

Ontario Public Health Standards:  
Requirements for Programs, Services and Accountability

Infectious Disease Protocol

# **Appendix 1:**

## **Case Definitions and Disease-Specific Information**

### **Disease: Group A Streptococcal Disease, invasive (iGAS)**

Effective: January 2024

# Group A Streptococcal Disease, invasive (iGAS)

Communicable

Virulent

[Health Protection and Promotion Act \(HPPA\)](#)<sup>1</sup>

[Ontario Regulation \(O. Reg.\) 135/18 \(Designation of Diseases\)](#)<sup>2</sup>

## Provincial Reporting Requirements

Confirmed case

Probable case

As per Requirement #3 of the "Reporting of Infectious Diseases" section of the [Infectious Diseases Protocol, 2018](#) (or as current), the minimum data elements to be reported for each case are specified in the following:<sup>3</sup>

- [O. Reg. 569](#) (Reports) under the HPPA;<sup>4</sup>
- The iPHIS User Guides published by Public Health Ontario (PHO); and
- Bulletins and directives issued by PHO.

## Type of Surveillance

Case-by-case

## Case Definition

### Confirmed Case

- Isolation of Group A *Streptococcus* (*Streptococcus pyogenes*) or deoxyribonucleic acid (DNA) detection by nucleic acid amplification test (NAAT) from a normally sterile site (e.g., blood, cerebrospinal fluid, joint, pleural, pericardial fluid) with or without evidence of clinical severity,

**OR**

- Isolation of Group A *Streptococcus* from a non-sterile site (e.g., skin) with evidence of severity.

## **Outbreak Case Definition**

The outbreak case definition varies with the outbreak under investigation. Please refer to the [Infectious Diseases Protocol, 2018](#) (or as current) for guidance in developing an outbreak case definition as needed.<sup>3</sup>

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be developed for each individual outbreak based on its characteristics, reviewed during the course of the outbreak, and modified, if necessary, to ensure that the majority of cases are captured by the definition. The case definitions should be created in consideration of the outbreak definitions.

Outbreak cases may be classified by levels of probability (i.e., confirmed and/or probable).

In addition, an outbreak is defined as increased transmission of GAS causing invasive disease in a population (see Table 1 below for definitions). For further details on outbreak definitions refer to Table 4, p.4, Public Health Agency of Canada (PHAC) Guidelines for the Prevention and Control of Invasive Group A Streptococcal (iGAS) Disease (2006, or as current). Outbreaks of iGAS disease do not frequently occur in the community and typically involve two cases (i.e., case-pairs) who have had close contact.<sup>5</sup>

**Table 1: Consideration for action for Outbreaks or Clusters**

Long-Term Care Home	<ul style="list-style-type: none"><li>• An incidence rate of culture-confirmed iGAS infections of &gt; 1 per 100 residents per month, or</li><li>• At least two cases of culture-confirmed iGAS infection in 1 month in facilities with fewer than 200 residents, or</li><li>• An incidence rate of suggested invasive or non-invasive GAS infections of &gt; 4 per 100 residents per month</li></ul>
Child Care Centre	One severe case of iGAS disease in a child attending a child care centre.
Hospital	One or more linked invasive or non-invasive GAS cases in either patients or staff occurring within 1 month of an iGAS case.

## Clinical Information

### Clinical Evidence

Evidence of severe invasive disease may be manifested as several conditions. The following are considered evidence of severe invasive disease:

- Streptococcal toxic-shock syndrome (STSS) which is characterized by hypotension (systolic blood pressure  $\leq$  90 mmHg in adults or < 5th percentile for age for children) and at least two (2) of the following signs:
  - renal impairment (creatinine  $\geq$  177  $\mu$ mol/L for adults);
  - coagulopathy (platelet count  $\leq$  100,000  $\text{mm}^3$  or disseminated intravascular coagulation);
  - liver function abnormality (AST [SGOT], ALT [SGPT], or total bilirubin  $\geq$  2x upper limit of normal for age);
  - adult respiratory distress syndrome (ARDS);
  - generalized erythematous macular rash that may desquamate.

