

# Pharyngitis:

**Abstract:** Sore throat is a common presentation in primary care. Accurate identification of cause is important for appropriate treatment. Clinical scoring systems and diagnostic tests are recommended to identify group A beta-hemolytic streptococcus, which warrants guideline-driven therapy. The article explores causes, diagnosis, management, and possible complications of pharyngitis.

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**A**cute pharyngitis accounts for 12 million healthcare encounters annually in the United States, approximately 1% to 2% of all ED visits, and up to 6% of outpatient appointments.<sup>1-4</sup> Sore throats rank within the top 20 reasons patients present to healthcare providers.<sup>4</sup> In temperate climates, the incidence is highest during the winter and early spring (November to May).<sup>5-7</sup> The most common cause of pharyngitis is viral infection. Group A beta hemolytic streptococcal (GABHS) pharyngitis (also known as Group A streptococcal pharyngitis) accounts for between 20% to 30% of presentations in children and 5% to 15% in adults.<sup>1,4,5,8</sup> The peak incidence is in ages 5 to 15.<sup>8</sup> Symptoms can be similar in GABHS and nonstreptococcus forms of pharyngitis, making clinical diagnosis difficult.

In cases other than GABHS pharyngitis, antibiotic therapy has not been shown to benefit most bacterial causes. Noted exceptions are *Corynebacterium diphtheriae* and *Neisseria gonorrhoeae*, which are treated with antibiotics specific to these conditions. Accurate diagnosis negates the need for unnecessary antibiotic therapy in most other cases of pharyngitis. Treatment of GABHS pharyngitis is important in decreasing nonsuppurative postinfectious disorders (such as rheumatic fever [RF] and poststreptococcal glomerulonephritis) and suppurative complications (including peritonsillar abscess and cervical lymphadenitis).<sup>5</sup>

## ■ Differential diagnosis

Pharyngitis can be defined as an inflammation of the upper respiratory tract, including the pharynx, larynx, and posterior nares, with sore throat as the most common presenting symptom.<sup>9</sup> The chief complaint of sore throat can have multiple etiologies (see *Causes of sore throat*). Most are the results by a pathogenic infection from a variety of organisms. Other causes of sore throat include overuse of the voice, smoking, allergies, irritation by a foreign body, tumor, or clinical entities, such as Kawasaki syndrome or thyroiditis.<sup>9</sup> Diagnosis of the most common causes of pharyngitis, common viral, bacterial, and Epstein-Barr virus (EBV) will be discussed.

## ■ Presenting symptoms

**Viral pharyngitis.** Viral etiology is the most common cause of pharyngitis and can be caused by a number of different viruses. The most common pathogens are rhinovirus and coronavirus, which cause the common cold, adenoviruses, and influenza viruses.<sup>6</sup> Coxsackievirus infections can present as hand-foot-and-mouth disease or herpangina.<sup>6</sup> Viral pharyngitis is a self-limited (5 to 7 days), generally benign, and is associated with systemic symptoms, such as cough, hoarseness, coryza, headache, malaise, joint pain, fatigue, and mild elevation of temperature or absence of fever.

**Keywords:** pharyngitis, sore throat, strep throat, streptococcal infection

# soothing the sore throat



**Bacteria pharyngitis.** The most common bacterial etiology in children and adolescents is GABHS. Although much less common, children and adults can develop pharyngitis from non-GABHS. Groups B, C, and G streptococcus are the strains most commonly documented. Group C and group G cases account for about 5% of cases and usually occur in clusters or sporadic outbreaks.<sup>10</sup> In patients with streptococcal pharyngitis, the onset of symptoms is often abrupt and includes throat pain, malaise, fever, chills, headache, enlarged cervical lymph nodes, and pharyngeal exudate.<sup>10</sup> Symptoms may also include nausea, vomiting, and abdominal pain in younger children. Patients with streptococcal pharyngitis usually do not have cough or nasal symptoms.<sup>5,8</sup>

**Infectious mononucleosis.** Infectious mononucleosis is another common cause of pharyngitis, especially in young adults 15 to 24 years of age.<sup>4</sup> Mononucleosis is caused by infection with EBV. Approximately 90% of patients with EBV have pharyngitis, and about one-third

also have exudates and tonsillar enlargement.<sup>10</sup> Other symptoms include fever, lymphadenopathy, extreme fatigue, malaise, splenomegaly, and abdominal pain.<sup>4,10</sup>

**■ Diagnostic testing**

Clinical features of viral pharyngitis, such as cough, hoarseness, rhinorrhea, and oral ulcer may make the diagnosis clear, rendering testing unnecessary. If clinical features alone do not differentiate GABHS from viral pharyngitis, then a rapid antigen detection test (RADT) and/or culture should be performed. Other tests may be warranted to differentiate additional causes.

