Appendix A: Disease-Specific Chapters

Chapter: *Haemophilus influenzae* type b disease, invasive

Revised January 2014
**Haemophilus influenzae** type b 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

*Haemophilus influenzae* serotype b (Hib) is a gram-negative encapsulated coccobacilli bacterium that causes invasive disease and illness. *H. influenzae* strains are either encapsulated (typeable) or non-encapsulated (nontypeable). Encapsulated strains (classified a-f) are more likely to cause invasive disease than non-encapsulated strains, which cause mild infection.\(^1\) Only type b strains are reportable.

2.0 Case Definition

2.1 Surveillance Case Definition
See Appendix B.

2.2 Outbreak Case Definition
Not Applicable.

3.0 Identification

3.1 Clinical Presentation

Meningitis is the most common clinical manifestation of invasive Hib disease, followed by epiglottitis and bacteremia.\(^1\) Onset of symptoms can be subacute, but is usually sudden, including fever, vomiting, lethargy and meningeal irritation with bulging fontanelle in infants or stiff neck and back in older children.\(^1\) Epiglottitis is a medical emergency as swelling of the epiglottis can lead to airway obstruction which can be life-threatening.\(^2,3\) Other manifestations of invasive disease include pneumonia, septic arthritis, cellulitis, otitis media, and purulent pericarditis.\(^2\)

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.publichealtontario.ca/en/ServicesAndTools/LaboratoryServices/Pages/default.aspx
4.0 Epidemiology

4.1 Occurrence
Between 2007 and 2011, an average of four cases of Hib occurred per year in Ontario.

For more information on infectious diseases activity in Ontario, refer to the current versions of the Ontario Annual Infectious Diseases Epidemiology Reports and the Monthly Infectious Diseases Surveillance Report.\textsuperscript{4,5}

Hib was the most common cause of bacterial meningitis and a leading cause of other serious invasive infections in young children before the introduction of Hib vaccines in 1998.\textsuperscript{6}

Incidence of Hib remains highest in infants <1 year of age followed by children 1-4 years of age.\textsuperscript{6} The majority of pediatric cases occur in unimmunized children, children too young to have received their primary series, or those with an underlying chronic condition or immunodeficiency.\textsuperscript{6}

While non-type b \textit{H. influenzae} are capable of causing invasive disease, in Ontario only invasive disease caused by serotype b is reportable.

4.2 Reservoir
Humans (asymptomatic carriers).\textsuperscript{3}

4.3 Modes of Transmission
Transmission is person-to-person most commonly through the nasopharynx by inhalation of respiratory droplets or by direct contact with nasal or throat secretions from an infected person during the infectious period.\textsuperscript{1,2}

4.4 Incubation Period
Unknown; probably short, two to four days.\textsuperscript{1}

4.5 Period of Communicability
As long as Hib bacteria are present, which may be for a prolonged period of time even without nasal discharge. Communicability ends within 24 to 48 hours after starting effective antibiotic therapy.\textsuperscript{1}

4.6 Host Susceptibility and Resistance
Susceptibility is assumed to be universal. Immunity is associated with the presence of circulating bactericidal and/or anticapsular antibody, acquired transplacentally, from prior infection, or through immunization.\textsuperscript{1} Invasive Hib disease is rare after five years of age. This age-dependent susceptibility is likely attributed to acquisition of Hib immunity through asymptomatic infection by Hib bacteria, the likelihood of which increases with age.\textsuperscript{3}
5.0 Reporting Requirements

5.1 To local Board of Health
Individuals who have or may have invasive disease caused by Hib shall be reported to the Medical Officer of Health (MOH) by persons required to do so under the Health Protection and Promotion Act, R.S.O. 1990 (HPPA). 7

5.2 To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry
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 #17: Timely Entry of Cases. 8

The minimum data elements to be reported for each case are specified in the following:

- Ontario Regulation 569 (Reports) under the HPPA, 9
- 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
Routine childhood immunization is the most important preventive measure against invasive Hib disease, with clinical efficacy estimated at 95% to 100% with a completed series. 1, 6

Immunize as per the current Publicly Funded Immunization Schedule for Ontario. 10 Under the Day Nurseries Act, documented receipt of immunizations recommended by the local MOH is required for attendance at licensed daycare centres. 11

In addition to children under 5 years of age, persons five years of age and older who are immunocompromised or have certain chronic diseases are at increased risk of invasive Hib disease; Hib vaccination is recommended for these high risk individuals. 6

6.2 Infection Prevention and Control Strategies
Droplet precautions are recommended for 24 hours after initiation of antimicrobial therapy for hospitalized cases. 1

Refer to Public Health Ontario’s website at 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/PID AC_Documents.aspx.

6.3 Management of Cases
Cases should be investigated to determine the source of infection. Refer to Section 5: Reporting Requirements above for relevant data to be collected during case investigation.
The following disease specific information should also be obtained during case management:12

- Clinical: symptoms and date of symptom onset;
- Laboratory: specimen type, specimen source, serotype;
- Immunization status specifically pertaining to Hib-containing vaccines (agent and administration dates);
- Epidemiologic: history of exposure (i.e. contact history), attendance at daycare/child care facility (see below).

Invasive Hib disease often requires hospitalization and immediate initiation of antimicrobial therapy to eliminate Hib colonization.2 Cases who are less than two years of age or who are a member of a household with a susceptible contact should additionally receive rifampin chemoprophylaxis prior to hospital discharge if cefotaxime or ceftriaxone were not used for treatment.2

Provide the family with information about the illness and immunization. Inform them that a child who has recovered from invasive Hib disease should receive Hib conjugate vaccine because natural infection may not provide adequate protective antibodies.