**OR**

- Soft-tissue necrosis,\* including necrotizing fasciitis or myositis or gangrene;

**OR**

- Meningitis;

**OR**

- Death;

**OR**

- A combination of any of these conditions.

## **Clinical Presentation**

*S. pyogenes* may colonize the throat of individuals (carriers) without symptoms and may be passed from person to person.<sup>5,6</sup>

iGAS infection occurs when the bacteria enter sterile parts of the body such as blood, deep tissue or the lining of the brain.<sup>7</sup> The most common clinical presentations of invasive group A *Streptococcus* are skin or soft tissue infections, bacteremia with no septic focus, pneumonia, streptococcal toxic shock syndrome (STSS) and necrotizing fasciitis (NF).<sup>5,8</sup>

The manifestations preceding the onset of iGAS disease are variable. Symptoms may be vague and include pain of unusual severity, swelling, fever, chills, influenza-like symptoms, generalized muscle aches, generalized macular rash, bullae, nausea, vomiting, diarrhea, malaise or joint pain.<sup>8</sup>

Symptoms of STSS include GAS and or NF, plus hypotension, adult respiratory distress syndrome, renal impairment, rapid onset of shock and multi-organ failure. STSS has a case fatality rate of up to 81%.<sup>5</sup>

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\* Soft-tissue necrosis should not include chronic soft-tissue necrosis/gangrene, or acute or chronic cellulitis. Soft-tissue necrosis should be acute in nature and deeper than the skin (e.g., necrotizing fasciitis, myositis and gangrene), as determined by the clinician.

For both NF and STSS, rapid diagnosis, aggressive management, and early use of appropriate antibiotics are critical.<sup>8</sup>

## Laboratory Evidence

### Laboratory Confirmation

Any of the following will constitute a confirmed case of invasive Group A Streptococcal (iGAS) Disease:

- Positive Group A *Streptococcus* (*S. pyogenes*) culture from a normally sterile site (e.g., blood, cerebrospinal fluid, joint, pleural, pericardial fluid);
- Positive Group A *Streptococcus* (*S. pyogenes*) culture from a non-sterile site (e.g., skin) with evidence of severity (refer to Clinical Evidence section below).

### Approved/Validated Tests

- Standard culture with serogrouping for Group A *Streptococcus*.
- Positive NAAT for *Streptococcus pyogenes* from a normally sterile site.

### Indications and Limitations

- Isolates from iGAS cases should be forwarded to Public Health Ontario's laboratory for further characterization.
- Once confirmed that the isolate is GAS (24-48hrs from the day specimens are received) all specimens are then forwarded to the National Microbiology Laboratory (NML) for *emm* typing. Outbreak specimens are given priority and sent to NML as soon as cultures are confirmed as GAS.
- Typing to determine genetic relatedness of isolates (identification of clusters) for outbreak investigations is available upon request. PHO's laboratory is currently transitioning away from Pulsed-Field Gel Electrophoresis (PFGE) to other testing methods such as whole genome sequence analysis. After consultation with Public Health Ontario's laboratory, isolates of interest will be forward to NML for outbreak investigation typing (cluster analysis beyond *emm* typing). Turn-around-time for outbreak investigation results from NML

varies but is expected to be approximately 2 weeks from time of receipt at their laboratory. **Note:** NML receives all iGAS specimens throughout Canada, as such, special request must be discussed with, and made by Public Health Ontario's laboratory.

For further information about human diagnostic testing, refer to [Streptococcus pyogenes \(Group A Streptococcal Disease or GAS\) – Typing | Public Health Ontario](#).<sup>9</sup>

## Case Management

In addition to the requirements set out in the Requirement #2 of the “Management of Infectious Diseases – Sporadic Cases” and “Investigation and Management of Infectious Diseases Outbreaks” sections of the [Infectious Diseases Protocol, 2018](#)<sup>3</sup> (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Provincial Reporting Requirements above for relevant data to be collected during case investigation. In addition, the following can also be investigated:

- History of varicella infection;
- Occupation;
- Residency/attendance at a facility or institution for institutional outbreaks;
- Risk factors/susceptibility for acquiring disease, such as homelessness, illicit drug use, and presence of wounds;
- Occurrence of death, including role of iGAS in cause of death if the case dies within seven days of diagnosis.

