

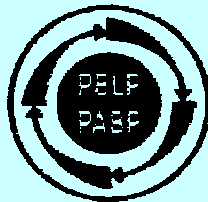
The Foundation for Medical Practice Education

Experience

Expérience

Practice
Integration

*Intégration dans
la pratique*



Learning
Objectives

*Objectifs
d'apprentissage*

New
Knowledge

*Nouvelles
connaissances*

La Fondation pour l'éducation médicale continue

Practice Based Learning Programs (PBLP) Programmes d'apprentissage basé sur la pratique (PABP)

McMaster University
1280 Main Street West • DTC Basement
Hamilton • Ontario • Canada L8S 4L8

Tel: 905-525-9140 ext./poste 22219 • 1-800-661-3249

Fax: 905-540-4988

Email: fmpe@mcmaster.ca

Website: www.fmpe.org



PHARYNGITIS

Sore throat is one of the most frequent reasons for patients to visit their family doctors. Most cases of acute pharyngitis seen in primary care are viral, not bacterial, in origin. Typically, less than 30% of cases in children and 10% of cases in adults are caused by group A streptococci (GAS). However, about half of all patients presenting with sore throat receive antibiotics.

Overuse of antibiotics for respiratory infections, a major contributor to ongoing development of bacterial resistance, is often attributed to the difficulty of *differentiating* bacterial from viral infections. While this may be true for otitis media and acute sinusitis, it is not the case in acute pharyngitis where both antigen detection tests and cultures are widely available. In addition, as with otitis media, there is increasing controversy about the true benefits of antibiotic treatment—even for confirmed GAS pharyngitis.

The aim of this module is to help:

- T** improve diagnostic accuracy for GAS pharyngitis
- T** better understand the role of antibiotics in treatment and, when indicated, to prescribe them appropriately
- T** educate patients about why (and why not) certain treatments are recommended

CASES

Case 1: Maya S., age 5, female

Part One

Leonie, a mother of 3 children, brings in her oldest daughter, Maya, because she has just developed “a bad cold.” Her primary complaint is a sore throat, but she also says that her tummy hurts and her left

ear is sore. She has a runny nose and diarrhea. She has no cough. On examination she looks quite well. She is afebrile. The only abnormal findings are mild erythema of her tonsils and tender anterior cervical lymphadenopathy.

**What investigations would you order?
Would you prescribe antibiotic treatment at this point? If so, with what?**

Part Two

Maya’s results are negative for GAS. The next afternoon her mother calls because, although Maya is just starting to perk up, her sore throat isn’t much better.

What would you do now?

Case 2: Nua Sag, age 30, male

Nua is one of your favourite patients. He comes in complaining of an agonizing sore throat that has bothered him for two straight days. He denies any other symptoms. On exam, he is febrile (temp= 38.2 EC), his tonsillar pillars are both beefy red with an obvious white exudate, and he has enlarged tender cervical lymph nodes. He has no cough.

What would be your approach?

Case 3: Mark S., age 6, male

Mark is brought in by his mother because of a sore throat. She is feeling distraught as he has been having recurrent strep throat since last summer. The first time, Mark presented with a sore throat and fever. A swab subsequently confirmed group A streptococcus (GAS). Mark was given amoxicillin for 10 days. Part of the prescription spilled in the bathroom so he didn’t get the full amount.

A week after finishing the medication, Mark developed a sore throat again. He was given another prescription for amoxicillin (which was finished this time). About a month later, he again had a sore throat and was seen by the on-call doctor. Although there was no fever or cough, the note described his throat as “very red.” A swab was taken and Mark was given azithromycin (Zithromax®) pending the result. The swab again confirmed GAS.

Now Mark has another sore throat. He also has a runny nose and a fever, but no cough. On exam, he has a red inflamed throat, no tonsillar or pharyngeal exudate, and non tender glands in the neck. No one else in his family has been ill. A repeat throat swab again shows GAS.

**How would you manage this patient?
If the patient had been 18 or older, would you consider giving a fluoroquinolone to treat the strep throat?**

INFORMATION SECTION

BACKGROUND

1. Acute pharyngitis is the second-most commonly diagnosed childhood illness,^{1,2} and is one of the most frequent reasons for children to visit their family doctors.^{3,4}
2. Most cases of pharyngitis (about 80%) are of viral etiology. Overall, when considering *both* adults and children, only about 10% of sore throats are caused by group A β-hemolytic streptococci (GAS).^{5,6} However, the prevalence of GAS in family practice can range from 10% to as high as 25% in Scandinavian countries.⁷

Table 1. Common Causes of Acute Pharyngitis

Etiology	Organisms
Viral	<ul style="list-style-type: none"> • rhinovirus • coronavirus • respiratory syncytial virus • adenovirus • herpes simplex virus 1&2 • parainfluenza • coxsackie A • Epstein-Barr virus • cytomegalovirus • human immunodeficiency virus • influenza A/B
Bacterial	<ul style="list-style-type: none"> • group A β-hemolytic streptococcus (GAS) • <i>Neisseria gonorrhoeae</i> • <i>Corynebacterium diphtheria</i> • <i>Arcanobacterium haemolyticum</i>
Others	<ul style="list-style-type: none"> • <i>Mycoplasma pneumoniae</i> • <i>Chlamydia pneumoniae</i> • toxoplasmosis

3. The probability of GAS as the cause of sore throat is highest among children under the age of ten. In a typical outpatient setting, the following age groups with sore throat will have GAS pharyngitis:⁸
 - 5- to 9-year olds: ~30%
 - 10- to 19-year olds: 15-20%
 - adults: only 5-10%
4. GAS pharyngitis is more common in the winter and spring.⁴
5. Although GAS is not part of the normal flora of the throat, an asymptomatic carrier state does exist. The rate is highest among children 3-15 years (5-21%), followed by 2-7% in children younger than 3 years and 2-3% in older adolescents and adults.⁸

