Evidence-Based Evaluation And Management Of Patients With Pharyngitis In The Emergency Department

Abstract

Pharyngitis is a common presentation, but it can also be associated with life-threatening processes, including sepsis and airway compromise. Other conditions, such as thyroid disease and cardiac disease, may mimic pharyngitis. The emergency clinician must sort through the broad differential for this complaint using a systematic approach that protects against early closure of the diagnosis. This issue reviews the various international guidelines for pharyngitis and notes controversies in diagnostic and treatment strategies, specifically for management of suspected bacterial, viral, and fungal etiology. A management algorithm is presented, with recommendations based on a review of the best available evidence, taking into account patient comfort and outcomes, the need to reduce bacterial resistance, and costs.
Case Presentations

You are working in a community emergency department when a first-time mother brings in her two-and-a-half-year-old daughter who has had a sore throat for 2 days. She has had low-grade fevers and will not eat, complaining of pain. She is not in daycare, looks well overall, and is drinking from a juice box in the examination room. Mom is asking for antibiotics for strep throat and you think to yourself, “Is this an appropriate patient to give antibiotics to?”

The next patient you see is a 20-year-old man who has had a sore throat for 2 days. He is febrile to 38.8°C, has bilateral tonsillar erythema and exudates, and tender cervical adenopathy. He has not been coughing, is able to eat and drink, and does not have any trouble breathing, but he is asking for pain medication. What should you give him? Does he need a test for strep? If so, which one? Does he need antibiotics? If so, what kind?

Later that day, you see a 35-year-old woman with 5 days of sore throat, presenting with voice changes. She looks well, but she but swears her voice is not normally this hoarse, and she has odynophagia without any other associated symptoms. Could this be a life-threatening cause of sore throat? Does she need an urgent intervention?

Your last patient is a 65-year-old male smoker complaining of several weeks of sore throat and hoarseness. He has not had a fever or other upper respiratory symptoms. He does not have any known exposures, and reports a gradual worsening of symptoms. You think to yourself, “What is the chance this is not infectious?” What other etiologies should you consider in this patient with sore throat?

Introduction

Pharyngitis is the combination of sore throat, fever, and pharyngeal inflammation, and it is one of the most common chief complaints seen in the emergency department (ED). Sore throat accounted for over 2 million ED visits in 2007. Emergency clinicians must be able to assess these patients for airway threats and determine an efficient treatment strategy.

This simple presentation is still the cause of much debate and practice variation, with conflicting guidelines for care. The crux of the pharyngitis debate centers around group A beta hemolytic Streptococcus (GABHS), or “strep throat,” which accounts for 20% to 30% of sore throat visits in children and 5% to 15% of sore throat visits in adults. It is estimated that, in the United States, between $224 million and $539 million are spent annually on GABHS in children and adolescents, not including the costs for the adult cases. This infection has been known to cause both suppurrative complications (eg, peritonsillar abscess or otitis media) and systemic complications (eg, acute rheumatic fever or glomerulonephritis). The incidence of suppurrative complications and acute rheumatic fever are thought to have been reduced by antibiotic use, and they remain a primary consideration for diagnosis and treatment. However, as the incidence of acute rheumatic fever has declined greatly in the United States and other developed countries, the importance of treatment to prevent this complication has come into question.

This leads to many questions that the emergency clinician must be able to answer, including: Does this patient have strep throat? Are antibiotics needed? What else, if anything, can we use to treat pain? Supplemental questions to those basics include: Could this be something dangerous, such as epiglottitis or a deep neck space infection? Are there other pathogens such as group C Streptococcus or Fusobacterium spp that we should be treating with antibiotics?

While many guidelines exist, including the Infectious Diseases Society of America (IDSA) guidelines from 2012, the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) guideline from 2012, the American Heart Association/American Academy of Pediatrics (AHA/AAP) guideline, and the Centers for Disease Control and Prevention/American Academy of Family Physicians/American College of Physicians (CDC/AAFP/ACP) guideline from 2001, the recommendations conflict, causing confusion about best practices, and this contributes to broad practice variability. This issue of Emergency Medicine Practice provides a systematic review of the literature in order to provide clarity for best practice.

Critical Appraisal Of The Literature

A literature search was performed on PubMed using the search terms: pharyngitis, tonsillitis, pharyngotonsillitis, streptococcal pharyngitis, and acute rheumatic fever. Titles, abstracts, and full articles were reviewed for content. The National Guideline Clearinghouse (www.guideline.gov) was also searched using the terms pharyngitis and sore throat and, within the practice guidelines, primary sources of literature were reviewed. The Cochrane Database of Systematic Reviews was also referenced using the terms pharyngitis and sore throat. Excluded articles included those regarding sore throat secondary to intubation. Important practice guidelines reviewed included the IDSA publication on streptococcal pharyngitis, the AHA/AAP publication on rheumatic fever and streptococcal pharyngitis, the ESCMID publication of acute sore throat, and the CDC/AAFP/ACP combined practice guideline on principles for appropriate antibiotic use in acute pharyngitis in adults.

These guidelines attempt to be evidence-based, but they fall to consensus for deciding which patients to test and treat (arguably their most important sections), which leads to discrepancies between them. While the literature is rich in studies on group A Streptococcus,
Many common pathogens can cause sore throat. Life-threatening, airway-compromising etiologies for sore throat must be ruled out, including epiglottitis, uvulitis, deep space neck infections (e.g., peritonsillar abscess or retropharyngeal abscess), Ludwig angina, and uncommon etiologies like diphtheria. Dripping, voice change, stridor, trismus, and/or a toxic appearance are red flags of a more serious disease state.

The most common cause of pharyngitis is viral syndromes, but GABHS is responsible for 20% to 30% of sore throat visits in children and 5% to 15% of sore throat visits in adults. Other bacterial causes of pharyngitis are groups B, C, and G beta hemolytic streptococci. Acute rheumatic fever has not been described as a complication of these pathogens. A 2006 review of 128 cases of peritonsillar abscess in Northern Ireland showed 7 of these cases had cultures that grew group B or C streptococci. Several studies have reported isolation of Fusobacterium from throat swabs, suggesting that this bacterium may be a cause for recurrent or persistent pharyngitis. However, the IDSA guidelines report that the evidence to support this is weak.

The CDC/AAFP/ACP guideline also reports that antibiotic treatment is necessary only for those patients with GABHS infection. The emergency clinician should remember that acute pharyngitis has a typical duration of 3 to 5 days. If symptoms persist longer than this typical period, then the differential should be broadened to include life-threatening complications (Lemierre syndrome, abscesses, etc).

