Appendix A:
Disease-Specific Chapters

Chapter: Group A Streptococcal Disease, invasive (iGAS)

Revised December 2014
Group A Streptococcal disease, invasive

- Communicable
- Virulent

Health Protection and Promotion Act:
Ontario Regulation 558/91 – Specification of Communicable Diseases

Health Protection and Promotion Act:
Ontario Regulation 559/91 – Specification of Reportable 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 100 distinct M-protein serotypes of *S. pyogenes* have been identified.\(^1\)\(^,\)\(^2\) Typing based on the M-protein gene 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

See Appendix B

3.0 Identification

3.1 Clinical Presentation

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).\(^1\)\(^,\)\(^3\)

*Streptococcus pyogenes* may colonize the throat of individuals (carriers) without symptoms and may be passed from person to person.\(^3\)

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.\(^3\)

Symptoms of NF and myositis include fever, and a red painful swelling of tissue, which spreads rapidly. Death may occur in 12-24 hours. NF and myositis are less severe than STSS, however they have a case fatality rate of about 20%.\(^3\)

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%. Survivors may be left with severe long-term disability.³

3.2 Diagnosis
See Appendix B

4.0 Epidemiology

4.1 Occurrence
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. 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 the Public Health Ontario Monthly Infectious Diseases Surveillance Reports and other infectious diseases reports for more current information on disease trends in Ontario.⁴, ⁵ http://www.publichealthontario.ca/en/DataAndAnalytics/Pages/DataReports.aspx

4.2 Reservoir
Humans, typically in their throat and skin.¹

4.3 Modes of Transmission
Transmission is generally person-to-person, most commonly by:
• 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.¹, ³

4.4 Incubation Period
Usually 1-3 days.¹

4.5 Period of Communicability
In untreated uncomplicated 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.⁷
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 chronic conditions including, HIV infection, cancer, heart disease, diabetes and lung disease. Additionally, Varicella, alcohol abuse, age (very young < 1 year; older individuals > 65 years), persons in institutions and pregnant women also appear to be at higher risk of invasive GAS disease.¹,³

5.0 Reporting Requirements

5.1 To local Board of Health
Individuals who have or may have iGAS shall be reported as soon as possible to the medical officer of health by persons required to do so under the Health Protection and Promotion Act, R.S.O. 1990 (HPPA).⁶

5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry
Report only case classifications specified in the case definition.
Cases shall be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the ministry within one business day of receipt of initial notification as per iPHIS Bulletin Number 17: Timely Entry of Cases.⁷

The minimum data elements to be reported for each case is specified in the following:
• Ontario Regulation 569 (Reports) under the Health Protection and Promotion Act (HPPA),⁸ ⁶
• 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,⁹ available on the PHO website at:
• Educate the public and health care worker about proper respiratory etiquette:¹⁰
  o 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.

Refer to Public Health Ontario’s website at [www.publichealthontario.ca](http://www.publichealthontario.ca) to search for the most up-to-date Provincial Infectious Diseases Advisory Committee (PIDAC) best practices on Infection Prevention and Control (IPAC). PIDAC best practice documents can be found at: [http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx](http://www.publichealthontario.ca/en/BrowseByTopic/InfectiousDiseases/PIDAC/Pages/PIDAC_Documents.aspx)

### 6.3 Management of Cases

Investigation of reported cases should begin as soon as possible after receiving the report. Refer to *Ontario Regulation 569 (Reports)* under the HPPA for relevant data to collect and make sure to include at a minimum:⁸,⁶

- Symptoms and date of symptom onset;
- 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;
- Identification of close contacts of cases, assessment of type of contact and probability of transmission; and
- 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.

- Health units should consider contacting PHO whenever the possibility of an outbreak exists (see 6.5/6.6). Contact information can be found at [http://www.publichealthontario.ca/en/About/Pages/Contact-Us.aspx](http://www.publichealthontario.ca/en/About/Pages/Contact-Us.aspx)
- Routine infection prevention and control 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 *Public Health Agency Canada (PHAC) Guidelines (2006)* 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.¹¹

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.¹¹

Public health units’ 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”.³,¹¹

The purpose of prophylaxis is to eradicate nasopharyngeal colonization of GAS and prevent disease.³ For detail information on the *Recommended Chemoprophylaxis Regimens for Close Contacts* see: [http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/32s2/7-rec-eng.php](http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/32s2/7-rec-eng.php)

*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.
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 PHAC document listed below as well as the other resources and references.


