**Haemophilus influenzae Invasive Disease**

**Organism:** *Haemophilus influenzae* (most commonly type b). ‘Type a’ has recently been seen in Alaska. There are six serotypes.

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

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

**Verify the Diagnosis**
- Most cases are sporadic. Prophylaxis of contacts depends on age of other household sibs (see algorithm).
- Most common types of invasive Hi disease: meningitis, epiglottitis, septic arthritis, cellulitis, and pneumonia.
- Educate parents about watching other siblings less than 4 years-old for stiff neck or fever; seek medical care immediately.
- Routine childhood immunization against type b, dosing depends on vaccine. ACIP schedule is available at [http://www.epi.alaska.gov/id/iz/schedule/birth18.htm](http://www.epi.alaska.gov/id/iz/schedule/birth18.htm)

**Laboratory Specimens**
- Gram stain of infected body fluid may show gram-negative coccobacilli.
• Culture CSF, blood, pleural fluid, joint fluid for organism.
• Latex agglutination is rapid method to detect Hib capsular polysaccharide antigen.
• Isolate should be sent to CDC-AIP for serotyping. Rapid tests for a presumptive b/not-b result are in use; however, those specimens must still be routed to AIP for confirmation.
• CDC-AIP does all serotyping. Notify them of cases and assist in coordination of specimen if needed. CDC-AIP can also do PCR on CSF if antibiotics were started before specimens were collected. Consult with them on a case-by-case basis.

Contact and Control Measures

Notes:
• Applies to type b; whether to extend to type a, is still under discussion.
• When a single case has occurred in a childcare facility, use of rifampin prophylaxis is controversial, and not recommended in Alaska. Encourage on-time immunization of children.

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

<table>
<thead>
<tr>
<th>Chemoprophylaxis Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>For all household contacts(^a) in the following circumstances:</td>
</tr>
<tr>
<td>- Household with at least 1 contact younger than 4 years of age who is unimmunized or incompletely immunized(^b)</td>
</tr>
<tr>
<td>- Household with a child younger than 12 months of age who has not completed the primary Hib series</td>
</tr>
<tr>
<td>- Household with a contact who is an immunocompromised child, regardless of that child's Hib immunization status</td>
</tr>
<tr>
<td>- For preschool and child care center contacts when 2 or more cases of Hib invasive disease have occurred within 60 days (see text)</td>
</tr>
<tr>
<td>- 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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemoprophylaxis Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>- For occupants of households with no children younger than 4 years of age other than the index patient</td>
</tr>
<tr>
<td>- 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</td>
</tr>
<tr>
<td>- For preschool and child care contacts of 1 index case</td>
</tr>
<tr>
<td>- For pregnant women</td>
</tr>
</tbody>
</table>

\(^a\)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.

January 2015
Chemoprophylaxis (rifampin)
Recommended oral rifampin dosage is 20 mg/kg as a single dose once a day for four (4) days. Maximum daily dose is 600mg. Adult dose is 600 mg daily. The dose for infants less than one (1) month of age has not been established; some experts recommend lowering the dosage to 10 mg/kg once daily for four days. See attached Calculation document as a quick guide for dosing.

Hospital Considerations
- Droplet Precautions for 24 hours after the initiation of effective therapy.

Reporting Requirements
- FTR: write up all confirmed and probable cases of Hib or others investigated.
- File Case Report for all cases of non-b Haemophilus influenzae.
- AK-STARS: enter all confirmed and probable HI cases. Use the CDC/Supplemental form to enter in data related to serotype, vaccination status, and outcome.
- CDC Case Definition is used to define confirmed and probable cases.
- Report all suspect or confirmed cases to CDC-AIP.

Recent References


Haemophilus influenzae, invasive disease

2015 Case Definition

Clinical Criteria
Invasive disease may manifest as pneumonia, bacteremia, meningitis, epiglottitis, septic arthritis, cellulitis, or purulent pericarditis; less common infections include endocarditis and osteomyelitis.