Also included in the differential are causes for sore throat that are not infectious, including systemic causes (Kawasaki disease, Stevens-Johnson syndrome, thyroiditis, neutropenia), trauma (foreign body, penetrating injury, caustic exposure, chemical or thermal burn, retropharyngeal hematoma), malignancy, and inflammatory processes such as allergies, gastroesophageal reflux, or postnasal drip. These causes should not be forgotten in a patient with isolated sore throat without fever or other infectious symptoms.

Prehospital Care

The primary goal of prehospital management of patients with pharyngitis is rapid recognition of airway compromise, with secondary goals of comfort and pain relief. When caring for a patient at risk for airway compromise, the receiving facility should be alerted as soon as possible to prepare for an emergent airway. The prehospital provider should focus on assessing vital signs (most importantly, oxygenation and respiratory rate); monito-
<table>
<thead>
<tr>
<th>Clinical Description</th>
<th>Causes</th>
<th>Clinical Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infectious Causes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infectious pharyngitis</td>
<td>Streptococcus group A, C, G, Neisseria gonorrhoeae, Arcanobacterium haemolyticum, Yersinia enterocolitica, Herpes simplex virus 1 and 2, Mycobacterium pneumoniae, Chlamydophila pneumoniae, Fusobacterium spp.</td>
<td>Sore throat, odynophagia, dysphagia, erythematous tonsils, tonsillar exudate</td>
</tr>
<tr>
<td>Mononucleosis</td>
<td>Epstein-Barr virus, Cytomegalovirus</td>
<td>Fatigue, malaise, sore throat, fever, adenopathy, enlarged tonsils, rash, splenomegaly</td>
</tr>
<tr>
<td>Common cold</td>
<td>Rhinovirus, Coronavirus, Parainfluenza virus</td>
<td>Cough, coryza, sore or scratchy throat, headache, muscle aches</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Corynebacterium diphtheriae</td>
<td>Stridor, drooling, fever, hoarseness, odynophagia, sore throat, pseudomembrane on pharynx or tonsils</td>
</tr>
<tr>
<td>Influenza</td>
<td>Influenza A and B virus</td>
<td>Fever, cough, sore throat, coryza, muscle aches, headache, fatigue, vomiting, diarrhea</td>
</tr>
<tr>
<td>Pharyngoconjunctival fever</td>
<td>Adenovirus</td>
<td>Cough, coryza, sore throat, bronchitis, diarrhea, conjunctivitis, fever, gastroenteritis</td>
</tr>
<tr>
<td>Lemierre syndrome</td>
<td>Fusobacterium spp, GABHS, Other anaerobes</td>
<td>Septic thrombophlebitis of the internal jugular vein and septic emboli of distant sites after acute sore throat</td>
</tr>
<tr>
<td>Vincent angina</td>
<td>Mixed anaerobes, Fusiform bacilli, Spirochetes</td>
<td>Acute necrotizing infection of the pharynx, unilateral sore throat, bad taste in mouth, and foul breath. Deep, well-circumscribed ulcer of 1 tonsil</td>
</tr>
<tr>
<td>Oropharyngeal tularemia</td>
<td>Francisella tularensis</td>
<td>Fever, sore throat, mouth ulcers, vomiting, diarrhea</td>
</tr>
<tr>
<td>Secondary syphilis</td>
<td>Treponema pallidum</td>
<td>Nonitchy rash that involves hands and feet, sore throat, fever, lymphadenopathy, fatigue, muscle aches</td>
</tr>
<tr>
<td>Herpangina</td>
<td>Coxsackievirus A</td>
<td>Hand, foot, and mouth disease</td>
</tr>
<tr>
<td>Primary HIV infection</td>
<td>Human immunodeficiency virus</td>
<td>Fever, rash, headache, malaise, muscle aches, oral ulcers, sore throat, night sweats, weight loss, adenopathy</td>
</tr>
<tr>
<td>Epiglottitis</td>
<td>Haemophilus influenzae, Haemophilus parainfluenzae, Streptococcus pneumoniae, GABHS, Staphylococcus aureus</td>
<td>Fever, odynophagia, dysphagia, drooling, stridor, respiratory distress, tripod positioning</td>
</tr>
<tr>
<td>Uvulitis</td>
<td>Haemophilus influenzae, GABHS</td>
<td>Dysphagia, foreign body sensation, drooling, stridor, muffled or “hot potato” voice</td>
</tr>
<tr>
<td><strong>Abscesses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retropharyngeal, parapharyngeal space infection</td>
<td>GABHS, Staphylococcus aureus, Haemophilus influenzae, Fusobacterium, Prevotella, Peptostreptococcus spp.</td>
<td>Fever, neck pain, decreased range of motion of neck, palpable neck mass, trismus, respiratory distress</td>
</tr>
<tr>
<td>Peritonsillar abscess</td>
<td>Fusobacterium, Prevotella, Peptostreptococcus spp</td>
<td>Fever, odynophagia, uvular deviation, trismus, muffled or “hot potato” voice</td>
</tr>
<tr>
<td>Submandibular abscess (Ludwig angina)</td>
<td>Streptococcus, Staphylococcus, Fusobacterium, Bacteroides spp</td>
<td>Fever, pain in associated teeth, “woody” induration of the floor of the mouth, drooling, trismus, dysphagia, stridor</td>
</tr>
</tbody>
</table>

Abbreviation: GABHS, group A beta hemolytic Streptococcus; HIV, human immunodeficiency virus.
ing for voice change, drooling, or other evidence of airway collapse; attempting to keep the patient calm and comfortable; and transporting the patient to the hospital.

**Emergency Department Evaluation**

In most cases of pharyngitis, once it is determined that the patient is not in respiratory distress and does not appear toxic, the emergency clinician can move quickly to a detailed history and physical examination. The physical examination is not enough to distinguish viral pharyngitis from GABHS, but certain aspects can help.

**History**

The history focuses on detailing infectious symptoms and exposures, especially close contacts with GABHS infections in the previous 2 weeks. Patients with GABHS typically have a more sudden-onset sore throat, dysphagia, fever, pharyngeal exudates and/or erythema, and tender and enlarged anterior cervical lymph nodes. In viral pharyngitis, patients are more likely to have other associated symptoms, such as conjunctivitis, coryza, hoarseness, cough, diarrhea and/or typical exanthems. These symptoms should be asked about, along with the duration of symptoms, onset, and course.

