

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

Infectious Disease Protocol

Appendix 1: Case Definitions and Disease- Specific Information

**Disease: *Haemophilus influenzae*,
all types, invasive**

Effective: May 2022

***Haemophilus influenzae*, all types,**

- Communicable
- Virulent

[Health Protection and Promotion Act \(HPPA\):](#)

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

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:

- [Ontario Regulation \(O. Reg.\) 569](#) (Reports) under the HPPA;⁵
- The iPHIS User Guides published by Public Health Ontario (PHO);
- For certain vaccines, information to be entered into the applicable provincial inventory system (i.e. Panorama or COVaxON); and
- Bulletins and directives issued by PHO.

Type of Surveillance

Case-by-case

Case Definition

Confirmed Case

Clinical evidence of invasive disease (see Clinical Evidence section) with laboratory confirmation of infection:

- Isolation of *Haemophilus influenzae* (*H. influenzae*) (serotypes a, b, c, d, e, f,

undifferentiated and non-typeable isolates) from a normally sterile site[†]

OR

- Isolation of *H. influenzae* (serotypes a, b, c, d, e, f, undifferentiated and non-typeable isolates) from the epiglottis in a person with epiglottitis

OR

- Detection of *H. influenzae* (serotypes a, b, c, d, e, f, undifferentiated and non-typeable isolates) deoxyribonucleic acid (DNA) in a normally sterile site[†] using a validated nucleic acid amplification test (NAAT)

Probable Case

Clinical evidence of meningitis with laboratory evidence of infection:

- Demonstration of *H. influenzae* type b (Hib) antigen in cerebrospinal fluid

OR

- Buccal cellulitis or epiglottitis in a child < 5 years of age with no other causative organisms isolated

Outbreak Case Definition

Not applicable

Clinical Information

Clinical Evidence

Clinical evidence of invasive disease caused by *H. influenzae* includes any of the following:

- Meningitis
- Bacteremia
- Epiglottitis
- Pneumonia
- Pericarditis
- Septic arthritis

[†] Examples of normally sterile body sites include blood, cerebrospinal fluid, joint fluid, pleural fluid, or pericardial fluid.

- Empyema

Clinical Presentation

H. influenzae disease in humans ranges from non-invasive infections such as acute otitis media to severe invasive infections such as meningitis and epiglottitis.² *H.*

influenzae serotype b (Hib) is the most pathogenic strain, causing 95% of invasive disease prior to the introduction of vaccine programs.¹ In the pre-vaccine era, the most common presentation of invasive Hib disease was meningitis (50%-65% of cases).³ Other common types of invasive disease include epiglottitis, pneumonia, arthritis and cellulitis.³ Non-type b encapsulated strains (a, c-f) can also cause invasive disease similar to type b infections.³

Non-typeable strains may cause invasive disease but are generally less virulent than encapsulated strains.³ Non-typeable strains more commonly cause infections such as conjunctivitis, otitis media, sinusitis, and pneumonia.²

Laboratory Evidence

Laboratory Confirmation

Any of the following will constitute a confirmed case of invasive *H. influenzae* disease:

- Positive culture for *H. influenzae* obtained from a normally sterile site;
- Positive culture for *H. influenzae* from the epiglottis in a person with epiglottitis;
- Positive NAAT result for *H. influenzae* DNA in a normally sterile site.

Approved/Validated Tests

- Standard culture for *H. influenzae* with serotyping from a normally sterile site, or from the epiglottis in a person with epiglottitis.
- NAAT to detect *H. influenzae* DNA.
- Antigen detection for *H. influenzae* type b by latex agglutination.

Consult with laboratory about appropriate specimens for each testing methodology.

Indications and Limitations

- Regardless of laboratory test used, all invasive *H. influenzae* isolates should be serotyped.
- NAATs and antigen detection assays may be used when culture methods are unable to isolate the organism, such as when antibiotic treatment has been initiated before a clinical specimen is obtained for culture.
- False positive and false negative reactions have been demonstrated with direct antigen detection assays. It must also be noted that *H. influenzae* antigen testing is limited to detection of serotype b, therefore other serotypes, undifferentiated and non-typeable strains cannot be detected with this method. Persons who present with meningitis in whom Hib antigen is detected in cerebrospinal fluid, and in the absence of positive culture or NAAT results, should be reported as a probable case of *H. influenzae*. Additionally, because Hib antigen detection tests can be positive in urine and serum of persons without invasive Hib disease (e.g., post-vaccination), persons should not be reported as cases if antigen is detected exclusively in urine or serum specimens.

For further information about human diagnostic testing, contact the Public Health Ontario Laboratories or refer to the [Public Health Ontario Laboratory Services webpage](#).

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* (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.

The board of health should obtain the following disease specific information during case management:⁸

All invasive Hi cases:

- Clinical: symptoms and date of symptom onset;
- Laboratory: specimen type, specimen source, serotype.