COMPLICATIONS

6. Antibiotic treatment of symptomatic GAS pharyngitis has long been advocated because untreated strep throat has been associated with the risk of developing acute rheumatic fever, acute glomerulonephritis, or suppurative complications such as peritonsillar abscess, retropharyngeal abscess, mastoiditis, otitis media, sinusitis, toxic shock syndrome and necrotizing fasciitis.⁹
7. In industrialized countries, acute rheumatic fever is now a rare disease. The decline in acute rheumatic fever may be due to a combination of improved social conditions, treatment of strep throats with antibiotics and changes in the prevalence of virulent streptococcal strains.¹⁰
 - a. The risk of acute rheumatic fever in communities with usual (or endemic) levels of GAS pharyngitis is estimated to be between 0.3-1% following an *untreated* GAS infection.^{7,10,11}
 - b. During an epidemic, however, the risk of developing acute rheumatic fever from untreated GAS may be as high as 3%.^{11,12} In most communities, public health will notify physicians if an epidemic is occurring— especially if any cases of rheumatic fever are reported. Several outbreaks of rheumatic fever did occur in the 1980s in about a dozen different states in the U.S.^{2,10}
 - c. Treatment for GAS can be safely postponed for up to 9 days after symptom onset and still prevent acute rheumatic fever.¹³ (Level 1b evidence)
8. Post-streptococcal acute glomerulonephritis is uncommon, affecting about 1 in 10,000 people who have had GAS.¹⁴ There is no solid evidence that the treatment of pharyngitis can prevent acute glomerulonephritis.¹⁵

DIAGNOSIS

Clinical Features

9. Patients with symptomatic GAS pharyngitis often present with sudden onset of sore throat, fever and pain with swallowing. Other variable findings include stomachache, earache, lymphadenitis, exudative tonsillitis, scarlatiniform rash, palatine petechia and excoriated nares in infants.^{16,8}
10. Unfortunately, many of the organisms in Table 1 produce a tonsillitis with symptoms and signs that overlap those of GAS. For example:
 - infectious mononucleosis will typically exhibit a pharyngeal exudate¹⁷
 - HSV-1 can also produce an exudative pharyngitis, particularly in college students¹⁸
11. A reliance on clinical impression alone produces a high probability of overtreatment. Even experienced physicians have been shown to overestimate the probability of positive cultures by 81%.⁵ As a result, the American Academy of Pediatrics,¹⁹ the Canadian Paediatric Society,²⁰ and the American Heart Association¹³ recommend that the diagnosis only be made by laboratory detection.
12. Other organizations support the use of defined clinical prediction rules/tools to improve diagnostic accuracy. These tools focus on the presence of fever, tonsillar exudates, tender cervical adenopathy and the absence of cough.²¹
 - a. The Infectious Diseases Society of America recommends using prediction rules to identify those patients who are at such a low risk of GAS that no further tests are needed; for all others, cultures should be taken but treatment given only to those with positive culture results.¹⁶
 - b. The Centers for Disease Control and Prevention support the Infectious Diseases Society of America's recommendations for *children*, and specifically states that any negative rapid test in children should be confirmed with a throat culture.
 - c. *For adults*, the Centers for Disease Control and Prevention, the American College of Physicians, and the American Academy of Family Physicians all recommend that a validated clinical prediction tool may be used to diagnose pharyngitis on clinical grounds alone.²²
13. One of these clinical prediction tools (see Appendix 1) is particularly applicable for use in family practice.^{21,23} This tool:
 - was in a primary care setting with developed patients who commonly present there²¹

Clinical Tool

- considers age as an important factor
 - was based on a prevalence of GAS infection similar to other general practice studies²¹
14. Two validation studies of the McIsaac clinical tool have been done with both children and adults presenting with sore throat.^{21,23} (Level 2b evidence) The most recent study found that, overall, this “score approach” had a sensitivity of 85% and specificity of 92%.
- (Note:** This score does not apply in a community where an outbreak of GAS is occurring.)
- Use of the score would have resulted in a 52% reduction in “unnecessary” antibiotic prescriptions compared to clinical impression alone—with the greatest reduction in the adult population.²³
- Thus, to reduce unnecessary antibiotics, the clinical tool is better than clinical judgment, but not as good as throat culture.
15. This clinical tool can be a simple, practical way to:
- *exclude* low-risk patients (who have a very low probability of GAS) from further investigations and unnecessary antibiotic use
 - *identify* higher-risk patients who may need to undergo diagnostic tests (see below)

Diagnostic Tests

Throat Swabs for Culture

16. A throat swab for culture is considered the gold standard for diagnosing GAS. It is indicated when a patient has a total sore throat score ≥ 3 (see Appendix 1) and is not currently taking antibiotics.²⁴
- a. Sensitivity ranges from 70-95%.¹⁵
 - b. Specificity ranges from 76-99%.⁹
17. A throat culture imposes a 24 to 48-hour delay in diagnosis. Delaying antibiotic treatment for this time period will not diminish its efficacy in preventing complications such as acute rheumatic fever.^{15,25}
18. Because 5-15% of school aged children are chronic carriers of GAS, indiscriminate culturing in patients with a low pre-test probability of bacterial pharyngitis should be avoided. A positive culture in a carrier does not mean that the patient has GAS pharyngitis.²⁵
19. Culturing of close contacts is not recommended; it may be indicated, however, in special circumstances (such as in patients with a history of acute rheumatic fever, during outbreaks of acute rheumatic fever, or if a “ping-pong” spread of the illness is suspected).¹⁶
20. Follow-up swab is generally not indicated in a person who is asymptomatic and has received a full treatment course, except in the following special circumstances:^{16,26}
- in patients with a history of rheumatic fever
 - patients who develop acute pharyngitis during outbreaks of acute rheumatic fever or acute glomerulonephritis, or during outbreaks of GAS pharyngitis in “closed or semi-closed communities” (e.g., residential schools/facilities)
 - if a chronic carrier state is suspected

Practice Tip: Taking a “Correct” Throat Swab

With a sterile throat swab, contact the surface of *both* tonsils and the posterior pharyngeal wall, avoiding other parts of the oral pharynx. For rapid antigen detection test, place swab immediately into special vial (extraction tube) and process. For culture, place swab in an appropriate medium and have it promptly delivered to the local lab.²⁴

Rapid “Strep Tests”

21. The Rapid Antigen Detection Test (RADT) or “rapid strep test” detects the presence of a carbohydrate specific to GAS on a throat swab.
- a. The specificity of the RADT is so high (95%) that a positive result essentially establishes the diagnosis of GAS.²⁷
 - b. The sensitivity has been reported to range from 70-95%.²⁸ Because of this, some experts recommend always confirming a *negative* test with a throat culture.¹⁵ Others suggest that if the sore throat score is between 1-3, the likelihood of GAS is now so low that further culture generally is not warranted.²⁹
 - c. RADT kits (containing 20-30 tests) must be purchased directly from the manufacturers. The approximate cost of one test is \$Cdn 8.50 in Canada³⁰ and \$US 3.90 in the US.³¹
22. Newer techniques that use DNA probes and enzyme/optical immunoassays may perform as well as throat cultures.
- a. A Canadian study comparing the optical immunoassay test to two standard throat swab culture methods found that the optical immunoassay test had similar specificity (97%) and positive predictive value (94%) to the combined results of culture. However, the sensitivity (89%) and negative predictive value (94%) were slightly lower.³²
 - b. Optical immunoassay kits must be purchased

directly from the manufacturer. On average, these tests are about three times as expensive as throat cultures.³¹ The approximate cost of one test is: \$Cdn 7.50 in Canada and \$US 6.50 in the US.³¹

23. Some provincial health plans may cover the costs of the RADT and optical immunoassay kits.

TREATMENT

Antibiotic Therapy

Benefits

24. The *potential* benefits of antibiotic therapy include:³³
- reduction in symptom severity and duration
 - prevention of acute rheumatic fever (see Info point 7)
 - prevention of suppurative complications (see Info point 6)
 - decreased infectivity to reduce risk of transmission.

25. A recent Cochrane Review¹¹ found that the use of antibiotics for pharyngitis reduces illness time by one day, the risk of acute rheumatic fever by 70%, and the incidence of associated acute otitis media by 75%. However, “because complication rates are low and the illness is short-lived” in modern *Western* society, the authors concluded that the absolute benefits of antibiotics for reducing symptoms and preventing complications are “modest.” (Level 2a evidence, with qualifiers below)

- a. **It should be noted most of the research data on acute GAS pharyngitis is from studies on adults.** Therefore, the evidence is weakest in the group for whom antibiotics may have the greatest effect—children with *proven* GAS pharyngitis.³³
- b. In addition, most of the randomized studies were conducted in the 1950s; while they were state-of-the-art clinical trials at the time, they do not measure up to modern-day standards. Of the 25 studies included in the review, only 17 were double-blinded.¹¹

26. The only commonly occurring form of pharyngitis for which antibiotics are definitely indicated is GAS. With the exceptions of *N. gonorrhoeae* and *C. diphtheria*, antibiotics are of no proven benefit for other forms of pharyngitis.¹⁵

Limitations

Antibiotic Resistance

27. An important limitation of antibiotic use is the ongoing development of resistance. Prescribing habits, especially of broad-spectrum agents, are one (though not the only) cause of antibiotic resistance.^{12,34}

28. Evidence has demonstrated that prior antibiotic use increases the risk for developing a drug-resistant infection. Furthermore, resistant strains can be transmitted to others (e.g., children in group care setting).³⁵

29. Fortunately, penicillin-resistant GAS has never yet been isolated from any clinical source.²² Resistance to macrolides (erythromycin, clarithromycin, azithromycin), however, is increasing steadily.^{22,36,37}

Adverse Effects

30. Antibiotics account for the largest proportion of adverse events related to drugs. The risk for developing an allergic reaction to penicillin ranges from 0.7-4%.²⁵ Other adverse effects include diarrhea, rashes, thrush, including serum sickness and immediate recurrences of GAS pharyngitis.^{12, 35.}

Treatment Failure

31. Treatment failure can occur with all antibiotics. It has been attributed to factors such as poor medication compliance, inadequate dose, repeat exposure to infection and antibiotic resistance. In the case of poor compliance, a patient can be offered an alternative dosing regimen (e.g., bid) or an alternative route of administration (e.g., IM penicillin).⁹

Asymptomatic Carriers

32. Repeat episodes of treatment failure will raise the suspicion of an asymptomatic GAS carrier in the family.⁹
33. A positive post-treatment culture indicates the asymptomatic chronic carrier state.⁹ Carriers have group A β -hemolytic streptococci in their throat but no immunologic reaction to this organism.¹⁶
34. It can be difficult to differentiate asymptomatic carriers experiencing intercurrent viral pharyngitis from those with true acute GAS pharyngitis.¹⁵
- a. Be suspicious in those patients who have multiple episodes of “confirmed” GAS pharyngitis within a period of months, or even years. They are likely GAS carriers experiencing intercurrent viral throat infections.
 - b. Lack of significant clinical response to antibiotic therapy and the presence of GAS in cultures

done during asymptomatic intervals can help to identify chronic carriers.¹⁶

- c. Factors such as the patient’s age, the season of the year, and the presence of influenza or enteroviral illnesses in the community may be helpful in making the diagnosis.¹⁶
 - d. Serotyping of repeated streptococcal isolates from the patient may also help in this differential diagnosis, although these studies usually are only available in specialized labs.¹⁶
35. Asymptomatic carriers are at low risk of suppurative and non-suppurative complications, and are unlikely to spread the organism to their close contacts.¹⁶ These patients are generally not treated unless they are implicated in the treatment failure of a close contact.⁹

