Alberta

Public Health Disease Management Guidelines

Haemophilus Influenzae, Invasive

Alberta

Ministry of Health, Government of Alberta

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Haemophilus Influenzae, Invasive Public Health Disease Management Guideline

http://www.health.alberta.ca/professionals/notifiable-diseases-guide.html

For further information on the use of this protocol contact:

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Health and Wellness Promotion Branch

Public Health and Compliance Branch

Alberta Health

Case Definition

Confirmed Case

Clinical evidence of invasive disease [A] with laboratory confirmation of infection:

- Isolation of Haemophilus influenzae (serotypes a, b, c, d, e, f, and non-typeable) from a normally sterile site [B].

[A] Clinical evidence of invasive disease due to *H. influenzae* includes meningitis, bacteremia, epiglottitis, pneumonia, pericarditis, septic arthritis, or empyema.

[B] Specimens from a normally sterile site are defined as:

- blood,
- cerebrospinal fluid (CSF),
- pleural fluid,
- peritoneal fluid,
- pericardial fluid,
- bone,
- joint fluid
- specimens taken during surgery (e.g., muscle collected during debridement for necrotizing fasciitis or fluid from a deep abscess).

NOTE: A specimen collected from a non-sterile site during a sterile procedure is not considered a "normally sterile site". See ProvLab Guide to Services for current specimen collection and submission information

Reporting Requirements

1. Physicians, Health Practitioners and others

Physicians, health practitioners and others shall notify the Medical Officer of Health (MOH) (or designate) of the zone of:

- All confirmed cases of **serotype b** in the prescribed form by the Fastest Means Possible (FMP).
- All confirmed cases of other serotypes (a, c, d, e, f and non-typeable) in the prescribed form by mail, fax or electronic transfer within 48 hours (two business days)

2. Laboratories

All laboratories shall report all positive laboratory results:
When serotype is not yet known:

- by mail, fax or electronic transfer within 48 hours (two business days) to the:
  - Chief Medical Officer of Health (CMOH) (or designate), and
  - MOH (or designate) of the zone.

For serotype b

- by FMP to the MOH (or designate) of the zone, and
- by mail, fax or electronic transfer within 48 hours (two business days) to the Chief Medical Officer of Health (CMOH) (or designate).

For all other serotypes (a, c, d, e, f, and non-typeable)

- by mail, fax or electronic transfer within 48 hours (two business days) to the:
  - Chief Medical Officer of Health (CMOH) (or designate), and
  - MOH (or designate) of the zone.

3. Alberta Health Services and First Nations and Inuit Health Branch

- The MOH (or designate) of the zone where the case currently resides shall notify the CMOH (or designate) by FMP of all confirmed cases of **serotype b** only.
- The MOH (or designate) of the zone where the case currently resides shall forward the Notifiable Disease Report (NDR) of all confirmed cases to the CMOH (or designate):

For serotype b

- Forward the initial NDR within one week of notification and the final NDR (amendment) within two weeks of notification.
- For out-of-province and out-of-country reports of **serotype b**, the following information should be forwarded to the CMOH (or designate) by FMP:
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province address and phone number
  - positive laboratory report and
  - other relevant clinical/ epidemiological information.

For all other serotypes (a, c, d, e, f, and non-typeable)

- Forward the initial NDR within two weeks of notification and the final NDR (amendment) within four weeks of notification.
- For out-of-province and out-of-country reports of all other serotypes, the following information should be forwarded to the CMOH (or designate) by phone, fax or electronic transfer within 48 hours (two business days) including:
  - name,
  - date of birth,
  - out-of-province health care number,
  - out-of-province address and phone number,
  - positive laboratory report, and
  - other relevant clinical/epidemiological information.

Epidemiology

Etiology

Haemophilus influenzae is a gram-negative coccobacillus in the family Pasteurellaceae.[1] *H. influenzae* bacteria are divided into two groups; encapsulated (typeable) and unencapsulated (non-typeable) strains. The encapsulated strains are further divided into 6 serotypes from a to f.[2]

Clinical Presentation

H. influenzae infection can be mild to severe and usually starts when the organism enters and colonizes the nasopharynx. The organism may remain briefly or may persist for several months with no symptoms.[1,2] Asymptomatic colonization is common, especially with non-typeable and non-type b strains.[3] In some individuals the organism may cause an invasive infection by entering the bloodstream (bacteremia) and spreading to other sites leading to:

- meningitis (most common)
- septicemia,
- epiglottitis,
- pneumonia,
- septic arthritis,
- cellulitis,
- pericarditis,
- empyema, or
- osteomyelitis.[1,2,4,5]

