***Streptococcus pyogenes* (GAS) Invasive Disease**

Organism: *Streptococcus pyogenes* Group A beta-hemolytic (130 different serotypes associated with different clinical manifestations).

- Most common is NON-invasive disease, e.g., impetigo or pharyngitis
- Only INVASIVE presentations, i.e., necrotizing fasciitis (NF), streptococcal toxic shock syndrome (STSS), bacteremia, are reportable
- Can also see nonsuppurative sequelae, e.g., rheumatic fever, post-streptococcal glomerulonephritis
- Rheumatic fever is reportable as a separate condition

Incubation period: Short, usually 1-3 days, rarely longer. Non-invasive infections may have variable incubation periods: pharyngitis – 2-5 days and impetigo – 7-10 days. Can also have asymptomatic carriage.

Infectious period: With adequate penicillin treatment, transmissibility generally ends within 24 hours.

- In untreated, uncomplicated cases, 10-21 days.
- In untreated cases with purulent discharges, weeks to months.
- In untreated cases with pharyngitis, contagiousness sharply reduced after 2-3 weeks.

Transmission route:

Person to person by contact with infectious secretions from the nose or throat of infections persons or by contact with infected skin lesions. Asymptomatic pharyngeal carriage occurs among all age groups but is most common among children. Persons with acute upper respiratory tract symptoms are particularly likely to transmit infections. Carriers have been responsible for nosocomial outbreaks, particularly following surgical procedures. Explosive outbreaks of sore throat may follow ingestion of contaminated food. Spread of GAS from humans to cattle has been responsible for outbreaks associated with raw milk.

Treatment:

- Standard therapy is Penicillin G, IM for 10 days. While antibiotics might shorten clinical illness somewhat, pharyngitis cases would likely improve in 3-4 days without treatment. Antibiotics are given to guard against suppurative complications and development of rheumatic fever.
- Erythromycin can be used for pen-sensitive patients, but resistance has been documented.
- Clindamycin or a cephalosporin may also be used. Sulfonamides and tetracyclines should not be used.
- For NF, aggressive surgical debridement of necrotic tissue is recommended in addition to antibiotic therapy.
- Immune Globulin Intravenous (IVIG) may also be used in the treatment of STSS in addition to antibiotic therapy.

Information Needed for the Investigation

Verify the Diagnosis

- Clinical description: NF causes severe local pain and tissue destruction. It is often characterized by rapid progression, rash, blistering, tachycardia, high fever and hypotension. STSS is a severe illness characterized by hypotension, coagulation disorder, and multiorgan failure. Incidence of invasive GAS infection highest among infants, the elderly, immune-suppressed, etc.
- *Confirmed:* isolation of GAS from a normally sterile site (CSF, blood, joint fluid, etc.) ABCs case definition (http://www.cdc.gov/abcs/methodology/case-def-ascertain.html GAS isolated from a wound culture and accompanied by NF or STSS.

Determine the Extent of Illness

Currently additional epidemiologic and laboratory data for individual cases are gathered by CDC-AIP. For cluster detection, SOE reviews case counts and geographic distribution monthly, and CDC-AIP reviews molecular data quarterly. If GAS epidemiology appears to be changing, SOE will coordinate with CDC-AIP for additional follow up, including confirming/determining if a cluster exists and discussing with partners about the need to launch a larger investigation. See CDC's website calculator for direction on launching an investigation: http://www2a.cdc.gov/ncidod/dbmd/abcs/calc/calc_new/index.htm . See also below for CDC guidance on when public health action may be indicated.

Settings requiring urgent public health action

- Postpartum and post-surgical GAS infections (see Prevention of Invasive Group A Streptococcal Disease among Household Contacts of Case Patients and among Postpartum and Postsurgical Patients: Recommendations from the Centers for Disease Control and Prevention. *Clin Infect Dis* 2002;35:950-59.)
- Outbreaks of rheumatic fever
- Clusters in military institutions
- Clusters in hospitals or long-term care facilities
- Outbreaks of invasive disease in child care centers and other school settings
- Outbreaks of invasive disease among young children following varicella (chicken pox) infections

Laboratory Specimens

- In suspected cases of invasive GAS, cultures of blood and focal sites of infection are indicated.
- Request that any isolate be sent to CDC/AIP directly.