**Clinical scoring criteria.** Diagnostic reasoning can be supported through the use of clinical scoring systems, such as the Centor or McIsaac criteria (see *Centor clinical scoring criteria*).<sup>11-13</sup> These criteria can also aid in stratifying which patients warrant RADT or culture and those needing antibiotic treatment.<sup>14</sup> Centor criteria evolved from a logistic regression analysis of strep positive adult patients who were seen in an ED. Four variables were predictive of a positive culture: tonsillar exudates, swollen tender anterior cervical nodes, lack of a cough, and history of fever. The presence of all four findings had a 56% probability of a positive culture. Patients with 3, 2, 1, or 0 findings had probabilities of 32%, 15%, 6.5%, and 2.5%, respectively.<sup>11</sup> McIsaac score adjusts the Centor score for the patient's age, since younger patients ages 3 to 14 years (add 1 point) are more likely to have GABHS than adults age 45 and older (subtract 1 point).<sup>12,13</sup>

Fine and colleagues validated the Centor prediction model in a study of 238,656 retail clinic patients presenting with sore throat.<sup>13</sup> However, a meta-analysis of 21 studies found that individual signs and symptoms are not enough to distinguish GABHS from other sore throat causes.<sup>15</sup> The authors asserted that although the Centor score can enhance clinical decision making, this tool should be used cautiously in settings with low GABHS pharyngitis incidence. The Infectious Diseases Society of America (IDSA) guidelines also support the use of the scoring system to identify those at low risk who do not need diagnostic testing. The score alone should not be used in lieu of diagnostic testing in questionable cases or in children.<sup>14</sup>

**Throat culture.** Throat culture, with a sensitivity of 90% to 95%, is considered the standard for diagnosing GABHS pharyngitis.<sup>14</sup> However, test results can be affected by a number of variables. Since swabbing must be obtained from the posterior pharynx and tonsillar surfaces for best results, an uncooperative patient can make adequate swabbing impossible.<sup>16</sup> Additionally, the result can reflect a false negative if a patient has taken any recent antibiotics. Cultures must be incubated for at least 18 to 24 hours; a

**Causes of sore throat<sup>6,10</sup>**

**Bacterial pharyngitis**

- Group A beta-hemolytic *streptococcus* (*Streptococcus pyogenes*)
- Group B, C, and G *streptococcus* (non-GABHS)
- *Neisseria gonorrhoeae*
- *Corynebacterium diphtheriae*
- *Fusobacterium necrophorum*
- *Mycoplasma pneumoniae*

**Viral pharyngitis**

- Rhinovirus
- Coronavirus
- Adenovirus
- Herpes simplex
- Parainfluenza virus/influenza virus
- Coxsackievirus A
- Epstein-Barr
- Cytomegalovirus
- Human immunodeficiency virus (acute retroviral syndrome)

**Other pathogens**

- Chlamydia pneumoniae

**Other conditions**

- Peritonsillar abscess
- Epiglottitis
- Retropharyngeal abscess
- Cervical lymphadenitis
- Thyrotoxicosis
- Gastroesophageal reflux
- Allergies
- Tumors of the tongue or upper airway

negative culture at 24 hours should be reexamined at 48 hours.<sup>14</sup> Thus, immediate therapeutic decisions based on diagnostic testing are not possible to make at the time of the appointment.

**Rapid antigen detection testing.** RADT via throat swab remains a practical and efficient diagnostic test for GABHS pharyngitis. This test allows for rapid diagnosis and immediate treatment, which can aid in reducing the risk of contagious transmission. RADT has a specificity of approximately 90% to 95% and sensitivity of 75% to 85%.<sup>14,17</sup> Newer molecular-based RADTs such as DNA probes and polymerase chain reaction (PCR) have better diagnostic accuracy than those that use immunoassays.<sup>18</sup> Unless known exposure is elicited by history, children under 3 years of age generally do not require testing for GABHS, since the incidence is uncommon.<sup>14</sup> In children and adolescents, a backup throat culture should be conducted in cases of negative RADT tests, since the proportion of GABHS pharyngitis in this population is high (20% to 30%), and lower test sensitivity can result in a false negative.<sup>3</sup> Routine backup cultures are not recommended in adults, as the incidence of GABHS pharyngitis is only 5% to 15%, and the subsequent risk of RF is low.<sup>3</sup> Since RADT is highly specific, positive results do not necessitate a backup culture in any population. Unless symptomatic, routine testing or empirical treatment of household contacts is not recommended.<sup>14</sup>

