

Beyond Puffers: Optimizing COPD Management

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Chronic obstructive pulmonary disease (COPD) is the fifth leading chronic disease in Canada, affecting approximately 750,000 men and women.¹ As such, COPD is commonly encountered in physicians' practices, regardless of their specialty. For family physicians, it can be a particularly challenging disease to treat. Even the most optimally managed patients can continue to have symptoms affecting their quality of life and day-to-day living. The goal of this article is to help family physicians optimize patient care by exploring new, or often overlooked, aspects of COPD therapies and management.



Diagnosis and Classification

Patients are often labeled with a diagnosis of COPD on the basis of their history and physical examination alone. This approach can lead to mismanagement of patients. A misdiagnosis of

Case 1

Mr. Jones, 45, has a 30 pack-year smoking history. He presents to your office complaining of a "chest cold," which he describes as a cough producing yellow sputum associated with mild shortness of breath. He says he gets similar episodes frequently throughout the year. He also reports that for the past few years, he has had a daily cough, which produces a small amount of clear sputum. He is otherwise healthy and taking no medications. His physical examination is normal. Spirometry shows normal values for forced expired volume in one second (FEV₁) and forced vital capacity (FVC).

Question: *What is your diagnosis?*

COPD

Case 2

Mrs. Smith, 66, has mild COPD. You last saw her a year ago. At that time she had good symptom control. She visits you today complaining of having increased shortness of breath. She is a night security guard at a university, which requires a lot of walking and climbing stairs. She now needs to use rescue bronchodilators up to three times per night. She had two exacerbations last winter, one requiring a short admission to hospital. She is taking two puffs of ipratropium bromide and two puffs of salbutamol four times daily. She stopped smoking two years ago and has been vaccinated against influenza virus and *pneumococcus*. Repeat spirometry shows that her FEV₁ is 65% predicted with a FEV₁ to FVC ratio of 58%.

Question: How could better symptom control be achieved?

COPD in a patient with normal spirometry values may lead to unnecessary pharmacological interventions and has the potential to do harm. At this stage, family physicians should emphasize interventions, such as smoking cessation and vaccinations, to prevent COPD and recurrent lower respiratory tract infections.

The GOLD (Global initiative for chronic Obstructive Lung Disease) guidelines offer a classification of COPD (Table 1), as do the 1998 Canadian Guidelines for the Treatment of Chronic Obstructive Pulmonary Disease.^{2,3} By classifying their COPD patients by stages, family physicians can offer therapies that have been

found to benefit others with similar disease severity.

When COPD patients are monitored over time, the GOLD guidelines recommend that spirometry be repeated if symptoms worsen or complications occur. This will help guide the introduction of additional therapies.

Discussion of Case 1

Mr. Jones' case illustrates the diagnostic value of spirometry in COPD. On history alone, one could conclude Mr. Jones suffers from chronic bronchitis, however, on spirometry, he has nor-



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mal lung function and, therefore, does not have COPD. He might have been unnecessarily prescribed short-acting bronchodilators (SABs). At this time, he does not need antibiotic therapy, as he is most likely suffering from a viral respiratory tract infection. This office visit presents a good opportunity to evaluate Mr. Jones' readiness to quit smoking and stress the health benefits of such a decision.⁴ He should also receive an annual influenza vaccination and pneumococcal vaccination.²

Noting in Mr. Jones' chart that he is at stage 0 will allow you to identify him as a patient at risk of developing COPD and reminds you to address his smoking and respiratory symptoms again during future visits. Repeated spirometry, performed every two to three years, or when symptoms worsen, will allow early detection of reduced lung function.

Use of Bronchodilators

Breathlessness is the most common symptom in patients with COPD. Inhaled bronchodilators are the cornerstone of pharmacological treatment for this symptom. Both inhaled anticholinergic agents (*e.g.*, ipratropium bromide) and inhaled B₂-agonists (*e.g.*, salbutamol) have been shown to be effective SABs in COPD.^{2,3} In choosing a SAB, family physicians must be aware that efficacy and side effects can vary from patient to patient.

It is crucial to review the proper administration of medications with COPD patients who experience treatment failure or a worsening of previously controlled symptoms. Optimal delivery of an inhaled SAB occurs by using a metered-dose inhaler (MDI), ideally with a spacer device. This requires patients be taught to use their inhalers properly (Tables 2 and 3).

