**Streptococcus pyogenes Invasive Disease – GAS**

**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 fascitis (NF), streptococcal toxic shock syndrome (STSS), bacteremia, are reportable.
- Can also see nonsuppurative sequelae, e.g., rheumatic fever, post-streptococcal glomerulonephritis.

**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.)
  GAS isolated from a wound culture and accompanied by NF or STSS.

Determine the Extent of Illness
- Are there other cases associated with the patient? (e.g., Is the patient post partum or post op?)
- Coordinate with CDC/AIP for case investigation and follow up
- Determine if cluster exists and discuss with partners about the need to launch a larger investigation. See CDC’s website for direction on launching an investigation: [http://www2a.cdc.gov/ncidod/dbmd/abcs/calc/calc_new/index.htm](http://www2a.cdc.gov/ncidod/dbmd/abcs/calc/calc_new/index.htm)

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.
Reporting Requirements

- FTR: write up cluster investigations only
- AK-STARS Database: enter all confirmed cases.
- Fax a case report 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. Case definition not updated since 1995. Included in chapter for historical reference only.**

References

- Control of Communicable Diseases Manual 19th Edition
**Streptococcus pyogenes Invasive Disease (GAS)**
(strep throat, necrotizing fasciitis, impetigo)

**What is group A streptococcus (GAS)?**
Group A streptococci 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. On rare occasions, 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 persons who are infected or through contact with infected wounds or sores on the 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 eliminates their ability to spread the bacteria. However, it is important to complete the entire course of antibiotics as prescribed. It is not likely that household items like plates, cups, or toys spread these bacteria.

**What kinds of illnesses are caused by group A streptococcal infection?**
Infection with GAS can result in a range of symptoms:
- No illness
- Mild illness (strep throat or a skin infection such as impetigo)
- Severe illness (necrotizing fasciitis, streptococcal toxic shock syndrome)

Severe, sometimes life-threatening, GAS disease may occur when bacteria get into parts of the body where bacteria usually are not found, such as the blood, muscle, or the lungs. These infections are termed "invasive GAS disease." Two of the most severe, but least common, forms of invasive GAS disease are necrotizing fasciitis and Streptococcal Toxic Shock Syndrome. Necrotizing fasciitis (occasionally described by the media as "the flesh-eating bacteria") destroys muscles, fat, and skin tissue. Streptococcal toxic shock syndrome (STSS), causes blood pressure to drop rapidly and organs (e.g., kidney, liver, lungs) to fail. STSS is not the same as the "toxic shock syndrome" frequently associated with tampon usage. About 20% of patients with necrotizing fasciitis and more than half with STSS die. While 10%-15% of patients with invasive group A streptococcal disease die from their infection, approximately 25% of patients with necrotizing fasciitis and more than 35% with STSS 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.

**Why does invasive group A streptococcal disease occur?**
Invasive GAS infections occur when the bacteria get past the defenses of the person who is infected. This may occur when a person has sores or other breaks in the skin that allow the bacteria to get into the tissue, or when the person’s ability to fight off the infection is decreased because of chronic illness or an illness that affects the immune system. Also, some virulent strains of GAS are more likely to cause severe disease than others.
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 kidney dialysis, and those who use medications such as steroids have a higher risk.

What are the early signs and symptoms of necrotizing fasciitis and streptococcal toxic shock syndrome?
Early signs and symptoms of necrotizing fasciitis:
- Fever
- Severe pain and swelling
- Redness at the wound site

Early signs and symptoms of STSS:
- Fever
- Dizziness
- Confusion
- A flat red rash over large areas of the body
- Abrupt onset of generalized or localized severe pain, often in an arm or leg

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. For persons with necrotizing fasciitis, early and aggressive surgery is often needed to remove damaged tissue and stop disease spread.

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. Persons 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 seek medical care. It is not necessary for all persons exposed to someone with an invasive group A strep infection (i.e. necrotizing fasciitis or strep toxic shock syndrome) to receive antibiotic therapy to prevent infection. However, in certain circumstances, antibiotic therapy may be appropriate. That decision should be made after consulting with your doctor.