Antimicrobial Stewardship News

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Antibiotic Use in Acute Bronchitis and Acute Exacerbations of Chronic Bronchitis

Background

Acute bronchitis and acute exacerbations of chronic bronchitis (AECB) are common respiratory conditions that are often inappropriately associated with bacterial infection and treated with antibiotics. In fact, nearly 75% of all antibiotics are prescribed for upper respiratory tract infections such as these.[1] To promote antimicrobial stewardship, it is critical to distinguish between these conditions and understand the indications for antibiotic therapy. The goal of this newsletter is to review acute bronchitis and AECB and their associated infectious etiologies and provide guidance on the use of antibiotics for these conditions.

Acute Bronchitis

Acute bronchitis is a common respiratory condition in patients with no prior lung disease characterized by self-limiting inflammation of the upper bronchi due to airway infection. Patients with acute bronchitis typically experience an acute onset cough lasting one to three weeks, which may or may not be associated with sputum production. Clinical characteristics of acute bronchitis are shown in **Table 1.**

The majority of cases of acute bronchitis are caused by respiratory viruses, including influenza A and B, parainfluenza, coronavirus, rhinovirus, respiratory syncytial virus (RSV), and human metapneumovirus.[2] Despite this fact, it is estimated 60% to 90% of patients seeking care receive prescriptions for antibiotics. Pathogens associated with community-acquired pneumonia in adults have been proposed as causes of acute bronchitis, but there is no convincing evidence to support the concept of "acute bacterial bronchitis."

DASON recommends against routinely administering antibiotics to patients with acute bronchitis

The use of antibiotics in acute bronchitis has been studied in many large, randomized trials. The vast majority of studies showed antibiotics offer no benefit to patients with acute bronchitis.[3] Therefore, DASON recommends against routinely administering antibiotics to patients with acute bronchitis.

Table 1. Clinical Characteristics and Etiology of Acute Bronchitis and Acute Exacerbations of Chronic Bronchitis

Acute Bronchitis	Acute Exacerbation of Chronic Bronchitis (AECB)
• Sudden onset cough (< 1-2 weeks) with or without sputum • No prior lung disease • Viral pathogens associated with majority of cases • Bacterial infections associated with < 10% of cases	• Subjective increase in cough, dyspnea, and/or sputum purulence from baseline • Baseline lung disease (generally COPD) • Viral pathogens detected in 30% to 60% of cases • Bacterial infections in 35% to 50% of cases

Acute Exacerbations of Chronic Bronchitis

Acute exacerbations of chronic bronchitis (AECB), also commonly referred to as COPD exacerbations, are defined as an acute worsening of respiratory symptoms beyond normal day-to-day variations leading to a change in medicatons.[4] Patients with AECB typically experience an acute worsening of respiratory symptoms, generally including changes in one or more of the "cardinal symptoms" shown in **Table 2**.

Table 2. Symptoms often present in AECB

Cardinal Symptoms
• Increased cough (frequency or severity) • Increased sputum (purulence or production) • Increased dyspnea

The clinical manifestations of AECB can range from a mild increase in cough to acute hypoxic respiratory failure requiring mechanical ventilation. There are a number of conditions identified as triggers for exacerbations; however, approximately 70% to 80% of all exacerbations of COPD are triggered by a viral or bacterial respiratory infection.[5]

Infectious Etiology

Acute exacerbations of chronic bronchitis (AECB) are often caused by viral or bacterial pathogens.

Viral pathogens are detected in about 30% to 60% of cases; however, detection of a respiratory virus may not always represent true infection. For example, common respiratory viruses have been detected in up to 15% of asymptomatic patients with stable COPD using PCR-based assays, suggesting this population of patients may be carriers.[6] An exception to these findings includes detection of influenza virus as patients are rarely asymptomatic carriers. Viral pathogens responsible for AECB are similar to those for acute bronchitis.

Bacterial infections trigger approximately 35% to 50% of AECB cases. Specific pathogens include *H. influenzae*, *M. catarrhalis*, and *S. pneumoniae*.[7,8] Less frequently, *P. aeruginosa* and Enterobacteriaceae are detected, particularly in patients with severe exacerbations, structural changes in airways (e.g. bronchiectasis), and history of colonization. The incidence of each bacterial pathogen is shown in **Table 3**.

