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An Evidence-Based Approach to the Diagnosis and Management of Acute Respiratory Infections

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ABSTRACT

Acute respiratory infections (ARIs) are commonly experienced in primary care. Although most ARIs are viral in nature and resolve without treatment, nurse practitioners and other clinicians prescribe antibiotics for them 40% to 50% of the time. Thus, the purpose of this article is to review current evidence-based recommendations about the diagnosis and management of ARIs in adults.

Keywords: Antimicrobial resistance, appropriate antibiotic use, respiratory infection

Acute respiratory infections (ARIs), including the common cold, acute rhinosinusitis, acute pharyngitis, and acute bronchitis, are the most common infections experienced by human beings.[1] Adults typically experience two to four ARIs a year, whereas children experience six to eight.[2] Although most ARIs are self-limited viral infections, nurse practitioners and other clinicians prescribe antibiotics for ARIs 40% to 50% of the time,[3] a practice that is thought to have contributed significantly to the current antimicrobial resistance crisis.[4]

Research has shown that clinicians overprescribe antibiotics for patients for two primary reasons. First, the desire to please or satisfy patients is a powerful motivator, and clinicians frequently describe this as the chief reason for why they prescribe antibiotics for patients with viral ARIs[5]; however, several studies have shown that patient satisfaction does not diminish when antibiotics are withheld.[6-8] Second, clinicians are often misinformed about the nature and course of ARIs or possess dated information about how to diagnose and manage them.[5] Thus, the purpose of this article is to review current evidence-based recommendations about the diagnosis and management of ARIs in adults.

ARI GUIDELINES

A comprehensive set of guidelines for the diagnosis and management of adult ARIs was published in 2001.[9] Those guidelines were endorsed by the Centers for Disease Control and Prevention (CDC), the American Academy of Family Physicians, the American College of Physicians, and the Infectious Diseases Society of America. The guidelines address nonspecific upper respiratory tract infections (the common cold), acute rhinosinusitis, acute pharyngitis, and acute bronchitis. Although somewhat dated, the guidelines continue to provide basic diagnostic and management information for acute rhinosinusitis and the common cold and are available for electronic download from the CDC's Get Smart about antibiotics website (*www.cdc.gov/getsmart*). The guidelines are summarized here, along with several updates from the current literature.

Antibiotics do not shorten or alter the course of the common cold and should be avoided.

COMMON COLD

The common cold or nonspecific respiratory tract infection is characterized by sinus, pharyngeal, or airway (eg, cough) symptoms, and there is a lack of any one predominating symptom. Most colds stem from a viral cause and less than 2% are complicated by bacterial causes. Cold symptoms typically last 1 to 2 weeks, and most patients report some symptom improvement after 1 week. The diagnosis of the common cold should be reserved for patients with an ARI that lacks a predominant symptom. Clinicians should not be swayed by the presence of purulent nasal discharge or tonsillar exudate, because these stem from sloughed epithelial cells and are not indicative of bacterial infection.[10]

Antibiotics do not shorten or alter the course of the common cold and should be avoided.[10] In addition, research has not found that vitamin C, zinc, or echinacea to be helpful.[11-13] Thus, management of the common cold should focus on symptom relief (eg, decongestants, anti-inflammatories) and reassurance that the symptoms will improve with time.[10]

ACUTE RHINOSINUSITIS

Acute rhinosinusitis is characterized by inflammation of the nasal mucosa and paranasal sinuses for less than 4 weeks. Although clinicians frequently prescribe antibiotics for rhinosinusitis, it is almost always viral in origin with less than 2% of the cases stemming from bacteria. Bacterial rhinosinusitis typically results from a secondary infection arising from sinus ostia obstruction and impaired mucous drainage[14] with the most common organisms being *Streptococcus pneumoniae, Hemophilus influenza,* anaerobes, and *Staphylococcus aureus* in decreasing order of prevalence.[15]

Clinically, differentiating bacterial from viral rhinosinusitis is challenging. The reference standard for diagnosing bacterial rhinosinusitis is sinus puncture with culture, an invasive procedure rarely performed in primary care. In addition, viral infections of the sinus cavities are frequently associated with abnormal radiographic findings, and studies of these examinations have shown that they are unable to distinguish between rhinosinusitis caused by bacteria or viruses. Thus, because of the difficulty associated with distinguishing viral from bacterial rhinosinusitis, the guideline recommends reserving the diagnosis of acute bacterial rhinosinusitis for patients who experience rhinosinusitis symptoms (eg, sinus pain, tooth pain, nasal congestion) for more than 7 days.[14]

Acute bacterial rhinosinusitis usually resolves without antibiotic treatment; thus, initial management for mild illness should focus on symptom management (eg, decongestants and anti-inflammatories).[14] In addition, some evidence shows that nasal steroid sprays may reduce both the length and severity of acute rhinosinusitis.[16] Antibiotics should be reserved for patients who are experiencing moderate to severe symptoms.[14] In most situations initial antibiotic selec-

Table 1. Summary of Recommended Treatment Options for Outpatient Acute Bacterial Rhinosinusitis in Adults[15]

Initial presentation[a]	Primary Option	Alternative Option
Antibiotic use in past month?	No; choose from Amoxicillin 1 g TID Cefdinir 300 mg Q12 h or 600 mg Q24 h Cefpodoxime 200 mg BID Cefprozil 250-500 mg BID If allergic to penicillin, choose from Moxifloxacin 400 mg Q24 h Doxycycline100 mg BID TMP-SMX (Bactrim DS), 1 tablet BID Clarithromycin 500 mg BID or Clarithromycin ER 1 g Q24 h	Yes; choose from Augmentin XR 2000/125 mg BID If allergic to penicillin, choose from Gatifloxacin 400 mg Q24 h Levofloxacin 750 mg Q24 h × 5 d Moxifloxacin 400 mg Q24 h
Clinical failure after 3 days of initial therapy[b]	Mild or moderate disease, choose from Augmentin XR 2000/125 mg BID Cefdinir 300 mg Q12 h or 600 mg Q24 h Cefpodoxime 200 mg BID Cefprozil 250-500 mg BID	Severe disease, choose from Gatifloxacin 400 mg Q24 h Levofloxacin 750mg Q24 h × 5 d Moxifloxacin 400 mg Q24 h

All regimens are for 10 days unless otherwise specified. TMP-SMX, trimethoprim and sulfamethoxazole; DS, double strength; ER, extended release.

[a] *Patients with fever and facial erythema are at increased risk of infection with* Staphylococcus aureus, *which warrants intravenous antibiotic therapy. See actual guideline.*

[b] *Consider referral to otolaryngologist for diagnostic aspiration and culture.*

tion should focus on the eradication of *S pneumoniae* and *H influenzae* and take into consideration recent antibiotic use that is associated with antibiotic resistance. However, if the patient is experiencing fever and facial erythema, *S aureus* should be covered with intravenous antibiotics (eg, naf-cillin). In general, oral antibiotic treatment should be continued for 10 days; however, if there is no clinical response after 3 days and depending on initial antibiotic selection, the clinician should either change the antibiotic therapy or refer to an otolaryngologist for aspiration and culture.[15] A summary of antibiotic recommendations for acute rhinosinusitis is given in Table 1.

ACUTE PHARYNGITIS

Acute pharyngitis in adults typically results from viral infections, including adenovirus, rhinovirus, influenza virus, herpes virus, and Epstein-Barr virus, to name a few. Bacteria associated with acute pharyngitis include *Streptococcus pyogenes* (Groups A, C, and G), *Neisseria gonorrhoeae, Corynebacterium diphtheriae, Francisella tularensis,* and *Yersinia* spp, as well as some anaerobes associated with Vincent's angina.[17] However, *S pyogenes* in the form of Group A β-hemolytic streptococci (GABHS) is the most common cause of bacterial pharyngitis and is responsible for 5% to 15% of adult cases of acute pharyngitis. In addition to reducing the complications associated with GABHS (eg, acute rheumatic fever, peritonsillar abscess), treatment of GABHS improves clinical symptoms and decreases transmission. Thus, when seeing patients with acute pharyngitis, clinicians should focus on determining whether GABHS is the infective source.[18]

Findings commonly associated with GABHS and viral pharyngitis are summarized in Table 2. However, because these are not exclusive to GABHS or viral pharyngitis, the guideline recommends testing all patients presenting with acute pharyngitis who have features associated with GABHS. Testing should occur with either a pharyngeal culture or rapid antigen detection test (RADT), that typically has a sensitivity of 90% and a specificity of 95% or greater. Unlike children and adolescents, confirmatory cultures of negative RADTs are not routinely recommended in adults because of the low incidence of GABHS and rheumatic fever in this population.[17]