Invasive Hib cases only:

- Immunization status specifically pertaining to Hib-containing vaccines (agent and administration dates);
- Epidemiologic: history of exposure (i.e. contact history), child care attendance (see below).

Antimicrobial therapy should be initiated immediately for invasive Hib disease to eliminate Hib colonization. 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

Information about the illness and immunization should be provided. Families should be informed that children who develop invasive disease when younger than 24 months of age are at risk of developing a second episode of disease and should be immunized according to the age-appropriate schedule for unimmunized children as if no Hib vaccine doses were previously received.² Please refer to the Publicly Funded Immunization Schedules for Ontario (2016, or as current).⁶

Contact Management

Secondary cases caused by non-type b or non-typeable *H. influenzae* strains are rare and chemoprophylaxis is not recommended for contacts of invasive non-b *H. influenzae* disease.² Therefore this section only applies to contacts of a case of invasive Hib disease.

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:
 - 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; and
- With an immunocompromised child, regardless of that child's Hib immunization status.
- Child care settings:
 - If one case of invasive Hib disease has occurred, chemoprophylaxis should be provided to incompletely or unimmunized children younger than four years of age; and
 - 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 should be administered as soon as possible as most secondary cases in households occur during the first week after hospitalization of the index case. However, initiation of prophylaxis more than 7 days after hospitalization may still be beneficial, as some secondary cases may occur later.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.² Vaccine series completion and administration at the recommended intervals is essential to achieve optimal protection against invasive Hib disease.

Outbreak Management

Not applicable.

Prevention and Control Measures

In the event that publicly funded vaccine doses are needed for case and contact management for Hib, the board of health should contact the Ministry of Health's immunization program at vaccine.program@ontario.ca as soon as possible.

Personal Prevention Measures

Currently, only Hib is vaccine-preventable. 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 Immunize as per the current Publicly Funded Immunization Schedules for Ontario (2016, or as current).⁶

In Ontario, the [Child Care and Early Years Act, 2014](#) (CCEYA) is the legislation that governs licensed child care settings. Pursuant to [O. Reg. 137/15](#) under the CCEYA, children who are not in school and who are attending licensed child care settings must be immunized as recommended by the local medical officer of health prior to being admitted. Under the CCEYA parents can provide a medical reason as to why the child should not be immunized or object to immunization on religious/conscience grounds.⁷

Hib vaccination is recommended for certain individuals over five years of age at high-risk for Hib disease, including those who are immunocompromised or have certain chronic diseases.^{1,3}

Infection Prevention and Control Strategies

Droplet precautions are recommended for 24 hours after initiation of antimicrobial therapy for hospitalized cases of Hib.²

Refer to [PHO's website](#) to search for the most up-to-date information on Infection Prevention and Control (IPAC).

Disease Characteristics

Aetiologic Agent - *H. influenzae* is a gram-negative coccobacilli bacterium that can cause invasive disease and illness. *H. influenzae* strains are either encapsulated (typeable) or non-encapsulated (non-typeable). Encapsulated strains (classified as serotypes a to f), are more likely to cause invasive disease than non-encapsulated strains.¹

All strains resulting in invasive disease are reportable.

Modes of Transmission - Transmission is person-to-person, most commonly by inhalation of respiratory tract droplets or by direct contact with respiratory tract secretions from an infected person during the infectious period or from an asymptomatic carrier.²

Asymptomatic colonization of *H. influenzae* is common, especially with non-typeable and non-type b capsular type strains. In neonates, infection can be acquired intrapartum by aspiration of amniotic fluid or by contact with genital tract secretions containing the organism.²

Incubation Period - Unknown; probably short, two to four days.⁴

Period of Communicability - The exact period of communicability of Hib is unknown. However, the risk of infection persists for as long as organisms are present whether or not there is nasal discharge.⁴ Hib disease is considered non-communicable within 24-48 hours after starting effective antibiotic therapy.⁴ The period of communicability for non-b strains is unknown.

Reservoir - Humans (asymptomatic carriers).³

Host Susceptibility and Resistance - Most of what is understood regarding susceptibility and resistance is in relation to Hib. Invasive Hib disease is less common after five years of age even in the absence of immunization. This age-dependent susceptibility is likely attributed to acquisition of Hib immunity through asymptomatic Hib infection, the likelihood of which increases with age.³ Risk factors for disease include host factors (e.g., chronic disease) and exposure factors (e.g., large household size/crowding, child care attendance, low socioeconomic status, and school-aged siblings) that increase the likelihood of exposure to Hib.³

Please refer to [PHO's Reportable Disease Trends in Ontario reporting tool](#) and other reports for the most up-to-date information on infectious disease trends in Ontario. Please note that case counts for non-b strains are only available following its designation as a disease of public health significance in May 2018.

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

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Case Definition Sources

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Document History

Revision Date	Document Section	Description of Revisions
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.