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1. Strep pharyngitis: the facts, the myths and how to handle school “outbreaks”

Every winter the Communicable Diseases Epidemiology Section (CDES) receives many calls regarding what are thought to be outbreaks of “strep throat” in Wisconsin schools and childcare settings. Although seasonal illness clusters of strep throat are expected, they still prompt questions regarding outbreaks, exclusion, and the concern of multiple infections in an individual.

The “bug”: Streptococcal pharyngitis (“strep throat”) is caused by the bacteria *Streptococcus pyogenes*, also referred to as Group A beta-hemolytic streptococcus (GAS). There are over 130 serotypes of *Streptococcus pyogenes* causing different illnesses such as pharyngitis (sore throat), impetigo, acute rheumatic fever (ARF), acute glomerulonephritis and toxic shock syndrome. Strep pharyngitis can occur at any age, but is most common among children aged 5-15 years.

Transmission: Group A beta-hemolytic streptococci are usually transmitted through contact with an infected person’s respiratory tract secretions. The incubation period for illness is typically 2-5 days, with transmission highest during acute infection. If untreated, the bacteria can be carried in the throat for weeks with the number of bacteria and transmission decreasing greatly after 2-3 weeks. Strep pharyngitis occurs year round but peaks during winter and spring.

While the family pet and toothbrushes are often accused of aiding transmission, the 2012 *Red Book* states, “Fomites and household pets, such as dogs, are not vectors of GAS infection.” Transmission is associated with close person-to-person contact, such as that occurring in schools, child-care centers, contact sports and dormitory environments. Secondary rates of infection are approximately 25% among household contacts of a symptomatic case.

The vast majority of cases of strep pharyngitis would resolve without antibiotic treatment. However, antibiotic treatment of all laboratory confirmed cases is standard to greatly shorten the period of contagiousness, reduce transmission of GAS to family members, classmates and close contacts, improve clinical symptoms and prevent rare but serious sequelae (e.g., acute rheumatic fever).

Prevalence: In a meta-analysis of 14 studies, conducted by the National Institutes of Health, the estimated pooled prevalence of strep pharyngitis in non-outbreak situations was 37% among school-age children who presented to a doctor’s office with a sore throat. The prevalence of GAS ranges from 10% to 14% in children less than 3 years of age with pharyngitis. Thus, the majority of cases of pharyngitis among children are caused by other etiologic agents (probably viral).

While strep pharyngitis rates are generally lower among adults (5-15%), rates are higher among parents of school-aged children and those in occupations involving close proximity to children. Acute strep pharyngitis is uncommon among children aged less than 3 years. Because of the lower rates among adults and children aged less than 3 years, and the extremely rare occurrence of rheumatic fever among these groups, diagnostic testing among these age groups is not recommended if individuals have symptoms more indicative of viral infection (e.g., cough, runny nose, congestion, hoarseness).

Signs and symptoms: Because there is broad overlap in the signs and symptoms of streptococcal and non-streptococcal (usually viral) pharyngitis, only a clinician using a laboratory test should diagnose a GAS infection. The ability to accurately diagnose streptococcal pharyngitis based on clinical signs and symptoms alone is generally low, even for the most experienced physicians.
Knowledge of the common signs and symptoms of strep pharyngitis and those more typical of a viral “cold” is important when deciding whether to seek medical care from a health care professional. Summaries of these signs and symptoms are included in the following table:

<table>
<thead>
<tr>
<th>Classic signs and symptoms of strep throat</th>
<th>Signs and symptoms NOT typical of strep throat</th>
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<tbody>
<tr>
<td>• Sudden onset of a very sore throat.</td>
<td>• Stuffy or runny nose</td>
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<tr>
<td>• Deeply red throat and tonsils, sometimes with white patches and pus.</td>
<td>• Cough</td>
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<tr>
<td>• Difficulty swallowing.</td>
<td>• Hoarseness</td>
</tr>
<tr>
<td>• Fever &gt;101°F</td>
<td>• Diarrhea</td>
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<tr>
<td>• Headache</td>
<td>• Conjunctivitis</td>
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<tr>
<td>• Tender and often swollen lymph nodes in the neck.</td>
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<tr>
<td>• Shivers and shaking alternating with cold sweats.</td>
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<tr>
<td>• In children, often nausea, vomiting and abdominal pain.</td>
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</tbody>
</table>

Testing: Bacterial culture of a pharyngeal swab is the standard for accurately diagnosing strep pharyngitis. However, the quality of the sample can affect the result, especially among small, uncooperative children from whom specimens are more difficult to obtain. Cultures, while accurate, typically take 48-72 hours for results. Rapid antigen tests use the same specimens collected for culture, give quick results and are highly specific when positive. A negative result should be followed with a culture.

Treatment: Patients with acute GAS pharyngitis should be treated appropriately with an antibiotic at the proper dose and duration (usually 10 days) to eradicate the bacteria from the throat.

