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# Pharyngitis In The ED: Diagnostic Challenges And Management Dilemmas

*9:15 a.m.: It's an unusually slow day in the ED. As you pick up the chart of the only patient awaiting care, you smile. The chief complaint is "sore throat and rash," and the patient is an 11-year-old girl. Shortly after entering the room, however, you aren't smiling.*

*The girl is well-appearing except for a diffuse morbilliform rash. From her mother (who is standing in the corner with her arms folded, looking unhappy), you learn that one of your colleagues saw the child a few days ago and prescribed an antibiotic to treat her sore throat. She says in no uncertain terms, "My daughter's throat is still sore, and now she has this rash. I want the right antibiotic, and I want this rash gone!" You notice that she's holding a copy of the hospital's patient satisfaction survey in her hand.*

**RARELY** is the complaint of sore throat a show-stopper requiring immediate action. With the exception of a handful of unusual but potentially life-threatening causes of pharyngitis, the emergency physician is principally concerned with the identification and treatment of patients with group A beta-hemolytic streptococcal (GABHS) infections in order to prevent a few rare but serious complications.

Effectively treating sore throat pain, ensuring adequate hydration, and, when indicated, promptly administering antibiotics are generally sufficient to reduce or eliminate the risk of long-term sequelae. Even so, the management of this "simple" condition is fraught with controversy and potential peril.

This issue *of Emergency Medicine Practice* presents an evidence-based approach to the evaluation and management of acute pharyngitis in adults and children. An emphasis is placed on accurately identifying and treating life-threatening causes of pharyngitis. In addition, management options for common causes of pharyngitis—including strategies to lessen patient pain and discomfort, shorten the disease course, decrease the rate of transmission, prevent complications such as acute rheumatic fever and peritonsillar abscess, and minimize the adverse effects of inappropriate antibiotic treatment—are presented.

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### CME Objectives

Upon completing this article, you should be able to:

1. discuss how the history and physical examination can identify causes of pharyngitis or determine the need for diagnostic testing, and how clinical decision rules may aid in this process;
2. discuss the utility and limitations of different diagnostic studies used in evaluating patients with pharyngitis;
3. discuss the identification and management of serious and/or potentially life-threatening causes of pharyngitis;
4. describe how to identify and manage GABHS in adults and children; and
5. describe appropriate treatment, such as antibiotic therapy and/or pain management, for patients with pharyngitis.

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*See "Physician CME Information" on back page.*

## Critical Appraisal Of The Literature

There is no dearth of literature regarding the evaluation and management of the patient with pharyngitis. Even disregarding industry-sponsored antibiotic comparison studies, a veritable mountain of information remains.

In order to effectively use the medical literature to guide his or her practice, the emergency physician must understand its limitations. For example, virtually every study of diagnosis uses the throat culture on sheep's blood agar as the reference standard. However, a streptococcal carrier with viral pharyngitis may still have a positive throat culture, and the patient with a true GABHS infection may have a negative throat culture if the culture was collected or incubated improperly. Likewise, the true test of the effectiveness of a treatment for GABHS infections is the prevention of serious post-streptococcal complications rather than recovery from the acute episode of pharyngitis. The acute disease is self-limited; whether treated or not, the vast majority of patients will get better. Moreover, the complications are so rare that a study of their prevention is impractical, if not impossible. Given that the reference standard is flawed and the outcome to be achieved is somewhat unclear, it's no surprise to find that physicians employ a wide range of diagnostic and treatment strategies.

### Guidelines

Several groups, including specialty societies and respected academic entities, have produced practice guidelines for the evaluation and management of pharyngitis. **Table 1** summarizes the most important guidelines. The Infectious Diseases Society of America produced one of the early practice guidelines and has revised it recently.[1,2] Practice guidelines also have been released by the American Academy of Pediatrics,[3] the University of Michigan Health System,[4] and the Scottish Intercollegiate Guidelines Network.[5] More recently, the Centers for Disease Control released its own guideline with endorsement from the American Academy of Family Physicians and the American College of Physicians–American Society of Internal Medicine.[6] This document was also published in a respected emergency medicine journal, which might be construed as tacit endorsement by organized emergency medicine.

All guidelines rely on a combination of scientific evidence and expert consensus. As might be expected, some of these guidelines offer conflicting advice. Several offer the practitioner a range of acceptable options. There is little question that these guidelines disagree about some key issues, but there is general agreement on several important issues. First, the guidelines all agree that patients with signs of viral illness can be managed symptomatically without testing or treatment. Conjunctivitis, cough, rhinorrhea, skin rash (other than scarlatina), and mucosal ulcers are all signs that the causative agent is likely to be a virus. When these are found in association with a sore throat, all of the guidelines allow for therapy to reduce the patient's symptoms without testing for GABHS and without prescribing antibiotics. Second, the guidelines generally agree that the stakes of missing a GABHS infection are lower in adults than in children and, as such, a high-sensitivity rapid antigen detection test (RADT) is adequate for the exclusion of GABHS in adult patients. There is no need to perform a confirmatory culture. Third, most of the guidelines agree that RADTs are not subject to false-positive results. A positive RADT confirms the diagnosis of GABHS pharyngitis. Treatment can begin without further testing. Finally, the guidelines all agree that penicillin remains the drug of

## Table 1. Summary Of Clinical Guidelines Pertaining To Pharyngitis.

### Infectious Disease Society of America

*Population:* Adults and children
*Patients with viral symptoms:* Do not test or treat
*Patients with symptoms of GABHS:* RADT or culture; treat only those with positive results
*Culture after negative RADT?* Children: yes; Adults: no
*Recommended antibiotic:* Penicillin (erythromycin if penicillin-allergic)

### Centers for Disease Control

(endorsed by the American Academy of Family Physicians and the American College of Physicians–American Society of Internal Medicine)
*Population:* Adults (patients older than 15 years of age)
*Patients with viral symptoms:* Do not test or treat
*Patients with symptoms of GABHS:* Use Centor criteria:*
- Centor score = 4: perform RADT or treat presumptively
- Centor score = 3: perform RADT or treat presumptively
- Centor score = 2: perform RADT or do not test or treat
- Centor score = 1 or 0: do not test or treat

In all cases in which an RADT is performed, only those with positive results are treated
*Culture after negative RADT?* No
*Recommended antibiotic:* Penicillin (erythromycin if penicillin-allergic)

### American Academy of Pediatrics

*Population:* Children
*Patients with viral symptoms:* Do not test or treat
*Patients with symptoms of GABHS:* RADT or culture; treat only patients with positive results
*Culture after negative RADT?* Yes
*Recommended antibiotic:* Penicillin (erythromycin if penicillin-allergic)

### Institute for Clinical Systems Improvement

*Population:* Adults and children
*Patients with viral symptoms:* Do not test or treat
*Patients with symptoms of GABHS:* RADT or culture; treat only patients with positive results
*Culture after negative RADT?* Yes
*Recommended antibiotic:* Penicillin (erythromycin if penicillin-allergic)

* Centor criteria: history of fever; absence of cough; swollen, tender, anterior cervical lymph nodes; and tonsillar exudate

Sources: Bisno AL, Gerber MA, Gwaltney JM, et al. Practice guidelines for the diagnosis and management of group A streptococcal pharyngitis. *Clin Infect Dis* 2002;35:113-125; Schwartz BM, Marcy MS, Phillips WR, et al. Pharyngitis—principles of judicious use of antimicrobial agents. *Pediatrics* 1998;101:171-174; Cooper RJ, Hoffman JR, Bartlett JG, et al. Principles of appropriate antibiotic use for acute pharyngitis in adults: Background. *Ann Emerg Med* 2001;37:711-719.

choice for the treatment of GABHS infection, with erythromycin being reserved for those who are penicillin-allergic. Many of the guidelines also recognize that once- or twice-daily amoxicillin may represent a more palatable and convenient alternative, but further study may be needed.

### Evidence-Based Reviews

The most significant evidence-based review to date appeared in the Cochrane database.[7] This critical appraisal of the literature considered 25 studies and 11,452 cases of sore throat. Its specific aim was to determine whether antibiotic treatment confers any immediate or subsequent benefit. (The reviewers did not consider diagnostic strategies.) Studies were selected using the following criteria: 1) They involved patients presenting to primary practitioners with acute sore throat. Both adults and children were included. 2) The outcome measures were the presence or absence of poststreptococcal complications like rheumatic fever, glomerulonephritis, or peritonsillar abscess or were resolution of symptoms like sore throat, fever, or headache. 3) The studies were randomized or "quasi-randomized" placebo-controlled trials. The Cochrane review concluded that antibiotic treatment does indeed benefit specific subsets of patients—offering significant benefit to a minority at the cost of unnecessarily treating a substantial majority.

## Epidemiology, Etiology, Pathophysiology, And Differential Diagnosis

Acute pharyngitis accounts for 1%-2% of all visits to physician's offices, clinics, and EDs.[8] In practice, this translates to approximately 27 million visits each year, making sore throat a common complaint for both office-based practitioners and emergency physicians. Interestingly, it has been estimated that for each person who seeks care for a sore throat, an additional 4-6 symptomatic individuals do not.[7]

Although most cases of pharyngitis do not have a life-threatening cause, the astute physician will remember that a sore throat can be the presenting complaint for some serious and even immediately life-threatening illnesses. Serious and / or potentially life-threatening causes include epiglottitis, diphtheria, Ludwig's angina, peritonsillar abscess, retropharyngeal abscess, gonococcal pharyngitis, infectious mononucleosis (if tonsils and lymphoid tissues become enlarged enough to cause airway obstruction), and GABHS (complications of which can include serious illnesses such as rheumatic fever). Less serious and usually self-limited causes include viral pharyngitis, non-GABHS bacterial pharyngitis, and candidiasis. Non-infectious causes include laryngeal / pharyngeal trauma, gastroesophageal reflux disease, persistent cough or post-nasal drainage, thyroiditis, and malignancies.

### Rare But Dangerous Causes Of Pharyngitis

#### *Epiglottitis*

Little more than a decade ago, emergency physicians and pediatricians were alert for the signs of acute epiglottitis in pediatric patients. This disease has several potential causes, but by far the most frequent is *Haemophilus influenzae* type B (Hib), an invasive encapsulated gram-negative coccobacillus that is spread from person to person in respiratory droplets.[9] Thanks to widespread immunization against Hib, epiglottitis is very rare among children in the developed world. However, it does occur at a reported rate of one case per 100,000 people per year among adolescents and adults. Although Hib might not be the most common cause of epiglottitis in this population, it has been postulated that it causes the most severe cases.[10-17]

The presentation among children is often dramatic. The patient first develops a fever; within a few hours, symptoms of respiratory distress develop. Drooling, dysphonia, and inspiratory stridor are common presenting signs.[12,13]

Although adult patients can present with acute onset of fever and acute airway obstruction, most present less dramatically. In many cases the patient has only intense pharyngitis and hoarseness. Other symptoms may include odynophagia and mild respiratory distress. Drooling and stridor occur in more severe cases. The patient may not be febrile and may have been symptomatic for several days rather than a few hours. The emergency physician should be especially wary of the patient with intense throat pain who has little inflammation of the tonsils and hypopharynx. Dyspnea at the time of admission has been reported to be an important sign of potential airway obstruction.[15-17]

#### *Diphtheria*

Immunization has also virtually eradicated *Corynebacterium diphtheriae* from the United States. This disease, which is caused by a gram-positive bacillus, is generally spread from person to person through respiratory droplets or contact with infected secretions. The most recent severe outbreaks of diphtheria have occurred in the former Soviet Union, where case-fatality rates have been as high as 23%.[18,19]

Unimmunized and immunocompromised children and adults remain at risk for both epiglottitis and diphtheria. There is also some evidence to suggest that certain immunizations (including the Hib vaccine) are less effective in children who are HIV-positive. It is especially important to consider these infections when evaluating unimmunized or under-immunized patients such as immigrants from countries lacking large-scale immunization programs.[20]

#### *Ludwig's Angina*

Ludwig's angina, an infection of the submandibular and sublingual spaces, was originally described in 1836. It is well-known to occur in both adults and children.[21,22]

In addition to fever, patients with Ludwig's angina present with a variety of complaints related to the oropharynx. Patients may have mouth, neck, or tooth pain, dysphonia, odynophagia, trismus, and / or drooling.[22,23] Dental disease, particularly of the mandibular molars, is the most common predisposing factor. Poor dental hygiene, recent dental treatment, local trauma, immunocompromise, and tongue piercing have been implicatedas well. Ludwig's angina may also occur without any predisposing factors.[23,24]

#### *Peritonsillar Abscess*

Peritonsillar abscess is a disease of older children and adolescents, though it can occur at any age. This infection forms in the area between the palatine tonsil and the

tonsillar capsule. It is the most serious expression of tonsillitis and, with an incidence of approximately 45,000 cases per year, is among the most common significant head and neck infections found in either adults or children.[25] Most infections are polymicrobial and include both aerobes (e.g., GABHS) and anaerobes (e.g., *Fusobacterium*).

