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Streptococcal toxic-shock syndrome (STSS)
(Streptococcus pyogenes)
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Streptococcal toxic-shock syndrome (STSS) (*Streptococcus pyogenes*)

Overview ^{1, 2, 3, 5, 6, 7}


Group A *Streptococcus* (group A strep, GAS) bacteria can live in a person's nose and throat. The bacteria are spread through contact with droplets from an infected person's cough or sneeze. If you touch your mouth, nose, or eyes after touching something that has these droplets on it, you may become ill. If you drink from the same glass or eat from the same plate as the sick person, you could also become ill. It is also possible for group A strep bacteria to spread from contact with sores from a group A strep skin infection.

Most GAS infections are relatively mild illnesses such as strep throat, scarlet fever, and impetigo (a skin infection). Occasionally GAS can cause severe and even life-threatening diseases. This can occur when GAS 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 group A strep disease." Two of the most severe, but least common, forms of invasive group A strep disease are necrotizing fasciitis and streptococcal toxic shock syndrome (STSS).

Another condition, called Toxic shock syndrome [other than Streptococcal (TSS)] is commonly caused by *Staphylococcus aureus* and *Clostridium sordellii*. These bacteria release toxins into the blood stream, which then spreads the toxins to body organs. **NOTE:** *Not all staph or strep infections cause toxic shock syndrome. This document will discuss STSS; for more on Toxic Shock Syndrome other than Streptococcal (TSS) visit the [following link](#).*

Most commonly STSS is seen in people who have recently had chickenpox, bacterial cellulitis (infection of the skin and underlying tissue), or have weak immune systems. The incubation period for STSS is not known but has been as short as 14 hours in cases associated with subcutaneous inoculation. Symptoms of STSS can include dangerously low blood pressure, shock, decreased kidney function, bleeding problems, bruising due to low blood platelet count, a rash that is red and flat and that covers most of the areas of the body, liver impairment, shedding of the skin in large sheets, especially over the palms and soles (but this does not always occur) and difficulty breathing. For a complete description of STSS, refer to the following sources:

- *Control of Communicable Diseases Manual (CCDM)*. 20th ed. Washington, D.C.: American Public Health Association, 2015.
- American Academy of Pediatrics. *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL. American Academy of Pediatrics; 2015.
- *Mandell, Douglas, and Bennett's Principles and Practices of Infectious Diseases: Vol. 2*. 8th ed. 2015.

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2010 Case Definition – Streptococcal toxic-shock syndrome (STSS)⁴ (2/16)

Clinical Description

Streptococcal toxic-shock syndrome (STSS) is a severe illness associated with invasive or noninvasive 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 Criteria

An illness with the following clinical manifestations*:

- Hypotension defined by a systolic blood pressure less than or equal to 90 mm Hg for adults or less than the fifth percentile by age for children aged less than 16 years.
- Multi-organ involvement characterized by two or more of the following:
 - Renal impairment: Creatinine greater than or equal to 2 mg/dL (greater than or equal to 177 $\mu\text{mol/L}$) for adults or greater than or equal to twice the upper limit of normal for age. In patients with preexisting renal disease, a greater than twofold elevation over the baseline level.
 - Coagulopathy: Platelets less than or equal to 100,000/ mm^3 (less than or equal to 100 x 10⁶/L) or disseminated intravascular coagulation, defined by prolonged clotting times, low fibrinogen level, and the presence of fibrin degradation products.
 - Liver involvement: Alanine aminotransferase, aspartate aminotransferase, or total bilirubin levels greater than or equal to twice the upper limit of normal for the patient's age. In patients with preexisting liver disease, a greater than two-fold increase over the baseline level.
 - Acute respiratory distress syndrome: 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.
 - A generalized erythematous macular rash that may desquamate.
 - Soft-tissue necrosis, including necrotizing fasciitis or myositis, or gangrene.

* Clinical manifestations do not need to be detected within the first 48 hours of hospitalization or illness, as specified in the 1996 case definition. The specification of the 48 hour time constraint was for purposes of assessing whether the case was considered nosocomial, not whether it was a case or not.

Laboratory Criteria for Diagnosis

Isolation of group A *Streptococcus*.

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Case Classification

Probable

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

Confirmed

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

NOTE: [*Toxic-Shock Syndrome other than Streptococcal \(TSS\)*](#) has a different surveillance case definition.

Information Needed for Investigation

Verify the diagnosis. What laboratory tests were conducted and what were the results?

Verify the diagnosis by referring to the Case Definition provided above. Complete the [Disease Case Report](#) (CD-1) by obtaining the information from the attending physician, hospital, laboratory, patient and/or a knowledgeable family member.

Establish the extent of the illness. Determine if household members, co-workers, or other close contacts are, or have been ill with invasive group A strep disease? If so, urge them to contact their health care provider for a medical evaluation.

Determine the source of infection. Obtain demographic, clinical and other epidemiological information necessary to complete the [2015 Active Bacterial Core Surveillance Case Report](#). The information may be obtained from the patient, health care provider, or a knowledgeable family member. **COMMENT:** *Sometimes the specific source of the infection will not be identified.*

Provide STSS information to persons at risk of infection and the general public as needed.


Efforts should be made to promote STSS awareness, see CDC's [GAS Frequently Asked Questions](#), [MedlinePlus](#) or [Johns Hopkins Medicine](#) for additional information.

STTS Surveillance. Review WebSurv to determine whether there have been other STSS cases. When cases are related by person, place or time, efforts should be made to identify a common source. Information obtained through the public health investigation will be used to identify possible sources of infection and to characterize persons or areas in which additional efforts are needed to raise awareness and reduce disease incidence.