If it is important to eradicate the carrier state for any reason, rifampin *plus* either clindamycin or penicillin is recommended.³⁸

When and What to Prescribe

36. Despite extensive research, considerable debate about how to best manage GAS pharyngitis remains.³⁹
- a. Some of the more recent literature from outside of North America has put less emphasis on both diagnosis and treatment,^{11,33,40} noting that antibiotics may shorten the illness, but only by a day or two and only if started early.²²
 - b. A recent cost-effectiveness analysis²⁵ compared the effect of five strategies for the diagnosis and treatment of *adults* with pharyngitis on four outcomes: acute rheumatic fever, peritonsillar abscess, duration of symptoms and allergic reactions to antibiotics. The study found that the approach of “*no testing or treatment*” was equally as effective as all other approaches. In areas where acute rheumatic fever is rare, this may indeed be the most effective strategy for *adults*, although a prospective controlled trial would be needed to decide this for certain.

37. In North America, we still emphasize the importance of diagnosing GAS accurately and then treating appropriately.
- a. Some recent guidelines indicate that using a validated clinical prediction tool alone is sufficient for diagnosis and treatment.^{8,29,37}
 - b. The Mclsaac sore throat scoring system, often regarded as the ‘best clinical decision rule,’¹²⁹ clearly reduces prescribing of “unnecessary antibiotics.” Even though a score of 4 or 5 only has an actual positive predictive value of 51%²³ (meaning that about half of those patients treated ‘*empirically*’ did not have GAS pharyngitis and

thus received antibiotics unnecessarily), this actually occurred in only 5-7% of all patients presenting with sore throats.

- c. On the contrary side, the above cost-effectiveness analysis²⁵ found *empirical* treatment to be the *least* effective clinical strategy. Although all other strategies were similarly effective, they estimated that *diagnosis by culture* was the *most* cost-effective.
 - d. A cost-effectiveness analysis *in children* examined five options for children (outcome: preventing acute rheumatic fever) and found treatment based on the “rapid test” to be the most cost-effective strategy.³⁸
38. It seems reasonable then (especially in adults) that GAS confirmation is warranted by either rapid antigen test or culture *before* antibiotics are prescribed. When a rapid antigen test or a culture does confirm GAS, appropriate antibiotic therapy is warranted, especially in children.²⁴
39. Empiric treatment, either pending or in lieu of a confirmatory test of GAS, may be supported by factors such as:
- difficult patient follow-up²⁴
 - limited access to a laboratory³⁴
 - more than 72 hour delay in report of culture results²⁴

Table 2. Antibiotic Choice and Dose/Duration²⁴

Antibiotic of Choice	Penicillin V	300mg PO tid/qid for 10 days or 600 mg PO bid for 10 days†
Acceptable Alternative for Children:	Amoxicillin	40mg/kg/day divided tid for 6-10 days, max 250 mg tid‡
Recommended alternative for penicillin allergic patients	Erythromycin	30-40 mg/kg/day divided bid/tid for 7-10 days, max 2g/day

† Shortening the course of penicillin from 10 days to 7 days has been associated with lower cure rates for GAS. However, compliance is an issue for 10-day dosing, particularly tid/qid, lending support to a 600 mg bid regimen (as listed).⁴¹ One study comparing 7 day to 3-5 day dosing showed that 7-day dosing is superior and should be the *minimum* course— noting that 10-day dosing would be warranted in certain groups (e.g., children at risk for acute rheumatic fever).⁴²(Level 1a-1b evidence)

‡ Numerous studies (RCTs and cohort studies) have shown comparable efficacy and safety for a 6-day vs. 10-day course of amoxicillin in the treatment of GAS.⁴³⁻⁴⁵ (Level 1b evidence)

40. Antibiotics should be discontinued if the culture result is negative.²⁴ Patients should be encouraged to return unused antibiotics to their local pharmacy for disposal.⁴⁶ Inappropriate use of leftover medication and the safety to others may be a consideration.
41. The taste of penicillin V suspension is unpalatable for many children. As a result, amoxicillin suspension may be preferable.¹⁶ Furthermore, amoxicillin can be given independent of meals, while penicillin V is best given on an empty stomach.⁴⁶ Amoxicillin is more likely to cause diarrhea.

Other/adjunct Treatments

42. According to a meta-analysis, treatments such as NSAIDs, acetaminophen, and steroids are effective in the short-term and may be just as, or more, effective than antibiotics in relieving symptoms of pharyngitis.⁴⁷
43. Other options include:
- Benzylamine HCl oral rinse (e.g., Tantum Oral Rinse®)—may reduce the pain of sore throat. A double blind study showed a 42% decrease in day 3 mean pain score.⁴⁸
 - Demulcent herbal tea [Throat Coat®]—a small multicentre RCT showed rapid, temporary relief of sore throat in patients with pharyngitis.⁴⁹ (This herbal tea contains licorice root and dry extract, wild cherry bark, fennel seed, cinnamon bark, orange peel, slippery elm bark and althea root.)
 - Steroids—IM steroids (dexamethasone) are superior to IM placebo in alleviating pain in pharyngitis.⁵⁰ Oral steroids provide similar relief of pain in acute exudative pharyngitis.⁵¹

Surgical Options

44. Tonsillectomy is a controversial procedure, and opinions vary greatly regarding the indications, and relative risks and benefits for surgery.⁵² A 2002 study concluded that the modest benefit conferred by tonsillectomy or adenotonsillectomy in children moderately affected with recurrent throat infections do not appear to justify the risks, morbidity and cost of surgery. There may be some benefit for tonsillectomy in children who are severely affected by recurrent throat infections.⁵³ (Level 2b evidence)
- Note:** This module is not designed to focus on details of surgery.

