

HAEMOPHILUS INFLUENZAE DISEASE - INVASIVE

Case definition

The case definition can be found in the [Nova Scotia Surveillance Guidelines](#).

Causative agent

Haemophilus influenzae is a gram-negative coccobacillus bacterium that can cause invasive disease. These bacteria are divided into two groups: encapsulated (typeable) and unencapsulated (non-typeable) strains. Encapsulated strains, classified as serotypes **a** through **f**, are more likely to cause invasive disease, whereas unencapsulated strains usually cause milder respiratory tract infections.

Unencapsulated strains are undifferentiated and non-typeable. Invasive *H. influenzae* type b (Hib) disease occurs worldwide. As the most pathogenic strain, Hib is the target of immunization programs. All other *H. influenzae* strains are collectively referred to as non-type b.

Since the introduction of Hib vaccines, the incidence of invasive Hib disease has decreased by 94% in countries with immunization programs, including Canada. Prior to vaccine programs, Hib accounted for 95% of invasive *H. influenzae* disease in Canada; today, non-type b-encapsulated strains account for the majority of invasive cases. There is a higher incidence of invasive disease caused by serotype a (Hia), primarily in young First Nations and Inuit children living in northern regions across their respective territories.

For more information about invasive *H. influenzae* disease in Canada, refer to [Haemophilus influenzae](#).

Source

Humans are the only known reservoir.

Incubation

The incubation period is unknown but is estimated at 2-4 days.

Transmission

H. influenzae is transmitted person to person through direct contact or via droplets from oral or nasal secretions — such as saliva, nasal mucous, or respiratory secretions — either from an infected individual during the infectious period or from an asymptomatic carrier. Pharyngeal colonization is common, particularly with non-Hib strains.

In neonates, infection is typically acquired intrapartum through aspiration of amniotic fluid or by contact with genital tract secretions containing the organism.

Communicability

Colonization of the upper respiratory tract with *H. Influenzae* begins in infancy. Approximately 20% of infants are colonized in the first year of life, increasing progressively with age. By 5–6 years of age, more than 50% of children will be colonized with this bacterium, and at least 75% of healthy adults as well.

As long as organisms are present, even without nasal discharge, asymptomatic carriage may persist indefinitely. Communicability typically ends within 24–48 hours after the initiation of effective antibiotic therapy.

Clinical Presentation and Severity

Clinical illness associated with invasive *H. influenzae* disease includes:

- meningitis
- epiglottitis
- pneumonia/empyema
- pericarditis
- septic arthritis
- bacteremia

Infection with Hib can occur in any age group; however, most cases occur in children under five years of age. Unimmunized children are at increased risk of invasive Hib disease. The risk of Hib meningitis is at least twice as high for children attending full-time daycare compared to those cared for at home.

Predisposing factors for invasive disease include:

- sickle cell disease
- asplenia
- HIV infection
- certain immunodeficiency syndromes
- malignant neoplasms

Symptoms of invasive Hib meningitis usually develop 2–4 days after infection and may include sudden onset of fever, changes in mental status or behavior, severe headache, and stiffness of the neck and back. In infants, a bulging fontanelle may be observed. Long-term complications following Hib meningitis may include permanent hearing loss, paralysis, seizures, and brain damage. The case-fatality rate for Hib meningitis is about 5%. Among survivors, severe neurologic sequelae occur in 10% to 15%, and deafness in 15% to 20%.

Diagnostic testing

Laboratory confirmation is established by isolating *H influenzae* from a normally sterile site, OR by isolating *H. Influenzae* from the epiglottis in a person with epiglottitis.

For additional information regarding diagnostic testing, refer to the [Nova Scotia Surveillance Guidelines](#)

For additional information regarding diagnostic testing, refer to the [PPHLN Microbiology Users Manual M0008-01](#)

Treatment

Children with severe invasive *H. Influenzae* infection are hospitalized and treated with antibiotics. Antibiotic treatment depends on the severity of disease, the location of the infection, and results of testing susceptibility.

Treatment should be directed by a healthcare provider experienced in managing invasive *H. influenzae* infections. Treatment recommendations fall outside the scope of Public Health.

Immunization

Currently, only Hib is vaccine preventable. Routine childhood immunization is the most important preventative measure against Hib disease, with clinical efficacy estimated at 95%–100% with a completed series.

