

Appendix A: Disease-Specific Chapters

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

Effective: February 2019

Group A Streptococcal disease, invasive (iGAS)

Communicable

Virulent

**Health Protection and Promotion Act:
O. Reg. 135/18 (Designation of Diseases)**

1.0 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.^{1,2} Typing based on the M-protein gene deoxyribonucleic (DNA) sequence (*emm* typing) can be performed and is more discriminating than M-protein serotyping.²

2.0 Case Definition

2.1 Surveillance Case Definition

Refer to [Appendix B](#) for Case Definitions.

2.2 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.

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 (GAS) Disease (2006, or as current). Outbreaks of invasive GAS disease do not frequently occur in the community and typically involve two cases (i.e. case-pairs) who have had close contact.³

Table 1: Consideration for action for Outbreaks or Clusters

Long-Term Care Home	<ul style="list-style-type: none">• An incidence rate of culture-confirmed iGAS infections of > 1 per 100 residents per month, or• At least two cases of culture-confirmed iGAS infection in 1 month in facilities with fewer than 200 residents, or• An incidence rate of suggested invasive or non-invasive GAS infections of > 4 per 100 residents per month
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 invasive GAS case

3.0 Identification

3.1 Clinical Presentation

iGAS infection occurs when the bacteria enter sterile parts of the body such as blood, deep tissue or the lining of the brain.⁴ The most common clinical presentations for invasive group A streptococci are skin or soft tissue infections, bacteremia with no septic focus, pneumonia, streptococcal toxic shock syndrome (STSS) and necrotizing fasciitis (NF).^{1,3}

S. pyogenes may colonize the throat of individuals (carriers) without symptoms and may be passed from person to person.^{2,3}

The manifestations preceding the onset of invasive GAS 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.¹

Symptoms of STSS include the primary site of 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%.³

For both NF and STSS, rapid diagnosis, aggressive management, and early use of appropriate antibiotics are critical.¹

3.2 Diagnosis

See [Appendix B](#) for diagnostic criteria relevant to the Case Definitions.

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the Public Health Ontario Laboratory Services webpage: <http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

4.0 Epidemiology

4.1 Occurrence

In Ontario, 715 confirmed cases of iGAS were reported each year on average between 2013 and 2017; however, the number of reported cases has increased approximately 5% per year during this period, with an almost 30% increase from 2016 to 2017.* Invasive GAS is most commonly seen in Ontario among adults greater than 65 years of age, followed by children less than 1 year of age. Invasive GAS follows a seasonal pattern, with cases occurring more frequently in the late winter and throughout the spring.

Please refer to Public Health Ontario's (PHO) Reportable Disease Trends in Ontario reporting tool and other reports for the most up-to-date information on infectious disease trends in Ontario.

<http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx>

For additional national and international epidemiological information, please refer to the PHAC and the World Health Organization.

4.2 Reservoir

Humans.¹

4.3 Modes of Transmission

Transmission is generally person-to-person, most commonly by:^{1,3}

- 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.

4.4 Incubation Period

Usually 1-3 days, for pharyngitis; estimated 7-10 days for impetigo.¹ 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).²

4.5 Period of Communicability

In untreated, uncomplicated impetigo cases, 10-21 days; in untreated conditions with purulent discharges, weeks or months. With adequate treatment, transmissibility

* Data included in the epidemiological summary are from January 1, 2013 to December 31, 2017. Data were extracted from Query on February 7, 2018 and therefore are considered preliminary.

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.¹

4.6 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.³ 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.^{1,3,4}

Immunity only develops against the specific M type of GAS and may last for years.¹

5.0 Reporting Requirements

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:

- *Ontario Regulation 569* (Reports) under the *Health Protection and Promotion Act* (HPPA);⁵
- The iPHIS User Guides published by PHO; and
- Bulletins and directives issued by PHO.

6.0 Prevention and Control Measures

6.1 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).⁶
- Educate the public and health care worker about proper respiratory etiquette:⁷
 - 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 invasive GAS infection is higher in persons with antecedent varicella infection.

6.2 Infection Prevention and Control Strategies

- Prompt identification and aggressive treatment of GAS infections to prevent increased incidence of invasive GAS disease.²
- 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.²

Refer to PHO's website at www.publichealthontario.ca to search for the most up-to-date information on Infection Prevention and Control (IPAC).

6.3 Management of Cases

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* (or as current), the board of health shall investigate cases to determine the source of infection. Refer to Section 5: 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 Section 2.2/6.6).
- 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.

6.4 Management of Contacts

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 invasive GAS disease with evidence of severity such as in Streptococcal Toxic Shock Syndrome, soft tissue necrosis,

meningitis, pneumonia or death.³ For the purpose of public health management of iGAS disease, GAS pneumonia should not be used as a sole indicator of severity.⁸

The definition of close contacts,[†] described in the PHAC guidelines, should be used to identify groups eligible for chemoprophylaxis.³ 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.⁸

Boards of health' advice to close contacts on monitoring for signs and symptoms of iGAS should be consistent with the PHAC guidelines' recommendation to "seek 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".^{3,8}

The purpose of prophylaxis is to eradicate nasopharyngeal colonization of GAS and prevent disease.³ 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 invasive GAS 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.³

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.³

6.5 Management of Outbreaks

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.