Group A Strep carriage and “repeated infections”

During the winter and spring in temperate climates, generally about 20% (there is a broad range) of asymptomatic school-children may be GAS carriers and can remain in a carrier status for up to 6 months. During that time, a child will typically experience episodes of viral illness, some causing pharyngitis. A child who is a GAS “carrier” will likely test positive for GAS using a throat culture or rapid antigen test. It is GAS carriage that propels the “repeated infection” scenario often described in school clusters.

The 2012 Red Book explains: “Patients who have repeated episodes of pharyngitis at short intervals and in whom GAS infection is documented...present a special problem. Most often, these people are chronic GAS carriers who are experiencing frequent viral illnesses and for whom repeated testing and use of antimicrobial agents are unnecessary.”

Failure rates of strep pharyngitis treatment with proper antibiotic therapy are low. Thus, a child with a positive throat swab specimen following appropriate antimicrobial therapy is most likely a GAS carrier or adherence to antibiotic therapy should be questioned.

GAS carriage is difficult to eradicate and there is no benefit to doing so unless there are special circumstances (e.g., family member with ARF or community outbreak of ARF). Carriers appear to be unlikely to spread GAS to close contacts and are at extremely low risk (if any) for developing complications. In situations where a child has no symptoms or has symptoms more indicative of a viral infection (e.g., cough, rhinitis, afebrile) it is NOT recommended to test or treat these children for GAS infections (Red Book, 2012, p. 672-5).
Schools, childcare and group settings

The most frequent inquiries regarding school and childcare outbreaks of “strep pharyngitis” are triggered by large numbers of children and staff out sick, self-reported sore throats and complaints that certain individuals have had repeated “strep” infections (sometimes reported as high as 8-10 times in an individual during the same school year). High rates of reported sore throat can give school officials the impression of an unusual outbreak of strep pharyngitis, but more often the situation is just a combination of typical viral illness rates concurrent with an expected occurrence of strep pharyngitis.

When experiencing high rates of absenteeism because of illness in school, childcare and group settings, the following guidelines can be useful:

**Children with laboratory confirmed GAS pharyngitis**: These children should be excluded from school, childcare and group settings until 24 hours after beginning treatment with appropriate antibiotic therapy. Proper antibiotic treatment should minimize the risk of GAS transmission after 24 hours, and children should be allowed to return to school, childcare and other group activities if they feel well and are not experiencing a fever.

**Children who test negative for GAS, or were not tested**: It is generally recommended that a child experiencing “influenza-like illness” (fever with cough or sore throat) must stay home from school for at least 24 hours after they no longer have a fever, without the use of fever-reducing medicine, and other symptoms improve. A fever is defined as a temperature of 100°F or higher.

Whether the cause of respiratory illness occurring in a school, child-care or group setting is viral or bacterial, the best advice to prevent the spread of all seasonal illness is the following:

- Avoid close contact with people who are sick.
- Stay home when you are sick.
- Cough or sneeze into your sleeve, or cover your mouth and nose with a tissue when you cough or sneeze.
- Wash your hands with soap and water or use hand sanitizer if no water is available, after coughing or sneezing and prior to eating
- Avoid unnecessarily touching your eyes, nose or mouth.

In the event of a call from a school reporting high absentee rates and illness among faculty and students, it is always prudent to remember that there are many respiratory viruses that can cause sore throat and other symptoms of acute respiratory illness that result in substantial absentee rates. Typically, there will be multiple illnesses caused by different etiologies occurring in children throughout the year. A combination of excluding sick children and staff, increased hand hygiene and time will help in getting through another winter season.

Further reading and resources

Clinical practice guideline for the diagnosis and management of group A Streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America

CDC - Pharyngitis: Treat Only Proven GAS: Physician Information Sheet (Pediatrics)

Dr. Rotbart’s GERMGems™ - Strep Throat
http://www.germproofyourkids.com/germgems4.html

Confessions of a Dr. Mom – Strep throat blog
http://www.confessionsofadrmmom.com/2011/03/strep-throat-dilemma/

CDC Health Promotion Materials - Handwashing
http://www.cdc.gov/handwashing/resources.html

2. Optimal specimen collection and testing for Legionellosis

Though the bacterium *Legionella* is believed to be a common cause of atypical and community acquired pneumonia (CAP), legionellosis is routinely underdiagnosed, leading to ineffective empiric treatment, unrecognized clusters of legionellosis and an incomplete understanding of the disease’s epidemiologic features. Legionnaires’ disease is clinically and radiographically indistinguishable from many other causes of pneumonia, therefore appropriate laboratory testing is essential to accurately diagnose the disease and select effective treatment. Because of its in-house laboratory availability and the rapid turn-around time, the most commonly ordered diagnostic assay when legionellosis is suspected is the *Legionella* urine antigen test. However, this test has limitations. It detects only *L. pneumophila* serogroup 1, which is the etiologic agent of 70-80% of legionellosis cases. Additionally the urine antigen test has an overall diagnostic sensitivity of approximately 70% in the detection of *Legionella* infection and a sensitivity of approximately 95% in detecting *L. pneumophila* serogroup 1 infection. *Legionella* culture methods can detect all species of *Legionella*, have a diagnostic sensitivity of 80%, and generate isolates that can be further characterized using serotyping and molecular subtyping methods (e.g. PFGE). Paired serologic testing of acute and convalescent sera is of little clinical value because of the time delay in specimen collections needed to detect a change in antibody titer. Direct fluorescent antibody staining of respiratory and tissue samples has lower sensitivity (25-75%) and specificity (94%) than the other assays, and is generally not considered a reliable diagnostic test option for legionellosis. DNA detection techniques, such as PCR, are offered by some referral laboratories and provide a rapid screening option that is often more sensitive than culture methods, but DNA detection tests are not considered confirmatory tests for surveillance purposes. Another drawback of PCR testing is the inability of this test to determine the serogroup of the *Legionella* bacterium.

