

STREPTOCOCCAL TOXIC SHOCK SYNDROME (STSS)

REPORTING INFORMATION

- **Class B2:** Report by the end of the business week in which the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism: Ohio [Confidential Reportable Disease form](#) (HEA 3334, rev. 1/09), [Positive Laboratory Findings for Reportable Disease form](#) (HEA 3333, rev. 8/05), the local health department via the Ohio Disease Reporting System (ODRS), or the telephone.
- Additional reporting information, with specifics regarding the key fields for ODRS reporting can be located in [Section 7](#).

AGENT

Streptococcus pyogenes, group A *Streptococcus*. There are more than 80 serologically distinct types of *S. pyogenes*, which may cause a variety of diseases ranging from relatively mild illnesses such as pharyngitis and impetigo to severe infections including septicemia and Streptococcal Toxic Shock Syndrome (STSS).

CASE DEFINITION

Clinical Description

Streptococcal Toxic Shock Syndrome (STSS) is a severe illness associated with invasive or non-invasive group A streptococcal (*Streptococcus pyogenes*) infection. STSS may occur with infection at any site, but most often occurs in association with infection of a cutaneous lesion. Signs of toxicity and a rapidly progressive clinical course are characteristic and the case-fatality rate may exceed 50%.

Clinical Case Definition

An illness with the following clinical manifestations:

- Hypotension: Defined by a systolic blood pressure ≤ 90 mm Hg for adults or less than the fifth percentile by age for children aged <16 years.
- Multi-organ involvement characterized by two or more of the following:
 - Renal impairment: Creatinine ≥ 2 mg/dL (≥ 177 $\mu\text{mol/L}$) for adults or greater than or equal to twice the upper limit of normal for age. In patients with pre-existing renal disease, a greater than twofold elevation over the baseline level.
 - Coagulopathy: Platelets $\leq 100,000/\text{mm}^3$ ($\leq 100 \times 10^6/\text{L}$) or disseminated intravascular coagulation (DIC), defined by prolonged clotting times, low fibrinogen level and presence of fibrin degradation products.
 - Liver involvement: Alanine aminotransferase (ALT, SGOT), aspartate aminotransferase (AST, SGPT) or total bilirubin levels greater than or equal to twice the upper limit of normal for the patient's age. In patients with pre-existing liver disease, a greater than twofold increase over the baseline level.
 - Acute respiratory distress syndrome (ARDS): Defined by acute onset of diffuse pulmonary infiltrates and hypoxemia in the absence of cardiac failure or by evidence of diffuse capillary leak manifested by acute onset of generalized edema, or pleural or peritoneal effusions with hypoalbuminemia.
 - Rash: A generalized erythematous macular rash that may desquamate.
 - Soft-tissue necrosis: Including necrotizing fasciitis, necrotizing myositis or

gangrene.

Laboratory Criteria for Diagnosis

Isolation of group A *Streptococcus*.

Case Classification

Suspect*: A clinically compatible case that is not yet laboratory confirmed or does not meet the clinical case definition.

Probable:

- A case that meets the clinical case definition in the absence of another identified etiology for the illness *and*
- Isolation of group A *Streptococcus* from a non-sterile site.

Confirmed:

- A case that meets the clinical case definition *and*
- Isolation of group A *Streptococcus* from a normally sterile site (e.g. blood or cerebrospinal fluid or, less commonly, joint, pleural or pericardial fluid).

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed it was not a case.

*This case classification can be used for initial reporting purposes to the Ohio Department of Health (ODH) as the Centers for Disease Control and Prevention (CDC) has not developed a classification.

Comment: See also [Streptococcal Disease, Invasive, Group A](#).

SIGNS AND SYMPTOMS

Acute illness characterized by fever, generalized erythroderma, rapid-onset hypotension, and symptoms of multisystem organ involvement that can include profuse watery diarrhea, vomiting, and severe myalgias. Evidence of local soft tissue infection (e.g. cellulitis, abscess, myositis, necrotizing fasciitis) associated with severe increasing pain is common with *Streptococcus pyogenes*-mediated toxic shock syndrome. STSS may occur without a readily identifiable focus of infection.

DIAGNOSIS

Blood culture results are positive for *Streptococcal pyogenes* in more than 50% of patients with *Streptococcal pyogenes*-mediated TSS. Culture results from the site of infection usually are positive and may remain positive for several days after appropriate antimicrobial agents have been initiated. A significant increase in antibody titers to streptolysin O, deoxyribonuclease B, or other streptococcal extracellular products 4 to 6 weeks after infection may help confirm the diagnosis if culture results were negative.

EPIDEMIOLOGY

Source

Group A streptococcal bacteria (GAS) are commonly found in the throat and on the skin. Invasive group A streptococcal disease occurs when the bacteria invade parts of the body (e.g. blood, lungs, deep muscle, fat tissue) where bacteria are not usually found. Epidemiologic data show an association between GAS invasive disease and GAS serotypes M1 and M3. Infection often begins at the site of a break in the skin (a surgical

or non-surgical wound). Cases have also been associated with minor non-penetrating trauma and with varicella-zoster virus infections.

Occurrence

The CDC estimates that 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. Persons of all ages are affected. Risk groups have been defined by race/ethnicity (notably Native Americans), underlying disease (e.g. varicella-zoster virus infection, diabetes mellitus, HIV infection) and behaviors (IV drug use). For the most part, infections occur sporadically, but clusters of invasive GAS infection and STSS have been reported in several settings including hospitals, nursing homes, families and military training facilities. Community-wide outbreaks have also been reported.