Peritonsillar abscess generally begins with pharyngitis. Over a period of 24-72 hours, the pain worsens and localizes to one side. The patient may have fever and complain of dysphagia, odynophagia, and ear pain. In severe cases the patient may have drooling or dysphonia. Limited mouth opening (trismus) is common and may also affect speech.[26] Peritonsillar abscess is readily identified on physical examination. Affected patients often have unilateral tonsillar enlargement with displacement of the tonsil and, often, the uvula to the contralateral side. In cooperative patients, the clinician may be able to palpate a fluctuant mass around the tonsil.

### *Retropharyngeal Abscess*

The retropharyngeal space lies anterior to the prevertebral layer of deep cervical fascia and posterior to the pharyngeal mucosa. It is, in fact, not one but three potential spaces separated by fascia. These spaces extend from the upper pharynx to the mediastinum. In young children, the retropharyngeal space contains a large plexus of lymph nodes. Suppuration of these nodes allows infection to spread throughout the retropharyngeal space. The retropharyngeal lymph nodes involute as the child ages and may be clinically insignificant as early as 3 or 4 years of age.[27] As a result, most patients with retropharyngeal abscesses tend to be very young children. Adolescents and adults can develop retropharyngeal abscesses, but these are generally the result of penetration of the posterior pharyngeal wall by a foreign object (e.g., toothpick, fishbone, etc.).[28]

The typical patient presents with fever, throat pain, and decreased oral intake. Because the disease process develops more slowly than epiglottitis, patients are less likely to present with an abrupt onset of symptoms. Some patients, in fact, will have already seen a physician and been placed on antibiotics prior to their ED visit. Many patients also complain of neck pain and / or stiffness, the combination of which may lead the clinician to consider meningitis.[27,29] Most patients lack the pharyngeal inflammation often seen with viral and bacterial pharyngitis; instead, the clinician may note asymmetry of the palate in the location of the abscess.

### *Infectious Mononucleosis*

Infectious mononucleosis is caused by the Epstein-Barr virus (EBV), a member of the herpesvirus family. In underdeveloped areas, most of the population is infected with EBV during childhood, when the disease is asymptomatic. In developed nations, however, the disease often occurs in adolescents and young adults. Its ready transmission in bodily fluids, especially saliva, has led to one of its monikers, "the kissing disease."

The classic triad of symptoms includes fever, sore throat, and lymphadenopathy. Tonsillopharyngitis, the most common symptom, occurs in 74%-83% of patients.[30] Exudative pharyngitis is seen less frequently.

In practice it may be difficult for the emergency physician to distinguish infectious mononucleosis from other causes of pharyngitis. However, the course of the illness has some unique characteristics. Most patients experience 24-48 hours of malaise followed by fever; patients may present after a week or more of symptoms. The sore throat typically begins on days 3-5, progressively worsens over the next few days, and then gradually improves.[30] Occasionally, a patient will develop

## Cost- And Time-Effective Strategies For Patients With Pharyngitis

**1. Do not test or prescribe antibiotics for patients with obvious viral syndromes.** Patients with cough, coryza, conjunctivitis, and other symptoms of viral illness are very unlikely to have concomitant GABHS infections. Treatment of such patients should be directed toward making them feel better.

*Caveat: This rule applies to otherwise healthy, immunocompetent patients who do not live in areas where rheumatic fever is endemic. More liberal treatment of high-risk patients is warranted.*

**2. Do not perform throat cultures for GABHS in patients over 15 years old.** Adults are at lower risk for rheumatic fever and are at lower risk for severe complications should they have rheumatic fever. Therefore, most authorities recommend that adults be managed with a combination of clinical guidelines and RADTs.

*Caveat: See prior item.*

**3. If you are going to treat based on clinical criteria, do not test.** Ordering a culture or RADT in a patient who has already received a prescription for antibiotics has no practical purpose.

**4. Limit the use of injections.** Injections ensure treatment and are appropriate in some cases, but for most patients a simple prescription is a less expensive and equally effective alternative.

**5. Do not prescribe broad-spectrum, new, or advanced antibiotics to treat pharyngitis in patients who are *not allergic* to penicillin.** Penicillin or amoxicillin are effective in the treatment of GABHS infections. There is no evidence of GABHS resistance to these agents, and there is little reason to use more expensive antibiotics to treat pharyngitis in patients who are not allergic to penicillin. For penicillin-allergic patients, the problem is somewhat more complex. The cheapest agent available is erythromycin. However, there is a relatively high incidence of GABHS resistance to erythromycin. Furthermore, many adolescents and adults are simply unable to cope with the gastrointestinal side-effects of erythromycin. In such patients, alternative agents are warranted. Children tolerate erythromycin a bit better; unless the child is known to have had problems with erythromycin in the past, it is probably worth trying.

*Caveat: In communities with both an increased incidence of erythromycin-resistant GABHS and an increased risk of rheumatic fever, an alternative agent should be chosen for children with GABHS pharyngitis.* ▲

significant lymphadenopathy and tonsillar hypertrophy. In some cases, this may lead to upper airway obstruction.[31] Splenomegaly, while not as common as other symptoms, supports the diagnosis of infectious mononucleosis; the clinician should therefore attempt to determine whether the spleen is enlarged.[32,33]

## Common And Usually Less Dangerous Causes Of Pharyngitis

Patients who lack symptoms of airway obstruction and other serious signs nonetheless present a diagnostic and therapeutic challenge. In most cases, the underlying cause of the patient's symptoms is an infection. The infectious agent most often causes symptoms by directly invading the pharyngeal tissue. The ensuing immune response and release of inflammatory mediators cause further local inflammation.

Most cases of acute pharyngitis are self-limited. Treatment may have little or no influence on the course of acute bacterial pharyngitis and will have none whatsoever on the course of viral pharyngitis.[34] Because timely antibiotic treatment may prevent serious post-streptococcal complications, the ED management of infectious pharyngitis usually involves distinguishing between GABHS and non-GABHS causes. Diagnosis and treatment strategies remain controversial but are inextricably linked. For example, should a clinician choose to treat all patients with pharyngitis with antibiotics, then bacteriologic diagnosis becomes little more than an exercise in epidemiology. On the other hand, the clinician who aims to limit antibiotic therapy might choose a strategy that accurately identifies the organism before treatment begins. Such decision-making has been the object of much research and debate.

### *GABHS Infections*

GABHS infections are significant because they are associated with non-suppurative complications—specifically, rheumatic fever and post-streptococcal glomerulonephritis. GABHS is also associated with suppurative complications (e.g., peritonsillar abscesses).

The incidence of GABHS varies widely within the population. Roughly 5%-15% of adults with sore throats will have an infection caused by GABHS.[35-37] In children, especially in school-age children, the incidence of GABHS infection increases to 15%-30%, with some authors suggesting that the highest incidence in this population may approach 50%.[3,38,39] The incidence of GABHS in children less than 3 years old is generally reported to be much lower than it is in school-age children; while controversial, some authors have suggested that the incidence among these patients is comparable to that found in their older peers.[39,40] Regional variations in the incidence have also been reported.[37,41,42]

A certain number of patients are actually asymptomatic carriers of GABHS. Like the disease itself, the carriage rate varies with age and geographic location. Whenever a throat culture is obtained from a carrier, it is likely to grow GABHS, and yet these patients are highly unlikely to have an actual GABHS infection.[37,41]

### *Non-GABHS Infections*

Although GABHS is the most important cause of infectious pharyngitis, a sore throat is more likely to be caused by a virus than by GABHS, even among school-age children.[42,43] A variety of other bacterial and viral agents have been described.

#### *Other Bacterial Causes*

**Group C and Group G streptococci:** Group C and Group G streptococci are the second and third most common bacterial causes of exudative pharyngitis after GABHS. Group C is more common in adolescents and young adults. The pharyngitis caused by this organism is less severe than that caused by GABHS. Group G streptococci have been implicated in "mini-epidemics" and in association with foodborne outbreaks (e.g., ingestion of cold hard-boiled eggs).[44,45]

***Arcanobacterium haemolyticum:*** *A. haemolyticum* is an interesting organism that can, depending on when it is stained, be either gram-positive or gram-negative. The typical patient is an adolescent or young adult. *A. haemolyticum* outbreaks have occurred in military barracks. Most patients have exudative pharyngitis and tender anterior cervical lymph nodes. However, unlike GABHS, many patients develop pruritis and have a non-productive cough. One- to two-thirds of patients with *A. haemolyticum* infections develop a non-peeling scarlatiniform rash. The rash initially appears on extensor surfaces 1-4 days after the onset of pharyngitis and then spreads to the trunk.[44-46]

**Anaerobes:** The three anaerobic organisms most frequently associated with pharyngitis are *Fusobacterium*, *Peptostreptococcus*, and *Bacteroides*. Anaerobes are associated with two entities. The first and most important of these is peritonsillar abscess. The second, and potentially more serious, type of anaerobic infections tend to occur in malnourished or immunosuppressed patients and in those who have undergone local irradiation of the neck. Affected individuals present with severe throat pain and foul breath odor. On examination, they are found to have purulent membranous exudates.[44]

***Neisseria gonorrhoeae:*** *N. gonorrhoeae* is spread to the pharynx by orogenital contact. Male-to-female transmission is 2-3 times more common than female-to-male transmission. Homosexual men have the highest infection rates. Although most infections are asymptomatic, in some cases the patient experiences mild pharyngitis with cervical lymphadenopathy. A concomitant sexually transmitted disease should lead the clinician to suspect *N. gonorrhoeae*.[44,45,47]

**Diphtheria:** Thanks to widespread immunization, infection by *C. diphtheriae* is exceptionally rare in most of the developed world, although there have been recent outbreaks in parts of the former Soviet Union. The characteristic gray or gray-brown pseudomembrane is the clinical finding that distinguishes diphtheria from other causes of pharyngitis. Although the pseudomembrane can cause airway compromise, the morbidity and mortality associated with diphtheria is primarily related to the cardiac and nerve toxins produced by the bacteria. The presence of the

pseudomembrane and the associated clinical findings are generally sufficient to warrant the initiation of treatment with diphtheria antitoxin and penicillin or erythromycin. However, a culture of the pseudomembrane should be performed on tellurite selective media or Loeffler's media.[19,44,45]