Contact and Control Measures

- If multiple cases occur, notify parents, healthcare providers and emergency rooms in the area of the occurrence of GAS.
- People with skin lesions should not handle food.

- Culture symptomatic contacts in outbreak settings, e.g., families with cases of NF, or healthcare outbreaks.

Hospital Considerations

- Minor skin, wound or burn use Standard Precautions.
- Endometriosis (puerperal sepsis) use Standard Precautions.
- Major skin, wound or burns (draining wounds) use Contact and Droplet Precautions for the first 24 hours after initiation of effective therapy.
- Pharyngitis in infants and children use Droplet Precautions for the first 24 hours after initiation of effective therapy.
- Pneumonia, scarlet fever in infants and young children, and serious invasive disease (concern for secondary transmission to patients or health care workers) use Droplet Precautions for the first 24 hours after initiation of effective therapy.
- Post-partum and post-surgical cases should prompt a facility internal infection control review.

Reporting Requirements

- FTR: write up cluster investigations only
- AK-STARS Database
    - Enter all *confirmed* cases
    - Indicate "NF" as a Secondary Condition if that is present
    - Indicate "STSS" as a Secondary Condition if that is present
    - Ensure especially for NF that the "Death" Y/N/U field is completed
    - AIP will fax all Case Report Forms to SOE for NF and deaths
    - Rheumatic Fever cases are entered as RF and not GAS cases, although sometimes a person might have two entries if they meet both case definitions
- Fax notification of any suspected GAS (not RF) cases to CDC/AIP (729-3473) upon receipt (within one working day.)
- May use ABCs (CDC) Case Report Form and Definition to define *confirmed* cases
- **NOTE:** GAS no longer reportable to CDC via NETSS since 2009. Case definition not updated since 1995. Included in chapter for historical reference only.

References

- CDC annual ABCs surveillance reports are available at: http://www.cdc.gov/abcs/reports-findings/surv-reports.html
- Red Book 2012 Report of the Committee on Infectious Diseases, 29th Edition
- Control of Communicable Diseases Manual 20th Edition
- Siegel JD, Rhinehart E, Jackson M, Chiarello L, and the Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Available at http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf

Alaska Division of Public Health

Prevention Promotion Protection

Streptococcus pyogenes or Group A Strep (GAS)

What is group A streptococcus (GAS)?
Group A streptococcus (GAS) is a bacterium often found in the throat and on the skin. People may carry group A streptococci in the throat or on the skin and have no symptoms of illness. Most GAS infections are relatively mild illnesses such as "strep throat," or impetigo (a skin infection). Occasionally, these bacteria can cause other severe and even life-threatening diseases.

How are group A streptococci spread?
These bacteria are spread through direct contact with mucus from the nose or throat of people who are sick with a GAS infection or through contact with infected wounds or sores on the skin. The bacteria may also be spread through contact with persons without symptoms but who carry the bacteria in their throat or on their skin. Ill persons, such as those who have strep throat or skin infections, are most likely to spread the infection. Persons who carry the bacteria but have no symptoms are much less contagious. Treating an infected person with an antibiotic for 24 hours or longer generally prevents the spread of the bacteria to others. However, it is important to complete the entire course of antibiotics as prescribed. It is not likely that household items like toys spread these bacteria. However, it is possible to spread these bacteria by drinking from the same glass or eating from the same plate as someone who is ill with a GAS infection like strep throat.

What kinds of illnesses are caused by group A streptococcal infection?
Infection with GAS can result in a range of illnesses:

- Mild illness such as strep throat or impetigo
- Severe illness (necrotizing fasciitis, streptococcal toxic shock syndrome)

Severe, sometimes life-threatening GAS disease may occur when these bacteria get into parts of the body where bacteria usually are not found, such as the blood, muscle, or the lungs. These infections are called "invasive GAS disease." Two of the most severe, but least common, forms of invasive GAS disease are necrotizing fasciitis and streptococcal toxic shock syndrome (STSS). Necrotizing fasciitis (occasionally described by the press as "the flesh-eating bacteria") rapidly destroys muscles, fat, and skin tissue. STSS causes blood pressure to drop rapidly and organs (e.g., kidney, liver, lungs) to fail. STSS is not the same as the staphylococcal toxic shock syndrome that has been associated with tampon usage. Less severe invasive illnesses caused by GAS include cellulitis and pneumonia. In the U.S, about 25% of patients with necrotizing fasciitis due to GAS and approximately 40% with STSS die. About 10%-15% of patients with any form of invasive group A streptococcal disease die.

