major cause of morbidity and mortality. The long-term prognosis in most patients indicates progressive deterioration in lung function and increased systemic manifestations. Severity of dyspnea and capacity for exercise are more predictive of mortality than FEV₁ is.^{14,16} The BODE index¹⁷ is a multi-dimensional tool that has been shown to predict survival based on body mass index (<21 is associated with greater mortality), FEV₁ (airflow obstruction), degree of dyspnea (MRC grade), and capacity for exercise (6-minute walk

Table 2. Modified Medical Research Council dyspnea scale

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

Adapted from *Br Med J* 1959;2:257-66¹⁵ with permission from the BMJ Publishing Group.

distance). The BODE score is useful in establishing prognosis and severity of disease,^{17,18} is responsive to respiratory rehabilitation,¹⁹ predicts risk of hospitalization for COPD patients better than FEV₁ does,²⁰ and is sensitive to change following exacerbations.²¹ In primary care, the BODE score gives an estimate of prognosis and, therefore, might be helpful in determining which patients should be considered for more aggressive therapy and follow-up. The BODE index is also useful for identifying response to certain interventions. Patients who have high BODE scores (indicating worse prognoses) might benefit from discussions about end-of-life care and referral to palliative care specialists.

A BODE score is easy to calculate and should be determined for each patient with COPD; it requires measurement of body mass index, spirometry, a 6-minute walk test, and evaluation of MRC dyspnea grade (Table 3¹⁷). A higher score (out of 10) indicates a worse prognosis. The mortality hazard ratio associated with a 1-unit change in score is 1.34.

Approach to management

It is crucial for physicians to be positive and supportive. Disease-specific education is important for all patients with chronic illnesses. If formal education programs are not available, information booklets on COPD are useful and are available through most provincial lung associations.

Nonpharmacologic therapy for COPD includes smoking cessation, yearly influenza vaccine, pneumonia vaccine every 5 to 10 years, and oxygen therapy (if patients have resting daytime hypoxemia). Smoking cessation counseling should be offered to all patients who continue to smoke. Cessation rates are higher when counseling is combined with smoking cessation aids, such as nicotine replacement therapy²² or newer therapies including bupropion or varenicline.²³

Table 3. Points used to calculate the BODE index score

VARIABLE	POINTS ON THE BODE INDEX			
	0	1	2	3
FEV ₁ (% 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		

FEV₁—forced expiratory volume of air in 1 second.

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The benefits of pulmonary rehabilitation are well recognized^{1,24} and include decreased dyspnea, increased capacity for exercise, and better quality of life. The main limiting factors are patients' motivation, the availability of rehabilitation programs, and failure to refer. It is now recognized that patients with all levels of disease can be enrolled in pulmonary rehabilitation programs, although those with more severe muscle weakness and exercise intolerance and less ventilatory limitation are likely better candidates.²⁵ The role of education in COPD management has gained greater importance with the recognition that education and self-management programs substantially reduce the number of nonscheduled clinic visits, emergency room visits, and hospital admissions.²⁶ We recommend that all patients with COPD receive counseling on the importance of regular structured physical activity. Patients should be encouraged to increase their physical activity and recognize that dyspnea is not a sign of harm.

There have been several recent advances in pharmacologic therapy for COPD. Chronic obstructive pulmonary disease is not asthma, and the role of bronchodilator therapy and corticosteroid therapy is unique in the treatment of COPD.