PATIENT EDUCATION

45. It is well documented that inappropriate prescribing of antibiotics is often a result of perceived parental pressure.^{54,55} In a 1997 Canadian survey of family physicians, 81% of physicians reported that they felt pressure from parents/patients to prescribe antibiotics for a respiratory infection.⁵⁶ However, a more recent Canadian survey found that physician perceptions of parental expectations are inaccurate, and that most parents do not expect antibiotics.³⁵
46. Patient satisfaction with sore throat treatment appears to be more closely associated with the physician's "understanding their concerns" or an adequate explanation for not prescribing antibiotics, than with a prescription for antibiotics.³⁵
47. In addition to explaining to patients/parents why a particular management strategy has been chosen—for example, why antibiotics have not been prescribed—the Patient Information Sheet, **Sore Throat**, in this module may be helpful. Educating parents about the potential harm for their child if treated inappropriately may be valuable:
- Children treated unnecessarily are at a higher risk for carrying resistant organisms, such as *Streptococcus pneumoniae*.⁵⁷ Those children, in turn, often spread resistant organisms to other children.⁵⁸

BOTTOM LINE

- Use the Sore Throat Score (Appendix 1) to guide management— especially to identify patients who require no further investigation and no antibiotics.
- Throat swab for culture is the gold standard for diagnosis, although the new rapid strep test can be an acceptable substitute in some situations.
- When antibiotic therapy is indicated, either penicillin V or amoxicillin is first-line.
- Don't assume that patients/parents expect antibiotic treatment, and take the time to explain the choice of treatment.

CASE COMMENTARIES

Case 1: Maya, age 5, female

Part One

What investigations would you order?

Although some of Maya's symptoms are suggestive of GAS pharyngitis, she also has features suggestive of a viral infection. Clinically, it can be very difficult to distinguish between the two (Info point 10). The use of the Sore Throat Scale (Appendix 1) can help to guide management.

According to the scale, Maya has a score of 3, which suggests only about a 30% chance of GAS. It would be reasonable to take a throat swab for culture at this time to determine if GAS is present. You also might consider a RADT (if available) as it offers greater specificity and quicker results (Info point 21). However, if the RADT is negative in a child, a culture should be done (Info point 12b, Appendix 1).

Would you prescribe treatment at this point? If so, with what?

As Maya is not particularly unwell, it would be appropriate to wait for the result of the swab to treat. You could explain to her mother that, since the chances of strep are only about 30%, the likelihood of exposing Maya to antibiotics unnecessarily is fairly high (Info points 27,47). The Patient Information Sheet, *Sore Throat*, provides information about other ways to manage symptoms.

If Maya was more ill (e.g., fever and/or tonsillar exudate giving a score of "4"), it may be reasonable to begin antibiotic therapy pending results of the swab—especially since she has presented early in the course of her illness.

The recommended first agent is penicillin V: 300mg PO tid/qid or 600 mg PO bid for 10 days (Table 2). Given Maya's age, however, amoxicillin suspension may be preferred (Info point 41). If you decide to treat and the swab comes back negative, it is recommended that the antibiotic be stopped (Info point 40).

Part Two

What would you do now?

Maya's mother may not be seeking antibiotics (Info points 45, 46).

Clarify whether she has been using analgesics (such as adequate doses of ibuprofen or acetaminophen) to ease Maya's sore throat pain (Info point 42). Other options might be considered if the pain was severe (info point 43).

At this point, discontinuation of the antibiotic is indicated if you chose to give one at her initial visit; Maya's mother may need advice about how to dispose of the unused antibiotic (Info point 40).

Case 2: Nua Sag, age 30, male

What would your treatment approach be?

Nua has many symptoms suggestive of GAS pharyngitis. His score on the sore throat scale (Appendix 1) would be 4. You also might want to explore the possibility of mononucleosis in Nua (Info point 10).

Most physicians find it more difficult to take a wait-and-see approach with a patient they like. However, especially for an adult, taking a throat swab would be a reasonable first step (Appendix 1). Nua only has a roughly 50/50 chance of GAS.

While awaiting culture results, alternative treatments could include any of the NSAIDs or other antipyretic/analgesic drugs (Info point 42). During the acute phase, you might also recommend rest, adequate fluid intake, gargling with warm salt water or benzdyamine rinse (Info point 43, Patient Handout).

Case 3: Mark S., age 6, male

How would you manage this patient?

This is a challenging case. Given the season (summer) and his lack of response to previous antibiotic therapy, Mark may be a chronic GAS carrier who is suffering from recurrent viral infections—rather than having repeated episodes of GAS pharyngitis (Info point 34). A positive culture, obtained during an asymptomatic period, would help to confirm this diagnosis (Info points 33, 34a). It would not be necessary to obtain throat swabs of other family members in the home (Info point 19), especially if Mark is identified as a GAS carrier.

Eradication of the carrier state is usually not necessary, unless Mark is thought to be repeatedly infecting other members of his family (Info point 35). However, it would be important to avoid multiple courses of antibiotics when Mark gets another sore throat and the "carried" strep is identified.

If the patient had been 18 or older, would you consider giving a fluoroquinolone to treat the strep throat?

More and more, fluoroquinolones are being used to treat recurrent strep throat. This will undoubtedly lead to drug resistance for a very important and useful class of drugs. Explore other reasons, particularly failure to complete the course correctly or inappropriate dosing, before considering second-line antibiotics (Table 2).

The Foundation's module team would like to acknowledge, with thanks, the PBSG groups facilitated by Dr. Tom Miller (SIV-Quincy, IL) and Dr. James Crummey (Toronto, ON) who pilot-tested this educational module.

Please visit our website: www.fmpe.org

©The Foundation for Medical Practice Education,
Volume 12(4):1-13, March 2004 <www.fmpe.org>

While every care has been taken in compiling the information contained in this module, the Program cannot guarantee its applicability in specific clinical situations or with individual patients. Physicians and others should exercise their own independent judgement concerning patient care and treatment, based on the special circumstances of each case. Anyone using the information does so at their own risk and releases and agrees to indemnify The Foundation for Medical Practice Education and the Practice Based Small Group Learning Program from any and all injury or damage arising from such use.