Penicillin continues to have good coverage against GABHS and remains the first-line recommended treatment: either penicillin V 500 mg twice daily or 250 mg four times daily for 10 days; however, if compliance is unlikely, a one time dose of 1.2 units of benzathine penicillin can be given. Alternatives to penicillin include the second-generation oral cephalosporins for 4 to 6 days or a macrolide (eg, erythromycin for 10 days, or azithromycin for 5 days). However, there are now macrolide-resistant GABHS strains; thus, culture and sensitivity is recommended when clinical failure is suspected.[15] Symptom management for both viral and GABHS pharyngitis should focus on reducing throat pain

Table 2. Findings Commonly Associated With Group A β-Hemolytic Streptococcus (GABHS) and Viral Pharyngitis[17]

Findings suggestive of GABHS
Sudden onset
Sore throat
Fever
Headache
Nausea, vomiting, abdominal pain
Inflammation of pharynx and tonsils
Patchy discrete exudate
Tender, enlarged anterior cervical nodes
Age 5-15 years
Presentation in winter or early spring
History of GABHS exposure
Findings suggestive of viral cause
Conjunctivitis
Coryza
Cough
Diarrhea

Note: The diagnosis of GABHS cannot definitively be made based on clinical signs and symptoms. However, clinical findings can be used to help identify persons who are at high or low risk of GABHS so that appropriate GABHS testing can be performed.

through the use of fluids, acetaminophen, and nonsteroidal anti-inflammatories.[18] A short trial of oral glucocorticoids may be helpful in reducing the pain and swelling associated with severe pharyngitis.[19]

ACUTE BRONCHITIS

Acute bronchitis is defined as an ARI in which cough, regardless of phlegm production, is the predominant symptom and has persisted for less than 3 weeks. Acute bronchitis is usually viral in origin (influenza A and B, adenovirus, rhinovirus, corona virus, respiratory syncytial virus); however, *Bordetella pertussis, Mycoplasma pneumoniae,* and *Chlamydia pneumoniae* are associated with 5% to 10% of the cases of acute bronchitis in adults.[20]

The diagnosis of acute bronchitis should only be given after pneumonia, acute, asthma, or exacerbation of chronic obstructive pulmonary disease has been ruled out.[20,21] Although sputum analyses and viral cultures are not recommended in patients with acute bronchitis, clinicians should be alert to the possibility of infection with *B pertussis* (whooping cough) and test for *B pertussis* whenever patients present with cough for 2 or more weeks along with symptoms of typical pertussis (eg, paroxysmal cough, post-tussive vomiting, or inspiratory whooping sound)[21] or earlier during community outbreaks or when patients present with symptoms suggestive of the catarrhal stage (eg, fever, malaise, cough). Treatment for *B pertussis* infections is described elsewhere.[15,22]

In the absence of confirmed pertussis, antibiotics are not recommended for the treatment for acute bronchitis. Instead, clinicians should focus on reassuring patients that bronchitis is a viral illness that usually resolves spontaneously in 2 weeks.

Patients should also be advised to be evaluated for a persistent (>2 weeks) cough or a cough illness associated with extreme lethargy, anorexia, difficulty breathing, or cyanosis. Unfortunately, research efforts have yet to identify the best way to decrease cough. Inhaled and oral β_2-agonists (eg, albuterol) may be of some help in cases of acute bronchitis when airflow obstruction and wheezing are present but are not helpful for routine use.[21] Antitussive agents (eg, codeine, dextromethorphan) have not been well studied in patients with acute bronchitis but are associated with mixed results in patients experiencing cough from the common cold. Thus, a short trial of antitussive agents for cough associated with acute bronchitis is reasonable; however, expectorants and mucolytic agents (eg, guaifenesin) were shown to be of no benefit in patients experiencing cough from acute bronchitis and are not recommended for use in routine practice.[23]

CONCLUSION

In general, ARIs are viral infections that do not routinely warrant antibiotic therapy. Previous studies have documented that antibiotics are often prescribed inappropriately for patients with viral ARIs. Primary care clinicians need to be familiar with current, evidence-based guidelines for ARIs that promote judicious antibiotic prescribing. In addition, they should keep in mind that inappropriate antibiotic prescribing for ARIs is associated with increased antimicrobial resistance and that withholding antibiotic prescriptions for ARIs does not decrease patient satisfaction. JNP

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1555-4155/07/$ see front matter

doi:10.1016/j.nurpra.2007.08.004