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.^{3,8}
- Contact the Public Health Ontario Laboratories prior to collection of any specimen(s) to ensure appropriate testing and coordination during both primary

[†] 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.

screening by non-PHO laboratories and molecular typing through Public Health Ontario Laboratories.

- Further information about laboratory investigations of GAS outbreaks can be found at Public Health Ontario Laboratory Services webpage:
<http://www.publichealthontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx>

Refer to Guidelines For The Prevention And Control Of Invasive Group A Streptococcal Disease (2006, or as current).³

7.0 References

1. Heymann DL, editor. Control of Communicable Diseases Manual. 20 ed. Washington, D.C: American Public Health Association; 2015.
2. Committee on Infectious Diseases, American Academy of Pediatrics. Section 3: Summaries of Infectious Diseases: Group A Streptococcal Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2018 Report of the Committee on Infectious Diseases. 31 ed. Itasca, IL: American Academy of Pediatrics; 2018.
3. Public Health Agency of Canada. Guidelines for the Prevention and Control of Invasive Group A Streptococcal Disease. Canada Communicable Disease Report. 2006;32S2.
4. Ontario Agency for Health Protection and Promotion (Public Health Ontario). Invasive Group A streptococcal disease in Ontario: 2016-17 seasonal summary. Toronto, ON: Queen's Printer for Ontario; 2018.
5. Health Protection and Promotion Act, R.S.O. 1990, Reg. 569, Reports, (2018). Available from: <https://www.ontario.ca/laws/regulation/900569>
6. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Best Practices for Hand Hygiene in All Health Care Settings. 4th ed. Toronto, ON: Queen's Printer for Ontario; 2014. Available from: https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx
7. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings. Toronto, ON: Queen's Printer for Ontario; 2012. Available from: https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/Routine_Practices_Additional_Precautions.aspx

8. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee. Recommendations on Public Health Management of Invasive Group A Streptococcal (iGAS) Disease. Toronto, ON: Queen’s Printer for Ontario; 2014. Available from: https://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx

8.0 Document History

Table 2: History of Revisions

Revision Date	Document Section	Description of Revisions
December 2014	General	<p>Deletion of Section 2.2 “Outbreak Case Definition”.</p> <p>Creation of new section: 6.5 “Outbreak Case Definition”.</p> <p>When at the beginning of a sentence, “iGAS” changed to “Invasive GAS”.</p>
December 2014	4.1 Occurrence	<p>Deletion of sentence “In Ontario, an average of approximately 467 cases of iGAS per year was reported between 2005 and 2009.”</p> <p>Replaced with new sentence: “In Ontario, 565 confirmed cases of iGAS were reported each year on average between 2008 and 2012; however, the number of reported cases has increased approximately 5% per year during this period.”</p> <p>End of first paragraph: Change from “...the winter...” to “...the late winter” and change from “...early spring months” to “...throughout the spring.”</p> <p>Second paragraph completely revised, still refers to Monthly Infectious Diseases Surveillance Reports.</p>
December 2014	4.6 Host Susceptibility and Resistance	<p>Sentences re-ordered.</p> <p>Change from “...underlying conditions...” to “...underlying chronic conditions...” and “alcohol abuse” removed from list of chronic conditions.</p> <p>Change from “Older individuals, persons with chronic diseases...” to “Varicella, alcohol</p>

Revision Date	Document Section	Description of Revisions
		<p>abuse, age (very young < 1 year; older individuals > 65 years)..."</p> <p>Deletion of: "Varicella is the most commonly identified risk factor in children, and close contacts of persons with invasive GAS are at higher risk of infection."</p>
December 2014	5.1 To local Board of Health	Change from "Confirmed and suspected cases shall be reported by phone..." to "Individuals who have or may have iGAS shall be reported as soon as possible..."
December 2014	5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry	Deletion of "For cases associated with an institution, the board of health must phone PHO, as specified by the ministry, within 24 hours."
December 2014	6.1 Personal Prevention Measures	Entire section revised.
December 2014	6.2 Infection Prevention and Control Strategies	<p>Third bullet: "...droplet precautions..." changed to "...contact and droplet precautions..."</p> <p>Third bullet: "...the start and continued compliance..." changed to "beginning and complying..."</p> <p>"Antibiotic" changed to "antimicrobial".</p> <p>Addition of paragraph referring to PHO's website for PIDAC Best Practices.</p>
December 2014	6.3 Management of Cases	Entire section revised.
December 2014	6.4 Management of Contacts	Entire section revised.
December 2014	6.5 Outbreak Case Definition	New section, much content sourced from previous version (sections 2.2 "Outbreak Case Definition" and 6.5 Management of Outbreaks").

Revision Date	Document Section	Description of Revisions
December 2014	6.6 Management of Outbreaks	Entire section revised, some previous content moved to section 6.5 "Outbreak Case Definition".
December 2014	7.0 References	Updated.
December 2014	8.0 Additional Resources	Updated.
February 2019	General	Minor revisions were made to support the regulation change to Diseases of Public Health Significance. Common text included in all Disease Specific chapters: Surveillance Case Definition, Outbreak Case Definition, Diagnosis, Reporting Requirements, Management of Cases, and Management of Outbreaks. The epidemiology section and references were updated and Section 8.0 Additional Resources was deleted.
February 2019	3.1 Clinical Presentation	Minor revisions to the entire section.
February 2019	4.4 Incubation Period	Entire section revised.
February 2019	4.6 Host Susceptibility and Resistance	Entire section revised.

