**Haemophilus influenzae Invasive Disease**

**Organism:** *Haemophilus influenzae* can be nontypeable or have one of six different serotypes (a through f). Type b is the one most type that people may be familiar with, and the one type for which there is a vaccine available.

**Incubation period:** Unknown, probably short, 2-4 days.

**Infectious period:** Prolonged, as long as organisms are present, even without nasal discharge. Non-communicable 24-48 hours after initiation of an effective antibiotic treatment.

**Transmission routes:** Respiratory inhalation of droplet discharges from nose and throat. Most common portal of entry is nasopharynx.

**Treatment:** Initial therapy for children with meningitis possibly caused by Hib is cefotaxime or ceftriaxone. Meropenem is an alternative empiric agent. Ampicillin can be substituted if the Hib isolate is susceptible to ampicillin. Treatment of other invasive *H. influenzae* infections is similar. Therapy is continued at least 10 days by the intravenous route and longer in complicated infections.

In the United States, approximately 30% to 40% of *H. influenzae* isolates produce beta-lactamase, necessitating a beta-lactamase-resistant agent, such as amoxicillin-clavulanate; an oral cephalosporin, such as cefdinir, cefuroxime, or cefpodoxime; or azithromycin for children with beta-lactam antibiotic allergy. Treatment of Hib disease with cefotaxime or ceftriaxone eradicates Hib colonization, eliminating the need for prophylaxis of the index patient. Patients who are treated with ampicillin, meropenem, or another antibiotic regimen and who are younger than 2 years of age should receive rifampin prophylaxis at the end of therapy for invasive infection.

**Information Needed for the Investigation**
Alaska Section of Epidemiology (SOE) Infectious Disease Program staff work with public health nursing entities to collect clinical and epidemiological information.

**Verify the Diagnosis**
Determine if signs or symptoms are compatible with invasive disease in conjunction with laboratory criteria.

Clinical case definition: disease may manifest as pneumonia, bacteremia, meningitis, epiglottitis, septic arthritis, cellulitis, or purulent pericarditis; less common infections include endocarditis and osteomyelitis.
Case Classification

Probable
- Meningitis WITH detection of *H. influenzae* type b antigen in cerebrospinal fluid (CSF)

Confirmed
- Isolation of *H. influenzae* from a normally sterile body site (e.g., CSF, joint fluid, pleural fluid, pericardial fluid) OR
- Detection of *H. influenzae*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., CSF, blood, joint fluid, pleural fluid, pericardial fluid), using a validated polymerase chain reaction (PCR) assay

Determine the Extent of Illness

Early diagnosis and treatment of invasive Haemophilus meningitis limits it spread to other susceptible people.
- Most cases are sporadic. Prophylaxis of contacts depends on age of other household sibs (see contact and control measures section).

Laboratory Specimens

Confirmation of a case requires detection and/or isolation of the bacteria from a normally sterile body site (e.g., CSF, blood joint fluid, pleural fluid, pericardial fluid)
- Gram stain of an infected body fluid may show gram-negative coccobacilli.
- Rapid latex agglutination tests to detect Hib capsular polysaccharide antigen for presumptive b/not-b results are in use; however, any isolate must still be routed to AIP for confirmation regardless of any rapid test result.
- Isolates should be sent to CDC-AIP for confirmatory testing, they do all serotyping. Notify them of suspect and confirmed cases and assist in coordination of specimen if needed. They also have the capacity to do PCR testing on CSF samples if antibiotics were started before specimens were collected. Consult required for such testing on a case-by-case basis.