Other important historical data to determine include the use of antipyretics or analgesics, trauma, ingestions, and immunization history. Sexual history is also helpful when considering less-common causes of pharyngitis, such as gonorrhea. Any recent dental procedures or infections should be recorded, especially if a patient is immunocompromised, as this could place the patient at risk for a life-threatening complication, such as Ludwig angina. It should be noted if there is a history of rheumatic fever, as a recurrent streptococcal infection could be more dangerous in this patient population.

The emergency clinician should ask about smoking, alcohol use, and weight loss, especially in older patients with isolated sore throat for which there is a concern for malignancy.

**Physical Examination**

The physical examination starts with the vital signs and continues with a careful inspection inside the mouth. Trismus (the inability to fully open the jaw) may indicate the presence of a more severe infection or abscess. The posterior pharynx should be examined for erythema, swelling, and exudates, as well as for symmetry. Evidence of cobblestoning may indicate postnasal drip as an etiology. Peritonsillar swelling or uvular swelling could alert the emergency clinician to infection of the peritonsillar space or uvula, respectively. The physical examination should include palpating the submental space under the tongue to rule out Ludwig angina (submandibular abscess).

The neck is carefully examined for adenopathy, masses, and range of motion. A thyroid examination may assess for evidence of thyroiditis, which may present as sore throat. Anterior cervical adenopathy is often associated with GABHS, while posterior cervical adenopathy in a patient aged < 30 years is suggestive of mononucleosis.

Finally, a skin inspection is performed. GABHS and other streptococcal illness can be associated with a diffuse, erythematous exanthem that feels like sandpaper, in which case, a diagnosis of scarlet fever is made. *Arcanobacterium haemolyticum* can also cause a scarlatiniform maculopapular rash, and mononucleosis can cause a maculopapular exanthem.

**The Centor Criteria**

The Centor criteria were developed in 1981 from a sample of 286 adult ED patients, based on the 4 findings of the history and physical examination that were most likely to be seen in patients with GABHS infection. The score was adapted by McIsaac in 1998 in 521 patients, with the addition of an age qualifier (+1 for ages 3-14 years, 0 for ages 15-44 years, -1 if age ≥ 45 years), where the authors found it was more sensitive than clinical gestalt in diagnosing GABHS.

In 2000, McIsaac validated the score in 619 patients in an ambulatory care setting, and in 2004 on another 787 patients. The Centor score, with or without the modification, is the most widely used score to help aid in risk stratification of patients for testing and treatment for GABHS.

**Diagnostic Studies**

Diagnostic testing should take a thoughtful, cost-effective approach, determining whether or not a patient has GABHS and avoiding antibiotics in

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**Table 2. Modified Centor Criteria**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Score</th>
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<tbody>
<tr>
<td>Fever</td>
<td>1</td>
</tr>
<tr>
<td>Absence of cough</td>
<td>1</td>
</tr>
<tr>
<td>Anterior cervical adenitis</td>
<td>1</td>
</tr>
<tr>
<td>Tonsillar exudate</td>
<td>1</td>
</tr>
<tr>
<td>Age 3-14 years</td>
<td>1</td>
</tr>
<tr>
<td>Age 15-44 years</td>
<td>0</td>
</tr>
<tr>
<td>Age &gt; 44 years</td>
<td>-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>Risk of Streptococcal Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1%-2.5%</td>
</tr>
<tr>
<td>1</td>
<td>5%-10%</td>
</tr>
<tr>
<td>2</td>
<td>11%-17%</td>
</tr>
<tr>
<td>3</td>
<td>28%-35%</td>
</tr>
<tr>
<td>≥ 4</td>
<td>51%-53%</td>
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patients with viral infections. This involves using clinical, epidemiologic, and specific laboratory testing for GABHS. However, testing is controversial and gold standards are limited by the presence of colonization. Not surprisingly, different societies have conflicting recommendations on which patients to test and which test to use. For example, the ACP guidelines place greater emphasis on decreasing testing, whereas the IDSA guidelines serve to decrease inappropriate antibiotic use.

Patients with primarily viral symptoms alone (such as coryza, cough, diarrhea, hoarseness, or discrete ulcerative stomatitis) do not require further testing because it is unlikely that a bacterial infection is causing the symptoms. In patients with a history of primarily viral symptoms, or 0-1 of the Centor criteria (see Table 2, page 5), RADTs should not be done, given these patients are unlikely to have GABHS.

For patients without a primary viral syndrome, clinical features between viral infections and GABHS have considerable overlap. Guideline recommendations diverge when symptoms are not obviously viral. (See Table 3.) Centor criteria are not very sensitive, and even subjects with all clinical features of a scoring system tend to have confirmed GABHS only around 50% of the time.

The IDSA guidelines and the AHA/AAP guidelines recommend against empiric treatment based on Centor criteria alone because of the risk from overuse of antibiotics. However, the CDC/AAFP/ACP guidelines consider empiric treatment of patients with 3 to 4 Centor criteria as an appropriate option. A recent cost-effectiveness analysis found empiric treatment to be neither the most effective management strategy nor the least expensive, however, some clinicians believe the effect of decreased pain and suffering that results from antibiotics is worth the overuse.

Obviously, this discrepancy deserves our attention and further study, but possibly more concerning is the number of clinicians who still do not follow any of these strategies and inappropriately treat patients with primarily viral symptoms or negative RADTs. While the emergency clinician has a choice in managing pharyngitis, the best data available show that one of these strategies should be picked.

**Rapid Antigen Detection Testing And Throat Cultures**

Laboratory determination of GABHS is primarily done with RADTs or a throat culture; throat culture is the gold standard. A properly performed throat culture (swabbing the posterior pharynx and tonsils, avoiding the tongue and lips) is 90% to 95% sensitive.

The original RADTs used the latex agglutination technique, but newer RADTs use enzyme immunoassay techniques and optical immunoassay technology, which are more sensitive. A recent prospective study of RADT found, not surprisingly, that sensitivity increased with heavy inoculum, and found a sensitivity and specificity of 86.7% and 94.6%, respectively.

A 2014 systematic review looking at RADTs in 59 studies and 55,766 patients found the sensitivity in children to be between 86% and 88%, and the specificity to be between 86% and 92%. In adults, sensitivity was 86% to 91%, and specificity was 93% to 97%.

