

STREPTOCOCCUS GROUP A BETA-HEMOLYTIC (INVASIVE)

Disease Overview

Infection with *Streptococcus pyogenes*, a gram-positive beta-hemolytic bacterium, is known as group A streptococci disease (GAS) and causes a wide variety of illness in humans both non-invasive (e.g., strep throat or impetigo) and invasive. More than 100 distinct M-protein serotypes have been identified. While rarer, the invasive infections are more severe, infecting normally sterile areas of the body such as the blood or organs. Two of the most severe manifestations are streptococcal toxic shock syndrome (a rapidly progressing infection causing low blood pressure/shock and injury to organs such as the kidneys, liver, and lungs) and necrotizing fasciitis (infection of muscle and fat tissue).

Symptoms

The symptoms preceding the onset of invasive GAS disease are variable depending on the manifestation or site of infection. Symptoms may be vague and include pain of unusual severity, swelling, fever, chills, flu-like symptoms, generalized muscle aches, generalized macular rash, bullae, nausea, vomiting, diarrhea, malaise, or joint pain.

Streptococcal toxic shock syndrome (STSS) and necrotizing fasciitis (NF) are the most serious manifestation of invasive GAS. STSS is caused by a toxin-producing GAS strain and is characterized by fever and hypotension along with multi-organ involvement. Necrotizing fasciitis can have devastating consequences and symptoms usually include fever and a red, painful swelling of tissue which spreads rapidly. NF is diagnosed when the disease spreads along the layer of tissue that surrounds the muscle (fascia).

Reservoir

Humans

Mode of Transmission

Transmission is through large respiratory droplets or direct contact:

- droplet spread when an infected individual coughs or sneezes;
- direct or indirect contact of the oral or nasal mucus membranes with infectious respiratory secretions or with exudates from wounds or skin lesions;
- direct or indirect contact of non-intact skin with infectious respiratory secretions or skin wound exudates;
- sharing of contaminated needles.

Nosocomial outbreaks of serious infections (following surgical procedures) have been contributed to anal, vaginal, skin, and pharyngeal carriers.

The portal of entry of invasive infections is frequently the skin however in many cases is not known.

Incubation period

1-3 days.

Period of Communicability

For the purposes of the PH management of contacts, the period of communicability is from 7 days prior to the onset of symptoms of the case to 24 hours after the case's initiation of antimicrobial therapy.

Risk Factors

Increased risk of acquiring/severe illness:

- Attending/working at day care centres;
- Residents of Long-Term Care Facilities;
- Chronic medical conditions such as diabetes mellitus, cardiac disease, pulmonary disease, cancer, or renal disease; human immunodeficiency virus infection; immunosuppressive conditions; intravenous drug use, alcoholism;
- Pregnancy;
- Varicella, chronic/current skin conditions, or persons with breaks in the skin (cuts, surgical wounds);

Note: A detailed list of other risk factors is captioned in the IGAS surveillance form.

Surveillance Case Definition

New Brunswick follows the national case definitions for confirmed and probable cases.

Confirmed Case

Isolation of group A streptococcus pyogenes (GAS) from a normally sterile site¹, with or without clinical evidence of severe invasive disease² i.e., Confirmed cases may or may not have “severe” invasive disease.

¹ **Normally sterile** site specimens are defined as:

- blood,
- cerebrospinal fluid (CSF),
- pleural fluid,
- peritoneal fluid,
- pericardial fluid,
- bone,
- joint fluid or
- specimens taken during surgery (e.g., muscle collected during debridement for necrotizing fasciitis or fluid from a deep abscess).

NOTE: A specimen taken from a non-sterile site collected during a sterile procedure is not considered a “normally sterile site”.

² Clinical evidence of **severe invasive disease** may manifest as several conditions. These include:

- streptococcal toxic shock syndrome (STSS), which is characterized by hypotension (systolic blood pressure < 90 mm Hg in an adult and < 5th percentile for age of children) and at least **TWO** of the following signs:
 - renal impairment (creatinine level > 177 µmol/L for adults)
 - coagulopathy (platelet count < 100,000/mm³ or disseminated intravascular coagulation)
 - liver function abnormality (AST, ALT or total bilirubin > 2x upper limit of normal)
 - acute respiratory distress syndrome (ARDS)
 - generalized erythematous macular rash that may desquamate
- soft tissue necrosis, including necrotizing fasciitis, myositis or gangrene
- meningitis
- GAS pneumonia NOTE: Pneumonia with isolation of GAS from bronchoalveolar lavage (BAL) when no other cause has been identified should be regarded as a form of severe invasive disease for the purposes of public health management. However, as BAL does not provide a sterile site specimen, the latter would not meet the national case definition of a confirmed case.
- other life-threatening conditions (as determined on a case-by-case basis)
- a confirmed case resulting in death.

