

Pharmacologic Management of an Acute COPD Exacerbation

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**ACPNets Quality Improvement Program
Chronic Obstructive Pulmonary Disease (COPD):
Improving Patient Care by Changing Physician Performance**

Recognizing a COPD exacerbation

- A sustained worsening of the patient's respiratory condition, from the stable state and beyond normal day to day variations, necessitating a change in regular medication.” - *Definition of COPD exacerbation from the 2000 Aspen Lung Conference*
- Most published definitions encompass some combination of three clinical findings. These three findings below constitute the **major criteria** for an acute COPD exacerbation:
 - Worsening dyspnea
 - Increase in sputum purulence (generally yellow or green)
 - Increase in sputum volume
- Recognize a **mild exacerbation** as characterized by one of the above major criteria plus one or more of the following:
 - An upper respiratory infection in the past 5 days
 - Fever without other apparent cause
 - Increased wheezing, increased cough
 - Increase in respiratory rate or heart rate 20% above baseline
- Recognize that a **moderate exacerbation** is characterized by two of the major criteria
- Recognize that a **severe exacerbation** is characterized by all three of the major criteria
- Acute spirometry is not necessary to diagnose an exacerbation or to assess its severity

Common causes of an exacerbation

- The most common causes of an exacerbation are infection of the tracheobronchial tree and air pollution, although the cause of about one-third of severe exacerbations cannot be identified
- The role of bacterial infections is controversial, but recent investigations have shown that at least 50% of patients have bacteria in high concentrations in their lower airways during exacerbations. The most common bacterial pathogens are:
 - *H. influenzae*
 - *M. catarrhalis*
 - *S. pneumonia*
- Patients at higher risk for infection with *Pseudomonas* spp or other enteric gram-negative rods in the sputum, in general, have greater airflow obstruction and prior use of antimicrobial agents

Initiating aggressive drug therapy for moderate to severe COPD exacerbations

- Consult table entitled **Comparative Dosing of Medications for Acute COPD Exacerbations**
- Initiate aggressive therapy with β_2 -agonists, anticholinergics, oral and systemic steroids in patients who may or do require hospitalization for COPD
- Consider administering antibiotics in patients who:
 - Have fever and/or change in quality, volume or color of sputum
 - Have severe underlying lung function with an FEV₁ <35% predicted
 - Are age 60 or older
- Glucocorticoids should be considered in addition to bronchodilators if the patient's baseline FEV₁ is \leq 50% predicted. A dose of 30-40 mg prednisolone per day for 7-10 days is recommended.
- Noninvasive mechanical ventilation in exacerbations:
 - improves respiratory acidosis
 - increases pH
 - decreases the need for endotracheal intubation
 - reduces PaCO₂, respiratory rate
 - reduces severity of breathlessness
 - reduces the length of hospital stay
 - reduces mortality when initiated early (i.e. prior to the development of impending respiratory failure)
- When treating an acute exacerbation, the following therapeutic options are **NOT** beneficial: mucolytic medications, chest physiotherapy, and methylxanthine bronchodilators. *The latter two options may be harmful.*
- If theophylline is used (for example to maintain levels in patients currently taking theophylline), be sure to check blood levels and be aware of potential drug-drug interactions, especially when antibiotics are used

Prescribing antibiotics

- Consider prescribing antibiotics for outpatient exacerbations if there are signs and symptoms of pulmonary infection
- Prescribe antibiotics for patients with COPD exacerbations with:
 - Increase in sputum volume
 - Increase in sputum purulence (generally yellow or green)
 - Worsening dyspnea
- For **mild exacerbations**, consider a course of:
 - tetracycline OR
 - trimethoprim/sulfamethoxazole
- For **moderate or severe exacerbations** or **unresponsive mild exacerbations**, consider alternatives such as:
 - β -lactamase inhibitor
 - extended-spectrum macrolides
 - second- or third-generation cephalosporins OR
 - a fluoroquinolone
- Always consider antibiotics in patients with one major criterion and a new abnormality on chest x-ray or an FEV₁ less than 35% predicted
- Do not routinely obtain sputum Gram stain and culture in patients with an exacerbation

When to refer patients to the emergency department for a severe COPD exacerbation

- Refer patients for loss of alertness or a combination of 2 or more of the following parameters indicative of a severe exacerbation:
 - Dyspnea at rest
 - Respiratory rate \geq 25/minute
 - Heart rate \geq 110/minute
 - Use of accessory muscles

When to hospitalize patients with an exacerbation of COPD

- Hospitalize patients who are experiencing impending respiratory failure, acute respiratory failure, or progressive deterioration of chronic respiratory failure.
- Hospitalize patients experiencing an acute exacerbation plus one or more of the following:
 - Inadequate response of symptoms to outpatient management
 - Inability to walk between rooms (patient was previously mobile)
 - Inability to eat or sleep due to dyspnea
 - Conclusion by family, physician, or both that the patient cannot manage at home and supplementary home care resources are not immediately available
 - Presence of a high-risk comorbid condition, pulmonary (e.g., pneumonia) or nonpulmonary
 - Prolonged, progressive symptoms before emergency department visit
 - Altered mentation
 - Worsening hypoxemia or new/worsening hypercarbia
- Hospitalize patients with new or worsening cor pulmonale unresponsive to outpatient management

When to consider home management

- The risk of dying from an exacerbation is closely related to the development of respiratory acidosis, the presence of serious comorbidities, and the need for ventilatory support.
- Attempts at managing patients (not at high risk of dying) entirely in the community have met with limited success. However, returning these patients to their homes with increased social support and a supervised medical care program after an initial emergency room assessment has been much more successful.
- Detailed cost-benefit analyses of these approaches have not been reported.
- Exact criteria for this approach as opposed to hospital treatment remain uncertain and will vary by healthcare setting.

How to manage patients at home

- Increase the dose and/or frequency of existing short-acting bronchodilator therapy, preferably with a β_2 -agonist.
- If not already used, an anticholinergic can be added until the symptoms improve
- Regarding antibiotics, refer to above section entitled **When and how to prescribe antibiotics**

Comparative Dosing of Medications for Acute COPD Exacerbations

Medication	MDI Dose	Nebulizer Dose	Special Instructions
Short acting β-2 agonists			
Albuertol	3-4 puffs q ½ - 2 h	2.5 mg q ½ - 2 h	
Metaproterenol	3-4 puffs q ½ - 2 h	10-15 mg q ½ - 2 h	
Terbutaline	3-4 puffs q ½ - 2h	N/A	Deliver with nebulizer if unable to use MDI with a spacer
Anticholinergics			
Ipratropium bromide	3-6 puffs q 2-6 h	500 µg q 2-4 h	
Systemic steroids			Taper Schedule: - Days 4-7: oral prednisone, 60 mg qd - Days 8-11: oral prednisone, 40mg qd - Days 12-15: oral prednisone, 20 mg qd Taper off or change to qod within 1-2 weeks
Methylprednisolone (Solu-Medrol)	Intravenous: 125 mg q 6 h x 72 h		
Prednisone	Oral: 40-60 mg qd		
Prednisolone	Oral: 30-50 mg qd		
Theophylline	If on theophylline, check level		Aim for levels of 5 to 12 µg /ml

Source: <http://pier.acponline.org/physicians/diseases/d153/tables/d153-tables.html>

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Sources for Pharmacologic Management of an Acute COPD Exacerbation

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