Complete immunization status is determined by the age at first dose, current age, and the number of doses received to date. For additional information refer to: [Table 2: Detailed vaccine schedule by age at first dose Haemophilus influenzae type B \(Hib\) vaccines: Canadian Immunization Guide](#)

There are no vaccines for non-type b-encapsulated strains or non-typeable *H. influenzae* bacteria.

Hib vaccine failure is rare but may be associated with immunodeficiency. Therefore, children who develop invasive Hib disease after completing the primary series should be evaluated for possible immunodeficiency.

For additional information, refer to:

- [Haemophilus influenzae type b \(Hib\) vaccines: Canadian Immunization Guide - Canada.ca](#)
- [Routine-Immunization-Schedules-for-Children-Youth-Adults](#)
- [Vaccine-Eligibility-for-High-Risk-Conditions.pdf](#)

PUBLIC HEALTH MANAGEMENT & CONTROL

Case Management

Public Health (PH) conducts a **full investigation only for invasive Hib cases** to determine the source of the infection. Invasive Hib disease is a **priority follow-up** and must be dealt with **immediately**. However, **all** Invasive *Haemophilus Influenzae* disease requires priority follow-up while serotype is pending, to avoid delays in initiating a full case investigation and administering chemoprophylaxis if the case is later confirmed to have Hib. Cases known to be non-type b still require follow up for Surveillance purposes as described in Steps for Case Management below.

Steps for Case Management

- 1) Obtain clinical information from the ordering provider or the responsible physician if the case is hospitalized. If the case is not hospitalized, confirm that the case or relevant caregiver has been notified of the positive result.
- 2) Conduct an interview with the case or relevant caregiver:
 - Determine Hib-specific immunization status. This helps assess the likelihood of Hib infection when serotyping is unavailable. If the case has completed an age-appropriate Hib immunization series, Hib infection is less likely.
 - Determine if the case attended a daycare, day home, nursery school, or other childcare setting.
 - Identify contacts who may meet eligibility criteria for post-exposure prophylaxis in the event the case is confirmed to have Hib.
 - For additional information regarding contacts, refer to [Contact Management](#).
- 3) Provide education to the case or caregiver:
 - Explain the duration of illness, communicable period, and mode of transmission. For additional information regarding invasive *H. influenzae* disease, refer to [Haemophilus influenzae disease - Canada.ca](#).
 - Review respiratory etiquette: cough or sneeze into a tissue or the elbow (not the hand); dispose of tissues in a lined waste container; perform hand hygiene immediately afterwards.
 - Discuss cleaning and disinfecting frequently touched surfaces and objects (e.g., toys, toilets, door handles, light switches, electronics, tables, and countertops). Always follow product label directions: clean surfaces first with soap or detergent, then disinfect.

- Reinforce proper hand hygiene techniques. For additional information, refer to [NSH Patient and Family Guide Hand Hygiene](#).
 - **NOTE:** Exclusion of cases is typically not applicable, as most require hospital-level care.
- 4) Inform families that children with invasive Hib infection when younger than 24 months of age remain at risk of a second episode of disease. Although uncommon, a second episode in the index case occurs within months of the initial illness, with higher risk in children younger than 12 months old, and particularly among those who are un/incompletely immunized, or immunocompromised. Children who develop invasive Hib disease after complete or incomplete immunization should be referred to a medical specialist (i.e., pediatrician, infectious disease specialist) at the discretion of the RMOH.
- 5) Encourage those who are incompletely immunized to ensure completion of an age-appropriate immunization schedule. For additional information, refer to [Haemophilus influenzae type B \(Hib\) vaccines: Canadian Immunization Guide - Canada.ca](#)

Contact Management

NOTE: Secondary infection from exposure to invasive *H. influenzae* non-type b cases is rare. There is **no public health follow-up** for contacts of cases of invasive *H. influenzae* non-type b disease.

Therefore, this section **only** applies to contacts of a case of invasive Hib disease. Secondary cases have occurred in unimmunized or incompletely immunized children exposed to invasive Hib disease in childcare or household settings.