For the purpose of public health management (i.e., to inform chemoprophylaxis for close contacts), a determination of whether or not iGAS disease was a cause of death should be made only if an iGAS case dies within seven days of diagnosis.

- Boards of health should consider contacting PHO whenever the possibility of an outbreak exists (See Outbreak Case Definition and Outbreak Management sections).
- Routine IPAC practices, as well as contact and droplet precautions should be

in effect until at least 24 hours after beginning and complying with appropriate antimicrobial therapy. More information on treatment and follow up investigations for specific settings is available in the resources and references listed below.

## Contact Management

Globally, expert opinion regarding chemoprophylaxis of contacts of persons with iGAS disease varies. In Ontario, chemoprophylaxis is recommended as per the PHAC Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease (2006, or as current) for close contacts of a case of iGAS disease with evidence of severity such as in STSS, soft tissue necrosis, meningitis, pneumonia or death.<sup>5</sup> For the purpose of public health management of iGAS disease, GAS pneumonia should not be used as a sole indicator of severity.<sup>10</sup>

The definition of close contacts,<sup>†</sup> described in the PHAC guidelines, should be used to identify groups eligible for chemoprophylaxis.<sup>5</sup> If numerous groups of people are identified as eligible for chemoprophylaxis, public health practitioners may give first priority for administration to high-risk groups, such as those outlined in the Centers for Disease Control and Prevention (CDC) guidelines.<sup>10</sup>

Boards of health's advice to close contacts on monitoring for signs and symptoms of iGAS should be consistent with the PHAC guidelines' recommendation to "seek

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<sup>†</sup> 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;
- 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; and
- Injection drug users who have shared needles with the case.



medical attention immediately should they develop febrile illness or any other clinical manifestation of GAS infection within 30 days of diagnosis in the index case".<sup>5,10</sup>

The purpose of prophylaxis is to eradicate nasopharyngeal colonization of GAS and prevent disease.<sup>5</sup> For detail information see the Recommendations for Chemoprophylaxis section of Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease (2006, or as current).

All close contacts of iGAS disease should be informed about the signs and symptoms of GAS infection and be advised to seek medical attention if signs and symptoms develop within 30 days after exposure to a case.<sup>5</sup>

For the management of selected Long-Term Care Home (LTCH) contacts, selected child care contacts, or selected hospital contacts refer to the appropriate section of Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease (2006, or as current) as well as the other resources and references.<sup>5</sup>

## Outbreak Management

Please see the [Infectious Diseases Protocol, 2018](#) (or as current) for the public health management of outbreaks or clusters in order to identify the source of illness, manage the outbreak and limit secondary spread.<sup>3</sup>

The following actions may be undertaken:

- Provide public health management of outbreaks or clusters to identify the source of illness, stop the outbreak and limit secondary spread.
- Follow the PHAC guidelines for screening in a long-term care facility (LTCF) for GAS, to avoid unnecessary screening/rescreening.<sup>5,10</sup>
- Contact the Public Health Ontario's laboratory prior to collection of any specimen(s) to ensure appropriate testing and coordination during both primary screening by non-PHO laboratories and molecular typing through Public Health Ontario's laboratory.
  - Further information about laboratory investigations of GAS outbreaks

can be found at [Streptococcus pyogenes \(Group A Streptococcal Disease or GAS\) – Typing | Public Health Ontario](#).<sup>9</sup>

Refer to [Guidelines For The Prevention And Control Of Invasive Group A Streptococcal Disease \(2006, or as current\)](#).<sup>5</sup>

## Prevention and Control Measures

### Personal Prevention Measures

- Educate the public and health care workers about reducing the spread of all types of infection by practicing proper hand hygiene especially after providing direct care and/or coming in contact with body fluids, before preparing foods and eating. For additional information on hand hygiene refer to: Best Practices for Hand Hygiene in All Health Care Settings (2014, or as current).<sup>11</sup>
- Educate the public and health care worker about proper respiratory etiquette:<sup>7</sup>
  - Not visiting in a health care facility when ill with an acute respiratory infection
  - Avoidance measures that minimize contact with droplets when coughing or sneezing, such as:
    - turning the head away from others
    - maintaining a two-metre separation from others
    - covering the nose and mouth with tissue
  - Immediate disposal of tissues into waste after use
  - Immediate hand hygiene after disposal of tissues
- Varicella vaccination, because the risk of acquiring iGAS infection is higher in persons with antecedent varicella infection.

