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Appropriate Antibiotic Use for Treatment of Nonspecific Upper Respiratory Infections, Rhinosinusitis, and Acute Bronchitis in Adults

Tina H. Degnan, MD
and Neil S. Skolnik, MD

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BACKGROUND

Acute sinusitis, bronchitis, pharyngitis, and nonspecific upper respiratory tract infections (URIs) account for the majority of antibiotics prescribed by primary care physicians in the United States. The emergence of antibiotic-resistant bacteria in the community setting is now an issue for individual patients as well as society at large, and it is the responsibility of all clinicians to limit antibiotic treatment to those patients who are most likely to benefit from it. The vast majority of acute respiratory infections are caused by viruses. Antibiotic treatment of patients with these infections selects for resistant nasopharyngeal bacteria, acutely increasing the spread of resistant pathogens through secretions and predisposing the treated patient to more serious bacterial infections in the future. The guidelines summarized in this chapter were designed by a panel of physicians representing family medicine, internal medicine, emergency medicine, and infectious diseases to provide a practical

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approach to the appropriate diagnosis and treatment of previously healthy adults with nonspecific URI, acute sinusitis, or acute bronchitis in the ambulatory care setting. Recommendations for the diagnosis and treatment of pharyngitis are provided in a separate chapter.

NONSPECIFIC URI

The diagnosis of nonspecific URI should be applied to a patient with an acute infection involving sinus, pharyngeal, and upper airway symptoms without a prominent symptom with which to make a more specific diagnosis of sinusitis, pharyngitis, or bronchitis. Antibiotics are ineffective in treating nonspecific URIs because most often, a virus is the causative agent. Mild cases are most frequently caused by rhinoviruses. Patients with more severe symptoms, especially when accompanied by myalgia and fatigue, are likely to be infected with influenza or parainfluenza viruses. Other sources of URI symptoms include adenovirus and respiratory syncytial virus (RSV).

Multiple studies have failed to show a benefit for antibiotic treatment in adults with URI. Purulent secretions and prevention of complications are two common justifications for antibiotic treatment of URI. The clinical finding of purulent sputum or rhinorrhea in a patient with URI symptoms is not a reliable indicator of bacterial infection and should not be used to justify treatment of the URI with antibiotics. Bacterial complication of a viral URI is rare, and antibiotics have not been shown to prevent complications such as pneumonia or hasten the resolution of URI in previously healthy adults. On the contrary, unnecessary antibiotic use predisposes patients to carriage of antibiotic-resistant *Streptococcus pneumoniae* and to invasive infection with this bacterium in the future.

RHINOSINUSITIS

Acute rhinosinusitis (acute sinusitis) is a common primary care diagnosis and physicians prescribe an antibiotic to 85–98% of patients with this illness. Although primary care physicians tend to think of rhinosinusitis as an acute bacterial infection, the majority of cases are caused by a virus. The lack of straightforward diagnostic criteria or available testing with which to distinguish a bacterial sinusitis that might benefit from antibiotic therapy from a viral infection has led to the clinical overdiagnosis of bacterial sinus infections and the overprescription of antibiotics.

Symptom duration is one criterion that has been used to diagnose acute bacterial sinusitis. By definition, acute rhinosinusitis symptoms last less than 4 wk, but patients and physicians begin to suspect bacterial rather than viral infection when symptoms last longer than a few days. Studies of rhinovirus infection describe duration of symptoms from 1 to 33 d, with an average illness lasting about 7–10 d. An estimated 0.2–2% of viral URIs are complicated by sinus

ostia obstruction leading to bacterial infection. Although studies have shown that few patients with symptoms lasting less than 7 d will have bacterial infections, the small percentage of bacterial compared with viral sinus infections and the underestimation of the duration of viral symptoms suggest that the majority of illnesses lasting longer than 7 d are caused by viruses and will not benefit from antibiotic treatment.

The gold standard method for diagnosis of bacterial sinusitis is sinus puncture, with *S. pneumoniae* and *Haemophilus influenzae* being the most commonly isolated organisms. This invasive test is clearly impractical for routine use in the primary care office. Sinus radiography is another test that has limited value for routine diagnosis of bacterial infection. Just as the symptoms of viral and bacterial rhinosinusitis overlap, so do the radiographic changes they produce. Most patients with viral sinusitis will have abnormal sinus radiographs, and determination of the degree of mucosal thickening and sinus obstruction becomes a judgment call with predictive value similar to that of clinical findings alone.

A further similarity of viral and bacterial rhinosinusitis is that all infections with mild to moderate symptoms are likely to resolve with symptomatic treatment alone. Therefore, rather than assigning treatment based on the difficult distinction of acute viral vs bacterial rhinosinusitis, antibiotic treatment should be prescribed for those patients with severe symptoms regardless of duration or patients with moderate symptoms that persist beyond 7 d. Patients who experience severe symptoms of purulent nasal discharge *accompanied by* maxillary tooth or facial pain, especially when unilateral, unilateral sinus tenderness, and worsening of symptoms after initial improvement should be treated with narrow-spectrum antibiotics such as amoxicillin, doxycycline, or trimethoprim–sulfamethoxazole in addition to the symptomatic treatments recommended for all patients with acute rhinosinusitis. Patients with mild symptoms or moderate symptoms persisting for less than 7 d should be treated with appropriate doses of analgesics, antipyretics, and decongestants and educated about their diagnosis and the chosen treatment strategy.