6.5 Outbreak Case Definition

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, PHAC Guidelines for the Prevention and Control of Invasive Group A Streptococcal (GAS) Disease, available from http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/06vol32/32s2/index.html. 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 Clusters³

| Long-Term Care Home | • 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 of staff occurring within 1 month of an invasive GAS case |

The outbreak case definitions are established to reflect the disease and circumstances of the outbreak under investigation. The outbreak case definitions should be created in consideration of the provincial surveillance case definition. For example, confirmed outbreak cases must at a minimum meet the criteria specified for the provincial surveillance confirmed case classification. Consideration should also be given to the following when establishing outbreak case definitions:

- Clinical and/or epidemiological criteria;
- The time frame for occurrence (i.e., increase in endemic rate of iGAS);
- The type of institution or place(s) where cases live or became ill/exposed;
• Special attributes of cases (e.g., age, underlying conditions and social/behavioural practices); and

• Further strain characterization and typing as appropriate, which may be used to support linkage.

For outbreak management purposes cases may be classified by levels of probability (i.e., confirmed, probable and/or suspect).

6.6 Management of Outbreaks

Public health units and health care providers should:

• 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.

• Contact the Public Health Ontario Laboratories 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 Laboratories.

○ Further information about laboratory investigations of GAS outbreaks can be found at Public Health Ontario Laboratory Services webpage: http://www.publichealthonline.ca/en/ServicesAndTools/LaboratoryServices/Pages/defaul.aspx

As per this protocol, outbreak management shall comprise of, but not be limited to, the following general steps:

• Confirm diagnosis and verify the outbreak;

• Establish an outbreak team;

• Develop an outbreak case definition - These definitions should be reviewed during the course of the outbreak, and modified if necessary, to ensure that the majority of cases are captured by the definitions;

• Contact the Public Health Ontario Laboratory prior to collection of any screening specimen(s);

• Implement prevention and control measures;

• Implement and tailor communication and notification plans depending on the scope of the outbreak;

• Conduct epidemiological analysis on data collected;

• Coordinate and collect appropriate clinical specimens where applicable;

• Prepare a written report; and

• Declare the outbreak over in collaboration with the outbreak team.

7.0 References


8.0 Additional Resources


9.0 Document History

Table 2: History of Revisions

<table>
<thead>
<tr>
<th>Revision Date</th>
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<tr>
<td>December 2014</td>
<td>General</td>
<td>Deletion of Section 2.2 “Outbreak Case Definition”. Creation of new section: 6.5 “Outbreak Case Definition”. When at the beginning of a sentence, “iGAS” changed to “Invasive GAS”.</td>
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</table>
| December 2014       | 4.1 Occurrence   | Deletion of sentence “In Ontario, an average of approximately 467 cases of iGAS per year was reported between 2005 and 2009.” 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.” End of first paragraph: Change from “…the
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<tr>
<td>December 2014</td>
<td>4.6 Host Susceptibility and Resistance</td>
<td>“winter…” to “…the late winter” and change from “…early spring months” to “…throughout the spring.” Second paragraph completely revised, still refers to Monthly Infectious Diseases Surveillance Reports.</td>
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<tr>
<td>December 2014</td>
<td>5.1 To local Board of Health</td>
<td>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…”</td>
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<td>5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry</td>
<td>Deletion of “For cases associated with an institution, the board of health must phone PHO, as specified by the ministry, within 24 hours.”</td>
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<td>December 2014</td>
<td>6.1 Personal Prevention Measures</td>
<td>Entire section revised.</td>
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<tr>
<td>December 2014</td>
<td>6.2 Infection Prevention and Control Strategies</td>
<td>Third bullet: “…droplet precautions…” changed to “…contact and droplet precautions…” Third bullet: “…the start and continued compliance…” changed to “beginning and complying…” “Antibiotic” changed to “antimicrobial”. Addition of paragraph referring to PHO’s</td>
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<td>December 2014</td>
<td>6.3 Management of Cases</td>
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<td>New section, much content sourced from previous version (sections 2.2 “Outbreak Case Definition” and 6.5 Management of Outbreaks”).</td>
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<td>Entire section revised, some previous content moved to section 6.5 “Outbreak Case Definition”.</td>
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