Table 3. Percent of Bacterial Pathogens in AECB[9]

Pathogen	Percentage Range
Haemophilus influenzae	13 to 50%
Moraxella catarrhalis	9 to 21%
Streptococcus pneumoniae	7 to 26%
Pseudomonas aeruginosa	1 to 13%

Less often patients present with infections caused by atypical bacteria or coinfections with a bacterial and viral pathogen. Atypical pathogens, including *Chlamydia pneumoniae* and *Legionella spp.*, are a relatively uncommon cause of exacerbations (less than 1% to 5%) except in the setting of an epidemic.[5,10] While coinfection is increasingly being considered, the overall incidence has not been well-described. Patients with coinfections typically present with severe symptoms and, as a result, have longer hospital stays.[11]

Indications for Antibiotics

Because of the numerous infectious etiologies associated with AECB, it is difficult to determine which patients have an infection that will likely respond to antibiotic therapy. Therefore, it is critical to examine patient characteristics and diagnostic tests to help estimate the likelihood of a bacterial or viral infection.

It has been shown that patients with AECB who have purulent sputum are much more likely to have bacterial infections than patients without.[4] This is reflected in the current guidelines, which recommend antibiotics in patients with moderate to severe exacerbations, defined as:

1) patients with all 3 cardinal symptoms;
2) patients with 2 cardinal symptoms (must have increased sputum purulence);
3) patients requiring mechanical ventilation.

Selection of Antibiotics

Antibiotics with activity against the most common pathogens (**Table 3**) should be selected. DASON recommends treatment with azithromycin, doxycycline, amoxicillin-clavulanic acid, or a cephalosporin (cefuroxime, cefpodoxime, cefdinir). We suggest avoidance of respiratory fluoroquinolones when possible. Choice of antibiotic for specific patients should be based on allergies, concomitant medications, risk of adverse events (e.g. prolonged QT), and local antimicrobial resistance patterns. In patients that are severely ill and at very high risk for *P. aeruginosa* (i.e., isolation of *P. aeruginosa* during previous hospitalization or recent receipt of broad-spectrum intravenous antibiotics), an antibiotic with activity against *P. aeruginosa* may be warranted. Such agents may include levofloxacin, cefepime, or piperacillin-tazobactam.

The duration of antibiotic therapy for patients with AECB should be limited to 5 days.

Take Home Points

1. Acute bronchitis is usually viral, and DASON recommends against treating with antibiotics
2. AECB are more often bacterial, but only select patients with AECB (i.e., moderate to severe exacerbations) should receive antibiotics
3. Antibiotics should be selected based on patient allergies, concomitant medications, and local antimicrobial susceptibilities
4. Antibiotic therapy should be limited to 5 days

References

1. Schuetz P, Amin DN, Greenwald JL. Role of procalcitonin in managing adult patients with respiratory tract infections. *Chest.* 2012;141(4):1063-1073.
2. Falsey AR, Erdman D, Anderson LJ, Walsh EE. Human metapneumovirus infections in young and elderly adults. *J Infect Dis.* 2003;187(5):785-790.
3. Fahey T, Stocks N, Thomas T. Quantitative systematic review of randomised controlled trials comparing antibiotic with placebo for acute cough in adults. *BMJ.* 1998;316(7135):906-910.
4. Global Strategy for the Diagnosis, Management and Prevention of COPD, Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2016. http://www.goldcopd.org (Accessed on August 15, 2016).
5. Sethi S, Murphy TF. Infection in the pathogenesis and course of chronic obstructive pulmonary disease. *N Engl J Med.* 2008;359(22):2355-2365.
6. Rohde G, Wiethege A, Borg I, et al. Respiratory viruses in exacerbations of chronic obstructive pulmonary disease requiring hospitalisation: a case-control study. *Thorax.* 2003;58(1):37-42.
7. Monso E, Ruiz J, Rosell A, et al. Bacterial infection in chronic obstructive pulmonary disease. A study of stable and exacerbated outpatients using the protected specimen brush. *Am J Respir Crit Care Med.* 1995;152(4 Pt 1):1316-1320.
8. Rosell A, Monso E, Soler N, et al. Microbiologic determinants of exacerbation in chronic obstructive pulmonary disease. *Arch Intern Med.* 2005;165(8):891-897.
9. Sethi S. Bacteria in exacerbations of chronic obstructive pulmonary disease: phenomenon or epiphenomenon? *Proc Am Thorac Soc.* 2004;1(2):109-114.
10. Sethi S, File TM. Managing patients with recurrent acute exacerbations of chronic bronchitis: a common clinical problem. *Curr Med Res Opin.* 2004;20(10):1511-1521.
11. Papi A, Bellettato CM, Braccioni F, et al. Infections and airway inflammation in chronic obstructive pulmonary disease severe exacerbations. *Am J Respir Crit Care Med.* 2006;173(10):1114-1121.

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- MARK YOUR CALENDARS! The DASON/DICON Fall 2016 Symposium will be held on Friday, November 18 at the Sheraton Greensboro Hotel at Four Seasons from 8:30AM-3:30PM – We look forward to seeing you there!