

# Acute Bronchitis

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Cough is the most common illness-related reason for ambulatory care visits in the United States. Acute bronchitis is a clinical diagnosis characterized by cough due to acute inflammation of the trachea and large airways without evidence of pneumonia. Pneumonia should be suspected in patients with tachypnea, tachycardia, dyspnea, or lung findings suggestive of pneumonia, and radiography is warranted. Pertussis should be suspected in patients with cough persisting for more than two weeks that is accompanied by symptoms such as paroxysmal cough, whooping cough, and post-tussive emesis, or recent pertussis exposure. The cough associated with acute bronchitis typically lasts about two to three weeks, and this should be emphasized with patients. Acute bronchitis is usually caused by viruses, and antibiotics are not indicated in patients without chronic lung disease. Antibiotics have been shown to provide only minimal benefit, reducing the cough or illness by about half a day, and have adverse effects, including allergic reactions, nausea and vomiting, and *Clostridium difficile* infection. Evaluation and treatment of bronchitis include ruling out secondary causes for cough, such as pneumonia; educating patients about the natural course of the disease; and recommending symptomatic treatment and avoidance of unnecessary antibiotic use. Strategies to reduce inappropriate antibiotic use include delayed prescriptions, patient education, and calling the infection a chest cold. (*Am Fam Physician*. 2016;94(7):560-565. Copyright © 2016 American Academy of Family Physicians.)

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**C**ough is the most common illness-related reason for ambulatory care visits, accounting for 2.7 million outpatient visits and more than 4 million emergency department visits annually.<sup>1</sup> Acute bronchitis is a clinical diagnosis characterized by acute cough, with or without sputum production, and signs of lower respiratory tract infection in the absence of chronic lung disease, such as chronic obstructive pulmonary disease, or an identifiable cause, such as pneumonia or sinusitis.<sup>2</sup>

## Etiology

Acute bronchitis is most often caused by a viral infection.<sup>3,4</sup> The most commonly identified viruses are rhinovirus, enterovirus, influenza A and B, parainfluenza, coronavirus, human metapneumovirus, and respiratory syncytial virus.<sup>3</sup> Bacteria are detected in 1% to 10% of cases of acute bronchitis.<sup>3-5</sup> Atypical bacteria, such as *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae*, and *Bordetella pertussis*, are rare causes of acute bronchitis. In a study of sputum samples of adults with acute cough for more than five days, *M. pneumoniae* was isolated in less than 1% of cases and *C. pneumoniae* was not identified.<sup>6</sup>

Approximately 10% of patients presenting with a cough lasting at least two weeks have

evidence of *B. pertussis* infection.<sup>7,8</sup> During outbreaks, pertussis detection is more likely in children and those with prolonged coughs.<sup>6,9</sup> Antibiotics can eradicate *B. pertussis* from the nasopharynx. They do not seem to shorten the course of illness unless given in the first one to two weeks.<sup>10</sup> Isolated outbreaks of pertussis occur throughout the United States, and increased testing of adults and children should be considered during these periods.

## Diagnosis

### MEDICAL HISTORY

Cough is the predominant and defining symptom of acute bronchitis. The primary diagnostic consideration in patients with suspected acute bronchitis is ruling out more serious causes of cough, such as asthma, exacerbation of chronic obstructive pulmonary disease, heart failure, or pneumonia. The diagnoses that have the most overlap with acute bronchitis are upper respiratory tract infections and pneumonia. Whereas acute bronchitis and the common cold are self-limited illnesses that do not require antibiotic treatment, the standard therapy for pneumonia is antibiotics.