Once the inhaler technique has been verified, appropriate management involves optimizing the

Practice Pointers

- Family physicians should consider the additional use of long-acting bronchodilators in COPD patients who remain symptomatic despite regular use of inhaled SABs.
- Inhaled corticosteroids (ICSs) are the cornerstone anti-inflammatory treatment in asthma.

medication dose. SABs can be prescribed on an as-needed or regular basis, depending on the persistence and severity of symptoms. If a patient is using ipratropium bromide, it may be necessary to increase the dosage to as many as four to six puffs four times per day (*qid*). With salbutamol, the dose can be increased to as many as four puffs *qid*, as long as patients do not experience troublesome side effects (*e.g.*, tachycardia, tremor and hypokalemia). Although it is wise to start at a small dose of SAB and titrate upwards, physicians often forget to increase the number of puffs, even in the face of worsening symptoms.

Family physicians should consider the additional use of long-acting bronchodilators in COPD patients who remain symptomatic despite regular use of inhaled SABs. Current choices include long-acting B₂-agonists (LABAs), such as salmeterol and formoterol, or an oral slow-release theophylline preparation. LABAs are well-accepted in the treatment of asthma. Their use in COPD has been shown to decrease the need for rescue bronchodilators, decrease breathlessness during exercise and improve health status.⁵⁻⁷ Although effective in some COPD patients, theophyllines are less well-tolerated due to side effects and numerous drug interactions.^{2,3} A once-daily, inhaled anticholinergic agent (tiotropium) has been demonstrated to be an effective long-acting bronchodilator in COPD, but is not yet available in Canada.^{8,9}

Table 1

Classification of Disease Severity in COPD and Stage-Appropriate Therapies

Stage (GOLD)	Characteristics (Gold Guidelines)	Recommended Treatments
0 At risk	Chronic symptoms Exposure to risk factors Normal spirometry	For all stages Avoid risk factors Smoking cessation Vaccinations
I Mild	FEV ₁ / FVC < 70% FEV ₁ ≥ 80%	SAB as needed (if used daily, then prescribe regular SAB)
II Moderate	IIA: FEV ₁ /FVC < 70% 50% ≤ FEV ₁ < 80%	Regular SAB(s) [†] LABA or theophylline (if still symptomatic on SAB)
	IIB: FEV ₁ /FVC < 70% 30% ≤ FEV ₁ < 50%	As for IIA and the following: • ICS ^{††} if frequent AECOPD • LTOT* • Pulmonary Rehabilitation* • Surgical intervention* • Referral to Specialist* • Discuss end-of-life care
III Severe	FEV ₁ /FVC < 70% FEV ₁ < 30% or Respiratory failure or Right heart failure	

GOLD = Global initiative for Chronic Obstructive Lung Disease; SAB: short-acting bronchodilator; LABA: Long-Acting B2-agonist; ICS: inhaled corticosteroid AECOPD: acute exacerbation of COPD; LTOT: long-term oxygen therapy.

*: If patient meets criteria.

†: Ipratropium bromide four to six puffs qid or salbutamol two to four puffs qid.

††: Fluticasone propionate 250 mcg bid or budesonide 400 mcg bid.

Adapted from the author's treatment recommendations; and Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease NHLBI/WHO Workshop Report: Executive Summary. NHI Publication No. 2701A, March 2001.

Table 2

Steps for Appropriate Use of MDI

- Remove cap.
- Shake inhaler.
- Hold inhaler upright.
- Tilt head back 10 to 15 degrees.
- Position inhaler 2 cm to 4 cm in front of open mouth.
- Begin inhalation and then activate inhaler.
- Inhale slowly and deeply to total lung capacity.
- Hold breath for five to 10 seconds.
- Exhale slowly through nose.
- Inhale one puff.
- Wait one to two minutes before inhalation of subsequent puff.

