Review

COPD Exacerbations:
Managing a Frequent Problem

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Acute Exacerbations of Chronic Obstructive Pulmonary Disease (AECOPD) are the most frequent cause of medical visits, hospitalization and death among patients with COPD. Importantly, following AECOPD, patients may experience long-lasting decline in functional status, pulmonary function and quality of life and a significant number may fail to reattain their pre-exacerbation baseline.[1] According to the Canadian Thoracic Society, AECOPD is defined as "a sustained (> 48 hours) worsening of dyspnea, cough or sputum production leading to an increase in the use of maintenance medications and/or supplementation with additional medications."[2] The average COPD patient will experience approximately two exacerbations per year and those with more severe underlying lung disease are more likely to experience more frequent and severe exacerbations. It is important to note that many episodes of AECOPD are underreported by patients and they do not immediately seek medical help.

Lucy's case

Lucy, 61, has moderately severe COPD (forced expiratory volume in one second [FEV1] 70% predicted). She is a former smoker with a 40 pack per year history. Baseline medications include tiotropium, a long-acting ß2-agonist and a short-acting ß2-agonist (SABA) on demand. Her last COPD exacerbation was 2 years ago. Over the past several days she has experienced worsening breathlessness and her chronic cough (usually productive of clear sputum) has worsened and her sputum is now yellowish in colour. She has been using her SABA every few hours with minimal relief and presents to your office for further evaluation.

Case Management

Lucy's chest exam demonstrates increased diffuse wheezing, but no localized findings. Her O_2 saturation is 94% on room air. She is given prednisone 30 mg q.d. for 10 days and an antibiotic. You ask her to continue taking her SABA as prescribed. As you give her a prescription for ipratropium to be taken every 4 hours for the next few days, she is instructed to temporarily hold her tiotropium. You arrange follow-up.

For more on Lucy, look to page 50.

Etiology

Between 50% to 70% of AECOPD cases are a result of pulmonary infection and of these many are viral in nature.[3] Other important causes include:

- environmental irritants (including cigarette smoke, cold or humidity, dust and allergens),
- decompensated congestive heart failure (which may trigger or mimic AECOPD) and
- pulmonary embolism.

Table 1

Antibiotic recommendations for purulent AECOPD

Group	Basic clinical state	Symptoms and risk factors	Probable pathogens	First choice antibiotics
Simple	COPD without risk factors	• Increased cough and sputum • Sputum purulence • Increased dyspnea	• *Haemophilus influenzae* • *Haemophilus* species • *Moraxella catarrhalis* • *Streptococcus pneumoniae*	• Amoxicillin • Doxycycline • Trimethoprim/ sulfamethoxasole • 2nd or 3rd generation cephalosporins • Extended-spectrum macrolides
Complicated	COPD with risk factors	As in simple, plus ≥ 1 of: • FEV1 < 50% predicted • ≥ 4 exacerbations per year • Ischemic heart disease • Use of home oxygen • Chronic oral corticosteroid use • Antibiotic use in past 3 months	As in simple, plus: • *Klebsiella* species • Other Gram-negatives • Organisms with increased probability of ß-lactam resistance	• ß-lactam/ ß-lactamase inhibitor • Respiratory fluoroquinolone

AECOPD: Acute exacerbations of chronic obstructive pulmonary disease
Reprinted with permission from O'Donnell, et al[2]

Presentation

During AECOPD, patients report variable combinations of increased:

- breathlessness,
- cough,
- wheeze,
- chest tightness, or
- change in sputum volume and purulence.

Non-specific symptoms are also common, including malaise and fatigue. Unlike asthma exacerbations, changes in routine spirometric measures such as forced expiratory volume in one second (FEV1) or peak expiratory flow rates (PEFRs) measured during AECOPD are often small[4] and do not reliably predict onset, severity, or prognosis.

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Lucy's resolution

When she is reassessed 1 week later, Lucy says she feels better, but is not yet back to her baseline. She will complete the course of prescribed corticosteroids and antibiotic. Also, you discontinue the ipratropium and restart her tiotropium.

Prevention

Patients with COPD should receive an annual influenza vaccine; the role of pneumococcal vaccination in preventing or reducing the severity of AECOPD is less certain.[2] Smoking cessation reduces the rate of decline of lung function in COPD and may prevent AECOPD. Patients who (based on the severity of their lung disease) are prescribed long-acting ß2-agonists (LABAs) or tiotropium may experience fewer exacerbations or a delayed time to their next exacerbation as compared to placebo. The chronic use of inhaled corticosteroids (ICS) to reduce the frequency of AECOPD is a matter of considerable debate, but current guidelines suggest that the combination of ICS/LABA should be considered for patients with a FEV1 < 60% predicted and who experience more than one exacerbation per year.[2]

Management of AECOPD

The majority of AECOPD cases are managed in an outpatient setting by primary care physicians. For patients presenting with symptoms suggestive of AECOPD, a complete history and physical should be performed in an attempt to rule out other important causes for worsening dyspnea or cough. Arterial blood gases should be considered for patients with hypoxemia evident on pulse oximetry and a chest x-ray should be obtained for patients presenting to the ED, for those admitted to hospital, or for outpatients in whom diagnostic uncertainty exists. Patients who are found to be hypoxemic should receive supplemental O_2 to maintain an oxygen saturation of ≥ 92%; a more conservative target of 88% to 92% may be reasonable for those patients with chronic hypercarbia.

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Bronchodilators

Increased use of bronchodilator medications is the mainstay of treatment of AECOPD and combined therapy with both short-acting ß2-agonists and anticholinergics is advocated.[2] When possible, short-acting bronchodilators should be administered by a metered-dose inhaler (MDI), ideally with an aerochamber or spacer device, but it is recognized that nebulized medications may be required by those unable to use MDIs effectively. The role of the longer-acting bronchodilators in the setting of AECOPD is unclear at present. For patients already taking long-acting bronchodilators, it

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Take-home message

- AECOPD occurs commonly, is often underreported and is the cause of considerable morbidity and mortality
- Increased use of short-acting bronchodilator medications is the mainstay of treatment
- Antibiotics are useful for patients with purulent AECOPD and choice of agent depends on the presence of risk factors that predispose to treatment failure
- Systemic corticosteroids are useful for patients with more severe AECOPD

seems reasonable to continue these during AECOPD while remaining vigilant as to the potential for increased side-effects when these are combined with escalating doses of short-acting bronchodilators. However, the concurrent use of short- and long-acting anticholinergic medications is not routinely suggested and tiotropium should be held temporarily if short-acting anticholinergics are utilized.

Antibiotics

Several randomized controlled trials have found that antibiotics administered during AECOPD are beneficial in patients who present with a change in sputum purulence.[5] Conversely, patients with AECOPD who produce clear or white sputum during AECOPD are likely to improve without antibiotics. The choice of antibiotic depends largely on the presence of risk factors that either predispose to treatment failure or are associated with increased risk of resistant pathogens. Based on the presence or absence of these risk factors, patients can be defined as experiencing a simple or a complicated AECOPD and this distinction is used to guide empiric antibiotic therapy (Table 1).

Corticosteroids

Systemic corticosteroids are likely beneficial for patients with more severe AECOPD, although the optimal dose and duration are debated. Current guidelines suggest the use of 30 mg to 40 mg q.d. of prednisone (or equivalent) for between 10 to 14 days.[2] Patients experiencing milder symptoms are likely to improve without the need for systemic corticosteroids and in all patients, the use of steroids must be counterbalanced by the risk of undue side-effects. Dx

References
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