**Atypical organisms:** The role of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* in pharyngitis is unclear. Chlamydial pharyngitis may occur prior to or during an episode of pneumonia. The presence of cough suggests that the pharyngitis is not caused by GABHS. Mycoplasmal pharyngitis might be associated with other constitutional symptoms like headache and abdominal pain or gastrointestinal symptoms in addition to cough. Both of these organisms are treated with macrolide antibiotics or with tetracycline.[44,45]

### *Viral Causes*

**Cytomegalovirus:** Cytomegalovirus presents in a fashion much like EBV but with much milder symptoms. This virus should be considered in the patient with a clinical picture resembling mononucleosis who has negative tests for EBV. Cytomegalovirus can be cultured, and there are specific antibody tests for the virus, but these are generally not indicated.[44]

**Adenovirus:** Adenovirus often presents as an intense exudative pharyngitis. In about half of the cases, the patient also has follicular conjunctivitis, which can be unilateral or, less commonly, bilateral. In patients with so-called "pharyngoconjunctival fever," no further diagnostic evaluation is required. Although a few patients with adenovirus become quite ill, in the vast majority of cases, the patient has about one week of uncomplicated pharyngitis followed by resolution of symptoms.[44,45]

**Herpes simplex:** Although many patients with primary herpes simplex infections complain of sore throat, the disease involves the mouth, as well. In most cases the diagnosis is made by the symptoms coupled with the presence of multiple shallow ulcers distributed over the entire oral cavity. Herpes simplex gingivostomatitis and pharyngitis are self-limited in immunocompetent individuals. However, the patient may experience significant pain, resulting in decreased oral intake and dehydration. Attention to pain control and hydration is, therefore, mandatory. Severely affected patients may require antiviral therapy.[44,45]

**Coxsackievirus:** Coxsackievirus also presents with pharyngitis associated with ulcerative lesions. However, the lesions of coxsackievirus are fewer in number, located in the posterior pharynx, and are often larger than those found in herpes infections.[44,45]

**Influenza virus:** Pharyngitis is often a part of the clinical picture seen with influenza type A and B infections. As is the case for many types of viral pharyngitis, the constellation of associated symptoms helps the clinician distinguish influenza from GABHS. The pharyngitis associated with influenza is non-exudative, and the patient does not have cervical adenopathy. Furthermore, most patients experience other symptoms such as cough, myalgias, and headache.[44]

**HIV:** Primary infection by HIV type I is often accompanied by sore throat and, usually, arthralgias and myalgias. Lymphadenopathy is common. While rash sometimes occurs, pharyngeal exudates are rare. When faced with these symptoms, the physician should take a careful history in order to identify those patients with risk factors for HIV infection.[44,45]

### Non-Infectious Causes Of Pharyngitis

A variety of non-infectious processes can cause pharyngitis. In general, all of these processes result in pharyngeal irritation. Examples include smoke inhalation, thermal or chemical burns, swallowed objects (either foreign substances or foods), and vocal strain. Allergens may result in mild pharyngeal irritation, either directly or as an effect of posterior nasal discharge. Other causes may include gastroesophageal reflux disease, thyroiditis, or malignancy. In most cases, the diagnosis can be made or at least suspected based on the history alone. In more subtle cases, the emergency physician need only exclude serious causes of pharyngitis in order to refer the patient for further evaluation.[44]

Finally, some cases of pharyngitis have interesting and unusual causes. In one reported case, a patient sustained pharyngeal burns when parts of the screen from her crack cocaine pipe disintegrated and were inhaled.[48]

## Prehospital Care

The role of prehospital care providers in the management of the patient with pharyngitis is limited. For the non-toxic patient, ambulance transport is not required.

Emergency medical service personnel should focus on two key issues. First, they should be alert for signs of respiratory compromise resulting from upper airway obstruction. When these are identified, the patient should receive high-flow oxygen en route to an emergency center. Additionally, the patient should be transported in the position that affords him or her the greatest comfort. Often this position is a seated or semi-erect position rather than a recumbent one. Under no circumstances should a patient with signs of upper airway obstruction be forced to recline. Should the patient undergo complete airway obstruction during transportation, he or she should be managed with bag-mask ventilation, tracheal intubation, or a surgical airway. Many so called "rescue" airway devices like the Laryngeal Mask Airway or the Combitube may be ineffective in the management of patients with upper airway obstruction. Likewise, the use of transtracheal jet ventilation in cases of complete airway obstruction is, at best, controversial. When faced with a patient with signs suggesting upper airway obstruction, prehospital personnel should consider transport to a facility capable of providing surgical airway management.

Second, many patients with severe pharyngitis have been unable to maintain adequate hydration. In such cases, the administration of intravenous fluids may make the patient feel better. However, in urban environments with relatively short transport times, intravenous hydration is mandatory only for those patients who are significantly

dehydrated. IV access attempts in children with impending airway obstruction may be ill-advised as emotional upset may worsen the obstruction.

## Emergency Department Evaluation

### Initial Assessment

While most patients with pharyngitis are not significantly ill and do not require immediate attention, the emergency physician should begin by considering serious and life-threatening causes of sore throat. Signs of potentially severe disease include dysphonia / aphonia, trismus, drooling, stridor, toxic appearance, and air-hunger. In some cases the physician will need to treat the patient's respiratory symptoms before determining their etiology. Before dismissing a case as "just another sore throat," the physician should systematically answer the following questions:

1. Does the patient exhibit signs of existing or impending respiratory compromise?
2. Could the patient have epiglottitis, retropharyngeal abscess, Ludwig's angina, peritonsillar abscess, or infectious mononucleosis with severe tonsillar and lymphoid hypertrophy?
3. Is the patient severely dehydrated?

Only after these questions have been answered negatively can the physician be reassured that the patient is not seriously ill.

### History

Although few causes of pharyngitis can be identified by history alone, the history can offer the physician clues to the etiology and guide the diagnostic evaluation.

Assuming that the patient is not in obvious distress, the emergency physician's first task is to elicit historical clues suggesting a more serious course of illness. These include the inability to speak, a muffled voice, severe pain with phonation, or complaints of decreased oral intake resulting from significant pain. An abrupt onset of symptoms or rapid progression of the illness are also worrisome. However, equally concerning are the symptoms that gradually worsen and do not remit. Under such circumstances, the physician should consider entities like laryngeal or esophageal tumors and retropharyngeal abscess.[27,28,44,45]

In more routine cases, the history is important in helping to limit the differential diagnosis. In the simplest cases, the patient can relate a clear history of inhalational injury, direct trauma, chemical exposure, vocal strain, or other causative event. Exposure to others with similar symptoms suggests an infectious etiology. As in more serious cases, the timing of the symptoms is an important consideration. The patient with viral or bacterial pharyngitis is likely to have had an onset of symptoms early in the course of his or her illness, whereas the patient with infectious mononucleosis may have had a few days of lethargy followed by the onset of throat pain.[30,32,33,44,45] Likewise, associated signs and symptoms are important. For example, GABHS infection is not commonly associated with coryza, cough, conjunctivitis, and viral exanthem. The presence of several of these symptoms can effectively exclude GABHS from the differential diagnosis.[41,44,45,49-54] Conversely, a scarlatiniform rash in association with pharyngitis in a school-age child and in the absence of other viral symptoms makes GABHS the most likely cause of the patient's symptoms.[53,54]

The patient's age, the season, and the geographic location are also important parts of the history. GABHS is far more common in school-age children and in the fall and winter months, while infectious mononucleosis is more common in adolescents and young adults.[30,41,44,45,49,50] The incidence of rheumatic fever and streptococcal carriage vary with geographic location.[55] Finally, the physician should note any history of recent oral or pharyngeal trauma, dental work, or cosmetic oral piercing.[21-23]

The patient's past history is equally important. A history of rheumatic fever or congenital heart disease should be noted. It is especially important to determine whether the patient might have valvular heart disease. Immunization status should be noted, as should a history of immunodeficiency. Patients who have previously had mononucleosis are unlikely to have it again. If the patient reports a medication allergy, it is important to note the type of reaction that occurred. Many patients mistakenly believe that they are allergic to certain medications because they experienced an untoward but non-allergic reaction to a previous dose of medication (e.g., vomiting after erythromycin). Prior surgical history is likewise important. The patient who has had a tonsillectomy cannot have tonsillitis. Finally, the patient should be asked about his or her attempts to treat the symptoms. Home remedies, herbal treatments, and traditional medicines all can contribute to the clinical picture. Ask specifically about antibiotics, as many patients present after having treated themselves with leftover antibiotics or antibiotics prescribed for a friend or relative. Although the patient may be embarrassed to admit that he or she has taken medication, this history is potentially important and should be obtained whenever possible.

### Physical Examination

In most cases the physical examination begins when the emergency physician enters the examination room. By that time he or she may have already seen the patient's vital signs and nursing assessment and may have formed an opinion as to the likely etiology of the patient's symptoms, as well as the likelihood of serious or life-threatening illness. Tachycardia, tachypnea, and / or hypotension are clearly worrisome and should prompt an immediate and thorough evaluation. The presence of fever strongly supports an infectious etiology.

Identification and management of existing or impending airway obstruction takes precedence over other aspects of care, and the emergency physician must be alert for the signs of this condition. Severely affected patients will prefer to lean forward with their necks extended. When they attempt to recline, their symptoms worsen. They are unable to swallow their secretions; therefore, drooling is a common sign. Likewise, such individuals may have muffled speech or may be unable to speak at all.[10]

In addition, the emergency physician should be alert for signs of dehydration, as some patients experience significant odynophagia and are unable to maintain adequate fluid intake. In addition to tachycardia, the patient may have sunken eyes, dry or "tacky" mucous membranes, and decreased elasticity of the skin.