Short-acting bronchodilator therapy (salbutamol and ipratropium) should be used to reduce dyspnea and improve exercise performance and lung function. Combination therapy achieves greater bronchodilation although has no additional effect on dyspnea or quality of life. Long-acting bronchodilator agents, including long-acting β -agonists (salmeterol and formoterol) and the long-acting anticholinergic agent tiotropium provide sustained improvements in lung function while also achieving improvements in dyspnea and quality of life. With greater understanding of the mechanisms responsible for dyspnea in COPD, it is now established that long-acting bronchodilator therapy, particularly tiotropium, exerts its beneficial effect by reducing dynamic hyperinflation and the resulting increased labour of breathing.²⁷ This helps to alleviate dyspnea and improve capacity for

exercise. A recent randomized controlled trial demonstrated a small but significant 5.7% absolute reduction in exacerbation rates in patients with severe COPD (mean FEV₁ was 36% of predicted) treated with tiotropium compared with those taking placebo.²⁸ The combination of tiotropium and ipratropium might cause excessive drying of the mouth and increased sputum viscosity and should, therefore, be used cautiously, if at all.

Inhaled corticosteroids (ICS) have been recommended for patients with moderate to severe airflow obstruction and frequent exacerbations based on data from randomized controlled trials.²⁹ Recent studies evaluating the effect of ICS on mortality have had conflicting results.³⁰ The TORCH trial, a large (n=6112), multicentre, randomized controlled trial, failed to show a statistically significant reduction in mortality in any of the treatment arms (fluticasone plus salmeterol, salmeterol alone, fluticasone alone) compared with placebo.³¹ Use of a combination of an ICS and a long-acting bronchodilator agent, though, has been shown to increase lung function, improve health-related quality of life, and reduce dyspnea compared with use of either agent alone.³²

In centres where sputum cell count measurement is available, we recommend measuring total and differential cell counts to evaluate for a concurrent diagnosis of eosinophilic bronchitis, which is present in up to 40% of patients with COPD.³³ Identifying these patients is important because they will have a greater response to ICS therapy and might also have a greater reduction in exacerbations while receiving this therapy.^{33,34}

Identifying and managing the systemic manifestations of COPD is extremely important. Patients with pulmonary hypertension secondary to COPD and cor pulmonale require careful fluid and diuretic management while stable and during exacerbations. Patients with chronic hypercapnia are at increased risk of respiratory acidosis and hypercapnic respiratory failure with uncontrolled supplemental oxygen therapy, particularly during exacerbations. Ideally, these patients should be identified while they are stable in order to prevent the complications associated with excessive supplemental oxygen delivery during exacerbations. Patients with low body mass and peripheral muscle dysfunction might benefit more from respiratory rehabilitation than patients whose exercise capacity is limited primarily by their ventilatory function.²⁵ Patients with COPD who have osteopenia or osteoporosis should be identified and treated with calcium, vitamin D, and bisphosphonate therapy, particularly when they have ongoing exposure to corticosteroids. Anxiety or depression can result from symptoms of COPD or arise independently. Anxious or depressed patients require careful evaluation and consideration of reversible causes, including excessive β -agonist use or oral corticosteroid therapy. In some situations, therapy directed at controlling symptoms results in a reduction in dyspnea-related anxiety. We have found it beneficial

to involve members of an interdisciplinary health care team, including social workers, psychiatrists, or respiratory therapists, in the care of these patients.

Outpatient management of exacerbations

Recurrent exacerbations are a principal feature of COPD and are defined clinically by increases in dyspnea, sputum volume, or sputum purulence. Exacerbations are associated with a substantial negative effect on quality of life, promote accelerated deterioration in lung function, and are associated with an increased risk of mortality.²⁰ Primary care providers commonly manage outpatient exacerbations of COPD. A chest radiograph should be done if clinically indicated, as it could alter management in up to 20% of cases.³⁵ Corticosteroids have been shown to reduce recurrent exacerbations, decrease length of time in hospital, and improve lung function in patients treated in hospital.³⁶ There is now also strong evidence supporting corticosteroid therapy in outpatient management of exacerbations of COPD, and this therapy should be used routinely unless there are contraindications. Based on evidence from a recent randomized controlled trial,³⁷ we recommend a 7- to 10-day course of prednisone (approximately 30 to 40 mg/d) for patients with exacerbations of COPD not requiring hospitalization. Antibiotics should be given to patients with infective exacerbations of COPD, which are usually characterized by increases in sputum volume and purulence. Patients could also benefit from increased doses of their usual short-acting bronchodilator therapy until the exacerbations resolve, although excessive use of short-acting anticholinergic therapy might cause sputum to become more viscous and make airway clearance more difficult. If an underlying cause is identified (eg, congestive heart failure), then therapy directed toward this cause is warranted. Patients with moderate to severe increases in symptoms or who appear unwell require evaluation in the emergency department and should be considered for hospitalization.