Definition of Close Contact/Exposure Criteria

The following definitions apply to the prophylaxis guidelines listed below:

- **Household contact:**
 - An individual residing with the infected individual, or a non-resident who spent four or more hours with the index case on at least five of the seven days preceding the day of hospital admission of the index case
 - This includes individuals who share sleeping arrangements, such as military personnel in a barracks setting.

Note: school contacts are not considered household contacts despite the time criteria for exposure.

- **Childcare Setting contact:** a child who has attended a childcare setting where an infected individual has been identified.

Contact Management When the Case Attends a Childcare Setting:

One case of Hib:

- Notify all parents of the occurrence of one case.
- Recommend chemoprophylaxis for eligible contacts (see below)
- Educate parents and staff to watch for signs and symptoms in children and staff, and to seek prompt medical attention for any ill children.
- Require the director of the childcare setting to notify Public Health if additional children become ill.

Two cases of Hib occur within 60 days:

- Notify all parents of the occurrence of cases.
- Recommend chemoprophylaxis for eligible contacts (see below)
- If unimmunized or incompletely immunized children attend the childcare setting, recommend prophylaxis for all attendees and staff, regardless of age or vaccine status.
- Recommend that unimmunized or incompletely immunized children receive a dose of Hib vaccine and be scheduled to complete the age-specific vaccine series.
- Educate parents and staff to watch for signs and symptoms in children and staff, and to seek prompt medical attention for any ill child.
- Require the director of the childcare setting to notify Public Health if additional children become ill.

Chemoprophylaxis for Eligible Contacts

The aim of chemoprophylaxis is to eliminate nasopharyngeal carriage of Hib bacteria and prevent secondary transmission. Ideally, chemoprophylaxis is given concurrently to all contacts, either at the same time or within 3 days, to prevent reinfection in the contact group.

Rifampin chemoprophylaxis is recommended for household and child-care contacts in the following circumstances:

All members of households:

- With at least one contact under four years of age who is unimmunized or incompletely immunized for age (see [CIG Table 2](#)).
- With an immunocompromised child, regardless of that child's Hib immunization status (i.e., even if fully immunized).
- With a child less than 12 months of age who has not received the age-appropriate Hib immunization primary series.

Child-care settings:

- If one case of invasive Hib disease occurs, chemoprophylaxis should be

provided to incompletely or unimmunized children younger than four years of age

- If 2 or more cases of invasive Hib disease occur within 60 days and children who are unimmunized or incompletely immunized attend the facility, chemoprophylaxis for all attendees and childcare providers should be provided regardless of age and immunization status.

NOTE: Ceftriaxone (IM) may be used as an **alternative prophylaxis for pregnant** individuals, individuals for whom rifampin is contraindicated, or who cannot tolerate oral medication. Consult with the RMOH regarding the use of ceftriaxone (IM) for pregnant individuals.

Contacts and Immunization

Offer the Hib vaccine to unimmunized or incompletely immunized contacts under 5 years of age, according to an age-appropriate schedule. Post-exposure immunization does not prevent or alter the severity of current exposure but provides an opportunity to update the immunization status of contacts and protect against future exposures.

For additional information regarding Hib immunization schedules, refer to:

[Haemophilus influenzae type B \(Hib\) vaccines: Canadian Immunization Guide - Canada.ca](https://www.canada.ca/en/health-canada/services/immunization/immunization-schedules/haemophilus-influenzae-type-b-hib-vaccines.html)

Exclusion

Any individual who is eligible to receive chemoprophylaxis should be isolated at home until 24 hours after chemoprophylaxis has been initiated.

Note: Cases not hospitalized should be excluded until symptoms have resolved and treatment is complete. Exclusion of cases is typically not applicable, as most require hospital-level care.

Education

- Ensure immunization according to the [Nova Scotia immunization schedule](#).
- Reduce direct contact and exposure to respiratory droplets.
- Practice proper handwashing technique using soap and warm running water.
- Educate parents about the risk of secondary infection and the importance of keeping their child home if they develop symptoms and are unwell.
- Monitoring exposed household and childcare contacts closely. Any exposed individual who develops a febrile illness should receive prompt medical evaluation.

General Information Sheet

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Date	Updates
April 2026	Invasive <i>Haemophilus Influenzae</i> Disease (non-b serotypes including untypeable) added to Nova Scotia’s list of notifiable diseases. Chapter contents received fulsome review and update to reflect this change.