In more routine cases, the examination begins with the initial introductions. The quality of the patient's voice is an important clue to the possible pathology. A muffled voice may suggest a more serious condition. Next, the physician should ask the patient to open his or her mouth and protrude his or her tongue. Trismus indicates severe inflammation and is often associated with peritonsillar abscess and severe peritonsillar cellulitis.[26,28] Inside the oral cavity, the clinician should look for dental disease and ascertain whether the tongue appears to be elevated. Both are clues to Ludwig's angina. This diagnosis is supported by a firm, almost "woody" feeling when the sublingual and submental tissues are palpated.[21-23] The oral and buccal mucosa should be examined for the presence of lesions. Multiple ulcerations in the anterior mouth suggests primary herpes, while the presence of a few larger lesions on the soft palate is more indicative of coxsackievirus infection.[44,45]

In the posterior pharynx, attention should be directed to the tonsils (if present) and the uvula. Relatively large but uniform tonsils are normal in young children. However, unilateral enlargement and peritonsillar cellulitis are findings classically associated with peritonsillar abscess and tonsillitis. Additionally, the enlarged tonsil may have displaced the uvula laterally. In cooperative older children and adults, a fluctuant mass may be seen or palpated in the palatal tissue surrounding the tonsil.[21-23] Inflamed tonsils with exudates are typical of many types of infectious pharyngitis. However, diphtheria causes a gray membrane that is adherent to the tonsils and posterior pharynx. Attempted removal of the membrane reveals a hemorrhagic base.[45] In some cases of infectious mononucleosis, the tonsils become so enlarged that the patient develops symptoms of upper airway obstruction.[30] Likewise, several infectious and non-infectious inflammatory conditions can cause significant edema of the uvula. In some cases, the uvula may become so enlarged as to create a potential obstruction.[44]

The palatal examination can also be helpful in identifying the cause of the patient's symptoms. Palatal petechiae in particular are more often associated with bacterial pharyngitis. Likewise, as mentioned previously, masses or bulging of the pharynx can suggest peritonsillar abscess and, occasionally, are seen at or near the midline of the posterior pharynx in patients with retropharyngeal abscesses.[21-23,27,44,45]

Examination of the neck is also important. Limitation in neck mobility, particularly the inability or unwillingness to extend the neck to look up (Bolte's sign), has been shown to be a reliable sign of retropharyngeal abscess.[27] A recent report demonstrated the subtle nature of the presenting symptoms of retropharyngeal abscess in young children. The clinician who considers the diagnosis only in those children with signs of upper airway obstruction will not identify many patients. Attempting to distract the child into looking up can help in the identification of less obvious cases. Children with a retropharyngeal abscess will look up only with their eyes, whereas unaffected children will look up by extending their necks.[27] Examination of the neck also includes palpation of the lymph nodes. Enlarged, tender anterior cervical nodes are a part of the Centor criteria (history of fever, absence of cough, and tonsillar exudate are the others), and their presence is an important clue to the diagnosis of GABHS.[51] On the other hand, posterior cervical lymph nodes are more often associated with infectious mononucleosis.[30,32,33]

The remainder of the physical examination is also of value. Patients with other symptoms suggestive of viral illness are unlikely to have a GABHS infection.[41,44,45,49-54] These include conjunctivitis, rhinorrhea, viral exanthem, serous otitis media, cough, and wheezing. Unilateral or, less commonly, bilateral follicular conjunctivitis associated with exudative pharyngitis is a hallmark of adenovirus infection.[44] In a school-age child with pharyngitis, the presence of a scarlatiniform rash, on the other hand, is almost diagnostic, and many clinicians advocate treating such patients without testing.[53,54] While the agent *Arcanobacterium haemolyticum* produces a very similar rash, patients with *A. haemolyticum* infections are generally older and more often have an associated cough. Their rash is highly pruritic and, unlike the rash of scarlet fever, does not peel.[44,46] Patients with infectious mononucleosis often have splenomegaly, and some have hepatomegaly, as well. If treated with amoxicillin, patients with infectious mononucleosis often develop a morbilliform rash. Such a rash in a patient with the appropriate history should be considered de facto evidence of EBV infection.[30,32,33]

Finally, patients with coxsackievirus A 16 may have the hand, foot, and mouth syndrome, in which the patient presents with ulcers on the hands, feet, genitals, and/or buttocks, in addition to oral and pharyngeal lesions.[44,45]

### *Clinical Decision Rules*

Clinical decision rules or scoring systems are designed to reduce the subjectivity of clinical decision-making by providing the physician with a list of clinical symptoms or signs that either increase or decrease the patient's likelihood of having GABHS. Several rules for both adults and children have been developed.

### *Cost-Effectiveness Rules*

One of the key reasons for the development of clinical decision rules is to provide cost-effective treatment while avoiding unnecessary exposure to antibiotics and complications of either the disease or its treatment.

Among the earliest rules are those developed by Tompkins. The Tompkins rules are based on the costs of various testing and treatment strategies and take into account the costs associated with rheumatic fever and its attendant complications, the costs of the treatment itself, and the costs associated with caring for individuals who have an allergic reaction to penicillin. (The rules do not account for the costs associated with missed work, alternative daycare arrangements, and other "social costs.") The rules are older and do not consider the costs of alternative antibiotics or RADTs. The Tompkins rules

recommend that all patients with at least a 20% chance of having a GABHS infection be treated presumptively without obtaining a culture. Conversely, those with less than a 5% chance would be neither cultured nor treated. Those patients with a 5%-19% chance of having a GABHS infection should be cultured.[56]

Tsevat et al performed a similar analysis. They compared the cost-effectiveness of seven strategies, which included neither testing nor treating anyone, treating all patients presumptively without testing, and various combinations of testing and treating, including the use of RADTs. They concluded that in a population of what they termed "adherent" patients, the most cost-effective strategy was throat culture followed by treatment only for those patients whose cultures were positive.[38]

The Tsevat study, while interesting, is more applicable to office-based practitioners with a reliable patient base. The Tompkins rules can be used to justify presumptive therapy but, given the low risk of rheumatic fever, would result in gross overtreatment if rigorously followed.

Rather than slavishly applying these criteria, emergency physicians should simply understand that there is a real or potential cost, whether immediate or delayed, associated with any treatment strategy. Presumptive treatment should be administered to patients with a reasonable chance of having a true infection, while those with a very low chance should be treated symptomatically. Patients with an intermediate risk are the best candidates for testing.

### *Rules For Adults*

Perhaps the best known clinical decision rules for pharyngitis are those published by Centor et al in 1981.[51] They used logistical regression models to create a four-item score. The four items were: 1) tonsillar exudates; 2) swollen, tender, anterior cervical lymph nodes; 3) lack of a cough; and 4) a history of fever. In a group of 286 patients over 15 years old, they found that patients who met all four criteria had a 56% probability of having a positive culture, while those who met none of the criteria had only a 2.5% probability of having a positive culture.[51] These rules have been prospectively validated in three adult populations and are considered to be highly reliable.[51,57,58]

McIsaac et al modified the Centor criteria slightly by adding two age-based criteria. In the McIsaac modification, one additional point is added if the patient is less than 15 years old, and a point is subtracted if the patient is 45 years of age or older. Patients with a McIsaac score of 0 or -1 have a 1% chance of having a positive throat culture, while those with a score of 4 or 5 have a 51% chance of having a positive throat culture.[57]

Walsh et al created a branching algorithm based on criteria similar to those used by Centor but also including a history of exposure to GABHS. Using the algorithm in a group of 418 adults, patients were sorted into high-, moderate-, and low-risk groups. Those patients in the high-risk group had a 23%-28% chance of having a positive throat culture, those in the moderate-risk group had a 12%-15% chance, and those in the low-risk group had a 3%-4% chance.[52]

The Centor rules are well-validated and have been endorsed by several respected specialty societies and the CDC.[6] Patients with a Centor score of 0 are very unlikely to have GABHS and, given the somewhat lower risk of complications in adult patients, can be treated symptomatically. Those with scores of 4 can be treated presumptively or tested (with an RADT), at the discretion of the physician, with the understanding that they have a 56% chance of having a positive throat culture. Depending on the circumstances, patients with scores of 2 or 3 can be tested, and only those with positive tests treated. Or, one can simply treat all patients with scores of 3 or 4 with antibiotics and give those with scores of 2 or less symptomatic treatment only.[6]

The McIsaac modification of the Centor rules should be valid as well, but they have not been as rigorously tested as the original rules. The Walsh branching algorithm is not as effective as the Centor rules.[52,57]

### *Rules For Children*

In 1977 Breese developed what he called a "simple scorecard" for the diagnosis of GABHS. This was a nine-item, weighted scoring system with a maximum possible score of 36 points. Unfortunately, the scoring system recommends the routine use of a white blood cell count. In addition, the validation study contained significant methodological flaws. These problems make this system impractical for routine use.[49]

In 1998 Wald et al published a study of a simplified version of the Breese scorecard.[44] They eliminated the white blood cell count and instead evaluated six items: 1) age; 2) season; 3) temperature of at least 38.3ºC; 4) adenopathy; 5) pharyngeal erythema, edema, or exudates; and 6) no symptoms of viral upper respiratory tract infection. The maximum possible score was 6. In a group of 365 children they found that a score of 5 or 6 predicted a positive culture in 59% and 75% of patients, respectively. On the other hand, a significant number of children with scores of 2 or 3 had positive throat cultures.[50]

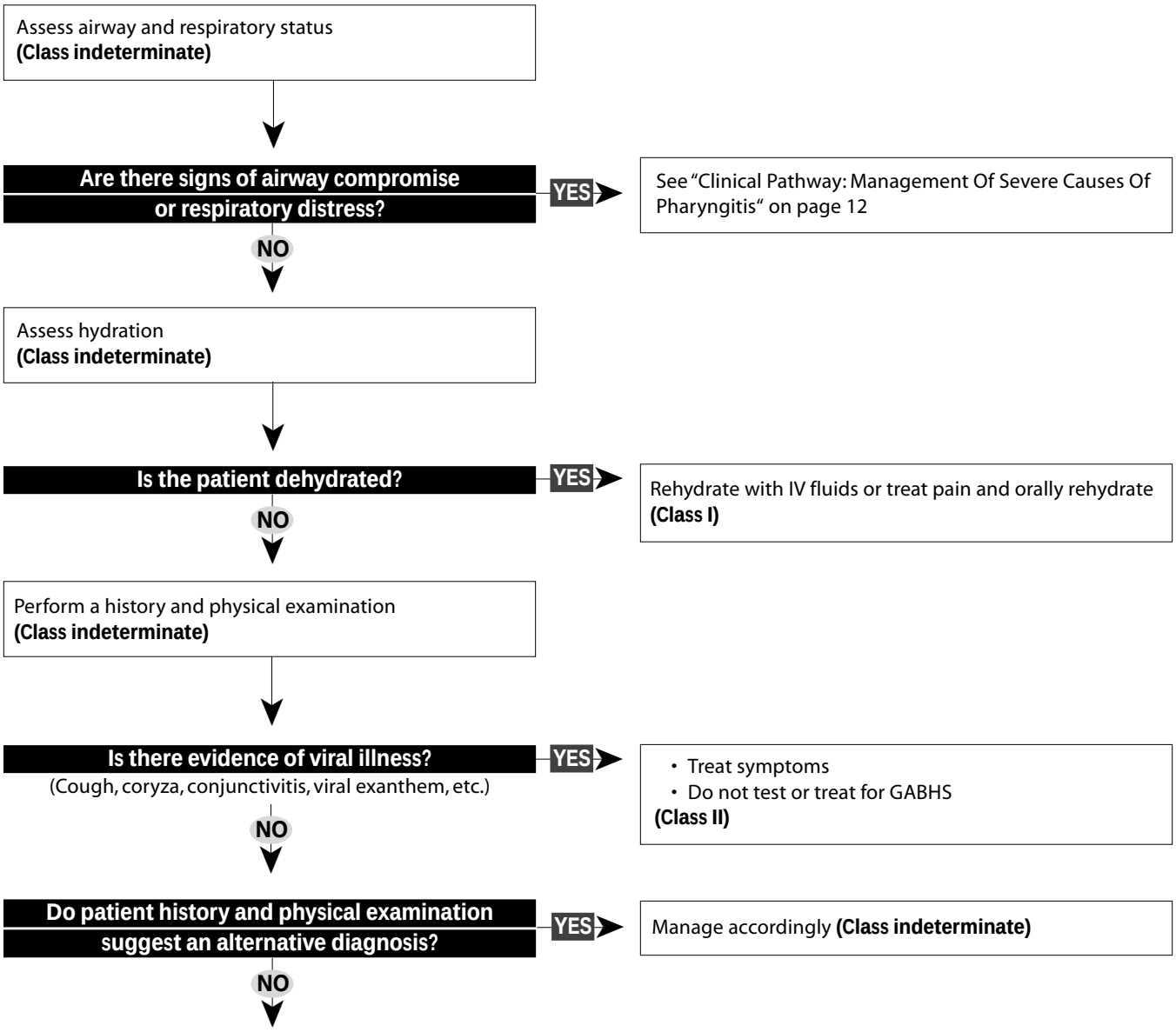
Attia et al developed and tested a four-item model. The items in their model included tonsillar swelling, cervical lymphadenopathy, and absence of coryza (valued at 1 point each) and presence of a scarlatiniform rash (valued at 2 points) for a total possible score of 5 points. A patient with a score of 0 had only a 12% chance of having a positive throat culture (approximately the GABHS carriage rate in the community studied), while a patient with a score of 4 or more had a 79% chance of having a positive throat culture. Unfortunately, a score of 4 or 5 points was only possible in the presence of a scarlatiniform rash, a relatively rare finding. Those patients with a score of 1-3 had, in aggregate, only a 36% chance of having a positive culture.[53,54]

McIsaac et al developed a modification of the Centor decision rules (as discussed in the section on rules for adults). In their validation study of 167 children and 453 adults, a patient with a score of 4 or 5 had a 51% chance of having strep throat.[57]

The results of these studies suggest that children with a

*Continued on page 14*

# Clinical Pathway: Evaluation And Management Of Pharyngitis




*Go to "Adults" or "Children" portion of pathway on next page*

The **evidence for recommendations** is graded using the following scale. For complete definitions, see back page. **Class I:** Definitely recommended. Definitive, excellent evidence provides support. **Class II:** Acceptable and useful. Good evidence provides support. **Class III:** May be acceptable, possibly useful. Fair-to-good evidence provides support. **Indeterminate:** Continuing area of research.