The case fatality rate of Hib meningitis is about 3–6% in industrialized countries even with treatment but remains as high as 40% in developing countries, where immunization programs are poorly integrated or are not present.[1,4,5] Severe long-term neurologic sequelae such as cerebral palsy, hydrocephalus, epilepsy, blindness and bilateral sensorineural deafness may occur in up to 10–15% of survivors.[4] Less severe long-term sequelae such as partial deafness, behavioural and learning difficulties, and speech and language problems may occur in up to 15–20% of survivors.[5]

The most common non-typeable infection in children is otitis media. In adults non-typeable strains result in respiratory tract infections and exacerbations of chronic obstructive pulmonary disease (COPD).[3,4] The case fatality rate ranges between 12-22% for invasive non-typeable infections and is associated with age, any underlying co-morbidities, clinical presentation and extent of follow-up after infection.[12] Neonatal sepsis due to non-typeable *H. influenzae* can have up to 50% mortality and 90% mortality in premature infants.[3]

Reservoir

Humans.[6]

Transmission

Transmission is person-to-person via inhalation of respiratory droplets or by direct contact with discharges from the nose and throat.[4,7]

Incubation Period

The incubation period remains unknown but is probably two to four days.[5]

Period of Communicability

The exact period of communicability is unknown but as long as bacteria are present, the infected person can still transmit disease.[7,8] An individual becomes non-infectious after completing at least 24hrs of effective antibiotic therapy.[9]

Host Susceptibility

Re-infection with *H. influenzae* can occur more than once.[10] Herd immunity relies on good immunization coverage against Hib within a population resulting in a significant level of protection for those most susceptible to Hib infection.[8]

Infection with Hib can occur in any age group, however most cases occur in children less than five years of age.[2] Children younger than 4 years of age, who are not immunized are at increased risk for invasive Hib disease.[3] Very young children (< 20 weeks of age) and the elderly over 65 years of age are most susceptible to invasive non-typeable *H. influenzae* disease.[11]

Risk factors for invasive Hib disease include:[1,12]

- host factors (HIV, chronic diseases such as sickle cell anemia, antibody deficiency syndromes, and malignancies).
- exposure factors (household crowding, large household size, child care or nursery school attendance, low socioeconomic status, low parental education levels, and school-aged siblings).

Incidence in Alberta

Invasive Hib first became notifiable in Alberta in 1979. By the time the first vaccine, polysaccharide vaccine (Hib-PRP), was introduced for children over the age of two years in Alberta in 1987, the total rate of invasive Hib was 5.8 cases per 100,000.[13,14] In 1992, a new conjugate Hib vaccine (Hib-Hboc) was introduced that provided protection for children two months of age and older. By 1993, rates of Hib in children less than one year of age had drastically declined to 0.3 cases per 100,000. From 2005 to 2017, 13 cases of invasive Hib disease were reported. Of the 13 cases, only three were up to date with their immunizations.[15]

Non-b serotypes became notifiable in 2011 and account for most invasive *H. influenzae* cases reported in Alberta.[15] The majority of cases occur in children <1 year of age followed by the 1-4

years of age group. Non-typeable is the most common serotype reported that also causes invasive disease in all age groups. This is followed by serotypes a and f.

For more information on current incidence rates and case counts of *Haemophilus influenzae* in Alberta, refer to the Interactive Data Health Application.

Public Health Management

Diagnosis

Laboratory confirmation is made by the isolation of the *H. influenzae* from a normally sterile site. The organism should be serotyped (e.g., Hib versus non-Hib) as soon as possible so as to provide direction regarding chemoprophylaxis and immunization of case/contacts.[8]

Detection of *H. influenzae* DNA is not considered a confirmed case, because Hib may be present in a non-pathogenic role and thus, depending on the site, may not reflect the actual pathogen. In addition, detection of *H. influenzae* DNA in a sterile site does not indicate that it is type b since this test does not differentiate between serotypes.[15]

Key Investigation

- Confirm the diagnosis and serotype.
- Obtain a history of illness including date of symptom onset, signs and symptoms and possible source of infection.
- Determine Hib-specific immunization status of the case. This can assist in determining the likelihood of Hib infection until the serotyping is known. If the case has completed an age-appropriate Hib immunization series, it is less likely to be Hib.
- **While awaiting serotype results:**
  - Identify contacts that meet eligibility criteria for post exposure prophylaxis (see Table 1) and obtain the ages, immunization status and weights of each contact.
  - Contacts include:
    - all persons living in the same household as the index case, or
    - any individual (household or non-household) who had four or more hours of contact with the case for 5 of the 7 days prior to the onset of illness, or after onset of illness and until the case completed at least 24 hours of appropriate antibiotic therapy, regardless of the age of the case.
    - Children or staff who attend the same childcare setting as the case.
  - Determine if case attended a daycare, day home, nursery school or other childcare setting and assess for additional cases of Hib at the site within the past 60 days.
    - If there were 2 or more confirmed Hib cases (not including the case under investigation) at the site within the past 60 days, obtain the ages, immunization status, and weights of attendees.
  - The MOH may recommend chemoprophylaxis for eligible contacts prior to obtaining serotype results if the case is highly suspected to have Hib infection. For more information refer to the section on Chemoprophylaxis of Eligible Contacts.