Based on data such as these, with proven high specificity, if a RADT is positive, then treatment is indicated. Limiting testing on low-risk patients with 2 or more Centor criteria will likely limit false positives from bacterial colonization. If a RADT is negative in a pediatric patient, a throat culture should be performed. However, in adults, it is acceptable to not send a backup throat culture, based on the lower incidence of GABHS and the low rates of acute rheumatic fever.

This discrepancy can be explained by the high pretest probability in children (30% in children vs 5%-15% in adults), as well as the higher (albeit still very low) probability of acute rheumatic fever developing in a child versus an adult. Cultures can be performed on adult patients with risk factors for complications (eg, immunocompromise, diabetes, history of rheumatic fever). While early initiation of antibiotics can lead to faster resolution of symptoms of pharyngitis, antibiotic therapy initiated within 9 days of symptom onset can still prevent acute rheumatic fever.

**Table 3. Summary Of Guidelines For Pharyngitis**

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<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>0 or 1</td>
<td>Do not test or treat</td>
<td>Do not test or treat</td>
<td>Do not test or treat</td>
<td>Do not test or treat</td>
</tr>
<tr>
<td>2</td>
<td>Perform RADT</td>
<td>Perform RADT</td>
<td>Perform RADT</td>
<td>Do not test or treat</td>
</tr>
<tr>
<td>3</td>
<td>Perform RADT</td>
<td>Perform RADT</td>
<td>Perform RADT or treat empirically</td>
<td>Perform RADT</td>
</tr>
<tr>
<td>≥ 4</td>
<td>Perform RADT</td>
<td>Perform RADT</td>
<td>Perform RADT or treat empirically</td>
<td>Perform RADT</td>
</tr>
</tbody>
</table>

Abbreviations: AAFP, American Academy of Family Physicians; AAP, American Academy of Pediatrics; ACP, American College of Physicians; AHA, American Heart Association; CDC, Centers for Disease Control and Prevention; ESCMID, European Society of Clinical Microbiology and Infectious Diseases; IDSA, Infectious Diseases Society of America; RADT, rapid antigen detection test.
**Diagnostic Studies For Young Children**

Diagnostic studies for GABHS are generally not indicated in children aged < 3 years, given the low incidence of streptococcal pharyngitis and acute rheumatic fever in this age group. Non-suppurative complications are rare, and the primary benefit to treating these children is to decrease transmission. The IDSA and the AAP do not recommend testing these children unless other risk factors are present, such as an older sibling who is *Streptococcus*-positive.

**Other Laboratory Testing**

Most patients with acute pharyngitis do not need any blood work performed for diagnosis or risk stratification. A 2014 Scandinavian study looked at whether blood tests (procalcitonin, C-reactive protein [CRP], white blood cell [WBC], and absolute neutrophil count [ANC]) could increase sensitivity when used with the Centor score and RADT or if they could be used instead of RADT. The authors found that, in 100 patients with acute tonsillitis, the values of CRP, WBC, and ANC were higher in patients with GABHS, but these tests had low sensitivity (66%-90%) and low specificity (45%-75%). There was no difference in procalcitonin levels, and the additional blood tests did not increase diagnostic accuracy.

Additionally, there is no indication for antistreptolysin O (ASO) titers in diagnosing acute pharyngitis, as this laboratory value does not rise until at least 1 week after the onset of infection. Consider other specific testing, if indicated by the history and physical examination, such as testing for gonorrhea, chlamydia, human immunodeficiency virus (HIV), or herpes simplex virus, especially in patients with sexual histories indicating the possibility of these infections. Monospot or Epstein-Barr virus titers should be considered in patients, especially adolescents, for whom there is concern for mononucleosis. Other hematologic findings in infectious mononucleosis include a relative lymphocytosis with > 10% atypical lymphocytes.

### Treatment

The most salient question regarding patients presenting with pharyngitis is regarding who needs antibiotics and who does not. Acute streptococcal pharyngitis is typically a self-limited illness, and inappropriate antibiotic use for upper respiratory infections has been a major contributor to antibiotic resistance. However, antibiotics are used to decrease symptom duration, to decrease suppurative complications, and to decrease the risk of acute rheumatic fever. There is also the hope that early antibiotic use will decrease infectivity, as the risk of contagion of symptomatic pharyngitis is approximately 10%, 25% of exposed contacts become colonized, and 40% of contacts colonized develop symptomatic infection.

GABHS should be treated with penicillin, amoxicillin, or benzathine penicillin for 10 days to ensure eradication of the organism from the pharynx. Intramuscular repository-penicillin therapy is the only drug proven to prevent rheumatic fever, and the prolonged course is aimed at preventing this complication. If the goal is to treat group C or G streptococcal infection, a shorter course would be appropriate. In a prospective randomized controlled trial of 652 patients, amoxicillin administered once daily was proven to be noninferior to amoxicillin administered twice daily. Penicillin and amoxicillin (in addition to being the only first-line therapy), are also more cost-effective than other alternatives.

#### Table 4. Antibiotic Treatment Of Group A Beta Hemolytic *Streptococcus* Pharyngitis

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Dosing</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin V, oral</td>
<td>• Children (weight &lt; 27 kg): 250 mg bid</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>• Adults and children ≥ 27 kg: 250 mg qid or 500 mg bid to tid</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin, oral</td>
<td>• Children: 50 mg/kg qd or 25 mg/kg bid (max 1 gram/day)</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>• Adults: 500 mg bid</td>
<td></td>
</tr>
<tr>
<td>Penicillin G</td>
<td>• Children (weight &lt; 27 kg): 600,000 units</td>
<td>Once</td>
</tr>
<tr>
<td>benzathine,</td>
<td>• Adults and children ≥ 27 g: 1,200,000 units</td>
<td></td>
</tr>
<tr>
<td>intramuscular</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| For patients with penicillin allergy (nonanaphylactic or not otherwise severe, eg, Stevens-Johnson syndrome, toxic epidermal necrolysis, etc)
| Cephalexin, oral   | • Children: 40 mg/kg/day divided bid (max 500 mg/dose)                 | 10 days  |
|                    | • Adults: 500 mg bid                                                   |          |
| Cefadroxil, oral   | • Children: 30 mg/kg qd                                                | 10 days  |
|                    | • Adults: 1 gram qd or 500 mg bid                                      |          |
| Clindamycin, oral  | • 21 mg/kg/day divided tid (max 300 mg/dose)                           | 10 days  |
| Azithromycin, oral | • Children aged < 12 y: 12 mg/kg/day (max 500 mg/day)a                 | 5 days   |
|                    | • Adults: 500 mg qd                                                   |          |
| Clarithromycin, oral | • Children: 15 mg/kg/day divided bid (max 250 mg/dose)                 | 10 days  |
|                    | • Adults: 250 mg bid                                                   |          |

*a* 60 mg/kg total dose has been shown to be more effective.