Laboratory Criteria for Diagnosis
- Detection of *Haemophilus influenzae* type b antigen in cerebrospinal fluid [CSF]
- Detection of *Haemophilus influenzae*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or CSF), using a validated polymerase chain reaction (PCR) assay; or
- Isolation of *Haemophilus influenzae* from a normally sterile body site (e.g., cerebrospinal fluid [CSF], blood, joint fluid, pleural fluid, pericardial fluid)

Epidemiologic Linkage
Not applicable for case classification.

Case Classification
Probable
- Meningitis WITH detection of *Haemophilus influenzae* type b antigen in cerebrospinal fluid [CSF]

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

Case Classification Comment(s)
Positive antigen test results from urine or serum samples are unreliable for diagnosis of *Haemophilus influenzae* disease and should not be used as a basis for case classification.

Isolates of *Haemophilus influenzae* are important for antimicrobial susceptibility testing.
# Haemophilus influenzae Invasive Disease Case Questionnaire

Name of person reporting: __________________________    Phone: _________________

Name of patient: __________________________    Phone: _________________

Residence: __________________________

DOB: ____/____/________    Sex: M ☐ F ☐    Race: __________________________

Provider or ER where care was obtained: __________________________

## Symptoms: (Y=Yes, N=No, U=Unknown)  Onset:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Y</th>
<th>N</th>
<th>U</th>
<th>Date:</th>
<th>Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden fever</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stiff neck</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petechial rash</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CSF/Blood obtained prior to administration of antibiotics? Y ☐ N ☐ Unknown ☐

CSF Results: Appearance_______Cell count_______Glucose_______Protein_______

Date CSF/Blood collected: ______________________

Isolate sent to CDC-AIP for Serotyping: Y ☐ N ☐    If Yes, Date: __________________

Vaccine History:    Vaccine name/type AND Date given

<table>
<thead>
<tr>
<th>Dose 1</th>
<th>Dose 2</th>
<th>Dose 3</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Household or Close Contacts</th>
<th>Prophylaxis Y N U</th>
<th>Daycare Contacts</th>
<th>Prophylaxis Y N U</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dosage Calculation Guidelines for Rifampin Prophylaxis To Prevent Invasive Hib Disease

Recommended oral dosage is 20 mg/kg as a single dose once a day for four (4) days. Maximum daily dose is 600mg. Adult dose is 600 mg daily. The dose for infants less that one (1) month of age has not been established; some experts recommend lowering the dosage to 10 mg/kg once daily for four days.¹

<table>
<thead>
<tr>
<th>Weight</th>
<th>Dosage</th>
<th>Dosage (Infant &lt; 1 month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pounds</td>
<td>KG</td>
<td>20MG/KG</td>
</tr>
<tr>
<td>5</td>
<td>2.3</td>
<td>46</td>
</tr>
<tr>
<td>10</td>
<td>4.5</td>
<td>90</td>
</tr>
<tr>
<td>15</td>
<td>6.8</td>
<td>136</td>
</tr>
<tr>
<td>20</td>
<td>9.1</td>
<td>182</td>
</tr>
<tr>
<td>25</td>
<td>11.3</td>
<td>226</td>
</tr>
<tr>
<td>30</td>
<td>13.6</td>
<td>272</td>
</tr>
<tr>
<td>35</td>
<td>15.9</td>
<td>318</td>
</tr>
<tr>
<td>40</td>
<td>18.1</td>
<td>362</td>
</tr>
<tr>
<td>45</td>
<td>20.4</td>
<td>408</td>
</tr>
<tr>
<td>50</td>
<td>22.7</td>
<td>454</td>
</tr>
<tr>
<td>55</td>
<td>24.9</td>
<td>498</td>
</tr>
<tr>
<td>60</td>
<td>27.2</td>
<td>544</td>
</tr>
<tr>
<td>65</td>
<td>29.4</td>
<td>588</td>
</tr>
<tr>
<td>≥70</td>
<td>≥31.8</td>
<td>600</td>
</tr>
</tbody>
</table>

For patients unable to swallow capsules, a liquid suspension (1% in simple syrup) or preweighed aliquots of rifampin powder can be prepared by the pharmacist (see package insert.)