*This clinical pathway is intended to supplement, rather than substitute for, professional judgment and may be changed depending upon a patient's individual needs. Failure to comply with this pathway does not represent a breach of the standard of care.*

# Clinical Pathway: Evaluation And Management Of Pharyngitis (continued)

## Adults

**Does patient have scarlatiniform rash OR *all four* of the Centor criteria?**

1. Absence of cough
2. Fever or history of fever
3. Tender and enlarged anterior cervical lymph nodes
4. Exudative pharyngitis

YES →
- Consider presumptive treatment for GABHS **(Class II)**
- RADT testing is an acceptable alternative **(Class III)**

NO ↓

**Does patient have three of the Centor criteria?**

YES →
- Perform RADT
- Treat positives
- *Do not* culture
- Presumptive treatment is an acceptable alternative

**(Class III)**

NO ↓

**Does patient have two of the Centor criteria?**

YES →
- Perform RADT
- Treat positives
- *Do not* culture

**(Class III)**

NO ↓

**Patient has one or none of the Centor criteria**
- Do not test or treat with antibiotics
- Treat symptoms

**(Class II)**

## Children

**Does patient have scarlatiniform rash OR *all five* of the following?**

1. Age 5-15 years
2. Fall or winter season
3. Temperature of at least 38.3°C
4. Tender and enlarged anterior cervical lymph nodes
5. Exudative pharyngitis

YES →
- Consider presumptive treatment for GABHS **(Class II)**
- RADT testing is an acceptable alternative **(Class III)**

NO ↓

**Is there a need for rapid diagnosis?**
- Does the patient have unreliable follow-up care?
- Is the patient likely to be noncompliant?

YES →
- Perform RADT **(Class II)**
- Treat positives
- Culture negatives **AND** document follow-up arrangements for culture results **(Class III)**

NO ↓
- Perform culture
- Arrange follow-up for positive results **(Class II)**
- RADT testing followed by treatment of positives and culture of negatives is an acceptable alternative **(Class II)**

The **evidence for recommendations** is graded using the following scale. For complete definitions, see back page. **Class I:** Definitely recommended. Definitive, excellent evidence provides support. **Class II:** Acceptable and useful. Good evidence provides support. **Class III:** May be acceptable, possibly useful. Fair-to-good evidence provides support. **Indeterminate:** Continuing area of research.

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# Clinical Pathway: Management Of Severe Causes Of Pharyngitis

**Does the patient have evidence of impending upper airway obstruction or partial upper airway obstruction?**
(e.g., drooling, stridor, aphonia, dysphonia, "tripod" position)

YES →

**Airway management takes precedence over diagnosis and treatment**
If management is to occur in the ED:
1. Prepare a "double set-up"
2. Consider alternatives to paralytic agents
3. Have alternative airway adjuncts immediately available

**(Class III)**

NO ↓

Perform a history and physical examination **(Class indeterminate)**

↓

**Is there evidence of Ludwig's angina?**
(Submental edema, elevation of the tongue, firm, "woody" sublingual area, history of dental disease, intraoral trauma or tongue piercing)

YES →

Surgical consultation **(Class indeterminate)**

NO ↓

**Is there evidence of epiglottitis?**
(Dyspnea at rest, intense throat pain out of proportion to examination findings, dysphonia)

YES →

- Visualize epiglottis using dental mirror or nasopharyngoscope **OR** obtain lateral neck film **(Class III)**
- If patient is a young child, consider immediate evaluation in the operating room **(Class III)**
- Admit

NO ↓

*Go to top of next page*

The **evidence for recommendations** is graded using the following scale. For complete definitions, see back page. **Class I:** Definitely recommended. Definitive, excellent evidence provides support. **Class II:** Acceptable and useful. Good evidence provides support. **Class III:** May be acceptable, possibly useful. Fair-to-good evidence provides support. **Indeterminate:** Continuing area of research.

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# Clinical Pathway: Management Of Severe Causes Of Pharyngitis (continued)

**Is there evidence of retropharyngeal abscess?** — YES →
(Neck stiffness, dysphonia, more gradual onset of symptoms; in adults, history of bone or other sharp object ingestion)

- Obtain CT scan **(Class III)**
- If diagnosis is confirmed, obtain surgical consultation **(Class indeterminate)**

NO ↓

**Is there evidence of peritonsillar abscess?** — YES →
(Trismus, unilateral tonsilar enlargement, tonsillar deviation, deviation of the uvula)

- Consider needle aspiration followed by antibiotic treatment directed against typical flora and anaerobes **(Class III)**

**OR**

- Obtain surgical consultation **(Class indeterminate)**

NO ↓

**Is there evidence of mononucleosis with severe tonsillar hypertrophy?** — YES →
(History of symptoms consistent with mononucleosis **AND** enlarged tonsils with signs of early airway obstruction)

- Admit
- Begin treatment with steroids

**(Class III)**

NO ↓

- Consider alternative diagnosis
- Reconsider above diagnoses

The **evidence for recommendations** is graded using the following scale. For complete definitions, see back page. **Class I:** Definitely recommended. Definitive, excellent evidence provides support. **Class II:** Acceptable and useful. Good evidence provides support. **Class III:** May be acceptable, possibly useful. Fair-to-good evidence provides support. **Indeterminate:** Continuing area of research.

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*Continued from page 9*

score of 5 or 6 using the Wald scorecard, a McIsaac score of 4 or 5, or those with a scarlatiniform rash associated with other typical symptoms of GABHS infection can be treated presumptively. Unfortunately, none of these methods can be used to exclude GABHS without testing.

## Diagnostic Testing

### Laboratory Tests

#### *Throat Culture*

When clinical decision rules and rapid detection tests are discussed, their sensitivity and specificity are virtually always compared to the "gold standard" of the throat culture, which is 90%-99% sensitive for the detection of GABHS infection. It is, of course, nearly 100% specific for the presence of the bacteria in the pharynx—but this may reflect a carrier state and not disease. The distinction between these states requires antibody testing.[41,44,45] Conversely, patients with relatively small numbers of organisms in their throats (e.g., carriers) may not have positive throat cultures.[44]

Another drawback is that the results are very dependent on the technique used to obtain the sample. The physician or nurse who attempts to obtain a culture from a crying and uncooperative child by shoving a swab somewhere into the child's mouth is wasting money and time. Instead, the swab should be passed along the surface of the tonsils (in patients who have undergone tonsillectomy, the tonsillar fossa is an acceptable alternative) and the posterior pharynx.[59] Using two swabs improves the odds of obtaining a positive culture.

From the perspective of the emergency physician, however, the primary problem with the throat culture is the time delay in obtaining results. This delay is problematic for several reasons. The ED must establish a method for contacting those patients with positive cultures and arranging for them to be treated. Records must be kept so that attempts at contact are verifiable. Such systems can become time- and labor-intensive. The patient may be forced to miss one or more days of school or work while waiting for the test result and is often further inconvenienced by a second medical visit. Finally, one of the benefits (albeit relatively minor) of treatment prior to receiving the test results is that the patient's symptoms might improve 24-48 hours sooner. A delay in treatment while awaiting culture results is likely to obviate this benefit.[44]

If the patient history suggests the possibility of gonococcal pharyngitis, routine throat culture on sheep's red blood cell agar is not the test of choice. Suspected infections should, instead, be confirmed by culture on Thayer-Martin agar.[45,47] Because certain non-pathogenic strains of *Neisseria* colonize the pharynx (especially in young children), and because of the potential consequences of the diagnosis of gonococcal pharyngitis, obtaining a second set of confirmatory cultures is recommended. Newer DNA probe tests for *N. gonorrhoeae* are not recommended for the diagnosis of gonococcal pharyngitis.[47,60]

#### *Rapid Antigen Detection Tests*

RADTs became available in the 1980s and have rapidly evolved. RADT testing is done in a fashion similar to the throat culture. A swab is passed over the tonsils and the posterior pharynx. In a person with pharyngitis, the presence of GABHS provides the source of bacterial antigens for the test. This material is treated and then exposed to antibodies against GABHS. A marker is used to detect the antigen / antibody complex. Early systems were based on latex agglutination technology. Because this test involves several steps and requires subjective interpretation by a technician, there are many opportunities for the technique to fail. It should come as no surprise that these tests have relatively low sensitivities (mean, 80%; range, 62%-97%).[61,62]

The next RADT tests to be developed and released were based upon enzyme-linked immunoabsorbent assay (ELISA). ELISA technology still involves several steps; however, the use of a color indicator means that the result is less reliant on subjective interpretation by laboratory personnel. Unfortunately, the ELISA tests have a performance profile very similar to that of latex agglutination (mean sensitivity, 79%; range, 61%-96%).[61,62]

The current generation of tests primarily employs optical immunoassay (OIA) technology. OIA tests rely on the changes in the reflection of light to indicate that the antibody has bound to the antigen sample. Test results are generally available in less than one hour, allowing a treatment decision to be made while the patient is still in the ED. Many studies comparing OIA detection test to GABHS culture have been conducted. Virtually all agree that OIA detection test are very specific for GABHS. In light of a positive test, the patient can be assumed to have streptococcal pharyngitis and can be treated accordingly. Unfortunately, in the case of sensitivity, the results of these studies have been quite variable. The sensitivities of OIA tests have been reported to be as low as 77% and as high as 95%-99%.[61-64] This range is, of course, an important issue. If the tests truly are 95%-99% sensitive, then their ability to detect true GABHS infection while simultaneously identifying those with non-streptococcal pharyngitis is on par with the throat culture. This implies that confirmation of a negative test by throat culture is unnecessary. On the other hand, if their sensitivity is closer to 77%, then roughly 20% of infections that would have been detected by culture would be missed.

Newer tests using DNA probe technology are available. These tests offer the promise of higher sensitivities and specificities. Unfortunately, the tests currently available have a turnaround time measured in hours rather than minutes. This makes them only slightly better than the culture in terms of speed with no advantage in cost.[61,64,65]

RADTs have many of the same potential failings as cultures. Like cultures, they rely on a properly collected specimen—and, like cultures, the technique used to perform the test can influence the results. Some have noted that in many cases in which the RADT is negative but the culture is positive, the culture has a very low bacterial colony count. This has led to the postulation that these are patients with very few organisms in their throats (perhaps GABHS

carriers with non-streptococcal pharyngitis).