*b* Standard adult 5-day pack dosing can be used (500 mg on day 1 and 250 mg on days 2-5).

Abbreviations: bid, 2 times a day; qd, 1 time a day; qid, 4 times a day; tid, 3 times a day.

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There are several treatment options in patients with penicillin allergy, and the treatment options are dependent on the severity of the reaction. When choosing an alternative antibiotic, one also must remember that GABHS is generally self-limited disease. In patients with a severe penicillin allergy (anaphylaxis, Stevens-Johnson syndrome, or other life-threatening complications), the emergency clinician could prescribe clindamycin, clarithromycin, or azithromycin. (See Table 4, page 7.) However, most patients can tolerate oral cephalosporins. GABHS resistance to penicillin has never been documented. Tetracyclines and sulfonamides are not recommended due to high rates of antimicrobial resistance of GABHS and high treatment failure rates.

Pain Relief
For the treatment of pain, the IDSA advises the use of aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs) in adults and NSAIDs in children. Treatment with steroids is not recommended by the IDSA or ESCMID guidelines. Supportive care includes analgesics (both systemic and topical), antipyretics, and gargles. As with all illnesses, patients should be told to rest and keep up an adequate fluid intake. The ESCMID guideline also recommends ibuprofen and acetaminophen for sore throat pain.

Most of the data on pain relief are from small randomized controlled trials, but a systematic review published in 2000 that reviewed 22 randomized trials of treatments other than antibiotics for sore throat found that NSAIDs and acetaminophen are effective in decreasing sore throat pain. In a study of 120 patients, 400 mg of ibuprofen was effective in reducing pain by 80% at 4 hours. Other small randomized controlled trials have shown the efficacy of benzocaine lozenges (165 patients) and AMC/DCBA (amylmetacresol/2,4-dichlorobenzyl alcohol) throat lozenges (310 patients). There was no benefit in the addition of a decongestant and antihistamine to acetaminophen, compared to acetaminophen alone, in pain control of viral nasopharyngitis (148 patients). These small studies in support of over-the-counter treatments give the emergency clinician other modalities for pain control to offer their patients besides antibiotics.

Special Circumstances
Counseling The Patient Who “Wants” Antibiotics
While over the years, physicians have been successful in decreasing unnecessary prescriptions for antibiotics, there are physicians who feel patients or parents “want” antibiotics and will not be satisfied without receiving them. A survey of pediatricians published in 1999 reported that the most common reason given for inappropriate antibiotic use was “parental pressure.” Additionally, for the time-crunching physician, giving antibiotics without doing a thorough clinical assessment or waiting for RADT results can allow for quicker patient visits. However, this approach leads to overprescribing, antibiotic side effects, increased medical costs, and antibiotic resistance.

While time-consuming, a discussion with the aim to educate and focus on shared goals, such as pain relief, can facilitate appropriate decision making. Offering the patient myriad pain control options, including NSAIDs, acetaminophen, lozenges, hot liquids, gargling salt water, etc, as opposed to focusing on antibiotics, may decrease inappropriate antibiotic prescriptions.

Fusobacterium And Lemierre Syndrome
Lemierre syndrome (postanginal sepsis) is a condition in which a severe sore throat is followed by internal jugular vein thrombosis and septicaemia with multiple septic emboli. This disease was first described by Andre Lemierre in 1936, but since widespread use of antibiotics began in the 1940s, there has been a sharp decline in the number of cases. There has been an increase in reporting of Lemierre syndrome over the last decade, but it is difficult to say whether incidence is increasing or there is merely an increase in reporting. This disease is associated with Fusobacterium necrophorum, which is thought to be a common non-GABHS bacterial cause of pharyngitis; however, it is often polymicrobial. Some authors have postulated that decreased use of antibiotics in pharyngitis has led to an increase in cases caused by untreated Fusobacterium infections, while others suggest that increased high-resolution imaging has led to increased diagnosis.

A 2009 review of the disorder looked at 114 cases reported in the literature and found that the majority of cases (57%) were thought to be caused by F necrophorum infections, and an additional 30% by other Fusobacterium species. This review also found the majority of infections to have originated as upper respiratory tract infections, primarily of the tonsil or pharynx (67%), and the pooled mortality rate was 5%.

F. necrophorum should be treated as a pathogen, if found. It is normally treated with penicillin and metronidazole or clindamycin for several weeks. Anticoagulation for this disorder is controversial, and given the small number of cases, it is usually managed by provider preference. The emergency clinician should consider this pathogen in the adolescent patient with evidence of significant pharyngitis and concern for bacteremia or sepsis.
Clinical Pathway For Managing Pharyngitis
In The Emergency Department

Airway compromise? (eg, difficulty breathing, drooling, voice change, stridor, trismus)

YES

NO

Concern for deep space neck or submandibular abscess?

YES

NO

Assess for primary viral syndromes (cough, coryza, conjunctivitis, headache, muscle aches). Present?

YES

NO

Assess for Centor criteria: (1) fever, (2) absence of cough, (3) anterior cervical adenitis, and (4) tonsillar exudate. Only 0-1 present?

YES

NO

≥ 4 Centor criteria present?

YES

NO

Only 2 or 3 Centor criteria present?

YES

NO

Take steps to maintain airway, as needed, and treat, as appropriate (Class I)

Initiate further testing, as needed, to determine etiology and treat, as appropriate

Do not test or treat for GABHS. Treat symptomatically for likely viral pharyngitis (Class I)

Consider other causes for sore throat besides viral illness. Other etiology more likely?

In child, perform throat culture to confirm

In adult, do not perform throat culture; offer supportive care only (Class I)

Treat; do not perform throat culture (Class I)

Perform RADT. Positive? (Class I)

Perform RADT; treat if positive. May consider empiric treatment (Class II)

Abbreviations: GABHS, group A beta hemolytic Streptococcus; RADT, rapid antigen detection test.

Class Of Evidence Definitions

Each action in the clinical pathways section of Emergency Medicine Practice receives a 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
  - Nonrandomized or retrospective studies: historic, cohort, or case control studies
  - Less robust randomized controlled trials
  - 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

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.