Recently published, updated guidelines from the American Academy of Allergy, Asthma and Immunology support the use of narrow-spectrum antibiotic therapy, specifically amoxicillin, as the first choice in the treatment of uncomplicated sinusitis in children and adults. Depending on the local prevalence of β -lactamase-producing strains of bacteria, it might be reasonable to add potassium clavulanate, in the form of amoxicillin-potassium clavulanate, which is usually effective against β -lactamase-producing *H. influenzae*, *M. catarrhalis*, *S. aureus*, and anaerobic bacteria. These guidelines indicate that in certain areas there are high rates of resistance to sulfamethoxazole-trimethoprim present in *S. pneumoniae*, *H. influenzae*, and *M. catarrhalis*, so that sulfamethoxazole-trimethoprim would not be an ideal first choice.

ACUTE BRONCHITIS

Acute bronchitis is a clinical diagnosis defined as an acute respiratory infection in which cough is a predominant symptom. Cough may be dry or productive of sputum but by definition lasts less than 3 wk. Cough illness lasting longer than 3 wk should be categorized as chronic or persistent cough illness and evaluated as such. Assessment of patients with chronic cough often begins with chest radiography and is beyond the scope of this chapter. As with the URI and sinusitis guidelines, the recommendations for acute bronchitis summarized here apply only to healthy adults without underlying lung disease.

The majority (70%) of previously healthy adults presenting to the primary care office with a chief complaint of cough will have acute bronchitis associated with URI. The next most common diagnoses are asthma (6%) and pneumonia (5%). Previously undiagnosed asthma in a patient with acute cough is an important consideration, but it is difficult to distinguish asthma from transient bronchial hyperresponsiveness and abnormal spirometry associated with uncomplicated acute bronchitis. Pneumonia is potentially the most serious diagnosis associated with acute cough illness and can be fairly accurately distinguished from acute bronchitis based on clinical examination findings. Therefore, the primary objective of the office visit for acute cough should be to exclude a diagnosis of pneumonia.

Non-elderly adult patients with normal vital signs (heart rate ≤ 100 , respiratory rate ≤ 24 , and oral temperature $\leq 38^{\circ}\text{C}$) and chest examination (absence of signs of focal consolidation such as asymmetric breath sounds, rales, egophony, or fremitus) are unlikely to have pneumonia. A patient with cough for less than 3 wk, whose clinical examination is not suspicious for pneumonia may be considered to have acute bronchitis, which is likely because of infection with a respiratory virus. Chest radiography or other diagnostic tests are rarely warranted in a previously healthy adult in whom pneumonia has been excluded based on clinical presentation.

Acute bronchitis is caused by both upper and lower respiratory tract viruses. Lower respiratory tract viruses such as influenza A and B, parainfluenza 3, and RSV are the most common causes of acute bronchitis, but upper tract viruses such as coronavirus, adenovirus, and rhinovirus may also cause acute cough illness. *Bordetella pertussis*, *Mycoplasma pneumoniae*, and *Chlamydia pneumoniae* (strain TWAR) are the only nonviral causes of uncomplicated acute bronchitis in previously healthy adults, accounting for 5–10% of cases. Gram stain and culture of sputum does not reliably identify these agents and, therefore, it is not recommended for evaluation of acute bronchitis in adults without underlying lung disease.

Randomized controlled trials have shown that antibiotic treatment of acute bronchitis in previously healthy adults is not beneficial. The two uncommon exceptions to this rule include cases of bacterial superinfection as evidenced by

infiltrate on chest X-ray and cases of suspected pertussis. Because previously immunized adults often do not present with the characteristic whooping cough of pertussis, it is difficult to distinguish this disease in this patient population from other causes of acute bronchitis. It is recommended that antibiotic treatment for pertussis should be limited to those adults with a high probability of exposure to the disease, such as during documented outbreaks. Treatment is largely beneficial as it decreases shedding of the organism. As pertussis is rarely suspected prior to 7–10 d of illness it is too late to speed resolution of symptoms.

Influenza infection is one other circumstance in which antimicrobial treatment of acute bronchitis may be warranted. Influenza viruses are the most common causes of uncomplicated acute bronchitis. It has been shown that during documented influenza outbreaks, clinical judgment can be as accurate as rapid diagnostic tests, which have a sensitivity of 63–81%. However, judgment must also be used in weighing the high cost of the newer neuraminidase inhibitors, which are active against both influenza A and B, against their rather limited benefit of 1 d of less illness in addition to the requirement that they be taken within 48 h of symptom onset and may contribute to the emergence of resistant viral strains.

In summary, a previously healthy adult patient with acute cough illness without signs of pneumonia or exposure to pertussis will not benefit from antibiotic treatment. Chest radiography should be limited to those cases in which pneumonia is suspected or cough has persisted for more than 3 wk in the absence of other known causes. Some patients with acute bronchitis will expect antibiotic treatment for uncomplicated acute bronchitis based on past experience. When antibiotic treatment is not warranted, all patients will benefit from the explanation that they have acute bronchitis, a self-limiting viral infection that may be thought of as a “chest cold,” and discussion about why antibiotics are not being prescribed. Patients should be prepared for the possibility that cough could last an average of 10–14 d. Analgesics, antipyretics, antitussives, β -agonist inhalers, and vaporizers should be offered, with the explanation that they will not shorten the course of illness but will provide symptomatic relief.

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