**Other tests.** Antistreptococcal antibody titers (antistreptolysin O and anti-DNase B) do not have utility in diagnosing acute GABHS pharyngitis. These titers do not begin to elevate until 7 to 14 days after illness onset and take weeks to peak. Levels can remain elevated for months even without active infection. Use of these titers should be reserved for supporting the diagnosis of acute RF or poststreptococcal glomerulonephritis.<sup>4,14,19</sup>

History or physical findings may necessitate other tests to rule in or out causes of pharyngitis other than viral or GABHS. In cases of suspected mononucleosis, a point-of-care heterophile antibody (Monospot) test should be done. This test has a sensitivity and specificity of 85% and 94%, respectively.<sup>4</sup> Results can be negative in about 25% of cases during the first week of illness, since the antibody may not be detectable.<sup>4,20</sup> A test for IgM and IgG antibodies to the viral capsid antibody can be performed if the diagnosis is uncertain.<sup>4,9</sup> In sexually active patients with pharyngitis, fever, and green exudate, a gonococcal culture can be done to determine the presence of *N. gonorrhoeae* if diagnosis is uncertain.

#### Centor clinical scoring criteria<sup>11,13</sup>

Finding	Score
History of fever greater than or equal to ( $\geq$ ) 38° C (100.4° F)	+1
Lack of cough	+1
Tonsillar exudates	+1
Swollen tender anterior cervical nodes	+1

**Note:** McIsaac score adds 1 point for ages 3-14 years and subtracts 1 point for patients 45 years of age and older. Used with permission from Robert M. Centor, MD.

#### Treatment

**Antibiotic therapy.** Antimicrobial treatment of GABHS pharyngitis is aimed at reduction of poststreptococcal complications, symptoms, duration, and disease spread. Agents should be selected based on spectrum of activity, infrequent adverse reactions, and cost. Although the incidence of GABHS pharyngitis is relatively low, especially in adults, up to 60% to 70% of patients presenting with sore throat in primary care settings receive antibiotic prescriptions.<sup>21,22</sup> In GABHS negative patients, antibiotic use does not shorten the illness course or relieve symptoms and contributes to antibiotic resistance and higher healthcare costs.

Barnett and Linder estimated that \$500 million was spent in the United States on unnecessary antibiotic prescribing to adults with pharyngitis between 1997 and 2010.<sup>21</sup> Even in patients with GABHS, antibiotics only shorten the duration of pain symptoms by an average of

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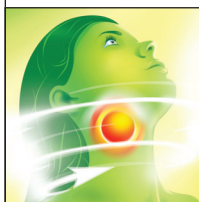
1 day.<sup>23</sup> Spinks, Glasziou, and Del Mar found in a review of 27 randomized controlled trials (RCTs) or quasi-RCTs that antibiotics reduced throat soreness and fever by half with the greatest difference occurring at day 3.<sup>23</sup> The benefit was greatest if the throat swabs were positive for *streptococcus*. The authors concluded that the absolute benefit of antibiotics in high-income countries is modest, but their use should be individualized and clinically justifiable. However, in communities at risk for RF, such as impoverished or those with poor healthcare access, antibiotics can reduce the incidence by two-thirds.<sup>23</sup> In making treatment decisions, using a combination of clinical scoring criteria

and diagnostic testing can decrease the likely inappropriate use of antibiotics.

IDSA has published updated treatment guidelines in 2012 for GABHS pharyngitis in pediatric and adult patients (see *Antibiotic regimens recommended for group A streptococcal pharyngitis*).<sup>14</sup> The guidelines recommend penicillin and amoxicillin as the agents of choice for treatment of GABHS in nonallergic patients.<sup>14</sup> These antibiotics are not only

(personal or family history of RF, crowded living conditions, low socioeconomic status).<sup>14</sup>

In patients with penicillin allergy, selected first-generation narrow spectrum cephalosporins, clindamycin, or macrolides (azithromycin or clarithromycin) may be used. Use of cephalosporins should be avoided in patients with anaphylactic-type reactions to penicillin due to the possibility of cross-reactivity. Broad-spectrum cephalosporins are not recommended and are considerably more expensive. Antibiotic resistance to macrolides varies geographically, so providers need to be aware of resistance patterns in their locale. Macrolides, such as clarithromycin, should be used cautiously in patients taking cytochrome P-450 3-A