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**Chronic Group A Beta Hemolytic Streptococcus Carriers**

Chronic GABHS carriers are patients with GABHS present in the pharynx for an extended period of time without evidence of infection. A 2010 systematic review from Shaikh and colleagues showed a GABHS carriage rate among children at 12%. However, data show that carriers have a low risk for systemic complications and a low risk for transmission to others. Additionally, carriers have been proposed as an explanation for antibiotic treatment failure, as it seems to be more difficult to eradicate the organism in these patients, but this is not typically a problem in the ED. The emergency clinician should be screening only patients with symptoms suggestive of GABHS, which should reduce the rate of false positives. Patients with a positive RADT should be treated with antibiotics.

**Controversies And Cutting Edge**

**Withholding Antibiotics For Group A Beta Hemolytic Streptococcus**

There is consensus in the American guidelines that GABHS should be treated with antibiotics, but there are some data that show that antibiotics for GABHS do not improve outcomes in developed countries where the prevalence of complications is low. After all, GABHS is a self-limited disease, and antibiotics have side effects, cost money, and their overuse contributes to resistance. For these reasons, the ESMID guidelines do not recommend treating sore throat with antibiotics to prevent acute rheumatic fever in low-risk patients. However, given the available data, we still feel that appropriate antibiotics are indicated in patients with GABHS, given the risk of acute rheumatic fever and other complications.

**Acute Rheumatic Fever**

Acute rheumatic fever is the most concerning possible complication of GABHS infection. It is an immune response caused by an antibody-mediated hypersensitivity reaction that occurs about 2 weeks after a GABHS infection. Components of the cell wall and membrane of GABHS are similar to common human proteins, leading to immunologic attack on many systems, including the synovium, brain, skin, and subcutaneous tissue, and, most importantly, the heart valves. Globally, it is the leading cause of cardiovascular death in people aged < 50 years. It is estimated that there are approximately 15.6 million cases worldwide, with 282,000 new cases and 233,000 deaths each year. However, there are very few cases in developed countries. It is estimated that the prevalence of acute rheumatic fever in children aged 5 to 14 years in Europe is only 1/1000 cases, compared to much higher rates in Australia (3.5/1000) and Sub-Saharan Africa (5.7/1000). It is unclear whether this is due to widespread antibiotic use, different pathogenesis of different strains, or genetic disposition. However, we do know that antibiotics have been shown to reduce the incidence of acute rheumatic fever. Additionally, we know that in the late 1980s and early 1990s, after acute rheumatic fever was thought to be almost eradicated in the United States, there were several outbreaks around the country (Utah, Ohio, Pennsylvania, California, and Tennessee), and it is postulated that the dwindling incidence led to decreased antibiotic use, which allowed for the resurgence.

**Other Complications**

Antibiotics are also given to decrease the incidence of suppurative complications. A 2013 Cochrane review showed that antibiotics decrease the incidence of acute otitis media, sinusitis, and peritonsillar abscess, but noted that the studies involved were mostly from before 1975, with only 3 studies done since 2000. The applicability of these results to more modern populations is in question.

Some researchers have looked into predicting and preventing suppurative complications in more recent studies. A 2007 retrospective study showed that male smokers aged 21 to 40 years are most likely to develop peritonsillar abscess (quinsy). This study by Dunn et al showed that, in a cohort of 606 patients who developed peritonsillar abscess over a 2-year period, only 31% presented with peritonsillar abscess after being treated for an uncomplicated sore throat. There was no evidence that antibiotics prevented peritonsillar abscess.

A 2013 prospective clinical cohort study tried to identify aspects of the history and physical examination that can predict the likelihood of suppurative complications. The study investigators followed 14,610 patients with acute sore throat, of which 1.3% developed suppurative complications. Patients with complications were more likely to have severe tonsillar inflammation (odds ratio [OR], 1.92) and severe earache (OR, 3.02), but 70% of complications occurred when neither was present. The authors reported both that clinical prediction rules had a poor predictive value of complications and that antibiotics did not decrease these complications. The authors suggested that clinicians should consider “delayed antibiotic prescription and safety-net strategies,” given the low prevalence of these complications and the inability to predict them.

Given the low prevalence of suppurative complications, these 2 studies seem to indicate that, in developed countries, prevention of suppurative complications is not a valid reason for supplying antibiotics for group A Streptococcus. However, more questions should be investigated, such as: Are there other pathogens or specific group A Streptococcus...
strains we should identify that are more likely to cause these complications? And again, if antibiotic use declined dramatically, would the rates of these complications increase?

**Treatment To Reduce Symptom Duration, Pain, And Contagiousness**

There are also data that suggest that treatment reduces symptom duration, pain, and contagiousness. The Cochrane review from 2013 showed the presence of symptoms (sore throat and fever) were reduced by about half with antibiotic use, and the duration of symptoms was shortened by about 16 hours. The greatest difference was seen at day 3. However, there are not enough data comparing other effective pain management strategies (NSAIDs, steroids, etc) alone versus antibiotics alone. Most of these studies focus on antibiotics in conjunction with pain medications or pain medications alone versus placebos.

**Corticosteroids For Odynophagia**

Corticosteroids are regularly used to decrease inflammation in disorders such as asthma, croup, mononucleosis, and other upper respiratory infections. There is some evidence that the emergency clinician should be using corticosteroids in sore throat, but it is controversial, and the IDSA does not recommend corticosteroids for treatment of GABHS pharyngitis.

A 2012 Cochrane review of 8 trials involving 743 patients showed antibiotics with corticosteroids were 3 times more likely to result in pain resolution at 24 hours as opposed to antibiotics alone. However, there are no trials involving corticosteroids alone without antibiotics, and this small sample did not have the power to look for rare complications that could be caused by corticosteroids (such as immunosuppression, masking other diseases, or worsening complications). This has led some providers to suggest that corticosteroids be used only in patients with severe symptoms and an inability to swallow. A single dose of oral dexamethasone (0.6 mg/kg, maximum of 10 mg) is recommended. In adults, a single oral daily dose of prednisone 60 mg for 1 to 2 days is acceptable.

The literature is also lacking data comparing corticosteroids to NSAIDs or acetaminophen, which have been shown to decrease pain in acute pharyngitis. These over-the-counter medications may have fewer complications than corticosteroids and, given that they are available over the counter, may decrease costs and physician visits.

Based on the best available evidence, corticosteroids can be considered in patients without risk factors (such as diabetes or immunosuppression) with severe sore throat, especially those with trismus or inability to swallow.