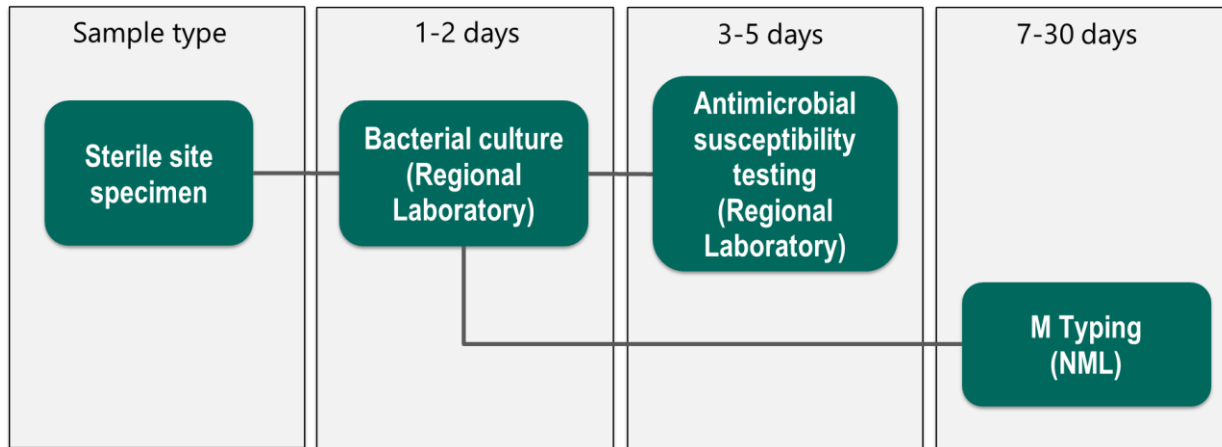
Probable Case

Isolation of GAS or a positive group A streptococcus antigen detection from a non-sterile site and with clinical evidence of severe invasive disease [2] in the absence of another identified etiology.

Diagnosis and Laboratory Guidelines

The diagnosis of a confirmed case of invasive GAS disease is made by isolating *S. pyogenes* from a normally sterile site. All cultures isolated from a sterile site are sent to NML for M typing and molecular *emm* gene sequencing for routine surveillance. Molecular sequencing and susceptibility testing are helpful in characterizing outbreaks, determining disease trends, and guiding appropriate clinical management of cases and contacts.

Figure 1: Laboratory testing and timelines.



Reporting

Per Policy 2.2 Disease and Event Notification to PHNB and Disease and Event Reporting section.

- Enhanced Surveillance. For all confirmed and probable cases an enhanced surveillance form should be completed, and information sent to PHNB within 5 days of completing interview.
- Routine Surveillance (RDSS) for all confirmed cases.

Case Management

Education

Case or relevant caregiver should be informed about:

- Nature of infection, length of communicable period and mode of transmission
- Hand Washing
- Cough/Sneeze Etiquette

Investigation

The public health response to a sporadic case of invasive GAS disease includes contact identification, contact tracing, and maintenance of surveillance for further cases.

Exclusion/Social Distancing

Not applicable as case would be managed in health care setting.

Treatment

Treatment will be dependent on the area of the body infected and resulting complications. This would be provided and managed by a health care provider.

Treatment of an infected person with an appropriate antibiotic for 24 hours or longer eliminates contagiousness. However, it is important to complete the entire course of antibiotics as prescribed.

Immunization

There is currently no vaccine available.

Contact Management

Prevention of secondary cases of invasive GAS relies on timely contact tracing to identify people at increased risk of disease (i.e., close contacts).

Education

Contact or relevant caregiver should be informed about:

- Nature of infection, length of communicable period and mode of transmission
- Hand Washing
- Cough/Sneeze Etiquette
- To seek medical attention immediately should they develop febrile illness or any other clinical signs or symptoms of invasive GAS disease within 30 days of diagnosis of index case.

Investigation

The case or a proxy for the case should be interviewed to determine close contacts.