Management of a Case

- Routine practices and droplet precautions apply until the completion of 24 hours of appropriate antibiotic therapy.[6]
- Children who develop invasive Hib disease after complete or partial immunization should be referred to a pediatrician for an immunologic assessment.

Treatment of a Case

- Treatment is usually 10 days with appropriate antibiotics.
- Treatment with cefotaxime and ceftriaxone eliminates *H. Influenzae* colonization.
- Patients who are younger than two years of age who have been treated with meropenem, ampicillin or any other antibiotic should receive rifampin prophylaxis at the end of therapy for invasive disease.[4] Rifampin achieves high concentrations in respiratory secretions and eradicates nasopharyngeal carriage in >95% of carriers.[9]

Management of Contacts of *Hib* Cases

- **NOTE:** Secondary infection from exposure to non *H. influenzae* b cases with invasive disease are rare. There is NO Public Health follow-up for contacts of cases of non *H. influenzae b*.
- Secondary cases of Hib have been reported in incompletely immunized or unimmunized children who may have been exposed to an invasive Hib case in a household or childcare setting.
- Educate all contacts, regardless of eligibility for post exposure prophylaxis on the risk of secondary cases and the need for prompt evaluation and treatment if signs and symptoms should occur.
- Exposed children who develop a febrile illness should receive prompt medical attention and, if indicated, appropriate antibiotic therapy should be initiated.

Chemoprophylaxis for Eligible Contacts

- Chemoprophylaxis is recommended for eligible contacts to prevent secondary cases of invasive Hib disease and eradicate nasal carriage in exposed contacts. Refer to Table 1 for recommendations.
- Antibiotics should be initiated as soon as possible, at least within 7 days after hospitalization of the case. Prophylaxis may be recommended after 7 days as secondary cases have occurred 7 days or more after hospitalization in the case. [4]
- Rifampin is the drug of choice as it eliminates nasopharyngeal carriage of Hib bacteria in 95% of cases and contacts and should be given as soon as possible.
- Rifampin is available for order by the zone through the Provincial Vaccine Depot and is given to contacts of invasive Hib at no charge. The dosage is based on weight for each contact. Refer to Table 2 for dosage recommendations.

Table 1: Hib Chemoprophylaxis Recommendations[4]

ALL close contacts* should receive prophylaxis when:	Prophylaxis should be considered for all attendees and personnel in a child care setting:
• There is at least one contact younger than 48 months of age with incomplete or absent Hib immunization history, • There is a child younger than 12 months of age that has not completed an age-appropriate primary Hib immunization series, • There is an immunocompromised child less than 18 years of age, regardless of that child's age and immunization status	• **Only** after two or more cases of invasive Hib occur within 60 days and children who have incomplete or absent Hib immunization history attend the childcare setting/nursery school.

** All persons residing in the same household as the index case as well as non-household contacts who have spent 4 or more hours of contact per day with the case for 5 of 7 days prior to onset of illness*

- In addition to chemoprophylaxis, children in the household, childcare settings who are unimmunized or incompletely immunized should be referred to public health for Hib vaccine as soon as possible.
- Post-exposure immunization is not known to prevent or alter severity of current exposure but is an opportunity to update the immunization status in contacts and provide protection against subsequent exposures. Refer to the current *Alberta Immunization Policy (AIP)* for immunization recommendations.
- Chemoprophylaxis is **NOT** indicated for the following:[4]
  - Close contacts of invasive non-type b disease.
  - Household contacts of invasive Hib disease when ALL the contacts regardless of age are fully immunized,
  - Households where there are no contacts younger than 4 years of age, other than the index case,
  - Childcare settings where there is only one index case,
  - Pregnant contacts of a case.

Table 2: Recommended Rifampin Dosage for Contacts

Age	Dosage
Children and Adults	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.

Preventive Measures

- Educate public on the risks of Hib disease and the importance of immunization.
- Refer to the *AIP* for current immunization recommendations.
- Educate public on how to prevent transmission of Hib including:
  - practicing good hand hygiene and respiratory etiquette,
  - avoiding sharing drinks or any other items used on the nose or mouth, and
  - cleaning frequently touched household surfaces.

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