

# Appendix A: Disease-Specific Chapters

Chapter: *Haemophilus influenzae* b disease, invasive

## ***Haemophilus influenzae* 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**

<b>1) Aetiologic Agent:</b>	<i>Haemophilus influenzae</i> ( <i>H. influenzae</i> ) serotype b (Hib) is a Gram-negative encapsulated coccobacilli bacterium that causes invasive disease and illness; there are numerous serotypes and non-typable strains (1, 2).
<b>2) Case Definition:</b>	
Surveillance Case Definition	<a href="#">See Appendix B</a>
Outbreak Case Definition	<p>The outbreak case definition varies with the outbreak under investigation. Consideration should be given to the following in establishing an outbreak case definition:</p> <ol style="list-style-type: none"><li>1. Clinical, laboratory and/or epidemiological criteria</li><li>2. A time frame for occurrence</li><li>3. A geographic location(s) or place(s) where cases live or became ill/exposed</li><li>4. Special attributes of cases (e.g. age, underlying conditions)</li></ol> <p>Cases may be classified by levels of probability (i.e. confirmed, probable or suspect).</p>
<b>3) Identification:</b>	
Clinical Presentation	<p>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). Progressive stupor or coma is common; occasionally there is a low-grade fever for several days with more subtle CNS symptoms (1).</p> <p>Meningitis is the most common presentation, next to epiglottitis and bacteraemia (1). Hib infection may also cause other diseases such as pneumonia, septic arthritis, cellulites and osteomyelitis (1, 2).</p>
Diagnosis	<a href="#">See Appendix B</a>

<b>4) Epidemiology:</b>	
Occurrence	Worldwide; most prevalent among children aged 2 months to 3 years. Prior to the introduction of routine vaccination with Hib vaccine in early 1990's, Hib disease was the most common serious invasive bacterial infection in children (1). In Ontario, Hib occurs rarely, with an average of 8 cases per year.
Reservoir	Humans (1)
Modes of Transmission	Transmission occurs by direct contact with discharge from nose and throat of infected persons during the infectious period via droplets, with the portal of entry most commonly the nasopharynx (1).
Incubation Period	Unknown; probably short, 2-4 days (1).
Period of Communicability	As long as organisms are present in nose and throat and possibly for up to 7 days prior to onset of illness; antibiotic treatment reduces communicability within 24-48 hours, however does not eliminate carriage (1).
Susceptibility and Resistance	<p>Susceptibility is assumed to be universal. Immunity is associated with the presence of circulating bacteria and/or anticapsular antibody, acquired transplacentally, from prior infection or through immunization (1).</p> <p>In Ontario, Hib is most common among the immunocompromised, infants who have not completed the primary series and unimmunized individuals.</p>
<b>5) Reporting Requirements:</b>	
To local Board of Health	Confirmed and suspected cases of invasive disease caused by <i>Haemophilus influenzae</i> type b shall be reported to the medical officer of health by persons required to do so under the <i>Health Protection and Promotion Act</i> , R.S.O. 1990.
To Public Health Division (PHD)	<p>Report only case classifications specified in the case definition to PHD.</p> <p>Cases shall be reported using the integrated Public Health Information System (iPHIS), or any other method specified by the Ministry <b>within five business days of receipt of initial notification</b> as per <i>iPHIS Bulletin</i> Number 17: Timely Entry of Cases (5).</p> <p>The minimum data elements to be reported for each case is specified in the following:</p> <ul style="list-style-type: none"> <li>• <i>Ontario Regulation 569</i> (Reports) under the HPPA;</li> <li>• The disease-specific User Guides published by the Ministry, and</li> <li>• Bulletins and directives issued by the Ministry.</li> </ul>

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## 6) Prevention and Control Measures:

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Personal Prevention Measures	<p>Routine childhood immunization remains the most important preventative measure against Hib disease (1).</p> <p>All children should receive primary immunization series as per the current Publicly Funded Immunization Schedules for Ontario. Also, refer to the Canadian Immunization Guide (CIG) for the immunization of high-risk individuals including cochlear implant recipients (3). The vaccine is not publicly funded for those 5 years or older.</p>
Infection Prevention and Control Strategies	<p>Droplet precautions are recommended for 24 hours after initiation of parenteral antimicrobial therapy for hospitalized cases.</p>
Management of Cases	<p>Investigate the case to determine source of infection. Refer to <i>Ontario Regulation 569</i> under the HPPA for relevant data to collect including:</p> <ul style="list-style-type: none"><li>• Immunization status of case</li><li>• Contact history and</li><li>• Attendance at day care (see below)</li></ul> <p>Confirm the diagnosis and serotype with the laboratory and confirm the case as per case definition.</p> <p>Treatment is with appropriate and strain sensitive antibiotic as per the direction of the attending health care provider.</p> <p>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 (4).</p>
Management of Contacts	<p>A contact is defined as anyone living with or has spent 4 or more hours per day with the case, for at least 5 of the 7 days preceding the day of hospital admission of the case (2).</p> <p>The aim of rifampin chemoprophylaxis is to eliminate nasopharyngeal carriage of Hib bacteria and prevent transmission. To effectively prevent secondary spread, rifampin should be given concurrently to all contacts at the same time or within 3 days, initiated 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).</p> <p>Chemoprophylaxis is recommended for all household and child care contacts in the following circumstances (2):</p> <p>Household:</p> <ul style="list-style-type: none"><li>• with at least one contact under 4 years of age who is unimmunized or incompletely immunized</li><li>• with an immunocompromised child, regardless of immunization status</li></ul>