Contact and Control Measures

- For any suspected case, determine any potential close and household contacts as soon as the report is received. **Do not wait for serotype results; this should be done as soon as possible.** This allows us to plan for potential broader prophylaxis or interventions while the laboratory testing is being completed should the serotype come back as “Hib”.
  - There may be situations where prophylaxis of household contacts may be recommended even without serotype results (delayed/unavailable serotype results, completely unimmunized children under 4 years old).
- Prophylaxis is recommended for Hib but not any other *H. influenzae* serotypes. Rifampicin should be given to all household contacts (including adults) in households with children younger than 1 year (other than index case) or with a child aged 1-3 years who is inadequately immunized (see table below).
  - **Recommended oral rifampin dosage:**

<table>
<thead>
<tr>
<th>Persons &gt; 1 month of age</th>
<th>20 mg/kg once daily for four (4) days. Max daily dose 600mg.</th>
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<tbody>
<tr>
<td>Infants less that one (1) month of age</td>
<td>10 mg/kg once daily for four days.</td>
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• When a single case has occurred in a childcare facility, use of rifampin prophylaxis is controversial, and is not recommended in Alaska.

**Indications and Guidelines for Rifampin Chemoprophylaxis for Contacts of Index Cases of Invasive *Haemophilus influenzae* Type b (Hib) Disease [Table 3.9, 2012 AAP Redbook]**

**Chemoprophylaxis Recommended**

For all household contacts\(^a\) in the following circumstances:

- Household with at least 1 contact younger than 4 years of age who is unimmunized or incompletely immunized\(^b\)
- Household with a child younger than 12 months of age who has not completed the primary Hib series
- Household with a contact who is an immunocompromised child, regardless of that child's Hib immunization status
- For preschool and child care center contacts when 2 or more cases of Hib invasive disease have occurred within 60 days (see text)
- For index patient, if younger than 2 years of age or member of a household with a susceptible contact and treated with a regimen other than cefotaxime or ceftriaxone, chemoprophylaxis usually is provided just before discharge from hospital

**Chemoprophylaxis Not Recommended**

- For occupants of households with no children younger than 4 years of age other than the index patient
- For occupants of households when all household contacts 12 through 48 months of age have completed their Hib immunization series and when household contacts younger than 12 months of age have completed their primary series of Hib immunizations
- For preschool and child care contacts of 1 index case
- For pregnant women

\(^a\)Defined as people residing with the index patient or nonresidents who spent 4 or more hours with the index patient for at least 5 of the 7 days preceding the day of hospital admission of the index case.

\(^b\)Complete immunization is defined as having had at least 1 dose of conjugate vaccine at 15 months of age or older; 2 doses between 12 and 14 months of age; or the 2- or 3-dose primary series when younger than 12 months with a booster dose at 12 months of age or older.

- Regardless of the serotype, children who are close contacts should have their vaccination status reviewed and updated as appropriate.
  - Vaccination is an effective strategy against invasive Hib disease for children under 5 years of age. PedvaxHib vaccine is recommended at 2 months, 4 months, and 12 months of age. Encourage on-time immunization. Children can receive vaccine on an accelerated catch-up schedule if they start late or are more than 1 month behind.
- Observe contacts younger than 6 years, especially infants, for signs of illness, such as fever.
- Educate parents about the risk of secondary cases in siblings younger than 4 years and the need for prompt evaluation and treatment if fever or stiff neck develops; seek medical care immediately.
Hospital Considerations


Reporting Requirements

- FTR: write up all confirmed and probable cases of Hib or others investigated.
- AK-STARS: enter all suspect, probable, and confirmed invasive *H. influenzae* (Hib, non-b, and nontypeable) into the surveillance tracking database CDC Form tab required fields for NETSS reporting, each indicated by green highlighted with a 🟢 mark. Data includes; if patient is < 6 years of age, if in daycare, type of infection caused by organism, specimen, bacterial species isolated, serotype, vaccination status, hospitalization status, and outcome.
- CSTE Case Definition is used to define confirmed and probable cases.
- Report all suspect, probable, and confirmed cases to CDC-AIP.

Section of Epidemiology *H. influenzae* Webpage

[https://go.dhss.ak.local/pub/home/dph/Epi/id/Pages/HFlu.aspx](https://go.dhss.ak.local/pub/home/dph/Epi/id/Pages/HFlu.aspx)

References

- CDC. Advisory Committee on Immunization Practices Recommended Immunization Schedules for Children and Adults. Available at: [http://www.cdc.gov/vaccines/schedules/index.html](http://www.cdc.gov/vaccines/schedules/index.html)