Notification

Immediately contact the [District Communicable Disease Coordinator](#), or the [Senior Epidemiology Specialist for the District](#), or the Missouri Department of Health and Senior Services (MDHSS) – Bureau of Communicable Disease Control and Prevention (BCDCP), phone (573) 751-6113, Fax (573) 526-0235, or for afterhours notification contact the MDHSS/ERC at (800) 392-0272 (24/7) if an outbreak* of TSS is suspected.

- If a case(s) is associated with a long-term care facility, BCDCP or the LPHA will contact the Section for Long Term Care Regulation, phone (573) 526-8524, Fax (573) 751-8493.

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- If a case is associated with a hospital-based long-term care facility. BCDPC or the LPHA will contact the Bureau of Health Services Regulation phone (573) 751-6303, Fax (573) 526-3621.

*An outbreak is defined as the occurrence in a community or region, illness(es) similar in nature, clearly in excess of normal expectancy and derived from a common or a propagated source.

Control Measures^{1, 2, 3}

The most important means of controlling GAS disease and its sequelae is prompt identification and treatment of infections. STSS is commonly community acquired and sporadic, yet clusters of invasive disease cases have been reported in nursing homes, families and hospital workers. Given the infrequency of these infections and the lack of clearly effective chemoprophylaxis regimen, routine screening for and prophylaxis against streptococcal infection are not recommend for household contacts of the index case.

However, because of the increased risk of death or sporadic, invasive GAS among certain populations (e.g., persons 65 years or older, persons with immunodeficiency, varicella, or diabetes mellitus) physicians may choose to offer targeted chemoprophylaxis for these household contacts. In deciding who should receive prophylaxis, the clinician needs to factor in the duration of contact, intimacy of contact, and underlying risk factors of individual contacts (i.e., contacts with open wounds, recent surgery, recent childbirth, concurring viral infections such as varicella or influenza, or immunodeficiency). Lacking data on which to base chemoprophylaxis, it seems reasonable to choose agents that have achieved highest rates of pharyngeal eradication in asymptomatic individuals, among these are clindamycin and azithromycin. Other regimens have been published elsewhere.³

Identification and treatment of carriers may also be undertaken in well-documented epidemics of severe streptococcal infection, such as outbreaks of GAS infection among nursing home residents, in order to halt ongoing transmission among a highly vulnerable population.¹ Because of the rarity of secondary cases and the low risk of invasive GAS infections in children, chemoprophylaxis is not recommended in schools or child care facilities.²

Laboratory Procedures

Isolation of group A *Streptococcus*.

Initial clinical specimen (raw sample) testing is NOT provided by the Missouri State Public Health Laboratory (MSPHL). However, private laboratories that obtains positive test results and is unable to confirm the species of streptococcus may send positive isolates to the MSPHL for testing: <http://health.mo.gov/lab/specialbacteriology.php>.

Reporting Requirements

STSS is a Category III reportable disease and shall be reported to the [local public health agency](#) or to the MDHSS within three (3) days of first knowledge or suspicion, by telephone, facsimile, or other rapid communication.



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As a Nationally Notifiable Condition, all confirmed and probable cases are a **STANDARD** report to CDC. MDHSS will submit these reports to the CDC by electronic case notification (WebSurv) within the next reporting cycle.

1. For all reported cases of STSS complete a [Disease Case Report](#) (CD-1) and a [2015 Active Bacterial Core Surveillance Case Report](#).
2. Entry of the completed CD-1 into WebSurv negates the need for the paper CD-1 to be forwarded to the District Health Office.
3. Send the completed 2015 Active Bacterial Core Surveillance Case Report to the District Health Office.
4. MDHSS will report to CDC following the above reporting criteria (see box).
5. All outbreaks or “suspected” outbreaks must be reported as soon as possible (by phone, fax or e-mail) to the District Communicable Disease Coordinator. This can be accomplished by completing the [Missouri Outbreak Surveillance Report](#) (CD-51).
6. Within 90 days from the conclusion of an outbreak, submit the final outbreak report to the District Communicable Disease Coordinator.

References

1. American Public Health Association. *Streptococcal Disease*. Van Beneden C, In: Heymann, D L (ed), *Control of Communicable Diseases Manual*. 20th ed. Washington, DC: American Public Health Association, 2015: 581-589.
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3. Elsevier Inc. *Streptococcus pyogenes*. Bryant AE, Stevens DL, In: Bennett JE, Dolin R, Blaser MJ eds. *Mandell, Douglas, and Bennett’s Principles and Practices of Infectious Diseases: Vol. 2*. 8th ed. 2015: 2285-2299.
4. Centers for Disease Control and Prevention’s (CDC) National Notifiable Diseases Surveillance System (NNDSS) and Case Definitions. <http://www.cdc.gov/nndss/conditions/streptococcal-toxic-shock-syndrome/case-definition/2010/> (2/16).
5. Centers for Disease Control and Prevention. *Group A Streptococcal (GAS) Disease*. In: <http://www.cdc.gov/groupastrep/index.html> (2/16).
6. The Johns Hopkins University. The Johns Hopkins Hospital and Johns Hopkins Health System. In: Johns Hopkins Medicine. http://www.hopkinsmedicine.org/healthlibrary/conditions/adult/infectious_diseases/toxic_shock_syndrome_tss_85,p00653/ (2/16).
7. U.S. National Library of Medicine, Bethesda, MD, U.S. Department of Health and Human Services, National Institutes of Health. *Streptococcal Infections*. In: MedlinePlus. <https://www.nlm.nih.gov/medlineplus/streptococcalinfections.html> (2/16).