During 2010 and 2011, 131 confirmed cases of legionellosis were reported in Wisconsin. Among case patients 123 (94%) were tested using the urine antigen test and 19 (14.5%) were cultured for *Legionella*. Thus, only 11 (8.4%) were tested using both test methods. *Legionella* species identification was determined for 13 (72%) of 18 culture-positive cases: 10 (77%) were identified as *L. pneumophila*, 2 as *L. anisa* and one as *L. bozemanii*. Considering the substantial limitations, yet predominate use of only urine antigens tests to diagnose legionellosis, and knowing that 20-30% of cases are caused by *Legionella* species other than *L. pneumophila* serogroup 1, we estimate that approximately 28-48 additional cases of legionellosis may have been missed during the two year period.

The Centers for Disease Control and Prevention recommends that optimal diagnostic testing for detecting *Legionella* spp. should include both urine antigen testing AND culture of respiratory secretions on selective media [buffered charcoal yeast extract (BCYE) agar]. Only 0.5 ml of urine is needed for the urine antigen assay that is available at many clinical laboratories. A variety of fluid and tissue specimens from the respiratory tract...
can be used for culture; sputum, bronchoalveolar lavage, bronchial washing and transtracheal aspirates are most commonly submitted, with lower respiratory tract secretions yielding the best test results. Similar specimens can also be used for PCR testing. Upper respiratory tract specimens, such as throat or nasopharyngeal swab, are not recommended for the diagnosis of *Legionella* infection. Prior to collection, it is best to consult with the testing lab as to any special specimen handling recommendations or requirements. In general, specimens should be collected into a sterile container prior to the initiation of antimicrobial therapy, chilled (not frozen) and promptly (<48 hours) submitted to the laboratory. Regional and reference laboratories are more likely to offer selective culture and PCR assays to detect *Legionella*. The Wisconsin State Laboratory of Hygiene (WSLH) offers *Legionella* culture and a *Legionella* genus specific PCR assay that detects *L. pneumophila* and other *Legionella* species. To facilitate detection of clusters and outbreaks of legionellosis, the WDPH encourages all clinical laboratories to expeditiously send isolates of *Legionella* to the WSLH for species identification and serotyping.

Sources of information:

*Top 10 Things Every Clinician Needs to Know About Legionellosis at*
http://www.cdc.gov/legionella/top10.htm

References:


3. News

**Fungal meningitis outbreak** – The multistate outbreak of fungal meningitis and joint infections linked to contaminated corticosteroids produced and distributed by the New England Compounding Center (NECC) was first reported by CDC and FDA on October 4th. The national investigation is ongoing with additional cases being identified and products being tested. Wisconsin DPH is participating in the investigation. Fortunately, at press time, no cases related to the outbreak have been identified in Wisconsin. The most up-to-date information on implicated and recalled products can be found at FDA’s website http://www.fda.gov/Drugs/DrugSafety/ucm322734.htm; and clinical investigation and guidance are at the CDC website http://www.cdc.gov/HAI/outbreaks/meningitis.html.

**Publications** – Traci DeSalvo, foodborne diseases epidemiologist at WDPH, is a co-author on the JAMA article titled: *Hospitalizations and Mortality Associated With Norovirus Outbreaks in Nursing Homes, 2009-2010*. The abstract is online at: http://jama.jamanetwork.com/article.aspx?articleid=1380392

4. Upcoming Meetings, Trainings & Important Dates

- December 1, 2012  World AIDS Day  http://www.worldaidscampaign.org/world-aids-day/
- December 2-8, 2012 National Handwashing Awareness Week  www.henrythehand.com

Free on-line training opportunities at University of North Carolina Center for Public Health Preparedness (UNC CPHP): http://cphp.sph.unc.edu/training/index.php. There are training modules for many public health topics, including epidemiology, outbreaks, emerging diseases and disaster preparedness. Some modules include CE credit for public health nurses and environmental health professionals.

The Wisconsin Epi Express is posted online at http://www.dhs.wisconsin.gov/communicable/WiEpiExpress/Index.htm and distributed by email to local, tribal, regional and state public health officials and infection preventionists in Wisconsin. Suggestions for article topics are welcomed. Distribution list removal or addition requests and topic suggestions should be sent to: Barb Anderson: Barb.Anderson@wi.gov.