Child care centre:

- when one case of invasive Hib disease has occurred for incompletely or unimmunized children younger than four years of age
- regardless of age and immunization status, when 2 or more cases of invasive Hib disease have occurred within 60 days

Rifampin prophylaxis should be considered for all attendees and staff regardless of age and immunization status (even if they do not fit the definition of a contact), when 2 or more cases of disease occur in a child care setting with inadequately immunized attendees within 60 days (2).

Careful observation of exposed unimmunized or incompletely immunized household, non-household, childcare contacts is vital. Exposed children who develop a febrile illness should seek prompt medical attention.

Obtain the age; Hib immunization status and weight of all household and child care contacts (2).

Rifampin Dosage for Treatment of Contacts (2)

Adults/Children greater or equal to 12 years:	600mg orally once daily for 4 days
Children under 12 years:	20 mg/kg (maximum 600 mg) orally once daily for 4 days
Infants younger than 1 month	10mg/kg orally once daily for 4 days

## Management of Outbreaks

An outbreak is defined as greater than the expected number of confirmed cases that are spatially and temporally linked. In response to a cluster of cases, the control principles are as outlined above for case and contact management with the addition and expansion of contact surveillance, chemoprophylaxis and vaccination.

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;
- 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;

	<ul style="list-style-type: none"> <li>• Conduct environmental inspections of implicated premise where applicable;</li> <li>• Coordinate and collect appropriate clinical specimens where applicable;</li> <li>• Prepare a written report, and</li> <li>• Declare the outbreak over in collaboration with the outbreak team.</li> </ul>
<p><b>7) References</b></p>	<p>(1) Heymann D, editor. Control of communicable diseases manual. 18th ed. Washington: American Public Health Association; 2004.</p> <p>(2) Pickering LK, Baker CJ, Long SS, McMillan JA, editors. Red book: 2006 report of the Committee on Infectious Diseases. 27<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006. Section 3, Summaries of infectious diseases; p. 310-8.</p> <p>(3) National Advisory Committee on Immunization. Canadian immunization guide. 7<sup>th</sup> ed. Ottawa: Public Health Agency of Canada; 2006. Available from: <a href="http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php">http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php</a>.</p> <p>(4) Iqbal K, Mayer L, Srivastava P, Rosenstein-Messonnier N, Bisgard KM. Chapter 2: Haemophilus influenzae type b invasive disease. In: Roush SW, McIntyre L, Baldy LM, editors. Manual for the surveillance of vaccine-preventable diseases. 4<sup>th</sup> ed. Atlanta: National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention; 2008. Available from <a href="http://www.cdc.gov/vaccines/pubs/surv-manual/chpt02-hib.pdf">http://www.cdc.gov/vaccines/pubs/surv-manual/chpt02-hib.pdf</a>.</p> <p>(5) Ministry of Health and Long-Term Care. Timely entry of cases. iPHIS Bulletin. 2007 May 11;17.</p>
<p><b>8) Additional Resources</b></p>	<p>Steering Committee on Infection Control Guidelines. Prevention and control of occupational infections in health care. An infection control guideline. Can Commun Dis Rep. 2002 Mar;28 Suppl 1:1-264. Available from <a href="http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf">http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/02pdf/28s1e.pdf</a>.</p> <p>Ministry of Health and Long-Term Care. Publicly funded immunization schedules for Ontario: January 2009. Toronto: Queen's Printer for Ontario; 2008. Available from <a href="http://www.health.gov.on.ca/english/providers/program/immun/pdf/sc_hedule.pdf">http://www.health.gov.on.ca/english/providers/program/immun/pdf/sc_hedule.pdf</a>.</p> <p>Ministry of Health and Long-Term Care. Infectious diseases protocol. Toronto: Queen's Printer for Ontario; 2009. Available from <a href="http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/ophs/infdispro.html">http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/ophs/infdispro.html</a> (or as current)</p> <p><i>Health Protection and Promotion Act</i>, R.S.O. 1990, c. H.7. Available from <a href="http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm">http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm</a>.</p>