Besides cough, other signs and symptoms of acute bronchitis include sputum

## SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	Evidence rating	References
Avoid prescribing antibiotics for uncomplicated acute bronchitis.	A	27, 41
Over-the-counter cough medications containing antihistamines and antitussives should not be used in children younger than four years because of the high potential for harm.	C	30
Consider using dextromethorphan, guaifenesin, or honey to manage acute bronchitis symptoms.	B	30, 34, 38
Avoid using beta <sub>2</sub> agonists for the routine treatment of acute bronchitis unless wheezing is present.	B	35
Employ strategies to reduce antibiotic use, such as asking patients to call for or pick up an antibiotic or to hold an antibiotic prescription for a set amount of time.	A	42, 43

*A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, go to <http://www.aafp.org/afpsort>.*

production, dyspnea, nasal congestion, headache, and fever.<sup>4,11,12</sup> The first few days of an acute bronchitis infection may be indistinguishable from the common cold. Patients may have substernal or chest wall pain when coughing. Fever is not a typical finding after the first few days, and presence of a fever greater than 100°F (37.8°C) should prompt consideration of influenza or pneumonia. Production of sputum, even purulent, is common and does not correlate with bacterial infection.<sup>13,14</sup>

Because the cough associated with bronchitis is so bothersome and slow to resolve, patients often seek treatment. Patients and clinicians may underestimate the time required to fully recover from acute bronchitis.<sup>15</sup> The duration of acute bronchitis-related cough is typically two to three weeks, with a pooled estimate of 18 days in one systematic review.<sup>15</sup> This corresponds to

results of a prospective trial, which found that patients who had a cough for at least five days had a median of 18 days of coughing.<sup>16</sup>

### PHYSICAL EXAMINATION

On physical examination, patients with acute bronchitis may be mildly ill-appearing, and fever is present in about one-third of patients.<sup>4,11</sup> Lung auscultation may reveal wheezes, as well as rhonchi that typically improve with coughing. It is important to rule out pneumonia. High fever; moderate to severe ill-appearance; hypoxia; and signs of lung consolidation, such as decreased breath sounds, bronchial breath sounds, crackles, egophony, and increased tactile fremitus, are concerning for pneumonia. Pneumonia is unlikely in nonfrail older adults who have normal vital signs and normal lung examination findings.<sup>17-20</sup>

### DIAGNOSTIC TESTING

Laboratory testing is usually not indicated in the evaluation of acute bronchitis. Leukocytosis is present in about 20% of patients; significant leukocytosis is more likely with a bacterial infection than with bronchitis.<sup>21</sup> Although rapid testing is available for some respiratory pathogens, it is usually not necessary in the typical ambulatory care patient.<sup>22</sup> Testing for influenza and pertussis may be considered when the suspicion is high and treatment would impact the course of the illness.

Biomarkers may assist in identifying patients who might benefit from antibiotics. Studies using C-reactive protein levels to

### BEST PRACTICES IN INFECTIOUS DISEASE: RECOMMENDATIONS FROM THE CHOOSING WISELY CAMPAIGN

Recommendation	Sponsoring organization
Cough and cold medicines should not be prescribed or recommended for respiratory illnesses in children younger than four years.	American Academy of Pediatrics
Antibiotics should not be used for apparent viral upper respiratory tract illnesses (sinusitis, pharyngitis, bronchitis).	American Academy of Pediatrics
Avoid prescribing antibiotics for upper respiratory tract infections.	Infectious Diseases Society of America

*Source: For more information on the Choosing Wisely Campaign, see <http://www.choosingwisely.org>. For supporting citations and to search Choosing Wisely recommendations relevant to primary care, see <http://www.aafp.org/afp/recommendations/search.htm>.*

guide antibiotic use in patients with respiratory tract infections are inconclusive,<sup>23</sup> although an elevated C-reactive protein level was associated with an increased likelihood of pneumonia in a large primary care trial.<sup>24</sup> A clinical decision rule for pneumonia was developed and prospectively validated by Swiss researchers, who found that pneumonia could be ruled out in patients with a C-reactive protein level of less than 50 mcg per mL and no dyspnea or daily fever.<sup>25</sup> Procalcitonin testing may be useful in the differentiation of pneumonia and acute bronchitis, but it is not widely available in clinical settings.<sup>26</sup> A large primary care trial of patients with lower respiratory tract infections found that procalcitonin testing added no benefit to a model that included signs, symptoms, and C-reactive protein levels.<sup>24</sup>

### INDICATIONS FOR CHEST RADIOGRAPHY

In patients with symptoms of acute bronchitis, imaging is primarily used to rule out pneumonia. Evidence-based guidelines from the American College of Chest Physicians state that imaging is not needed in patients with acute bronchitis symptoms who have normal vital signs and normal lung examination findings.<sup>22</sup> Patients with pneumonia typically have tachypnea, tachycardia, or dyspnea.<sup>12</sup> An exception to this rule is patients older than 75 years, who may present with more subtle signs of pneumonia and are less likely to have fever or tachycardia.<sup>19</sup> *Table 1* includes indications for chest radiography in patients with symptoms of acute bronchitis.<sup>22</sup>

### Management

Supportive care and symptom management are the mainstay of treatment for acute bronchitis. The role of antibiotics is limited. Since 2005, the National Committee for Quality Assurance has recommended avoidance of antibiotic prescribing for acute bronchitis as a Health-care Effectiveness Data and Information Set Measure.<sup>27</sup>

**Table 1. Indications for Chest Radiography in Adult Patients with Symptoms of Acute Bronchitis**

Dyspnea, bloody sputum, or rusty sputum color
Pulse > 100 beats per minute
Respiratory rate > 24 breaths per minute
Oral body temperature > 100°F (37.8°C)
Focal consolidation, egophony, or fremitus on chest examination

*Information from reference 22.*

All major guidelines on bronchitis, including those from the American College of Chest Physicians, recommend against using antibiotics for acute bronchitis unless the patient has a known pertussis infection.<sup>2,22</sup> The American Academy of Pediatrics recommends that antibiotics not be used for apparent viral respiratory illnesses, including sinusitis, pharyngitis, and bronchitis.<sup>28</sup> Despite these recommendations, antibiotics are often prescribed for acute bronchitis.<sup>29</sup>

### OVER-THE-COUNTER MEDICATIONS

Over-the-counter medications are often recommended as first-line treatment for acute cough. However, a Cochrane review on over-the-counter medications for acute cough in the community setting showed a paucity of good data; existing trials are of low quality and report conflicting results.<sup>30</sup>

A randomized controlled trial showed that compared with placebo, there was no benefit from ibuprofen in decreasing severity or duration of cough in patients with acute bronchitis.<sup>31</sup> Another randomized controlled trial comparing ibuprofen, acetaminophen, and steam inhalation found that those with a lower respiratory tract infection or age younger than 16 years had a modest reduction in symptom severity when taking ibuprofen over acetaminophen, although the ibuprofen group was more likely to seek care again for new or nonresolving symptoms.<sup>32</sup>

Antihistamines are often used in combination with decongestants in the treatment of acute cough. Two trials of antihistamines alone showed no benefit compared with placebo in relieving cough symptoms. Combination decongestant/antihistamines are more likely to have adverse effects with no to modest improvement in cough symptom scores.<sup>30</sup> In 2008, The U.S. Food and Drug Administration warned against the use of over-the-counter cough medications containing antihistamines and antitussives in young children because of the high risk for harm, and these medications are no longer labeled for use in children younger than four years. They are continuing to investigate the safety of these medications in children up to 11 years of age.<sup>30,33</sup>

### ANTITUSSIVES

Antitussives work by reducing the cough reflex and can be divided into central opioids and peripherally acting agents. Codeine is a centrally acting, weak opioid that suppresses cough. Two studies show no benefit from codeine in decreasing cough symptoms,<sup>30</sup> and the American College of Chest Physicians does not recommend its use in the treatment of upper respiratory tract infections.<sup>22</sup>

Dextromethorphan is a nonopioid, synthetic derivative of morphine that works centrally to decrease cough. Three placebo-controlled trials show that dextromethorphan, 30 mg, decreased the cough count by 19% to 36% ( $P < .05$ ) compared with placebo, which is equivalent to eight to 10 fewer coughing bouts per 30 minutes.<sup>30</sup>

Benzonatate is a peripherally acting antitussive that is thought to suppress cough via anesthesia of the respiratory stretch receptors. One small study comparing benzonatate, guaifenesin, and placebo showed significant improvement with the combination of benzonatate and guaifenesin, but not with either agent alone.<sup>34</sup>

#### EXPECTORANTS

Guaifenesin is a commonly used expectorant. It is thought to stimulate respiratory tract secretions, thereby increasing respiratory fluid volumes and decreasing mucus viscosity, and it may also have antitussive properties.

A Cochrane review including three trials of guaifenesin vs. placebo showed some benefit.<sup>30</sup> In one trial, patients reported that guaifenesin decreased cough frequency and intensity by 75% at 72 hours compared with 31% in the placebo group (number needed to treat = 2). A second trial showed decreased cough frequency (100% of the guaifenesin group vs. 94% of the placebo group;  $P = .5$ ) and improved cough severity (100% of the guaifenesin group vs. 91% of the placebo group;  $P = .2$ ) at 36 hours, and reduced sputum thickness (96% of the guaifenesin group vs. 54% of the placebo group;  $P = .001$ ). A third trial using an extended-release formulation of guaifenesin showed improved symptom severity at day 4 but no difference at day 7.<sup>30</sup>

#### BETA<sub>2</sub> AGONISTS

Many patients with acute bronchitis have bronchial hyperreactivity, leading to impaired airflow in a mechanism similar to asthma. A 2015 Cochrane review does not support the routine use of beta<sub>2</sub> agonists for acute cough.<sup>35</sup> Two trials included children and found no benefit from albuterol in decreasing daily cough scores, daily proportion of cough, or median duration of cough, although both studies excluded children who were wheezing at the time of evaluation or had signs of bronchial obstruction. The studies of adults had mixed results, but the findings suggest that beta<sub>2</sub> agonists should be avoided if there is no underlying history of lung disease or evidence of wheeze or airway obstruction. However, beta<sub>2</sub> agonists may have some benefit in certain adults, especially those with wheezing at the time of evaluation who do not have a previous diagnosis of asthma or chronic

obstructive pulmonary disease. Because there is limited supportive evidence, the use of such medications should be weighed against the risk of adverse effects, including tremor, shakiness, and nervousness.<sup>35</sup>

#### HERBAL AND OTHER PREPARATIONS

Alternative medications are commonly used in the treatment of acute bronchitis. *Pelargonium sidoides* has some reported modest effectiveness in the treatment of acute bronchitis, but the quality of evidence is considered low, and the studies were all done by the manufacturer in Ukraine and Russia.<sup>36</sup> There are insufficient data to recommend for or against the use of Chinese medicinal herbs for the treatment of acute bronchitis, and there are safety concerns.<sup>37</sup>

A Cochrane review of honey for acute cough in children included two small trials comparing honey with dextromethorphan, diphenhydramine (Benadryl), and no treatment.<sup>38</sup> Honey was found to be better than no treatment in decreasing the frequency and severity of cough, decreasing bothersome cough, and improving quality of sleep. Given the warnings against the use of antitussives in young children, honey is a reasonable alternative for the relief of acute cough in children older than one year.<sup>38</sup>