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effective but are less expensive than many other agents. Duration of treatment is 10 days for oral agents or a one-time dose of penicillin G benzathine I.M. The latter may be a desired route in patients unable or unwilling to complete an entire course of oral medications as well as in populations in which the development of post-GABHS RF is a concern

inhibitors, since QT interval prolongation can occur.<sup>19,24,25</sup>

Cephalosporins, clindamycin, or clarithromycin should be prescribed for 10 days, while azithromycin may be given for 5 days. Patients need to be counseled regarding completion of an entire course regardless of symptom improvement to reduce the incidence of treatment failure

#### Antibiotic regimens recommended for group A streptococcal pharyngitis<sup>14</sup>

Drug, route	Dose or dosage	Duration or quantity
<b>For individuals without penicillin allergy</b>		
Penicillin V, oral	Children: 250 mg twice daily or three times a day; Adolescents and adults: 250 mg four times a day or 500 mg twice daily	10 days
Amoxicillin, oral	50 mg/kg once daily (maximum = 1,000 mg); alternate 25 mg/kg (maximum = 500 mg) twice daily	10 days
Penicillin G benzathine, I.M.	Less than 27 kg: 600,000 units; 27 kg or greater: 1,200,000 units	1 dose
<b>For individuals with penicillin allergy</b>		
Cephalexin, <sup>a</sup> oral	20 mg/kg/dose twice daily (maximum = 500 mg/dose)	10 days
Cefadroxil, <sup>a</sup> oral	30 mg/kg once daily (maximum = 1 g)	10 days
Clindamycin, oral	7 mg/kg/dose three times a day (maximum = 300 mg/dose)	10 days
Azithromycin, <sup>b</sup> oral	12 mg/kg once daily (maximum = 500 mg)	5 days
Clarithromycin, <sup>b</sup> oral	7.5 mg/kg/dose twice daily (maximum = 250 mg/dose)	10 days

<sup>a</sup> Avoid in individuals with immediate-type hypersensitivity to penicillin

<sup>b</sup> Group A streptococcal pharyngitis resistance to these agents is well known and varies geographically and temporarily

**Note:** Consult the manufacturer's complete drug product label before prescribing any of the drugs discussed.

Adapted from: Shulman ST, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America, p. e86-e105 (2012) with permission from Oxford University Press.

and future resistance. A Cochrane review found that 3 to 6 days of oral antibiotics in children compared with standard 10-day penicillin treatment had safe and comparable results.<sup>26</sup> Self-limiting adverse reactions such as diarrhea, vomiting, and abdominal pain occurred in the short treatment groups. However, shorter durations may be more convenient and result in higher adherence and treatment completion. Although symptoms from streptococcal group B and group C can be similar to those of GABHS, treatment of these causes remains controversial and is not included in guidelines.

The patient and family should be educated on the importance of antibiotic regime completion to avoid treatment failure and complications. The patient is considered contagious until taking the antibiotic for 24 hours; therefore, the patient should be counseled to avoid public exposure at school or work until then. In general, most patients will feel better within 24 to 48 hours after antibiotics are started.

**Supportive therapy.** Symptom relief for patients with either viral or GABHS pharyngitis can be augmented with the use of an analgesic/antipyretic agent, such as acetaminophen or a nonsteroidal anti-inflammatory agent. Aspirin should be avoided in children due to the risk of Reye syndrome. Corticosteroid use is not routinely recommended.<sup>14</sup> However, studies have demonstrated a reduced mean time to onset of pain relief by 6 hours with additional pain relief at 24 hours. Use of corticosteroids should be individualized and used as an adjunct to antibiotics in treating severe or exudative pharyngitis.<sup>27-30</sup> Nonpharmacologic measures include rest, adequate hydration, saline gargles, and topical anesthetic agents. Parents should be instructed against the use of anesthetic lozenges in young children due to choking risks. Tonsillectomy is not recommended as a preventive treatment for recurrent GABHS.<sup>14</sup> Patients should be instructed to avoid sharing food and utensils to prevent the spread of illness. A new toothbrush should be used after resolution of the illness to avoid reinfection.

### ■ Major complications

Most cases of pharyngitis are self-limited even without pharmacologic treatment. However, inadequate treatment of GABHS can lead to further complications, including peritonsillar abscess, glomerulonephritis, or RF.