Mode of Transmission

Transmission is by direct contact with secretions from infected persons. There is some evidence that close contacts (e.g. family/household members, health care providers, nursing homes) might be at an increased risk for infection with GAS. The same strain of GAS may cause different disease in different hosts ranging from asymptomatic or mild infection to invasive disease.

PUBLIC HEALTH MANAGEMENT

Case

Treatment

Early recognition of invasive GAS infections is important because of their potential for rapid progression and fatal outcome. Penicillin is effective for treating most GAS infections. More aggressive infections, however, do not respond as well to penicillin and it may be helpful to add clindamycin to the penicillin regimen. Where deep infection with invasive GAS is suspected, prompt and aggressive exploration and debridement are mandatory. Intravenous fluids and other supportive measures typically used in the management of shock and multi-organ failure are often necessary.

Isolation

Ohio Administrative Code 3701-3-13 (Z) states:

"Streptococcal infection: a person with a streptococcal infection shall be excluded from school or child care center for twenty-four hours after the initiation of effective antimicrobial therapy."

Standard precautions, as well as droplet and contact precautions, are recommended for all patients with toxic shock syndrome attributed to *Streptococcus pyogenes*.

Contact

There are no official recommendations for culture and therapy or prophylaxis for close contacts of persons with invasive GAS. However, because of evidence that close contacts of a case might have an increased risk of developing GAS, throat cultures and cultures of any lesions may be considered in those persons with close contact to the case, especially if contacts have severe underlying illness. Culture-positive persons should be treated.

Infection Control

The following guidelines for infection control in health care personnel have been published by the Centers for Disease Control and Prevention (CDC) and Hospital Infection Control Practices Advisory Committee (HICPAC) (*American Journal of Infection Control* 1998;26:289-354).

Patient-to-Personnel Transmission: Nosocomial spread of group A streptococci to personnel can be prevented by adherence to standard precautions or other transmission precautions. Personnel should wash their hands thoroughly after each patient contact, wear gloves when contact with potentially contaminated secretions is anticipated and wear gowns when soiling with infective material is likely. Items contaminated by respiratory secretions or wound drainage should be disposed of in a proper manner. Secondary spread and illness in hospital personnel have occurred following direct contact by personnel with secretions from infected patients.

Personnel-to-Patient Transmission: Sporadic outbreaks of surgical wound infections or postpartum infections caused by group A streptococci have been associated with carriers among operating room or delivery room personnel. The main reservoirs of group A streptococci in implicated carriers are the pharynx, the skin, rectum and female genital tract. Direct contact and droplet spread are the major modes of transmission in these settings. Since surgical wound infections or postpartum infections due to GAS occur infrequently, any isolate from cases should be saved for possible serotyping should an outbreak ensue. The occurrence of ≥ 2 cases should prompt an epidemiologic investigation.

Restriction from patient care activities and food handling is indicated for personnel with GAS infections until 24 hours after they have received appropriate therapy. However, no work restrictions are necessary for personnel who are colonized with GAS unless they have been epidemiologically linked to transmission of infection within the facility.

Child Care Centers and Preschools

The most important means of controlling any GAS disease is prompt identification and treatment of infections. Children with GAS infections should not return to the child care center or preschool until at least 24 hours after beginning antimicrobial therapy and until they are afebrile. Contacts of documented cases of streptococcal infection who have recent or current clinical evidence of GAS infection should have appropriate cultures taken and should be treated if the culture is positive.

What is group A streptococcal (GAS) invasive disease?

Streptococcus pyogenes (group A *Streptococcus*) bacteria are commonly found in the throat and on the skin. Many healthy people carry these bacteria and have no symptoms of illness. Invasive group A streptococcal disease is a serious, and sometime life-threatening disease, that occurs when *Streptococcus pyogenes* bacteria invade parts of the body where bacteria are not usually found, including: blood, cerebral spinal fluid, lungs, wounds, deep muscle and fat tissue.

What is Streptococcal Toxic Shock Syndrome (STSS)?

STSS is a form of invasive GAS. STSS can occur with an infection at any body site, but most often occurs in association with infection of a skin lesion. The disease is characterized by the occurrence of shock and failure of organs, such as the kidneys, liver, lungs, and brain, early in the course of GAS infection.

Who gets invasive GAS disease?

Anyone can get invasive GAS disease or STSS. People with underlying health problems such as diabetes, chronic heart, lung or kidney problems, cancer and HIV infection are at greater risk to develop invasive GAS disease. A break in the skin, such as a cut or surgical wound or chickenpox may increase a person's risk. There is some evidence that close contacts of a case (family/household members, health care providers, nursing homes) may be at an increased risk for infection with GAS due to direct contact with secretions from infected persons.

How common is invasive GAS disease?

The Centers for Disease Control and Prevention (CDC) estimates that 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.

How is invasive GAS disease treated?

Penicillin is effective for treating most GAS infections. Surgery is necessary in some cases. Intravenous fluids and other supportive measures typically used in the management of shock and multi-organ failure are often necessary.

Should close contacts of persons with invasive GAS disease be tested or treated?

As previously mentioned, there is some evidence that close contacts of a case (family/household members, health care providers, nursing homes) might be at an increased risk for infection with GAS due to direct contact with secretions from infected persons. Throat cultures and cultures of any lesions may be considered in those persons with close contact to the case, especially if contacts have severe underlying illness. Culture-positive persons should be treated.