How common is invasive group A streptococcal disease?
About 9,000-11,500 cases of invasive GAS disease occur each year in the United States, resulting in 1,000-1,800 deaths annually. STSS and necrotizing fasciitis each comprise an average of about 6%-7% of these invasive cases. In contrast, there are several million cases of strep throat and impetigo each year.

What is reportable in Alaska?
In Alaska, health care providers and laboratories are required to report *only* invasive GAS cases. Annual counts are published in Epidemiology *Bulletins* and have averaged between 40-70 cases each year.

Who is most at risk of getting invasive group A streptococcal disease?
Few people who come in contact with GAS will develop invasive GAS disease. Most people will have a throat or skin infection, and some may have no symptoms at all. Although healthy people can get invasive GAS disease, people with chronic illnesses like cancer, diabetes, and chronic heart or lung disease, and those who use medications such as steroids have a higher risk. People with skin lesions (such as cuts, chickenpox, or surgical wounds), the elderly, and adults with a history of alcohol abuse or injection drug use also have a higher risk for disease.

What are the early signs and symptoms of necrotizing fasciitis and STSS?
Early signs and symptoms of necrotizing fasciitis:

- Severe pain and swelling, often rapidly increasing
- Fever
- Redness at the wound site

Early signs and symptoms of STSS:

- Sudden onset of generalized or localized severe pain, often in an arm or leg
- Dizziness
- Flu-like symptoms such as fever, chills, muscle aches, nausea, vomiting
- Confusion
- A flat red rash over large areas of the body (only occurs in 1 in 10 cases)

How is invasive group A streptococcal disease treated?
GAS infections can be treated with many different antibiotics. For STSS and necrotizing fasciitis, high dose penicillin and clindamycin are recommended. For those with very severe illness, supportive care in an intensive care unit may also be needed. With necrotizing fasciitis, early and aggressive surgery is often needed to remove damaged tissue and stop disease spread. Early treatment may reduce the risk of death from invasive GAS; however, even the best medical care does not prevent death in every case.

What can be done to help prevent group A streptococcal infections?
The spread of all types of GAS infection can be reduced by good hand washing, especially after coughing and sneezing and before preparing foods or eating. People with sore throats should be seen by a doctor who can perform tests to find out whether the illness is strep throat. If the test result shows strep throat, the person should stay home from work, school, or day care until 24 hours after taking an antibiotic. All wounds should be kept clean and watched for possible signs of infection such as redness, swelling, drainage, and pain at the wound site. A person with signs of an infected wound, especially if fever occurs, should immediately seek medical care. It is not necessary for all persons exposed to someone with an invasive GAS infection (i.e., necrotizing fasciitis or STSS) to receive antibiotics to prevent infection. However, in some situations, antibiotics may be recommended. That decision should be made after talking with your doctor.

Invasive, Group A (GAS) *Streptococcus pyogenes* Case Definition

Clinical Description

Invasive group A streptococcal infections may manifest as any of several clinical syndromes, including pneumonia, bacteremia in association with cutaneous infection (e.g., cellulitis, erysipelas, or infection of a surgical or nonsurgical wound), deep soft-tissue infection (e.g., myositis or necrotizing fasciitis), meningitis, peritonitis, osteomyelitis, septic arthritis, postpartum sepsis (i.e., puerperal fever), neonatal sepsis, and nonfocal bacteremia.

Laboratory Criteria for Diagnosis

Isolation of group A *Streptococcus* (*Streptococcus pyogenes*) by culture from a normally sterile site (e.g., blood or cerebrospinal fluid, or, less commonly, joint, pleural, or pericardial fluid)

Case Classification

Confirmed

A case that is laboratory confirmed

Comments

The 1995 case definition appearing on this page was later re-published in the 1997 *MMWR* Recommendations and Reports titled *Case Definitions for Infectious Conditions Under Public Health Surveillance*.[1] Thus, the 1995 and 1997 versions of this case definition are identical. As of 2009, GAS was no longer considered nationally notifiable.

Reference

1. CDC. (1997). Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*, 46(RR-10), 1-55. http://www.cdc.gov/mmwr/preview/mmwrhtml/00047449.htm