Authors: **R. J. Henneberry, Bsc, MD, CCFP**
*Family /Emergency Physician
Halifax, Nova Scotia*

R. Russek, MD, CCFP
*Family Physician
Cambridge, Ontario*

Reviewers: **W. J. McIsaac, MD, MSc, CCFP**
*Family Physician
Toronto, Ontario*

S. A. Halperin, MD, FRCPC
*Infectious Diseases (Pediatrics)
Halifax, Nova Scotia*

R. A. Pennie, MD, FRCPC
*Infectious Diseases (Pediatrics)
Brantford, Ontario*

Medical Editor: **J. G. Wakefield, MD, CCFP**
*Family Physician
Hamilton, Ontario*

Medical Writer: **L. Cranston, Hons BA**
Hamilton, Ontario

Researcher: **W. Leadbetter, RN, BScN**
Hamilton, Ontario

References

1. Attia MW, Zaoutis T, Klein JD, Meier FA. Performance of a predictive model for streptococcal pharyngitis in children. *Arch Pediatr Adolesc Med* 2001; 155(6):687-691. PM:11386959
2. Freid VM, Makuc DM, Rooks RN. Ambulatory Health Care Visits by Children: Principal Diagnosis and Place of Visit: Vital and Health Statistics. 137. 1998. Hyattsville, MD, National Center for Health Statistics. Series 13.
3. Nyquist AC, Gonzales R, Steiner JF, Sande MA. Antibiotic prescribing for children with colds, upper respiratory tract infections, and bronchitis. *JAMA* 1998; 279(11):875-877. PM:9516004
4. Schappert SM. National Ambulatory Medical Care Survey: 1992 Summary. Advance Data from Vital and Health Statistics No. 253. 1994. Hyattsville, MD, National Center for Health Statistics.
Ref Type: Report
5. Poses RM, Cebul RD, Collins M, Fager SS. The accuracy of experienced physicians' probability estimates for patients with sore throats. Implications for decision making. *JAMA* 1985; 254(7):925-929. PM:3894705
6. Komaroff AL, Pass TM, Aronson MD, Ervin CT, Cretin S, Winickoff RN et al. The prediction of streptococcal pharyngitis in adults. *J Gen Intern Med* 1986; 1(1):1-7. PM:3534166
7. Mclsaac WJ, Goel V, Slaughter PM, Parsons GW, Woolnough KV, Weir PT et al. Reconsidering sore throats. Part 2: Alternative approach and practical office tool. *Can Fam Physician* 1997; 43:495-500. PM:9116521
8. Ebell MH, Smith MA, Barry HC, Ives K, Carey M. The rational clinical examination. Does this patient have strep throat? *JAMA* 2000; 284(22):2912-2918. PM:11147989
9. Hayes CS, Williamson H, Jr. Management of Group A beta-hemolytic streptococcal pharyngitis. *Am Fam Physician* 2001; 63(8):1557-1564. PM:11327431
10. Massell BF, Chute CG, Walker AM, Kurland GS. Penicillin and the marked decrease in morbidity and mortality from rheumatic fever in the United States. *N Engl J Med* 1988; 318(5):280-286. PM:3336421
11. Del Mar CB, Glasziou PP, Spinks AB. Antibiotics for sore throat. In: *The Cochrane Library*, Issue 2, 2003. Oxford, Update Software.
12. Mclsaac WJ, Goel V, Slaughter PM, Parsons GW, Woolnough KV, Weir PT et al. Reconsidering sore throats. Part I: Problems with current clinical practice. *Can Fam Physician* 1997; 43:485-493. PM:9116520
13. Bisno AL, Gerber MA, Gwaltney JM, Jr., Kaplan EL, Schwartz RH. Practice guidelines for the diagnosis and management of group A streptococcal pharyngitis. Infectious Diseases Society of America. *Clin Infect Dis* 2002; 35(2):113-125. PM:12087516
14. Health Central. Post-streptococcal GN. Health Central. Accessed Nov 2003.
www.healthcentral.com/mhc/top/000503.cfm
15. Bisno AL. Acute pharyngitis. *N Engl J Med* 2001; 344(3):205-211. PM:11172144
16. Bisno AL, Gerber MA, Gwaltney JM, Jr., Kaplan EL, Schwartz RH. Diagnosis and management of group A streptococcal pharyngitis: a practice guideline. Infectious Diseases Society of America. *Clin Infect Dis* 1997; 25(3):574-583. PM:9314443
17. Schooley R.T. EBV. In: Mandell DB, editor. *Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases*, 5th edn. Philadelphia: Churchill Livingstone, 2000:1599-1613.
18. McMillan JA, Weiner LB, Higgins AM, Lamparella VJ. Pharyngitis associated with herpes simplex virus in college students. *Pediatr Infect Dis J* 1993; 12(4):280-284. PM:8387178