Case resolution

Smoking cessation was discussed, and the woman started taking a long-acting anticholinergic agent (tiotropium) once daily along with a short-acting bronchodilating agent (salbutamol), 2 puffs as needed up to 4 times a day. An exercise program was discussed and recommended. She was seen in follow-up in the fall, and influenza vaccine was provided. The patient reported that she had stopped smoking and had noticed an improvement in her dyspnea and capacity for exercise. She was also very happy to report that she was now able to complete all 18 holes of golf with her friends.

Conclusion


Chronic obstructive pulmonary disease is a common systemic disorder that is preventable, often underdiagnosed,

EDITOR'S KEY POINTS

- Using a simple approach to identifying and managing chronic obstructive pulmonary disease (COPD) could substantially improve care of patients with COPD and the efficiency of practice.
- Screening can be carried out with office spirometry. All smokers and ex-smokers 40 years old and older should be screened.
- Measures other than forced expiratory volume of air in 1 second should be used to establish the severity of disease in primary clinical practice. Another helpful maneuver is to measure dyspnea using the modified Medical Research Council dyspnea scale or BODE index, a multidimensional tool that predicts survival of patients with COPD based on body mass index, forced expiratory volume of air in 1 second, degree of dyspnea, and capacity for exercise.

POINTS DE REPÈRE DU RÉDACTEUR

- L'utilisation d'une méthode simple pour identifier et traiter la maladie pulmonaire obstructive chronique (MPOC) pourrait améliorer considérablement les soins aux patients atteints et l'efficacité de nos interventions.
- On peut effectuer le dépistage au bureau par la spirométrie. Tous les fumeurs et ex-fumeurs de 40 ans et plus devraient subir le dépistage.
- Dans les soins primaires, l'évaluation de la gravité de l'atteinte devrait recourir à des mesures autres que le volume expiratoire maximal/seconde. Une autre manœuvre utile, qui permet de prédire la survie des patients atteints de MPOC, consiste à mesurer la dyspnée par une modification de l'échelle de dyspnée du Conseil des Recherches Médicales ou par l'indice de Bode, un outil multidimensionnel fondé sur l'indice de masse corporelle, le volume expiratoire maximal/seconde, le degré de dyspnée et la capacité à l'effort.

and amenable to therapy. Patients with COPD who suffer from dyspnea could benefit from short- and long-acting bronchodilator agents and respiratory rehabilitation. Application of recent advances in management of COPD in office practice is practical³⁸ and can provide physicians and patients with renewed optimism in managing COPD. 

Competing interests

Dr McIvor has received honoraria for speaking events and attending advisory board meetings of pharmaceutical companies involved in chronic obstructive pulmonary disease, including AstraZeneca, Abbot, Bayer, Boehringer Ingelheim, GlaxoSmithKline, Nycomed, Merck Frosst, and Pfizer. **Dr Cox** has been sponsored by GlaxoSmithKline, Pfizer, AstraZeneca, and Boehringer Ingelheim to speak to

groups of primary care physicians about chronic obstructive pulmonary disease specifically related to the Canadian Thoracic Society's guideline on management of the disease.

Correspondence to: Dr R.A. McIvor, St Joseph's Healthcare—Firestone Institute for Respiratory Health, 50 Charlton Ave E, Hamilton, ON L8N 4A6; telephone 905 522-1155; fax 905 521-6183; e-mail amcivor@stjosham.on.ca

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