There is another potential problem with RADTs. A recent study demonstrated that these tests are subject to so-called spectrum bias. That is, the sensitivity of the test varies with the likelihood of disease in the subject. In this study, the RADT was 61% sensitive in subjects with none or one of the Centor criteria, 76% sensitive in those with two Centor criteria, 90% sensitive in those with three Centor criteria, and 97% sensitive in those with four Centor criteria. These findings imply that, among other things, in patients with three or four Centor criteria who have a negative RADT, confirmatory cultures may be unnecessary and may serve to explain the wide variation in the reported sensitivities of these tests.[66]

For all of these failings, RADTs perform as well as or better than most clinical decision rules, although they are more costly.

### *ASO Testing*

The human host produces antibodies to certain components of the GABHS cell wall (somatic or cellular antigens) and to substances produced by the organism (extracellular antigens). The test for anti-streptolysin O (ASO), the antibody directed against an antigenic hemolysin produced by the GABHS organism, is most familiar to clinicians. It has been used for many years to track the recovery of patients with rheumatic fever and poststretococcal glomerulonephritis. In recent years, ASO titers and other antibody tests have been incorporated into commercial kits, making them easier to obtain.

However, as a clinical tool, antibody tests have many drawbacks. The most important problem is that one titer says little about the status of the patient's condition. There is no reference standard for a "normal" ASO titer. Many factors affect the immune response to GABHS infection, including the age of the patient, the underlying incidence of the disease in the population, the site of the infection (pharyngitis produces a more vigorous antibody response than skin infection), the season of the year, and whether or not antibiotics were given and the timing of such treatment. Antibody testing, therefore, is only useful in tracking the course of an illness in an individual patient. The initial titer is only useful in the presence of later "convalescent" titers. This limitation makes antibody testing nearly useless to the emergency physician.[67]

### *Heterophile Antibody Testing For Mononucleosis*

EBV infection can be identified with certainty by a variety of antigen tests; however, most are expensive and labor-intensive. The most commonly used surrogate for specific tests is the heterophile antibody response (Monospot).

This test is inexpensive and readily available but imperfect. The test is not specific for EBV. Furthermore, since the antibody response takes some time to occur, the test may not be positive early in the course of illness. Only 60%-70% of patients have a positive heterophile antibody test during the first week of illness. By the third week, 80%-90% of patients will have a positive test. In 15%-20% of adolescent and young adult patients with a true infection, the test remains negative. In young children, even fewer have a positive heterophile antibody test.[30]

### *Complete Blood Count*

In the evaluation of the patient with pharyngitis, the role of the complete blood count (CBC) is limited and should not be routine. While patients with either bacterial pharyngitis or an abscess are likely to have an elevated white blood cell count, in most cases, the CBC is of no assistance in making a diagnosis. Patients with infectious mononucleosis do often have atypical lymphocytes noted on peripheral smear. This finding may help the clinician to confirm his or her suspicions, particularly when the physician is evaluating the patient early in the course of illness, when the heterophile antibody test is most likely to be negative.[30]

## Radiologic Tests

### *Soft Tissue Lateral Neck Film*

The soft tissue lateral neck film is used primarily in the evaluation of patients with symptoms of upper airway obstruction. A properly performed soft-tissue lateral neck film can help the physician to diagnose epiglottitis, retropharyngeal abscess, pharyngeal, esophageal, or tracheal foreign bodies, and, when combined with an AP soft tissue neck film, croup. For patients with epiglottitis, the classic finding is enlargement of the epiglottis (also known as the "thumbprint sign"). It is important to understand that inflammation of the epiglottis is not an isolated occurrence. Other tissues near the epiglottis are also inflamed, and their appearance on x-ray will be altered. The entire area around the epiglottis appears edematous. Furthermore, the lateral neck film may be less helpful in the diagnosis of adult epiglottitis than in pediatric epiglottitis.[10,17] When the symptoms are strongly suggestive of epiglottitis, direct examination of the epiglottis is preferred for adults.[10,16,17]

For patients with retropharyngeal abscess, the classical finding on soft tissue lateral neck film is widening of the retropharyngeal soft tissues. This begs the question, "How wide is too wide?" There is no single answer to this question. Over the years, various rules of thumb have been suggested. The most common of these states that the prevertebral space anterior to the second cervical vertebrae should be no larger than the width of the vertebral body itself, provided that the patient is a young child.[68] More precisely stated, the retropharyngeal tissues should be 7 mm or less measured from the most anterior portion of C2. The retrotracheal space should be measured from the anterior aspect of C5 or C6 and should be less than 14 mm.[29,68] No evidence has demonstrated this rule to be superior to the clinician simply looking at the film and using his or her judgment. In order to provide the most useful information, the patient must be properly positioned. The retropharyngeal space will appear falsely enlarged unless the patient's neck is well extended and the film is taken in full inspiration.[29] When the patient is a young child (the typical victims of retropharyngeal abscess are young children), a useful radiograph may be difficult to achieve. Furthermore, CT scanning has been demonstrated to be more sensitive than plain radiographs and, therefore, should be considered the modality of choice when retropharyngeal abscess is strongly suspected.[27,29,68,69]

Most radioopaque foreign bodies are readily detectable on plain radiographs. However, only a few foreign bodies are radioopaque. In practice, plain films are most useful in the identification of metallic foreign bodies (e.g., coins). This modality is less useful for objects that are less dense.[70-72] While the appearance of these objects on plain x-ray is often touted as a means by which to distinguish between tracheal and esophageal foreign bodies, in practice objects located within the trachea cause more serious respiratory symptoms. Furthermore, many objects that will readily pass into the esophagus are too large to enter the trachea.[73]

Although laryngotracheobronchitis, commonly called "croup," is largely a clinical diagnosis, when doubt exists or when other diagnoses are being considered, AP and soft tissue lateral neck films may be useful. On the AP view, the classic finding in croup is narrowing of the tracheal air column in the subglottic region (also known as the "steeple" sign); on the lateral film, a "foggy" or "ground glass" appearance is commonly noted in the subglottic area.[74]

### *Computed Tomography*

CT is the modality of choice in the evaluation of suspected abscesses. When the clinician strongly suspects that the patient has, for example, a retropharyngeal abscess, many experts argue that plain x-rays are superfluous and should be omitted in favor of a CT scan.[27,29,68,69] CT is also useful in the evaluation of patients with Ludwig's angina.[21-23]

For all of its advantages, however, CT scanning does have some drawbacks. The patient must lie supine, if only for a few minutes, and this may be difficult or impossible when the patient has symptoms of airway obstruction. Likewise, young children, unless sedated, may move during the study. Movement can be reduced or eliminated with sedation, but this has attendant risks. Finally, CT scanning exposes the patient to significantly more radiation than plain radiography.[75]

## Ten Pitfalls To Avoid

**1. "How could it have been epiglottitis? This guy was 45 years old. Besides, his throat didn't look bad at all!"** Epiglottitis is very rare in American children. However, adults still can and do get the disease. Adults with epiglottitis often present in a more subtle fashion. The majority of adult patients complain of intense throat pain and hoarseness. Dyspnea upon presentation is a very worrisome sign. The emergency physician should be especially wary of the patient with significant throat pain with a relatively benign-appearing posterior pharynx. A simple lateral neck x-ray is often diagnostic. It is also perfectly acceptable to attempt to visualize the epiglottis with a dental mirror or a nasopharyngoscope.

**2. "Sure, the kid was in distress—but with epiglottitis out of the picture, I figured it would be okay just to sedate him and take a look in the ED."** Pediatric epiglottitis is but one form of upper airway obstruction, and *Haemophilus influenzae* type B is not the only cause of epiglottitis. Chemical and thermal injury and, uncommonly, other types of infection can result in edema of the epiglottis and its surrounding tissues. Management of any patient with impending airway obstruction is best conducted in the most controlled environment possible. Definitive management in the ED should be considered as a last resort. When forced to manage a patient with airway obstruction in the ED, the physician should have several alternative airway devices available and, in most cases, should prepare for a surgical airway with a "double set-up."

**3. "Hey, it was just a sore throat. What do you mean, she came back the next day severely dehydrated?"** Pharyngitis can be exceptionally painful, which makes it difficult for patients to consume enough liquids. The emergency physician should first ensure that the patient is adequately hydrated at the time of his or her initial evaluation and then be certain to suggest or prescribe medications and other strategies to reduce the patient's pain so that he or she can maintain adequate fluid intake.

**4. "My strategy is a quick exam and a prescription. What's wrong with that?"** While many physicians employ a strategy of presumptive treatment for all cases of pharyngitis, this approach is flawed on several levels. First, many patients would prefer to understand their disease and why the physician is recommending one course of treatment rather than another. Second, unnecessary antibiotic treatment increases the cost of healthcare, increases the incidence of resistant bacteria, places the patient at risk for medication allergy and other untoward reactions, and creates an expectation of antibiotics for future illnesses.

**5. "That teenager had all four Centor criteria, so I treated her with amoxicillin. Her mom was really mad about the rash."** Patients who have infectious mononucleosis can resemble those with GABHS pharyngitis. Penicillin treatment has no impact on the disease, but patients with mononucleosis who take amoxicillin can get a diffuse morbilliform rash. The rash is harmless and doesn't represent medication allergy; however, many patients find the rash upsetting. The rash can be avoided by treating those in the classic mononucleosis age group with penicillin instead of amoxicillin or by performing a high-sensitivity RADT and treating only those patients with a positive result. Patients who are presumptively treated with amoxicillin should be warned about this possible complication.

**6. "Hey, I work in an ED—I don't have much use for a social history."** In most cases, pharyngitis is a benign, self-limited illness. However, in certain circumstances, more liberal treatment is indicated. It is particularly important to know which patients are at greater risk for more serious forms of pharyngitis and for complications. For example, recent immigrants from certain countries (e.g., the former Soviet Union) might be more likely to have diphtheria. Likewise, rheumatic fever, while rare, occurs with greater frequency in certain parts of the United States and in certain countries. (In the United States, outbreaks have been reported in Pennsylvania, Utah, West Virginia, and Texas, among others. Worldwide, rheumatic fever remains a problem in much of the third world.) Patients

*Continued on page 17*

## Treatment

### Airway Management

Although a complete discussion of emergency airway management is beyond the scope of this article, airway management is the first priority for the patient with respiratory distress. The patient with complete airway obstruction obviously requires immediate airway management. It is appropriate to attempt bag-valve mask ventilation (the two-person technique is recommended and often required to achieve adequate ventilation) as the initial management technique. If adequate ventilation with the bag-valve mask cannot be achieved, and orotracheal intubation cannot be accomplished, a surgical airway will be necessary.[76]

For patients with impending airway obstruction, administration of 100% oxygen is the first priority. Definitive management of the airway might occur in the ED, the intensive care unit, or the operating room depending on local protocols and the availability of personnel and equipment. If the underlying cause of the patient's symptoms is surgical or possibly surgical, the appropriate surgeon should be notified as soon as possible.