19. Dajani A, Taubert K, Ferrieri P, Peter G, Shulman S. Treatment of acute streptococcal pharyngitis and prevention of rheumatic fever: a statement for health professionals. Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young, the American Heart Association. *Pediatrics* 1995; 96(4 Pt 1):758-764. PM:7567345
20. Committee on Infectious Diseases. Group A Streptococcal Infection. In: Pickering LK, editor. *2000 Red Book*, 25th edn. Elk Grove Village, IL: American Academy of Pediatrics, 2001:526-536.
21. Mclsaac WJ, White D, Tannenbaum D, Low DE. A clinical score to reduce unnecessary antibiotic use in patients with sore throat. *CMAJ* 1998; 158(1):75-83. PM:9475915
22. Bisno AL. Diagnosing strep throat in the adult patient: do clinical criteria really suffice? *Ann Intern Med* 2003; 139(2):150-151. PM:12859165
23. Mclsaac WJ, Goel V, To T, Low DE. The validity of a sore throat score in family practice. *CMAJ* 2000; 163(7):811-815. PM:11033707
24. British Columbia Medical Association. Diagnosis and management of group a streptococcal pharyngitis - a practice guideline. BCMA Guidelines and Protocols Advisory Committee, editor. 2003.
25. Neuner JM, Hamel MB, Phillips RS, Bona K, Aronson MD. Diagnosis and management of adults with pharyngitis. A cost-effectiveness analysis. *Ann Intern Med* 2003; 139(2):113-122. PM:12859161
26. Gerber MA. Treatment failures and carriers: perception or problems? *Pediatr Infect Dis J* 1994; 13(6):576-579. PM:8078758
27. Gerber MA, Tanz RR, Kabat W, Dennis E, Bell GL, Kaplan EL et al. Optical immunoassay test for group A beta-hemolytic streptococcal pharyngitis. An office-based, multicenter investigation. *JAMA* 1997; 277(11):899-903. PM:9062328
28. Sheeler RD, Houston MS, Radke S, Dale JC, Adamson SC. Accuracy of rapid strep testing in patients who have had recent streptococcal pharyngitis. *J Am Board Fam Pract* 2002; 15(4):261-265. PM:12150457
29. Ebell MH. Strep throat. *Am Fam Physician* 2003; 68(5):937-938. PM:13678144
30. Abbott Diagnostics. RADT. Personal Communication. Nov 2003.
31. Tsevat J, Kotagal UR. Management of sore throats in children: a cost-effectiveness analysis. *Arch Pediatr Adolesc Med* 1999; 153(7):681-688. PM:10401800
32. Kuhn S, Davies HD, Katzko G, Jadavji T, Church DL. Evaluation of the Strep A OIA assay versus culture methods: ability to detect different quantities of group A Streptococcus. *Diagn Microbiol Infect Dis* 1999; 34(4):275-280. PM:10459477
33. Danchin MH, Curtis N, Nolan TM, Carapetis JR. Treatment of sore throat in light of the Cochrane verdict: is the jury still out? *Med J Aust* 2002; 177(9):512-515. PM:12405896
34. Gums JG. Redefining appropriate use of antibiotics. *Am Fam Physician* 2004;69(1):35,39-40. PM:14727818
35. Paluck E, Katzenstein D, Frankish CJ, Herbert CP, Milner R, Speert D et al. Prescribing practices and attitudes toward giving children antibiotics. *Can Fam Physician* 2001; 47:521-527. PM:11281085
36. McGeer A. Does prior antibiotic therapy mean we should change prescribing? Toronto Invasive Bacterial Diseases Network. 2002. Vol. 3 (Issue 1) Accessed Nov 2003. <http://microbiology.mtsinai.on.ca/research/tibdnews/tibdndec02-3-1.pdf>

37. Cooper RJ, Hoffman JR, Bartlett JG, Besser RE, Gonzales R, Hickner JM et al. Principles of appropriate antibiotic use for acute pharyngitis in adults: background. *Ann Intern Med* 2001; 134(6):509-517. PM:11255530
38. Ehrlich JE, Demopoulos BP, Daniel KR, Jr., Ricarte MC, Glied S. Cost-effectiveness of treatment options for prevention of rheumatic heart disease from Group A streptococcal pharyngitis in a pediatric population. *Prev Med* 2002; 35(3):250-257. PM:12202067
39. Martel L. Sore throats, why the dilemma? *BMJ* 2003; 326(7392):766. PM:12676859
40. Scottish Intercollegiate Guidelines Network (SIGN). Management of Sore Throat and Indications for Tonsillectomy. A national clinical guideline. 1999. www.show.scot.nhs.uk/sign/guidelines/index.html. Accessed Feb 2004.
41. Lan AJ, Colford JM, Colford JM, Jr. The impact of dosing frequency on the efficacy of 10-day penicillin or amoxicillin therapy for streptococcal tonsillopharyngitis: A meta-analysis. *Pediatrics* 2000; 105(2):E19. PM:10654979
42. Zwart S, Sachs AP, Ruijs GJ, Gubbels JW, Hoes AW, de Melker RA. Penicillin for acute sore throat: randomised double blind trial of seven days versus three days treatment or placebo in adults. *BMJ* 2000; 320(7228):150-154. PM:10634735
43. Cohen R, Levy C, Doit C, De La RF, Boucherat M, Fitoussi F et al. Six-day amoxicillin vs. ten-day penicillin V therapy for group A streptococcal tonsillopharyngitis. *Pediatr Infect Dis J* 1996; 15(8):678-682. PM:8858671
44. Curtin-Wirt C, Casey JR, Murray PC, Cleary CT, Hoeger WJ, Marsocci SM et al. Efficacy of penicillin vs. amoxicillin in children with group A beta hemolytic streptococcal tonsillopharyngitis. *Clin Pediatr (Phila)* 2003; 42(3):219-225. PM:12739920
45. Peyramond D, Portier H, Geslin P, Cohen R. 6-day amoxicillin versus 10-day penicillin V for group A beta-haemolytic streptococcal acute tonsillitis in adults: a French multicentre, open-label, randomized study. The French Study Group Clamorange. *Scand J Infect Dis* 1996; 28(5):497-501. PM:8953681
46. Drug Information Centre & Complex Continuing Care HHSC. Disposal of antibiotics. Personal Communication. October 2003.
47. Thomas M, Del Mar C, Glasziou P. How effective are treatments other than antibiotics for acute sore throat? *Br J Gen Pract* 2000; 50(459):817-820. PM:11127175
48. Whiteside MW. A controlled study of benzydamine oral rinse ("Difflam") in general practice. *Curr Med Res Opin* 1982; 8(3):188-190. PM:7128190
49. Brinckmann J, Sigwart H, Van Houten TL. Safety and efficacy of a traditional herbal medicine (throat coat®) in symptomatic temporary relief of pain in patients with acute pharyngitis: a multicenter, prospective, randomized double-blinded, placebo-controlled study. *J Altern Complement Med* 2003; 9(2):285-298. PMID: 12804082
50. Marvez-Valls EG, Ernst AA, Gray J, Johnson WD. The role of betamethasone in the treatment of acute exudative pharyngitis. *Acad Emerg Med* 1998; 5(6):567-572. PM:9660281
51. Marvez-Valls EG, Stuckey A, Ernst AA. A randomized clinical trial of oral versus intramuscular delivery of steroids in acute exudative pharyngitis. *Acad Emerg Med* 2002; 9(1):9-14. PM:11772663
52. Burton MJ, Towler B. Tonsillectomy versus non-surgical treatment for chronic/recurrent acute tonsillitis (Cochrane Review). In: *The Cochrane Library*, Issue 4, 2003. Chichester, UK: John Wiley & Sons Ltd.
53. Paradise JL, Bluestone CD, Colborn DK, Bernard BS, Rockette HE, Kurs-Lasky M. Tonsillectomy and adenotonsillectomy for recurrent throat infection in moderately affected children. *Pediatrics* 2002; 110(1 Pt 1):7-15. PM:12093941