6.4 Management of Contacts

A contact is defined as a person living with or who has spent four or more hours per day with the case, for at least five of the seven days preceding the day of hospital admission of the case.2

Chemoprophylaxis is recommended to eliminate nasopharyngeal carriage of Hib bacteria and prevent secondary transmission. To effectively prevent secondary spread, rifampin chemoprophylaxis is recommended for household and child care contacts in the following circumstances:2

All members in households:2

- With at least one contact under four years of age who is unimmunized or incompletely immunized
- With a child less than 12 months of age who has not received the primary series
- With an immunocompromised child, regardless of that child’s Hib immunization status

Child care centres:

- If one case of invasive Hib disease has occurred, chemoprophylaxis should be provided to incompletely or unimmunized children younger than four years of age
- If two or more cases of invasive Hib disease have occurred within 60 days and unimmunized or incompletely immunized children attend the facility, chemoprophylaxis for all attendees and childcare providers should be considered.

If chemoprophylaxis is indicated, rifampin dosages should be administered as soon as possible. If more than 14 days have passed since the last contact with the case, the benefit of rifampin prophylaxis is likely to be decreased.2
Careful observation of exposed unimmunized or incompletely immunized household, non-
household, and childcare contacts is vital. Exposed children who develop a febrile illness
should promptly see their health care provider for evaluation.²

In addition to chemoprophylaxis, all contacts who are young children and who have not been
completely immunized against Hib or are not immunized at the recommended age-
appropriate intervals should receive required immunizations. Vaccine series completion and
administration at the recommended intervals is essential to achieve optimal protection against
invasive Hib disease.

6.5 Management of Outbreaks
Not applicable.

7.0 References
1 Heymann D, editor. Control of communicable diseases manual. 19th ed. Washington,
3 Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-
Foundation; 2012 [cited 2013 Aug 27]. Available from:
4 Ontario. Ministry of Health and Long-Term Care. Ontario annual infectious diseases
epidemiology report, 2009. Toronto, ON: Queen’s Printer for Ontario; 2009 (or as
current). Available from:
port_2009.pdf
5 Ontario Agency for Health Protection and Promotion (Public Health Ontario). Monthly
Available from:
http://www.publichealthontario.ca/en/ServicesAndTools/SurveillanceServices/Pages/Mo
nthly-Infectious-Diseases-Surveillance-Report.aspx
6 National Advisory Committee on Immunization; Public Health Agency of Canada.
Canadian immunization guide. Evergreen ed. Part 4 active vaccines: Haemophilus
influenza type b vaccine. Ottawa, ON: Her Majesty the Queen in Right of Canada; 2012
[cited 2013 Aug 27]. Available from:
7 Health Protection and Promotion Act, R.S.O. 1990, c. H.7. Available from:
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm
8 Ontario. Ministry of Health and Long-Term Care. Timely entry of cases and outbreaks.
iPHIS bulletin. Toronto, ON: Queen’s Printer for Ontario; 2012:17 (or as current).
9 Reports, R.R.O. 1990, Reg. 569. Available from:


8.0 Additional Resources


### 9.0 Document History

#### Table 1: History of Revisions

<table>
<thead>
<tr>
<th>Revision Date</th>
<th>Document Section</th>
<th>Description of Revisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2014</td>
<td>General</td>
<td>New template.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Title of Section 4.6 changed from “Susceptibility and Resistance” to “Host Susceptibility and Resistance”</td>
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<tr>
<td></td>
<td></td>
<td>Title of Section 5.2 changed from “To Public Health Division (PHD)” to “To the Ministry of Health and Long-Term Care (the ministry) or Public Health Ontario (PHO), as specified by the ministry”</td>
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<tr>
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<td></td>
<td>Section 9.0 Document History added.</td>
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<tr>
<td>1.0 Aetiologic Agent</td>
<td></td>
<td>The second part of the first sentence, “…ther are numerous serotypes and non-typable strains”, was deleted and replaced with the following: “H. influenzae strains are either encapsulated (typeable) or non-encapsulated (nontypeable). Encapsulated strains (classified a-f) are more likely to cause invasive disease than non-encapsulated strains, which cause mild infection. Only type b strains are reportable.”</td>
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<td>3.1 Clinical Presentation</td>
<td></td>
<td>Entire section revised.</td>
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<tr>
<td>3.2 Diagnosis</td>
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<td>Addition of direction to contact Public Health Ontario Laboratories or PHO website for additional information on human diagnostic testing.</td>
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<td>4.1 Occurrence</td>
<td></td>
<td>Entire section revised.</td>
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<tr>
<td>4.2 Reservoir</td>
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<td>Change from “Humans” To “Humans (asymptomatic carriers)”.</td>
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<td>4.3 Modes of Transmission</td>
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<td>Entire section revised.</td>
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<td>4.5 Period of Communicability</td>
<td></td>
<td>Entire section revised.</td>
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<tr>
<td>4.6 Host Susceptibility and Resistance</td>
<td></td>
<td>Final sentence, “In Ontario, Hib is most common among the immunocompromised”</td>
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<tr>
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<td>infants who have not completed the primary series and unimmunized individuals” and replaced with “Invasive Hib disease is rare after five years of age. This age-dependent susceptibility is likely attributed to acquisition of Hib immunity through asymptomatic infection by Hib bacteria, the likelihood of which increases with age.”</td>
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<td>6.3 Management of Cases</td>
<td>Entire section revised.</td>
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<tr>
<td>6.4 Management of Contacts</td>
<td>Majority of section revised. Rifampin dosages for treatments of contacts removed.</td>
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