MDI = metered-dose inhaler

Table 3

Steps for Appropriate Use of MDI With Spacer Device

- Remove cap.
- Shake inhaler.
- Place MDI at end of spacer device (SD).
- Activate MDI into SD.
- Exhale gently.
- Place SD into mouth, closed lips with chin level or tilted up.
- Inhale slowly and deeply to total lung capacity (three to four seconds).
- Hold breath for five to 10 seconds.
- Exhale slowly through nose.
- Inhale one puff.
- Wait one to two minutes before inhalation of subsequent puff.

MDI = metered-dose inhaler

Use of Inhaled Corticosteroids

Inhaled corticosteroids (ICSs) are the cornerstone anti-inflammatory treatment in asthma. Their use in COPD offers more modest benefits in a minority of patients. A number of randomized control trials have failed to show ICSs to be disease-modifying agents in COPD since they do not slow the rate of decline of lung function.¹⁰⁻¹³ However, 10% to 20% of COPD patients treated with ICS have a small increase in baseline forced expiratory volume (FEV).¹³ There is no role for chronic use of oral corticosteroids in COPD.²

ICS used in moderate to severe COPD patients has been shown to slow the decline of health status, and this has attributed to a decrease in the number and severity of acute exacerbations.^{10,14} Arguably, moderate to severe

COPD patients with spirometry who suffer frequent exacerbations (*i.e.*, more than three episodes per year) may benefit from ICS.

Discussion of Case 2

A few aspects of COPD treatment are highlighted in the case of Mrs. Smith. First and foremost, the inhaler technique must be verified and corrected as necessary. The dose of the SABs she uses is sub-optimal and she should increase her regular ipratropium bromide to four to six puffs qid. If her breathlessness is still not well-controlled, she may benefit from a trial of inhaled LABA. There is no indication, in her case, for the use of an ICS.

COPD

Case 3

Mr. Brown, 68, has moderate to severe COPD. You last saw him three months ago, after discharge from hospital following an exacerbation that required intubation and admission to the intensive care unit. He has recently suffered another exacerbation requiring a visit to the emergency department where he was prescribed a short course of oral corticosteroids that ended three weeks ago. He complains of significant breathlessness with activities of daily living, feeling weak and having difficulty concentrating to the point where he has given up playing checkers with his friends. He does not sleep or eat well and has lost some weight.

His physical examination reveals a barrel chest and quiet breath sounds with no wheezes or crackles. The jugular venous pressure is elevated 5 cm above the sternal angle and there is 2+ pitting edema of the ankles. Spirometry shows an FEV₁ of 41% and a FEV₁ to FVC ratio of 48%. An arterial blood gas performed on room air shows a partial pressure of carbon dioxide (PaCO₂) of 45 mmHg and a partial pressure of oxygen (PaO₂) of 48 mmHg.

Question: What is the appropriate management?

Long-Term Oxygen Therapy

Patients with severe COPD can develop hypoxemic and/or hypercapnic respiratory failure, even in the absence of an acute exacerbation. One of the complications of chronic hypoxemia is *cor pulmonale*, or right-sided heart failure secondary to increased vascular resistance in the pulmonary circulation. Large trials of long-term oxygen therapy (LTOT) have shown a decrease in mortality and morbidity in COPD patients using at least 15 hours of supplemental oxygen per day.^{15,16} Not all COPD patients, however, benefit from LTOT, and careful candidate selection is necessary. Indications for LTOT include COPD patients found to have cyanosis, right heart failure, or polycythemia. Such patients must be stable, exacerbation-free (usually two to three months since their last exacerbation) and ex-smokers. They also must have a waking partial pressure of oxygen (PaO₂) less than 55 mmHg on room air, an oxygen saturation less than 88% or a PaO₂ ranging from 55 mmHg to 59 mmHg with

evidence of polycythemia or *cor pulmonale*, despite receiving optimal medical therapy.²

Pulmonary Rehabilitation

Patients with COPD often lead a sedentary lifestyle because of their respiratory symptoms. This can lead to limb muscle deconditioning and social isolation, impacting negatively on quality of life and making symptoms worse. The goals of pulmonary rehabilitation, as detailed in the GOLD guidelines, are to “reduce symptoms, improve quality of life, and increase physical and emotional participation in everyday activities.”² Pulmonary rehabilitation consists of a structured program of exercise, education, psychosocial support, nutritional advice and physiotherapy. It has been shown to decrease symptoms, improve exercise tolerance and improve quality of life among patients with severe COPD.¹⁷

Similar to LTOT, patients who can benefit from

pulmonary rehabilitation must be carefully selected. Good candidates include men and women with symptomatic COPD affecting their quality of life, despite receiving optimal medical therapy. They must be stable and free of exacerbation for a period of time, typically six to eight weeks.