## Infection Prevention and Control Strategies

- Prompt identification and aggressive treatment of GAS infections to prevent increased incidence of iGAS disease.<sup>6</sup>
- Individuals with confirmed streptococcal pharyngitis, especially school aged children, should remain at home until at least 24 hours after beginning and complying with appropriate antimicrobial therapy.
- For hospitalized cases, it is recommended that contact and droplet precautions should be in effect until at least 24 hours after beginning and complying with appropriate antimicrobial therapy.<sup>6</sup>

Refer to [Group A Streptococcal Disease, Invasive \(iGAS\) | Public Health Ontario](#) to search for the most up-to-date information on Infection Prevention and Control (IPAC).<sup>9</sup>

## Disease Characteristics

**Aetiologic Agent** - Invasive Group A Streptococcal (iGAS) disease is caused by the gram-positive, beta-hemolytic bacterium, *Streptococcus pyogenes* (*S. pyogenes*).

More than 200 distinct M-protein serotypes of *S. pyogenes* have been identified.<sup>8, 6</sup>

Typing based on the M-protein gene deoxyribonucleic (DNA) sequence (*emm* typing) can be performed and is more discriminating than M-protein serotyping.<sup>6</sup>

**Modes of Transmission** - Transmission is generally person-to-person, most commonly by:<sup>8, 5</sup>

- 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; and
- Sharing of contaminated needles.

**Incubation Period** – Usually 1-3 days, for pharyngitis; estimated 7-10 days for impetigo.<sup>1</sup> Incubation period for STSS is not known but has been as short as 14 hours in cases associated with subcutaneous inoculation of organisms (e.g., childbirth, penetrating trauma).<sup>6</sup>

**Period of Communicability** - In untreated, uncomplicated impetigo cases, 10-21 days; in untreated conditions with purulent discharges, weeks or months. With adequate treatment, transmissibility generally ends within 24 hours. Persons with untreated streptococcal pharyngitis may carry the organism for weeks or months, but infectivity decreases in 2-3 weeks after onset of infection.<sup>8</sup>

**Reservoir** - Humans.<sup>8</sup>

**Host Susceptibility and Resistance** - Susceptibility is general; many persons who acquire iGAS infection have no underlying disease. The risk of iGAS disease is associated with several underlying conditions including, HIV infection, cancer, heart disease, diabetes, lung disease and alcohol abuse.<sup>5</sup> Other individuals also at increased risk are those with skin breakdown (e.g., burns, wounds, chickenpox), people who use injection drugs and postpartum and postsurgical patients, and children less than one year and adults over 60 years old.<sup>8, 5, 7</sup>

Immunity only develops against the specific M type of GAS and may last for years.<sup>8</sup>

Please refer to [PHO's Reportable Disease Trends in Ontario reporting tool](#) for the most up-to-date information on infectious disease trends in Ontario.<sup>12</sup>

For additional national and international epidemiological information, please refer to the Public Health Agency of Canada and the World Health Organization.

## References

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## Case Definition Sources

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## Document History

<b>Revision Date</b>	<b>Document Section</b>	<b>Description of Revisions</b>
April 2022	Entire Document	New template. Appendix A and B merged. No material content changes.
April 2022	Epidemiology: Occurrence section	Removed.
April 2022	ICD Codes	Removed.
July 2022	Clinical Information	Updated to include an 'OR' missing between STSS and soft tissue necrosis.
January 2024	Laboratory Evidence	Updated "Indications and Limitations" subsection.