#### ANTIBIOTICS

At least 90% of acute bronchitis episodes are viral, yet antibiotics are commonly prescribed. Unnecessary antibiotic prescriptions result in adverse effects and contribute to rising health care costs and antimicrobial resistance. A recent study of antibiotic prescribing trends from 1996 to 2010 found that antibiotics were prescribed in 71% of visits for acute bronchitis and that the rate of prescribing increased during the study period.<sup>29</sup> Although clinicians are more likely to prescribe antibiotics in patients with purulent sputum, a prospective observational study showed no difference in outcomes when antibiotics were prescribed to patients with green or yellow sputum, indicating that this is not a useful indicator of bacterial infection.<sup>39</sup> Smokers are also more likely to receive antibiotic prescriptions, with some populations of smokers being prescribed antibiotics more than 90% of the time despite no difference in outcomes.<sup>40</sup>

A Cochrane review suggests there is no net benefit to using antibiotics for acute bronchitis in otherwise healthy individuals.<sup>41</sup> Although antibiotics decreased cough duration by 0.46 days, decreased ill days by 0.64 days, and decreased limited activity by 0.49 days, there was no difference in clinical improvement at follow-up. The most common adverse effects reported were nausea,

**Table 2. Strategies to Reduce Antibiotic Use for Acute Bronchitis**

- Use delayed prescription strategies, such as asking patients to call for or pick up an antibiotic or to hold an antibiotic prescription for a set amount of time
- Address patient concerns in a compassionate manner
- Discuss the expected course of illness and cough duration (two to three weeks)
- Explain that antibiotics do not significantly shorten illness duration and are associated with adverse effects and antibiotic resistance
- Discuss the treatment plan, including the use of nonantibiotic medications to control symptoms
- Describe the infection as a viral illness or chest cold

Information from references 29, 42, and 43.

diarrhea, headache, skin rash, and vaginitis with a number needed to harm of 5. Given minimal symptom improvement in an otherwise self-limited condition, increased rate of adverse effects, and potential for antibiotic resistance, it is wise to limit the use of antibiotics in the general population; further study in frail older persons and individuals with multiple comorbidities is needed.<sup>41</sup> If pertussis is confirmed or suspected because of a persistent cough accompanied by symptoms of paroxysmal cough, whooping cough, and post-tussive emesis, or recent pertussis exposure, treatment with a macrolide is recommended.<sup>10</sup>

### STRATEGIES TO REDUCE INAPPROPRIATE ANTIBIOTIC USE

Delayed prescribing, in which the patient is given an antibiotic prescription at the visit but told not to fill it unless symptoms continue beyond a predetermined time, significantly decreases antibiotic use.<sup>42</sup> A Cochrane review showed no difference in clinical outcomes between patients with acute bronchitis who were treated immediately with antibiotics and those with delayed or no antibiotic treatment. In addition, patients reported comparable satisfaction when given immediate vs. delayed antibiotics (92% vs. 87%).<sup>43</sup>

Patients who present with the expectation that they will receive an antibiotic are more likely to receive one, even if the clinician thinks the prescription is unnecessary.<sup>44</sup> In fact, the strongest predictor for an antibiotic prescription is the clinician's perception of patient desire for antibiotics.<sup>45</sup> However, patients want symptom relief and will often accept leaving without an antibiotic prescription if the clinician addresses their concerns, shows

personal interest, discusses the expected course of the illness, and explains the treatment plan.<sup>45</sup> Calling the infection a chest cold<sup>44</sup> and educating the patient about the expected duration of illness (two to three weeks)<sup>15</sup> are also helpful. *Table 2* includes strategies for reducing antibiotic prescriptions for acute bronchitis.<sup>29,42,43</sup>

**Data Sources:** The PubMed database was searched in Clinical Queries using the term acute bronchitis. Systematic reviews were searched and narrowed by etiology, diagnosis, therapy, prognosis, and clinical prediction guidelines. The Agency for Healthcare Research and Quality, National Guideline Clearinghouse, National Quality Measures Clearinghouse, and Essential Evidence Plus were also searched. Search date: January 2015.

**NOTE:** This review updates a previous article on this topic by Albert,<sup>46</sup> Knutson and Braun,<sup>47</sup> and Hueston and Mainous.<sup>48</sup>

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