**Indications For Tonsillectomy**

Tonsillectomy has declined over the years, but is still performed in patients with recurrent tonsillitis and pharyngitis. For the emergency clinician, general knowledge on the indications and benefits of tonsillectomy may be important for counseling the patient with recurrent pharyngitis. The IDSA does not recommend tonsillectomy “...solely to reduce frequency of group A streptococcal pharyngitis.”

A 2014 Cochrane review of surgical versus nonsurgical treatment for tonsillitis analyzed 5 studies of children (987 patients) and 2 studies of adults (156 patients), and found a modest decline in episodes of sore throat and total days with sore throat for children in the first postoperative year. The authors concluded that the data on outcomes in adults could not be determined, based on the low quality of evidence. The authors found no difference in the use of analgesics and no evidence for decreased use of antibiotics in posttonsillectomy patients.

Based on these data, the emergency clinician could consider consultation with an ear, nose, and throat specialist regarding tonsillectomy for a patient with recurrent tonsillitis, especially a child, but the data do not support this surgery.

**Disposition**

The majority of patients who present with sore throat will be sent home, so it is important to ensure that the patient is able to tolerate oral intake and is not at risk for becoming dehydrated. Of course, if there is concern for airway compromise, then the patient should have definitive treatment (eg, intubation, needle aspiration of a peritonsillar abscess, surgical debridement of a submandibular abscess) or admission for monitoring.

The patient should be counseled on the possibility of developing suppurative complications with or without antibiotics. Patients should be advised to watch for cellulitis, otitis, sinusitis, and deep neck space abscesses. Patients should also return if symptoms do not resolve within 3 to 5 days, at which point, other etiologies should be explored. Finally, patients with a history of acute rheumatic fever or with an unusually high risk of recurrence (eg, in an area of acute rheumatic fever outbreak) should have primary care follow-up for throat culture to ensure eradication 2 to 7 days after completion of therapy.

**Summary**

One of the most common chief complaints facing the emergency clinician is the patient with sore throat and fever. As always, the first step in the management of these patients is assessing the airway, but in most patients, there will be no airway compromise. These infections are primarily caused by viruses,
1. “It was just a sore throat, so I didn’t think she needed to be admitted for intravenous fluids.” Pharyngitis can be a simple diagnosis, but it is imperative to make sure patients’ pain is adequately controlled so they can maintain an adequate oral intake. Not assessing a patient’s fluid status and ability to eat and drink initially and prior to discharge can lead to poor outcomes and readmissions.

2. “I discharged him with viral pharyngitis after a negative RADT. I didn’t expect him to end up in the intensive care unit with multiple septic emboli.” Lemierre syndrome is a rare but well-described complication of pharyngitis, normally associated with *Fusobacterium spp*, not GABHS. It is most commonly seen in adolescent patients shortly outside of the “acute” (3-5 day) pharyngitis window, with internal jugular venous thrombosis and sepsis. Patients should always be given clear return precautions and follow-up plans.

3. “I didn’t ask about his sexual history.” Gonorrhea can cause an exudative pharyngitis, and should be considered in the broad differential for pharyngitis. *Chlamydia trachomatis*, HIV, and herpes simplex virus can all also produce pharyngeal syndromes and symptoms. Failing to take a good history can prevent diagnosis of these conditions.

4. “She told me her voice sounded funny, but it sounded fine to me.” Patients presenting with sore throat can have serious airway complications. Voice change should be considered to be a sign of deep space neck infection or epiglottitis and should be further investigated with direct visualization or imaging to identify a cause.

5. “He had a cough, runny nose, and hoarseness, but I still gave penicillin for his sore throat. He had never had an allergic reaction to an antibiotic before.” Inappropriate use of antibiotics can lead to unnecessary costs, antibiotic resistance, and allergic or other unpleasant reactions for patient. Antibiotic use should be limited to only those patients with a clear indication. Patients with obvious evidence of viral pharyngitis, or only 0-1 score on Centor criteria should not be treated with antibiotics.

6. “I gave antibiotics, but the patient is very upset that she developed a peritonsillar abscess and had to come back.” While antibiotics have been shown to decrease suppurative complications, they can still occur. Patients should be counseled on the possible complications of pharyngitis and given strict return precautions and a follow-up plan.

7. “I never felt under his tongue.” Given the broad differential associated with pharyngitis, the emergency clinician’s best tool for success is a thorough history and physical examination. Ludwig angina or a submandibular abscess results in a “woody” induration in the submental space. Forgetting to fully examine the entire oral cavity or associated structures (skin, spleen, etc) can result in missed diagnoses.

8. “The patient reported a penicillin allergy, so I gave cephalexin. I never asked what the reaction was.” Penicillin is the treatment of choice for GABHS pharyngitis, but in penicillin-allergic patients, there are other options. Cephalosporins have low cross-reactivity to penicillin, have been proven effective against GABHS, and can be used if a patient had a minor reaction. However, if a patient had a severe allergy to penicillin such as anaphylaxis, Stevens-Johnson syndrome, or other airway involvement, cephalosporins should not be used.

9. “I saw the patient yesterday and diagnosed her with viral pharyngitis. She didn’t need any treatment. I don’t know why she is back.” Pharyngitis can be very painful for patients, and even if antibiotics are not prescribed, the emergency clinician should counsel the patient on methods for pain control. NSAIDs, acetaminophen, lozenges, and gargles can all be effective. Even though most of these medications are available over the counter, patients should still be instructed on what to use and how to use them in order to prevent repeat visits.

10. “It was just a sore throat. Why would I think about cancer?” Infectious pharyngitis should last only 3 to 5 days, and anyone presenting with a longer course needs a broader differential. In older patients or patients with other risk factors for malignancy (smoking, obesity, heavy alcohol use), it must be considered, or it will most certainly be missed.
and GABHS infections are usually self-limiting, but current guidelines still recommend treatment of GABHS to rule out suppurative and systemic complications. The emergency clinician should also not forget the broad differential for this complaint, and should screen for other etiologies, such as mononucleosis or gonococcal pharyngitis. This requires a thorough history and physical examination, but a history and physical examination alone are not enough to distinguish viral from bacterial pharyngitis. The emergency clinician should use the Centor criteria and obvious evidence of a viral infection to guide the use of RADTs, with confirmatory throat cultures in children, but not in adults. Treatment of GABHS should be with penicillin or amoxicillin unless the patient has an allergy to these antibiotics. Pain should be managed with NSAIDs, acetaminophen, and throat lozenges, and patients should be counseled on return precautions, given the chance of persistent infection or complications.