**Suppurative.** Suppurative complications can occur with the spread of GABHS from the pharynx to deeper tissues by extension. Severe complications of GABHS pharyngitis include peritonsillar or retropharyngeal abscess, sinusitis,

and otitis media. Infection with *Fusobacterium necrophorum* is associated with Lemierre syndrome, a complication that can follow a recent oropharyngeal infection.<sup>10</sup>

**Peritonsillar abscess.** Peritonsillar abscess (quincy) is a deep infection of the head and neck, which can coincide with pharyngitis and tonsillitis. Although this infection can be caused by several organisms, GABHS is the most common cause. Patients appear ill and generally present with symptoms such as fever, dysphagia, otalgia, and trismus (difficulty or inability to open the mouth). Since even swallowing saliva can be painful, drooling may occur. Patients often speak in a muffled voice (“hot potato voice”).<sup>32</sup>

Physical findings include an erythematous swollen soft palate with tonsillar enlargement, uvula deviation to the contralateral side, cervical lymphadenitis on the affected side, and rancid breath. Since death can occur from airway obstruction, aspiration, or hemorrhage from carotid sheath

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erosion or septic necrosis, immediate referral to an otolaryngologist and/or transfer to an ED should occur.<sup>33</sup> Diagnosis can be made via computerized tomography (CT) scan or magnetic resonance imaging (MRI) to distinguish between abscess and cellulitis and to determine any spread of infection into the deep neck region. Treatment consists of abscess drainage via needle aspiration or incision and drainage. Antibiotic therapy includes the combination of penicillin or a cephalosporin plus metronidazole. Amoxicillin should not be used unless mononucleosis has been ruled out due to the risk for maculopapular rash. Severe cases warrant I.V. antibiotics.<sup>10,33,34</sup>


**Lemierre syndrome.** Lemierre syndrome, described in 1936, is a life-threatening condition caused by the Gram-negative bacteria *F. necrophorum*. This organism is the cause in up to 10% of pharyngitis in adolescents and young adults and has been reported as a major pathogen in peritonsillar abscesses in adolescents.<sup>10,31,34,35</sup> Estimated probability of developing Lemierre syndrome is approximately 1 in 400 cases of *F. necrophorum* pharyngitis.<sup>35</sup> Symptoms of bacteremia occur after approximately 4 days of the initial illness. Patients present with worsening symptoms: fever, neck mass or swelling with pain and decreased range of motion, and enlarged lymph nodes.<sup>10,37-40</sup>

Suppurative thrombophlebitis of the internal jugular vein and metastatic infections occur. Untreated, the condition has a high mortality rate. Clinical diagnosis is based



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possible causes of pharyngitis. Although most cases are viral in nature, other causes can have serious complications if not recognized and treated. Accurately determining the diagnosis using scoring systems and lab tests can reduce excess antibiotic use and prevent complications. Importantly, the NP is a position to provide patients and families with education about the course of the illness and the appropriate use of antibiotics. Serving as an antimicrobial steward can result

in lower healthcare costs and resistance patterns within communities. 

on clinical presentation and failure to improve, as no commercial polymerase chain reaction test exists. The bacteria can be isolated from specialized testing on throat swabs, but results are not immediate. CT scan of the neck with contrast can help confirm the diagnosis. Patients should be immediately hospitalized for antibiotic therapy with clindamycin or penicillin and metronidazole.<sup>37-40</sup> Due to the concern for this complication, some experts recommend treating adolescents and young adults with three of the Centor criteria with penicillins or cephalosporins and to avoid use of macrolides since *F. necrophorum* is resistant to these agents.<sup>31,35</sup>


**Nonsuppurative.** Although not common, complications or sequelae of GABHS pharyngitis can include RF and acute glomerulonephritis. These infections are more common in children ages 5 to 15.<sup>19</sup> Although they can occur in late adolescence and early adulthood, the incidence in the general adult population is uncommon.

The incidence of RF is rare in the United States. However, RF is a leading cause of heart disease in developing areas, including parts of Africa, India, and in indigenous people living in poverty in developed countries such as Australia.<sup>8</sup> A patient with a past history of RF who develops subsequent GABHS pharyngitis is at a high risk for recurrent RF and worsening heart disease. Thus, secondary prevention with continuous antimicrobial prophylaxis is recommended rather than episodic treatment of GABHS pharyngitis.<sup>19</sup>

Poststreptococcal glomerulonephritis typically is preceded by GABHS pharyngitis 1 to 2 weeks before the onset of symptoms.<sup>41</sup> Symptoms include sudden onset of fever, hematuria, oliguria/anuria, edema, and hypertension. Recovery generally occurs within 3 to 4 weeks. Studies do not indicate that antibiotic treatment of GABHS pharyngitis affords protection against this complication.<sup>23</sup>

### ■ Moving forward

Sore throat is a common presenting complaint in primary care settings. The nurse practitioner (NP) must be astute in obtaining a targeted history and physical exam to determine

in lower healthcare costs and resistance patterns within communities. 

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