**Haemophilus influenzae type b Fact Sheet**

**What is *Haemophilus influenzae* type b (Hib) disease?**
Until recently, Hib was one of the most important causes of bacterial infection in young children. Hib may cause a variety of diseases such as meningitis (inflammation of the coverings of the spinal column and brain), blood stream infections, pneumonia, arthritis and infections of other parts of the body.

**Who gets Hib disease?**
Hib disease can occur in any age group. Due to widespread use of Hib vaccine in children, very few cases of Hib are reported each year in Alaska. Hib is diagnosed more often in the elderly, unimmunized children and people who are immunocompromised.

**How is Hib disease spread?**
Hib disease may be transmitted through contact with mucus or droplets from the nose and throat of an infected person.

**What are the symptoms of Hib disease?**
Symptoms may include fever, lethargy, vomiting and a stiff neck. Other symptoms depend upon the part of the body affected.

**How soon do symptoms appear?**
The incubation period for Hib disease is unknown, but is probably less than one week.

**When and for how long is a person able to spread Hib disease?**
The contagious period varies. Unless treated, it may be transmitted for as long as the organism is present in the nose and throat, even after symptoms have disappeared.

**Does past infection with Hib disease make a person immune?**
Children who had Hib disease when younger than 24 months of age may be at risk of getting Hib disease again. Children and adults, who had Hib disease when 24 months of age or older, are likely to be immune.

**What is the treatment for Hib disease?**
Antibiotics such as cefotaxime, ceftriaxone, ampicillin, and chloramphenicol are generally used to treat serious infections. Rifampin is used in some circumstances as preventive treatment for persons who have been exposed to Hib disease.

**What are the possible complications associated with Hib disease?**
If Hib meningitis occurs, a certain proportion of those who recover may suffer long-lasting neurological problems. In some instances, cases may be fatal.

**What can be done to prevent the spread of Hib disease?**
Several types of Hib vaccine are available and children should start Hib immunizations at 2 months of age. Recommendations for scheduling subsequent doses depends on the manufacturer. Therefore, it is important to consult with your physician. The recommended immunization schedule for children is available at: [http://www.epi.alaska.gov/id/iz/schedule/birth18.htm](http://www.epi.alaska.gov/id/iz/schedule/birth18.htm)
Important Information about Rifampin For Prevention of *Haemophilus influenzae* type b Invasive Disease

**Description:**
Rifampin is an antibiotic. The full prescribed dosage should be taken as directed.

**Contraindications:**
- Do not take if you are allergic to rifampin or any of the components, or to any of the rifamycins.
- Concurrent administration with certain protease inhibitors is contraindicated.

**Talk with your provider about:**
- Medication allergies
- If you have liver disease
- Pregnant or breast-feeding
- Medication profile as rifampin can have drug interactions with the following groups (not a complete list):
  - Antiarrhythmic
  - Anticonvulsants
  - Anticoagulants
  - Antifungals
  - Beta-blockers
  - Calcium channel blockers
  - Hepatitis C medications
  - HIV-AIDS medications
  - Oral or systemic hormonal contraceptives
  - Sulfonylureas
  - Thyroid products

**Patient instructions:**
- Best if taken on an empty stomach with a full glass of water (1 hour before or 2 hours after a meal), if necessary try taking with a small amount of food.
- Avoid alcohol while taking this medication
- Be aware that taking rifampin may produce reddish coloration of the urine, sweat, sputum, and tears. Soft contact lenses may be permanently stained.

**If you forget a dose:**
Take the missed dose as soon as you remember it. However, if it is almost time for the next dose, skip the missed dose and continue your regular dosing schedule. Do not take a double dose to make up for a missed dose.

**Possible side effects:**
- Cramps
- Fever
- Diarrhea
- Dizziness
- Drowsiness
- Fatigue
- Fever
- Headache
- Heartburn
- Mental confusion
- Muscular weakness
- Nausea
- Visual disturbances
- Vomiting

If necessary, contact your provider for recommendation and assessment of symptoms.

**Contact your provider immediately if you experience any of the following symptoms:**
- Rash
- Sore tongue
- Sore mouth
- Yellowing of the skin or eyes

**Storage considerations:**
- Keep medication in original container
- Keep out of reach of children
- Store at room temperature, avoid excess heat
- Store in a dry place
- Properly dispose of any unused or expired medication