**Case Conclusions**

For your two-and-a-half-year-old patient with sore throat and fever, you remembered that children younger than 3 years of age with group B streptococcal infection may present with atypical symptoms, but they are unlikely to have GABHS and do not require testing or treatment unless there is a close contact with the disease. You counseled the patient’s mother on appropriate use of NSAIDs and acetaminophen and on monitoring for complications, and then discharged the toddler.

The 20-year-old patient met all 4 Centor criteria (fever, tonsillar exudates, tender cervical lymphadenopathy, and no cough). Based on the ambiguity in the guidelines and the preference at your facility, you knew you could empirically treat him or send a RADT. You also remembered to take a good sexual history from this patient and considered sending a throat swab for gonorrhea and chlamydia. You decided to send the RADT, and, given the positive result, you prescribed penicillin for a 10-day course. You discharged him with a plan for pain control and monitoring for complications.

You were concerned about the 35-year-old woman with 5 days of sore throat and voice changes. You remembered that most acute pharyngitis resolves in 3 to 5 days and should not involve voice changes, so you decided to consult the ENT specialist to help with a fiber-optic nasopharyngoscopy. Because of concern for epiglottic swelling, the patient was admitted for airway monitoring, intravenous antibiotics, and intravenous steroids.

Your 65-year-old male patient was also concerning, and you realized you could not rule out malignancy in this older male smoker. Given the duration of symptoms and lack of other infectious symptoms, this patient also did not likely have infectious pharyngitis. You scheduled an urgent ENT appointment for him within the next few days, and discharged him with pain control after expressing your concerns and the need for close follow-up.

**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 will be included in bold type following the reference, where available. In addition, the most informative references cited in this paper, as determined by the authors, will be noted by an asterisk (*) next to the number of the reference.


40. Mackenzie A, Fuite LA, Chan FT, et al. Incidence and patho-


63. Robertson KA, Volmink JA, Mayosi BM. Antibiotics for the primary prevention of acute rheumatic fever: a meta-analysis. BMJ. 2005;331(7511):11. (Systematic review)


68. Thomas M, Del Mar C, Glassziou P. How effective are treatments other than antibiotics for acute sore throat? Br J Gen Pract. 2000;50(459):817-820. (Systematic review)


75. Mangione-Smith R, Elliott MN, Stivers T, et al. Ruling out the need for antibiotics: are we sending the right message? Arch Pediatr Adolesc Med. 2006;160(9):945-952. (Cross sectional study; 38 pediatricians, 522 parents)


83. Mitchell MS, Sorrentino A, Centor RM. Adolescent pharyngi-
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1. Which of the following statements regarding the epidemiology of pharyngitis is TRUE?
   a. Most cases of pharyngitis are due to GABHS.
   b. GABHS is more common in adults than children.
   c. GABHS is more common in the late winter and early spring in temperate climates.
   d. GABHS is transmitted via direct contact.

2. An 18-month-old patient presents with poor oral intake and difficulty swallowing. Her mother is concerned for strep throat and would like antibiotics. You do a full history and physical examination and find a vaccinated only child with moist mucous membranes and mild pharyngeal edema, but no exudates. You should:
   a. Prescribe a 10-day course of penicillin for presumed strep throat
   b. Send a RADT and treat if positive
   c. Send a throat culture and treat if positive
   d. Counsel the mother on how her daughter does not likely have strep and does not need antibiotics for sore throat

3. A 25-year-old man presents with 2 days of sore throat and fever. He has tender cervical lymphadenopathy and no cough. He is able to drink liquids without difficulty and is otherwise well appearing. An appropriate test to order on this patient is:
   a. Complete metabolic panel
   b. RADT
   c. C-reactive protein
   d. Absolute neutrophil count
4. A 25-year-old man presents with sore throat and fever. He has no cough or rhinorrhea. On examination, he has tender cervical nodes and pharyngeal exudate without distortion of the pharyngeal anatomy. The RADT is positive. He is allergic to penicillin. Appropriate treatment options include all of the following EXCEPT:
   a. Treat with amoxicillin
   b. Treat with clindamycin
   c. Find out the patient’s reaction to penicillin, and, if mild, prescribe a first-generation cephalosporin
   d. Treat with erythromycin

5. An emergency clinician should not perform a RADT on patients with primarily viral symptoms and/or only 1 Centor criterion for all of the following reasons EXCEPT:
   a. To decrease costs
   b. To decrease ED length of stay
   c. Chronic carriage of GABHS is common and may result in a false-positive result
   d. They should have a throat culture instead

6. A 25-year-old man presents with sore throat and fever. He has no cough or rhinorrhea. On examination, he has tender cervical nodes and pharyngeal exudate without distortion of the pharyngeal anatomy. The RADT is positive. He has no allergies to medications. First-line treatment is:
   a. Penicillin
   b. Azithromycin
   c. Cephalexin
   d. Clindamycin

7. A 25-year-old man presents with sore throat and fever. He has a runny nose and a cough. On examination, he has bilateral pharyngeal erythema without exudates and no distortion of the pharyngeal anatomy. You should:
   a. Perform a RADT and, if negative, send a throat culture.
   b. Perform a RADT, but do not send a throat culture if negative.
   c. Perform no testing and treat symptomatically for viral pharyngitis.
   d. Treat GABHS presumptively with penicillin.

8. Sore throat associated with septic emboli, especially including the internal jugular vein, is known as:
   a. Lemierre syndrome
   b. Vincent angina
   c. Ludwig angina
   d. Oropharyngeal tularemia

9. Corticosteroids for treatment of pain associated with acute pharyngitis:
   a. Should be considered in all patients who present to the ED
   b. Have been proven to decrease symptom duration
   c. Should be given for a short course of 5 to 7 days
   d. Have been proven safe without concomitant antibiotics

10. Which of the following statements regarding tonsillectomy is TRUE?
    a. Tonsillectomy is routinely indicated for patients with recurrent sore throat.
    b. Tonsillectomy should only be considered in patients with > 10 episodes of sore throat a year.
    c. Tonsillectomy is not recommended solely to reduce episodes of GABHS pharyngitis.
    d. After tonsillectomy, most patients are unlikely to have recurrent episodes of pharyngitis.
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Goals: Upon completion of this activity, you should be able to: (1) demonstrate medical decision-making based on the strongest clinical evidence; (2) cost-effectively diagnose and treat the most critical presentations; and (3) describe the most common medicolegal pitfalls for each topic covered.

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