54. Bauchner H, Pelton SI, Klein JO. Parents, physicians, and antibiotic use. *Pediatrics* 1999; 103(2):395-401. PM:9925831
55. Barden LS, Dowell SF, Schwartz B, Lackey C. Current attitudes regarding use of antimicrobial agents: results from physician's and parents' focus group discussions. *Clin Pediatr (Phila)* 1998; 37(11):665-671. PM:9825210
56. McIsaac WJ, Goel V. Sore throat management practices of Canadian family physicians. *Fam Pract* 1997; 14(1):34-39. PM:9061342
57. Hofmann J, Cetron MS, Farley MM, Baughman WS, Facklam RR, Elliott JA et al. The prevalence of drug-resistant *Streptococcus pneumoniae* in Atlanta. *N Engl J Med* 1995; 333(8):481-486. PM:7623880
58. Rauch AM, O'Ryan M, Van R, Pickering LK. Invasive disease due to multiply resistant *Streptococcus pneumoniae* in a Houston, Tex, day-care center. *Am J Dis Child* 1990; 144(8):923-927. PM:2378341

Appendix 1

Clinical Tool for the Management of Pharyngitis

Step 1

Determine the patient’s total sore throat score by assigning points to the following criteria:

Criteria	Point
Temperature >38°C	1
No cough	1
Tender anterior cervical adenopathy	1
Tonsillar swelling or exudate	1
Age: 3-14 years	1
Age: 15-44 years	0
Age ≥45 years	-1

Total Score: _____

Step 2

Choose the appropriate management suggested below according to the total sore throat score:

Total Score	Chance of GAS Infection in Community with Usual Levels of Infection	Suggested Management
1	2-3 % 4-6 %	No culture or antibiotic is required.
2	10-12 %	RADT*/culture if considering treatment. Treat only if result is positive.
3	27-28 %	RADT*/culture all. Treat only if result is positive.
≥4	38-63 %	RADT*/culture. Consider empirical treatment with penicillin on clinical grounds.†

* If RADT is negative in children, culture.

† If patient has high temperature, is clinically unwell, and presents early in disease course.

Adapted from:

- McIsaac WJ, White D, Tannenbaum D, Low DE. A clinical score to reduce unnecessary antibiotic use in patients with sore throat. *CMAJ* 1998;158(1):75-83.
- Ebell MH, Smith MA, Barry HC, Ives K, Carey M. The rational clinical examination. Does this patient have strep throat? *JAMA* 2000; 284(22):2912-2918.
- Ebell MH. Strep throat. *Am Fam Physician* 2003; 68(5):937-938.



Sore Throat

What causes a sore throat?

Sore throat (your doctor may call it pharyngitis - fair-en-jy-tis) can be caused by many things:

- viruses (such as the one that causes the common cold)
- bacteria (such as the one that causes strep throat, see below)
- mucus draining from your sinuses to your throat
- irritation from cigarette smoke, polluted air or alcohol
- hay fever or other allergies

How do I know what's causing my sore throat?

Most sore throats are caused by viruses. Sometimes it can be difficult to know if the sore throat is caused by something else because symptoms are all similar. Your doctor often can tell this by an examination.

Sometimes tests are needed to be sure that the sore throat is not caused by a bacteria germ called Streptococcus or just plain "Strep". In this case, the doctor will take a throat swab. If the swab is sent for a throat culture, it may take a day or two to get the result—but it's very accurate. Sometimes, the swab may be tested differently (with a rapid strep test) for a quicker result.

What is the treatment for a sore throat?

Most sore throats are caused by viruses, and the body's immune system will clear the infection. Antibiotics do **NOT** work against viruses and can be harmful if you use them when you don't need them.

If the sore throat is caused by the Streptococcus bacteria, your doctor will probably prescribe an antibiotic such as penicillin. It is important to take ALL of the medication because, in *very rare* situations, the streptococcus can result in serious illnesses (such as rheumatic fever). By completing the antibiotic medicine, you can help to avoid any serious complications and help prevent the bacteria from coming back.

What can relieve the sore throat symptoms?

There are many things that can help the throat feel better until the infection has cleared:

- Take a pain reliever such as acetaminophen (Tylenol®) or ibuprofen (Advil®). Children **should not take** aspirin/ASA.
- Gargle with warm salt water (one teaspoon in a large glass of water).
- Suck on popsicles, throat lozenges, or low-sugar hard candy.
- Drink cool fluids and eat soft foods.
- Use a humidifier.

Adapted from:

Sore Throat. Ask Your Family Doctor. Developed by the College of Family Physicians of Canada
www.cfpc.ca/programs/education/pated/Sore_throat.asp

Strep Throat. American Academy of Family Physicians
www.familydoctor.org/x2232.xml

Patient Information Sheet
Feel Free to Copy this Sheet



©The Foundation for Medical Practice Education
Hamilton, Ontario Canada www.fmpe.org