Referral to a Respiriologist

COPD is most often managed by family physicians, however, on occasion, help from a respirologist or internist should be sought. Indications for referral to a specialist are outlined in Table 4.

End-of-life Issues

COPD is an incurable disease, leading to premature death. It is very difficult, however, to predict the rate of decline of lung function or progression of symptoms in most individuals. As such, discussions about end-of-life issues should be addressed routinely in patients with severe COPD. Feelings about intubation and mechanical ventilation should be explored in the office at a time when the patient is not undergoing a health crisis. This offers patients a chance to inform their family physician and family members of their desired conditions and events surrounding their death (*e.g.*, advance directives) and should help to avoid the use of undesired therapies or interventions in the terminal stages of their disease.¹⁸

For all COPD patients, but especially those with expectations of a shortened survival (Table 5), issues such as dying at home and palliative care should be discussed openly. We should all try to avoid the situation where a patient hears for the first time in the emergency department, intensive care unit or hospital ward that his/her life

Table 4

Indications for Referral to a Respirologist in COPD

- Uncertain diagnosis.
- Patient age < 40 years or < 10 pack-year smoker.
- Symptoms disproportionate to lung dysfunction.
- More than three respiratory tract infections per year.
- Moderate to severe disease ($FEV_1 < 50\%$ predicted).
- Rapid decline in lung function.
- Assessment for LTOT.
- Assessment for pulmonary rehabilitation.
- Assessment for major surgical intervention.

COPD = chronic obstructive pulmonary disease;
 FEV_1 = forced expired volume in 1 second;
 LTOT = long-term oxygen therapy.

expectancy is limited. Appropriate palliation of dyspnea and anxiety should be instituted by all family physicians with patients with advanced COPD.¹⁷ If necessary, the advice of a palliative care physician or a respirologist can be sought.

Discussion of Case 3

Mr. Brown's case highlights certain aspects of the management of significantly debilitated patients with severe COPD. In his case, he will likely meet the criteria for LTOT, which may help his mentation and allow him to resume his hobbies. He would also benefit from pulmonary rehabilitation. The fact that he recently suffered an exacerbation of COPD, however, precludes him from being assessed for LTOT or being enrolled in a pulmonary rehabilitation program.

Table 5

Predictors of Shortened Survival in COPD

- Moderate to severe COPD (symptoms at rest and/or FEV₁ < 50% predicted).
- On LTOT.
- Recent hospitalization for acute exacerbation.
- Poor nutritional status.
- Advanced age.
- Significant co-morbidities.

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These issues can be revisited in the near future (e.g., six to eight weeks after the time of the last exacerbation).

Because of the severity of his disease, and the likely need for evaluation for LTOT and pulmonary rehabilitation, Mr. Brown should be referred to a respirologist. He was recently intubated and mechanically ventilated, and, as such, is in a good position to make his views known about future invasive assisted ventilation. This would be a good time to explore the patient's and family's concerns about end-of-life care. Is he afraid of dying a respiratory death? Does he wish to die at home? Would he want resuscitation efforts should he have a cardio-respiratory arrest at home or during a hospital admission?

Conclusion

COPD is a common chronic respiratory disease that all family physicians should feel comfortable managing. Recent consensus guidelines provide assistance with management decisions.

Spirometry should be used in patients with chronic respiratory symptoms to detect COPD or to rule it out. Reinforcing the importance of smoking cessation and administering vaccinations are key interventions early in the course of COPD. As the disease progresses, the use of inhaled bronchodilator medication provides symptomatic benefit for most patients. Often overlooked aspects of this therapeutic intervention are maximizing medication dosage and verifying the patient's inhaler technique. In more severe cases of COPD, prevention, detection and treatment of complications, such as recurrent exacerbations and respiratory failure, usually will require consultation with a respirologist or internist. Lastly, patients should be given an opportunity to discuss their desires and fears regarding end-of-life care. [CME](#)

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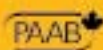
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