### Peritonsillar Abscess

In the past, most patients were admitted to the hospital and underwent incision and drainage followed by antibiotic treatment. Recent evidence, however, suggests that needle aspiration may be just as effective, although it may be associated with a higher rate of recurrence. Experienced emergency physicians may undertake this procedure but must take care to avoid complications, the most serious of which is inadvertent puncture of the carotid artery.[77,78] In addition to having the abscess aspirated, most patients should be placed on antibiotics. Currently, clindamycin and second- or third-generation cephalosporins are the recommended agents.[25] With proper aspiration, antibiotic treatment, and appropriate follow-up, many patients with

## Ten Pitfalls To Avoid (continued)

who are at greater risk for these illnesses are candidates for a thorough evaluation. It is very important to recognize that virtually all clinical decision rules and treatment pathways designed for pharyngitis were intended for use under normal circumstances. These rules should not be used during outbreaks and should not be applied to individuals at greater risk for serious disease.

**7. " I sent the new tech in to do the rapid strep test. It was negative, but now the throat culture is positive, and I have to call the child back."** There are many reasons that the RADT might be negative even though the patient has GABHS pharyngitis. The most common reason is undoubtedly poor collection technique. The swab should be passed over both tonsils and the posterior pharynx. In patients whose tonsils have been removed, the tonsillar fossae are an adequate substitute. Failure to perform the tests correctly can result in false-negative results. All members of the staff responsible for performing these tests should be thoroughly trained in the proper collection method.

**8. "I was worried about a retropharyngeal abscess. The lateral neck film seemed to confirm my suspicions, so I ordered a CT scan. For the patient's sake, I'm happy that the scan was normal, but I just don't understand how this could have happened."** The soft-tissue lateral neck x-ray remains the screening test of choice for retropharyngeal abscess, although some authors advocate direct CT scanning of high-risk cases. Enlargement of the prevertebral soft tissues suggests the presence of this disease. However, care must be taken to distinguish a truly enlarged prevertebral space from one that only appears to be enlarged. The most common reason for a falsely positive soft-tissue lateral neck film is inappropriate flexion of the patient's neck. Retropharyngeal abscess is most common in young children, and it can be very difficult for the radiology technician to properly position these often uncooperative patients. Nonetheless, the emergency physician should not accept the film unless the patient's neck is well extended. Similarly, if the child is crying vigorously at the time the film is taken, the technician should attempt to obtain the x-ray while the patient is in inspiration. Expiratory films of crying children often appear to have large prevertebral spaces.

**9. "I don't understand it. I wrote a prescription and spent time explaining things to the family. How could the patient have relapsed?"** There are several possible explanations for treatment failure or relapse in a patient with GABHS pharyngitis. Noncompliance is probably the most common reason. If oral medication is used, most authorities recommend a full 10 days of treatment. Patients who fail to comply with this regimen are more likely to fail treatment. Some authors have suggested that the presence of other beta-lactamase-producing bacteria in the patient's throat might prevent beta-lactam antibiotics, like penicillin, from eradicating a sufficient number of GABHS organisms. Patients who fail therapy or relapse shortly after treatment might benefit from treatment with antibiotics effective against beta-lactamase-producing organisms. Penicillin remains the drug of choice for initial treatment in non-allergic patients. Finally, penicillin-allergic patients who are treated with erythromycin might have an infection caused by a strain of GABHS that is resistant to erythromycin. In such cases, treatment with a different agent is warranted.

**10. "I treated the guy with an appropriate antibiotic, but he complained because I didn't address his need for pain medication."** Since only a minority of patients with pharyngitis can be expected to benefit from antibiotic treatment, one of the emergency physician's primary duties is to assess and treat the patient's discomfort. Some patients will benefit from simple over-the-counter analgesics, gargles, and topical agents, while others might require narcotic pain medications in order to receive maximum benefit. There is a growing body of evidence suggesting that steroid treatment might be beneficial in the subset of patients with documented bacterial pharyngitis. The issue of pain control has long been an important one, but recently it has been the focus of several regulatory bodies. As such, emergency physicians should ensure that all patients with painful conditions receive adequate analgesia. ▲

peritonsillar abscesses can be managed as outpatients.[25,77,78]

### Infectious Mononucleosis With Impending Airway Obstruction

Although most cases of infectious mononucleosis are little more than an annoyance, a few patients will develop significant lymphoid hypertrophy. A subset of these patients (0.1%-1.0%) will go on to develop signs of airway obstruction. In these patients, treatment with corticosterioids is generally recommended to reduce the tonsillar hypertrophy and, therefore, to reduce the obstructive symptoms.[79] Unless the patient has difficulty swallowing, prednisone (1 mg/kg/day; maximum dose, 60 mg) is generally effective. Intravenous methylprednisolone (2 mg/kg/day; maximum dose, 125 mg) is an acceptable alternative.

### Infectious Pharyngitis

Treatment of infectious pharyngitis consists of therapy to reduce patient discomfort and antibiotic treatment of the infectious agent when appropriate.

However, there is often little in the way of medical evidence to support many of these therapies. For example, an antihistamine, with or without a decongestant, could, in theory, eliminate the posterior nasal drainage that causes pharyngeal irritation associated with viral upper respiratory tract infection; however, most studies of these agents find little or no benefit.[80]

What most patients desire is relief from the sore throat. Such treatments come in a variety of forms. Some are over-the-counter medications, available at virtually any pharmacy or supermarket, while others require a prescription.

First, and easiest to use, are non-prescription analgesic medications to reduce fever and help with body aches. These include acetaminophen, aspirin, ibuprofen, and naproxen. Each of these agents has advantages and disadvantages. In appropriate doses, all are relatively effective pain medications, and most are available in inexpensive generic preparations. One study of children with pharyngitis compared the effectiveness of acetaminophen, ibuprofen, and placebo and found that by 48 hours, pain had resolved in 80% of ibuprofen-treated children, 70.5% of acetaminophen-treated children, and 55% of those who took the placebo. The difference between ibuprofen and placebo was statistically significant, while the differences between acetaminophen and placebo and between acetaminophen and ibuprofen were not.[81]

If the patient has significant pain that has not been relieved by one of these agents, the physician can certainly consider treatment with an oral narcotic agent. Of the three commonly prescribed oral narcotics—codeine, oxycodone, and hydrocodone—the latter two are slightly more effective and are associated with fewer unpleasant side-effects.[82]

A variety of topical agents are also available. Topical sprays containing benzocaine and/or phenol are available over the counter and in prescription preparations. These preparations provide temporary relief from pain and might allow the patient to ingest enough liquids to maintain adequate hydration or to swallow analgesic capsules or tablets without undue discomfort. On the other hand, they affect the taste buds and are rapidly washed away by saliva and consumed liquids.

These medications are very safe if used in the recommended doses. However, there is little or no evidence to support their use. German investigators compared the effectiveness of lozenges made from the mucolytic ambroxol hydrochloride to placebo lozenges and found that ambroxol hydrochloride provided superior pain reduction.[83,84] Unfortunately, this agent is not available in the United States. Likewise, British and Australian investigators have demonstrated that lozenges containing 8.75 mg of flurbiprofen are superior to placebo in reducing the pain associated with sore throat. Currently, flurbiprofen is only available in the United States as an ocular preparation.[85]

Finally, no discussion of symptomatic treatment would be complete without consideration of the role of corticosteroids. Although many practitioners routinely prescribe or administer corticosteroids to patients with pharyngitis, there are no large trials to support this practice. However, the results of a number of smaller studies suggest that corticosteroid treatment provides pain relief several hours sooner than might otherwise be expected.[86-89] Early studies centered on the use of intramuscular steroids, but the results of more recent trials indicate that oral agents are equally effective.[87,88] A single 10 mg dose of dexamethasone (either taken orally or injected intramuscularly) and a single 60 mg dose of prednisone have been demonstrated to be effective in adults. Children should receive a single dose of oral dexamethasone (0.6 mg/kg; maximum dose, 10 mg). Interestingly, the greatest benefits seem to occur in patients who have culture-proven bacterial pharyngitis. Therefore, steroids should be strongly considered in those patients who seem more likely to have bacterial pharyngitis based on the criteria previously discussed. It should be noted that all patients in these studies were also treated with antibiotics and that the use of other analgesic agents was not controlled. It is, therefore, not possible to determine the effect of steroid treatment as monotherapy for the discomfort of nonbacterial pharyngitis. However, based on these limited studies, corticosteroids do appear to be safe. None of the authors report any significant untoward events associated with the use of corticosteroids.

#### *Antibiotic Treatment Of GABHS*

There is little question that, despite years of use, penicillin remains remarkably effective in the treatment of GABHS infections. A study that compared GABHS cultures obtained in the 1930s to modern cultures demonstrated that, at least in vitro, penicillin remains a potent weapon.[90] That being said, some authors have noted both bacteriologic and clinical failures in association with penicillin treatment. Depending on the measure used, roughly 20%-30% of patients might be expected to "fail" treatment with penicillin or to relapse.[91,92] While the significance of these failures in terms of placing the patient at risk for rheumatic fever is debatable, no discussion of treatment is complete without addressing these issues.[90] GABHS bacteria are not the only inhabitants of the human respiratory tract. *H. influenzae, Moraxella catarrhalis,* and other bacteria are also often present. Many of these bacteria produce beta-lactamase and

are therefore resistant to penicillin. Studies comparing patients with significant numbers of beta-lactamase producers in their throats with those who do not harbor such organisms have concluded that penicillin is less likely to eradicate GABHS in the former group. It has been theorized that the beta-lactamase produced by other bacteria actually decreases the concentration of penicillin in the pharynx, thereby diminishing its effectiveness.[93,94] Others have found that alpha-hemolytic streptococci play an important role as well. It has been proposed that the alpha-hemolytic bacteria compete with other organisms for nutrients. Patients with lower colony counts of alpha-hemolytic organisms coupled with higher counts of beta-lactamase producers seem to fail treatment with penicillin more often.[94] These findings have led some to assert that agents more effective against beta-lactamase organisms either should replace penicillin altogether or be used to treat those patients who have experienced a penicillin failure.[90,93,95]

Critics of this approach argue that in areas with an overall low incidence of rheumatic fever, the benefits of microbiologic cure are questionable and may not be worth the risks of increasing bacterial resistance and the costs of these agents.[91,96] Given the difficulties associated with the performance of a definitive study, most clinicians will be forced to rely on the recommendations of experts and specialty societies along with their own interpretation of the medical literature.