Close contacts are defined as:

- Household contacts of a case who have spent at least 4 hours/day on average with the case in the previous 7 days or 20/ hours/week with the case;
- Non-household persons who share the same bed with the case or had sexual relations with the case;
- Persons who have had direct mucous membrane contact with the oral or nasal secretions of a case, such as mouth to mouth resuscitation, open mouth kissing or unprotected direct contact with an open skin lesion of the case;
- Injection drug users who have shared needles with the case;

The following will be determined in consultation with the RMOH:

- Selected Long Term Care Facility contacts;
- Selected childcare contacts;
- Selected hospital contacts

To be considered a close contact, there must have been exposure to the case during the period from 7 days prior to onset of symptoms in the case to 24 hours after the case's initiation of antimicrobial therapy. School classmates (kindergarten and older), work colleagues, as well as social or sports contacts of a case are not usually considered close contacts, unless they fit into one of the above categories.

High risk close contact

- older persons (≥ 75 years)
- pregnant women ≥ 37 weeks gestation

- women within 28 days of giving birth
- neonates (up to 28 days old)
- individuals who develop chickenpox with active lesions within 7 days prior to diagnosis in the iGAS case, or within 48 hours after commencing antibiotics by the iGAS case, if exposure is ongoing

Prophylaxis

Chemoprophylaxis

Chemoprophylaxis should only be offered to close contacts of a confirmed severe case. The objective of chemoprophylaxis is to prevent disease in colonized individuals and in those who have recently been exposed, thereby decreasing transmission of a strain known to cause severe infection. This should be administered as soon as possible and preferably within 24 hours of case identification but is still recommended for up to 7 days after the last contact with an infectious case.

Recommended Chemoprophylaxis Regimens for Close Contacts

Drug	Dosage	Comments
First-generation cephalosporins: cephalexin, cefadroxil, cephradine	First line. Children and adults: 25 to 50 mg/kg daily, to a maximum of 1 g/day in 2 to 4 divided doses × 10 days	Recommended drug for pregnant and lactating women. Should be used with caution in patients with allergy to penicillin. Use of cephalosporins with nephrotoxic drugs (e.g., aminoglycosides, vancomycin) may increase the risk of cephalosporin-induced nephrotoxicity.
Erythromycin	Second line. Children: 5 to 7.5 mg/kg every 6 hours or 10 to 15 mg/kg every 12 hours (base) × 10 days (not to exceed maximum of adult dose) Adults: 500 mg every 12 hours (base) × 10 days	Erythromycin estolate is contraindicated in persons with pre-existing liver disease or dysfunction and during pregnancy. Sensitivity testing is recommended in areas where macrolide resistance is unknown or known to be ≥ 10%.
Clarithromycin	Second line. Children: 15 mg/kg daily in divided doses every 12 hours, to a maximum of 250 mg po bid × 10 days Adults: 250 mg po bid × 10 days	Contraindicated in pregnancy. Sensitivity testing is recommended in areas where macrolide resistance is unknown or known to be ≥ 10%.
Clindamycin	Second line. Children: 8 to 16 mg/kg daily divided into 3 or 4 equal doses × 10 days (not to exceed maximum adult dose of	Alternative for persons who are unable to tolerate beta-lactam antibiotics.

	600 mg daily) Adults: 150 mg every 6 hours × 10 days	
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Canadian Pediatric Society, Invasive group A streptococcal disease: Management and chemoprophylaxis. (2019) <https://cps.ca/en/documents/position/Invasive-group-A-streptococcal-disease>

Health Care providers are responsible to verify the appropriate therapy as per current guidelines.

Immunization

There is currently no vaccine available. Varicella infection is considered to be a common pre-disposing factor to IGAS. Therefore, administration of the varicella vaccine is recommended as a preventative measure. The Varicella vaccine is given at 12 and 18 months of age as part of the New Brunswick Routine Immunization Schedule.

Exclusion/Social Distancing

Individuals with confirmed streptococcal pharyngitis, especially school aged children, should remain at home until at least 24 hours after beginning and complying with appropriate antibiotic treatment. See school exclusion guidelines. [SchoolExclusionGuidelines.pdf \(gnb.ca\)](#)

Outbreak Management

An outbreak is defined as increased transmission of GAS causing invasive disease in a population. Outbreaks of invasive GAS disease do not occur in the community frequently and typically involve two cases (i.e., case-pairs) who have had close contact.

Activate the local outbreak plan when an outbreak is declared.

For more information on IGAS refer to:

Public Health Agency of Canada Supplement - Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease