

Group A Streptococcal (GAS) Infections

Summary

Group A Streptococcus (*Streptococcus pyogenes*) can cause both invasive and non-invasive disease, as well as non-suppurative sequelae. These infections can be severe and may be associated with streptococcal toxic shock syndrome (STSS) or necrotizing fasciitis (NF). The most common group A streptococcal (GAS) non-invasive infection is acute pharyngotonsillitis (pharyngitis), which manifests as sore throat with tonsillar inflammation. More than 240 distinct serotypes of group A Beta-hemolytic streptococci (*Streptococcus pyogenes*) have been identified based on M-protein serotype or M-protein gene sequence (*emm* type). Certain *emm* types have been associated with virulence of the bacteria. Risk factors for invasive GAS include: older age, cancer, heart disease, diabetes mellitus, HIV infection, injection drug use, and recent varicella infection.

Agent

Streptococcus pyogenes, group A β -hemolytic streptococci.

Transmission

Reservoir:

Humans are the only reservoir for *S. pyogenes*.

Mode of Transmission:

GAS is spread person-to-person through direct contact with respiratory secretions, such as saliva, wound discharge, or nasal secretions of infected or colonized persons, or through direct contact with skin lesions of infected persons. Asymptomatic pharyngeal carriage occurs among all age groups but is most common among children. Impetigo (or pyoderma), an invasive disease of GAS, may result from colonization of GAS through breaks in skin (e.g., bites, burns, traumatic wounds, varicella lesions) or through penetration of intact mucous membranes. The specific portal of entry is unknown in the majority of invasive GAS disease cases. Subsequent invasive GAS infections among household contacts of index cases of invasive GAS are rare. In the healthcare setting, colonized (anus, vagina, throat, or skin) healthcare workers may spread GAS to patients. Crowded conditions — such as those in schools, daycare centers, or military training facilities — facilitate transmission.

Period of Communicability:

Communicability of patients with GAS pharyngitis is highest during acute infection. In untreated people, communicability gradually diminishes over a period of weeks. Patients are no longer contagious within 24 hours after initiation of appropriate antimicrobial/antibiotic therapy. Among persons with asymptomatic pharyngeal carriage of GAS, the risk of transmission to others is believed to be minimal, but carriage may persist for months. Untreated purulent GAS skin lesions may be contagious for weeks or months.

Clinical Disease

Incubation period:

The incubation period for GAS pharyngitis is usually 2-5 days. For impetigo it is believed to be 7-10 days. For invasive GAS disease, the incubation period is variable.

Illness:

Pharyngitis (strep throat) is the most common non-invasive clinical syndrome resulting from infection with GAS. Scarlet fever is a non-invasive illness known to often occur simultaneously with pharyngitis and involves a characteristic confluent erythematous sandpaper-like rash cause by one or more GAS erythrogenic exotoxins. Skin infections (e.g., impetigo or pyoderma) are also common. Infrequently, however, GAS may become invasive and cause more severe illness. Post-streptococcal glomerulonephritis (PSGN) can develop after strep throat, scarlet fever, or impetigo but is rare. Invasive GAS infections often encompass bacteremia with or without a focus of infection and can present as streptococcus toxic shock syndrome (STSS), overwhelming sepsis, or necrotizing fasciitis. Other infections caused by GAS include erysipelas, cellulitis (including perianal), vaginitis, pneumonia, endocarditis, pericarditis, septic arthritis, purpura fulminans, osteomyelitis, myositis, puerperal sepsis, surgical wound infection, mastoiditis, and neonatal omphalitis.

Postpartum invasive GAS:

Isolation of GAS during the postpartum period, from either a sterile site or a wound infection, in association with a clinical postpartum infection (e.g., endometritis). The postpartum period of interest includes all inpatient days and the first seven days after discharge.

Postsurgical invasive GAS:

Isolation of GAS during the hospital stay or during the initial seven days after discharge, from a sterile site or a surgical wound, in a postsurgical patient for whom the indication for surgery was not a preexisting GAS infection.

Diagnosis

The diagnosis of GAS (*S. pyogenes*) is established by isolation from a normally sterile site (e.g., blood or cerebrospinal fluid or, less commonly, joint, pleural, or pericardial fluid) OR pathogen specific nucleic acid must be detected in a specimen obtained from a normally sterile body site, using a validated molecular test.

Treatment

High-dose parenteral antimicrobial therapy is required for invasive GAS infections. Resistance to penicillin or cephalosporins has not been documented; thus, susceptibility to testing is needed only for non-beta-lactam agents, such as macrolide or clindamycin, to which *S. pyogenes* can be resistant. The goal of antimicrobial therapy for GAS pharyngitis is to reduce acute morbidity, suppurative and nonsuppurative acute rheumatic fever complications, and transmission to close contacts For more severe cases, including toxic shock syndrome, clindamycin and intravenous immune globulin may be used. Clindamycin **should not be used alone** as initial antimicrobial therapy in life-threatening situations because of the potential for resistance (Refer to American Academy of Pediatrics. 2021-2024 Red Book: Report of the Committee on Infectious Diseases, 32nd Edition. Illinois, Academy of Pediatrics, 2021 for more information). Treatment decisions should ultimately be made by the patient's health care provider.

Surveillance

Case Definition:

Confirmed- Isolation of GAS (*S. pyogenes*) from a normally sterile site (e.g., blood or cerebrospinal fluid or, less commonly, joint, pleural, or pericardial fluid).

Probable - A clinically compatible postpartum or postsurgical case in which GAS is isolated from a wound (and not from a normally sterile site), without NF or STSS.

Reporting:

Report all suspected, probable or confirmed cases to the Infectious Disease Epidemiology Bureau (IDEB) at 1-833-SWNURSE (1-833-796-8773). Information needed includes: patient's name, age, sex, race, ethnicity, home address, home phone number, occupation, and health care provider.

Case Investigation:

Use the Bacterial Meningitis Invasive Respiratory Disease (BMIRD) Form to complete the investigation. Information should also be entered into NM-EDSS per established procedures.

Sporadic cases: Individual cases of invasive GAS do not need to be routinely interviewed.

Postpartum / Postsurgical GAS: Even one case should prompt an epidemiologic investigation by the hospital's infection control personnel in conjunction with the Epidemiology and Response Division due to the potential for prevention of additional cases if source colonized health care personnel (HCP) can be identified and treated. In response to a single identified case, surveillance in the hospital should be enhanced and GAS isolates saved. Enhanced surveillance should involve review of microbiology records from the previous six months, consultation with obstetricians/surgeons/other providers and review of medical records to identify other possible cases, and encouraging active culturing for all suspected new cases. Current guidelines state that screening of HCP for GAS colonization may be considered for one identified case but is strongly recommended for two or more cases identified within a 6-month period.

Control Measures

The most important means of reducing spread of GAS disease is prompt identification and treatment of infections. Appropriate hand hygiene is recommended before and after contact with infected persons.

1. Case management

1.1. Isolation: Children with streptococcal pharyngitis or scarlet fever should be excluded from child care until 24 hours of appropriate antibiotic therapy has been completed.

2. Contact management

Prophylaxis:

- 2.1. Routine chemoprophylaxis is not recommended for household contacts of index patients.
- 2.2. Health care providers may choose to offer chemoprophylaxis to household contacts who are at increased risk for invasive GAS infection (e.g., aged >65 years of age, HIV infection, diabetes mellitus, varicella) or of subsequent death once infected (age >65 years.)
- 2.3. Providers who choose to prescribe chemoprophylaxis for a high-risk household contact should prescribe chemoprophylaxis for all household members since clustering of asymptomatic carriage of GAS within households is common.

3. Prevention

3.1. If appropriate, families and close contacts of sporadic cases may be educated about signs and symptoms of GAS infections, about persons at increased risk for invasive GAS, and about varicella vaccination as a means of preventing invasive GAS as a complication of chickenpox.

3.2. Immunization: Not currently available.

Management of *Streptococcus A* in Child Care Centers

1. One case of invasive GAS in a child care or pre-school setting is not usually a cause for alarm, although it may cause anxiety among staff and parents.
2. Management of isolated cases
 - 2.1. Recommend that all classmates and classroom staff with signs/symptoms of pharyngitis or active skin lesions be cultured for GAS infection by their usual medical provider.
 - 2.2. Exclude symptomatic culture-positive children and staff from the facility until 24 hours after beginning correct antimicrobial therapy.
 - 2.3. Recommend that all children >12 months of age who are susceptible to varicella (i.e., no history of chickenpox and no varicella vaccination) receive varicella vaccination.
 - 2.4. A second case of invasive GAS in the same facility within several months' time period should be considered a possible outbreak and warrants an epidemiologic investigation and more aggressive disease control measures. Please contact IDEB at 1-833-796-8773 for assistance.

Management of *Streptococcus A* in Long-Term Care Facilities

One case of invasive GAS should prompt enhanced surveillance by the facility for other possible cases of GAS infection. The identification of additional cases may require more rigorous epidemiologic investigation and disease control measures. Please contact IDEB at 1-833-796-8773 for assistance.

References

American Academy of Pediatrics. Kimberlin, DW ed. 2021-2024 Red Book: Report of the Committee on Infectious Diseases. 32nd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2021.

Centers for Disease Control and Prevention. (2022). Group A Streptococcal (GAS) Disease. <https://www.cdc.gov/groupastrep/>. (Accessed 9 May 2023).

See Invasive Group A *Streptococcus* Fact Sheet ([English](#)) ([Spanish](#)).