Treatment of pharyngitis—even documented GABHS pharyngitis—is not without risk. Patients can experience allergic reactions and unpleasant side-effects from antibiotic treatment. Additionally, some authors have noted a higher relapse and recurrence rate among patients treated early in the course of their illness as compared to those who are treated later. These investigators have suggested that later treatment might allow the patient to mount a more vigorous immune response, which may later serve to protect him or her from relapse.[97] However, other studies refute these findings.[98] Others have noted that patients who receive antibiotics for one instance of pharyngitis tend to seek care for similar symptoms in the future and are more likely to believe that antibiotics are beneficial or necessary.[99,100]

Although many antibiotics can effectively eradicate GABHS, **Table 2** and **Table 3** list the most commonly recommended agents and their doses for adults and children. **Table 4** (on page 20) lists alternative agents and their doses, and **Table 5** (on page 20) lists agents that are ineffective against GABHS. Other than issues of allergies and other untoward side-effects, the choice of treatment method and agent is largely a matter of physician and

## Table 2. Recommended Antibiotics For GABHS Infections In Adults.

**Patients who *are not allergic* to penicillin:**
**Standard treatments**
- Penicillin V: 250 mg PO every 6-8 hours for 10 days **OR**
- Penicillin G benzathine: 1.2 Million units intramuscularly (one dose)

**Alternative treatments**
- Penicillin V: 500 mg PO twice per day for 10 days **OR**
- Amoxicillin: 750 mg PO once per day for 10 days*

**Patients who *are allergic* to penicillin:**
**Standard treatment**
- Erythromycin ethylsuccinate: 400 mg PO four times per day for 10 days

**Alternative treatments**
- Azithromycin: 500 mg PO on day 1 followed by 250 mg PO on days 2-5; each dose is taken only once per day **OR**
- Cefadroxil: 1000 mg PO once per day for 10 days†
- Cephalexin: 500 mg PO twice per day for 10 days†

* Research supports this regimen; however, it is based on a few relatively small studies (Class II)
† Cephalosporins should not be used in patients with immediate type penicillin allergy

## Table 3. Recommended Antibiotics For GABHS Infections In Children.

**Patients who *are not allergic* to penicillin:**
**Standard treatment**
- Penicillin V:
  - Patients < 27 kg—125 mg PO four times per day for 10 days
  - Patients ≥ 27 kg—250 mg PO every 6-8 hours for 10 days **OR**
- Penicillin G benzathine:
  - Patients < 27 kg—600,000 units intramuscularly (one dose)
  - Patients ≥ 27 kg—1.2 Million units intramuscularly (one dose)

**Alternative treatments**
- Penicillin V:
  - Patients < 27 kg—250 mg PO twice per day for 10 days
  - Patients ≥ 27 kg—500 mg PO twice per day for 10 days **OR**
- Amoxicillin:
  - Patients < 27 kg—40 mg/kg PO three times per day for 10 days
  - Patients ≥ 27 kg—750 mg PO once per day for 10 days*

**Patients who *are allergic* to penicillin:**
**Standard treatment**
- Erythromycin ethylsuccinate: 40 mg/kg (maximum dose, 400 mg) in 2-4 divided doses per day for 10 days

**Alternative treatments**
- Azithromycin: 10 mg/kg (maximum dose, 500 mg) on day 1 followed by 5 mg/kg (maximum dose, 250 mg) on days 2-5; each dose is taken only once per day **OR**
- Cefadroxil: 30 mg/kg/day (maximum dose, 1000 mg) in two divided doses for 10 days† **OR**
- Cephalexin: 25-50 mg/kg/day (maximum dose, 500 mg) in 2-4 doses for 10 days†

* Research supports this regimen; however, it is based on a few relatively small studies (Class II)
† Cephalosporins should not be used in patients with immediate type penicillin allergy

patient preference. However, the relative costs of the agents used should also be considered.

In many cases, the physician will be restricted to the drugs on a prescription plan formulary. The first question to be answered is, "shot or pills?" An intramuscular injection is very uncomfortable but provides one-time, single-dose treatment. Parents are spared the need to administer further doses of medication to an uncooperative child, and busy working adults do not have to remember to take antibiotics. No notes allowing medication to be given at school or daycare are needed, and the indigent family is spared the cost of an antibiotic prescription. The physician need not worry about compliance. On the other hand, injections are associated with more severe allergic reactions, are painful, and, when the cost of the medication and the nursing time to administer it are considered together, are expensive.

Oral antibiotics are effective but must be taken several times daily for a long course, increasing the risk of noncompliance and partially treated GABHS. Most authorities still recommend a 10-day course of most oral agents.[101] However, several small randomized trials have indicated that either once- or twice-daily amoxicillin or twice-daily penicillin are effective alternatives to the standard four doses per day schedule.[102-104] Compliance with medication increases as the number of doses per day decreases, so regimens allowing fewer doses of medication each day are attractive. Furthermore, once- or twice-daily dosing eliminates the need for a child to take a dose of medication at school or daycare. While these results are promising, all of these studies involved a relatively small number of subjects. A larger randomized trial is required before these treatment options can be considered the standard of care.

In addition to problems with compliance, oral medications are associated with some unwanted side-effects. Gastrointestinal symptoms such as vomiting and diarrhea are not uncommon. Furthermore, many liquid medication preparations are rather unpalatable. It is difficult to force a struggling toddler to take a medication that he or she does not want. All of these factors should be considered with the patient and/or patient's parents before a final decision regarding treatment is made.

## Table 4. Other Agents Effective Against GABHS.

**Cefuroxime**
- Adults: 250 mg PO twice a day for 10 days
- Children: 20 mg/kg/day PO in two divided doses for 10 days

**Clindamycin**
- Adults: 300-450 mg PO four times a day for 10 days
- Children: 20-30 mg/kg/day in four divided doses for 10 days

**Amoxicillin/clavulanate**
- Adults: 250-500 mg PO three times per day for 10 days
- Children: 40 mg/kg/day in three divided doses for 10 days

## Table 5. Agents Not Effective Against GABHS.

- Tetracyclines
- Fluoroquinolones
- Sulfonamides
- Trimethoprim
- Chloramphenicol

## Summary

The vast majority of patients who come to an ED for treatment of pharyngitis have a self-limited viral illness. These patients have a right to expect pain relief and education but do not necessarily require antibiotics. A substantial number of patients, particularly school-age children, will have an infection caused by GABHS. Finally, a small minority of patients will have a more serious underlying illness. A careful history and physical examination coupled with judiciously selected ancillary tests will identify most of these patients. The emergency physician must, as always, be vigilant to detect the few with serious illness among the many with routine pharyngitis. ▲

## References

Evidence-based medicine requires a critical appraisal of the literature based upon study methodology and number of subjects. Not all references are equally robust. The findings of a large, prospective, randomized, and blinded trial should carry more weight than a case report.

To help the reader judge the strength of each reference, pertinent information about the study, such as the type of study and the number of patients in the study, will be included in bold type following the reference, where available. In addition, the most informative references cited in the paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.


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## Physician CME Questions

**65. Conjunctivitis, cough, rhinorrhea, skin rash (other than scarlatina), and mucosal ulcers in patients with pharyngitis suggest that the diagnosis is likely to be:**
a. GABHS.
b. viral pharyngitis.
c. epiglottitis.
d. Ludwig's angina.

**66. Which of the following must be identified in the evaluation of patients with pharyngitis in order to rule out serious and/or life-threatening conditions?**
a. Existing or impending respiratory compromise
b. Epiglottitis, retropharyngeal abscess, Ludwig's angina, peritonsillar abscess, or mononucleosis with severe tonsillar and lymphoid hypertrophy
c. Severe dehydration due to inability to drink
d. All of the above

**67. Non-infectious causes of pharyngitis include smoke inhalation, thermal or chemical burns, swallowed objects, vocal strain, gastroesophageal reflux disease, thyroiditis, and malignancy.**
a. True
b. False

**68. In patients with intense throat pain but little inflammation of the tonsils and hypopharynx, which of the following is the most likely explanation?**
a. Viral pharyngitis
b. GABHS
c. Epiglottitis
d. Peritonsillar abscess

**69. According to several recent clinical guidelines, patients with pharyngitis with signs of a viral illness should be managed symptomatically without testing or treatment.**
a. True
b. True for adults; false for children
c. True for children, false for adults
d. False

**70. According to several recent studies about the use of clinical decision rules for children with pharyngitis, children who have a scarlatiniform rash associated with other typical symptoms of GABHS infection:**
a. can be treated presumptively.
b. should have an RADT and throat culture.
c. should be treated with chloramphenicol.
d. should have a throat culture and referral for follow-up.

**71. According to several recent clinical guidelines, the drug of choice for patients with GABHS is penicillin (or erythromycin for the penicillin-allergic).**
a. True
b. False

**72. Which of the following, in conjunction with pharyngitis, most likely represents Ludwig's angina?**
a. Cough, rhinitis, conjunctivitis
b. Fever, dysphagia, trismus
c. Fever, lymphadenopathy, tonsillar hypertrophy
d. Fever, immunocompromise, recent dental trauma/dental disease

**73. Which of the following, in conjunction with pharyngitis, most likely represents viral pharyngitis?**
a. Cough, rhinitis, conjunctivitis
b. Fever, dysphagia, trismus
c. Fever, lymphadenopathy, tonsillar hypertrophy
d. Fever, immunocompromise, recent dental trauma/dental disease

**74. Which of the following, in conjunction with pharyngitis, most likely represents mononucleosis?**
a. Cough, rhinitis, conjunctivitis
b. Fever, dysphagia, trismus
c. Fever, lymphadenopathy, tonsillar hypertrophy
d. Fever, immunocompromise, recent dental trauma/dental disease

**75. Which of the following, in conjunction with pharyngitis, most likely represents peritonsillar abscess?**
a. Cough, rhinitis, conjunctivitis
b. Fever, dysphagia, trismus
c. Fever, lymphadenopathy, tonsillar hypertrophy
d. Fever, immunocompromise, recent dental trauma/dental disease

**76. Patients with symptoms of viral illness are unlikely to have concomitant GABHS infections. Therefore, testing and antibiotics are unnecessary.**
a. True
b. True, if the patient is otherwise healthy and does not live where rheumatic fever is endemic
c. True for children, false for adults
d. False

**77. Which of the following is *not* one of the Centor criteria?**
a. History of fever
b. Absence of cough
c. Age less than 15 years
d. Swollen, tender, anterior cervical lymph nodes
e. Tonsillar exudate

**78. According to CDC guidelines for pharyngitis in adults, patients with a Centor score of 4:**
a. should be treated presumptively with antibiotics or tested with an RADT.
b. should not be tested or treated with antibiotics.
c. have a 2% chance of having GABHS.
d. should be treated with tetracycline.

**79. According to CDC guidelines for pharyngitis in adults, patients with a Centor score of 0 or 1:**

a. should be treated presumptively with antibiotics or tested with an RADT.
b. should not be tested or treated with antibiotics.
c. have a 50% chance of having GABHS.
d. should be treated with fluoroquinolones.

**80. Which of the following has the *least* evidence to support its effectiveness in providing symptomatic relief for patients with pharyngitis?**

a. Over-the-counter analgesics like acetaminophen
b. Oral narcotic agents like hydrocodone
c. Antihistamines
d. Corticosteroids

## Coming in Future Issues:

Hand Injuries • Pulmonary Embolism • The Suicidal Patient

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Each action in the clinical pathways section of *Emergency Medicine Practice* receives an alpha-numerical score based on the following definitions.

**Class I**
- Always acceptable, safe
- Definitely useful
- Proven in both efficacy and effectiveness

*Level of Evidence:*
- One or more large prospective studies are present (with rare exceptions)
- High-quality meta-analyses
- Study results consistently positive and compelling

**Class II**
- Safe, acceptable
- Probably useful

*Level of Evidence:*
- Generally higher levels of evidence
- Non-randomized or retrospective studies: historic, cohort, or case-control studies
- Less robust RCTs
- Results consistently positive

**Class III**
- May be acceptable
- Possibly useful
- Considered optional or alternative treatments

*Level of Evidence:*
- Generally lower or intermediate levels of evidence
- Case series, animal studies, consensus panels
- Occasionally positive results

**Indeterminate**
- Continuing area of research
- No recommendations until further research

*Level of Evidence:*
- Evidence not available
- Higher studies in progress
- Results inconsistent, contradictory
- Results not compelling

Significantly modified from: The Emergency Cardiovascular Care Committees of the American Heart Association and representatives from the resuscitation councils of ILCOR: How to Develop Evidence-Based Guidelines for Emergency Cardiac Care: Quality of Evidence and Classes of Recommendations; also: Anonymous. Guidelines for cardiopulmonary resuscitation and emergency cardiac care. Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Part IX. Ensuring effectiveness of community-wide emergency cardiac care. *JAMA* 1992;268(16):2289-2295.

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