Haemophilus influenzae Invasive Disease

Summary:

Haemophilus influenzae are gram-negative coccobacilli that cause a broad range of infections. The organism is transmitted from person to person by respiratory droplets. The most common manifestations of invasive disease are bacteremia, meningitis, and pneumonia. Signs and symptoms may include fever, headache, neck stiffness, cough, respiratory distress, or general ill appearance. Diagnosis is made by bacterial culture or polymerase chain reaction (PCR). Antimicrobial treatment is indicted for invasive *H. influenzae* infections to prevent poor patient outcomes and sequelae. The epidemiology of invasive *H. influenzae* disease has shifted in the post-Hib vaccination era (Hib = *H. influenzae* type b). Nontypeable *H. influenzae* is now the most common, while *H. influenzae* type a (Hia) is the most common encapsulated serotype.

Agent:

Haemophilus influenzae is classified into six capsular types (a through f) and nonencapsulated (nontypable) strains.

Transmission:

Reservoir:

Humans are the only reservoir for Haemophilus influenzae.

Mode of transmission:

General**:** The organism resides in the upper human respiratory tract. Person-to-person transmission occurs through inhalation of respiratory tract droplets or through direct contact with respiratory tract secretions from infected or colonized individuals. In neonates, infection is acquired intrapartum by aspiration of amniotic fluid or by contact with genital tract secretions. Pharyngeal colonization is common, especially with non-type b strains.

Type b**:** Widespread use of Hib conjugate vaccine has markedly reduced colonization rates for type b. Colonization rates increase following recent exposure in closed populations (such as family or childcare contacts of a person with disease).

Period of communicability:

General**:** Undefined as the organism can be transmitted as long as it is present in the nasopharynx.

Type b**:** For patients with invasive Hib disease, the patient is considered noninfectious 24 hours after initiation of appropriate antimicrobial therapy.

Clinical Disease:

Incubation period:

Unknown.

Illness:

When bacteria disseminate from the mucosal surfaces of the upper respiratory tract into the bloodstream and elsewhere in the body, clinical illness occurs. Common manifestations of invasive disease are bacteremia, meningitis, pneumonia, epiglottitis, cellulitis, otitis media, purulent pericarditis, septic arthritis or other musculoskeletal disease. Signs and symptoms may include fever, headache, meningismus, cough, respiratory distress, bone or joint pain, or general ill appearance. Non-encapsulated or nontypeable strains of *H. influenzae* usually cause noninvasive infections including otitis media, sinusitis, conjunctivitis, pneumonia, and bronchitis.

Laboratory Diagnosis:

H. influenzae can be cultured from blood, cerebrospinal fluid (CSF), joint fluid, sputum, pleural fluid, and other body sites. A gram stain of infected body fluid can demonstrate the organism and allow a presumptive diagnosis to be made. Because occult meningitis is known to occur in young children with invasive Hib disease, a lumbar puncture should be strongly considered in the presence of invasive disease, even in the absence of central nervous system signs and symptoms. Isolation of the bacterium is needed to confirm *H. Influenzae* invasive disease, determine the serotype, and test for antimicrobial susceptibility. **All *H. influenzae* isolates associated with invasive disease must be serotyped** (which is performed at New Mexico Department of Health Scientific Laboratory Division).

Antigen detection methods, which have been historically used on CSF, blood, and urine specimens, are not recommended because they lack sensitivity and specificity. Slide agglutination is used to detect Hib capsular polysaccharide antigen in CSF, but a negative test does not exclude the diagnosis, and false positives have been reported. Positive antigen test results can occur from circulation of Hib antigen in urine or serum; this circulation can be caused by asymptomatic Hib carriage, recent vaccination, or fecal contamination of urine specimens. Cases identified exclusively by these methods should be considered suspect cases only.

Nucleic acid amplification (NAATs) available in multiplexed assays to detect *H. Influenzae* DNA directly in blood, CSF, or other clinical specimens also has the advantage of detecting *H. Influenzae* in the absence of a clinical sample. Real-time PCR detects DNA of all *H. Influenzae* in blood, CSF, or other clinical specimens, and may be particularly useful in patients whose specimens are obtained after the initiation of antibiotics. Even when the organisms are nonviable following antimicrobial treatment, PCR can still detect *H. Influenzae* DNA.

Treatment:

Patients with invasive *H. influenzae* must receive antimicrobial therapy. The choice of specific therapy should consider local antibiotic susceptibility patterns of invasive isolates. Treatment decisions are made by the patient's health care provider;

consultation with infectious disease specialists can be beneficial in treating invasive infections.

Surveillance

Case Definition:

Confirmed - Isolation of *Haemophilus influenzae* from a normally sterile body site (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

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

Reporting:

Report all suspected, probable or confirmed cases of invasive *H. influenzae* immediately to the New Mexico Department of Health, Center for Health Protection (CHP) at (833) 796-8773. Information needed includes patient's name, age, sex, race, ethnicity, home address, home phone number, occupation and health care provider.

Control Measures (type b only):

1. Case management
    1.1. Isolation: For hospitalized patients with invasive Hib disease, droplet precautions should be used for 24 hours after initiation of antimicrobial therapy.
    1.2. Prophylaxis: Treatment of Hib disease with cefotaxime or ceftriaxone eradicates Hib colonization. Chloramphenicol in combination with ampicillin could be used as an alternative. The treatment course is usually 10 days. As ampicillin-resistant strains of Hib are now common throughout the United States, an index case who has been treated with a regimen other than the cefotaxime or ceftriaxone, are younger than 2 years old, and/or a member of a household with a susceptible contact should receive rifampin chemoprophylaxis at the end of therapy for invasive infection.
2. Contact management
    2.1. Isolation: Not applicable.
    2.2. Indications and Guidelines for Rifampin Chemoprophylaxis for Contacts of Index Cases of Invasive *Haemophilus influenzae*, type b (Hib) disease[1].

Type b: Chemoprophylaxis with rifampin is indicated for close contacts of patients with invasive *Haemophilus influenzae* type b (Hib) disease. Two Hib conjugate vaccines are currently licensed for routine immunization in infants. Prior to introduction of *H. influenzae* type b (Hib) conjugate vaccine, the majority of invasive disease in children was caused by type b. The epidemiology of invasive *H. influenzae* infection has changed in the post-Hib

vaccination era, with the majority of the disease now caused by nontypeable *H. influenzae* in all age groups. Rifampin should be given orally once a day for four days, in a dose of 20 mg/kg (maximum daily dose 600 mg). For infants aged less than one month, the dose is not well established; 10 mg/kg has been recommended by some experts. The adult dose is 600 mg.

Prophylaxis Recommended:

1. For all household contacts[2] (except pregnant women) in the following circumstances:

    a. Household with at least 1 child younger than 4 years of age who is unimmunized or incompletely immunized[3]

    b. Household with a child younger than 12 months of age who has not completed the primary Hib series

    c. Household with an immunocompromised child, regardless of that child's Hib immunization status or age

2. For preschool and childcare center contacts when two or more cases of Hib invasive disease have occurred within 60 days.

3. For index patient, if younger than 2 years old or a member of a household with susceptible contact and treated with a regimen other than cefotaxime or ceftriaxone, chemoprophylaxis usually is provided just before discharge from the hospital.

Prophylaxis NOT Recommended:

1. For occupants of households with no children younger than 4 years old other than the index patient.

2. 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.

3. Not routinely recommended for preschool and childcare contacts of one index case. Consult with a medical epidemiologist for specific guidance.

4. For pregnant women.

Prophylaxis is not recommended for contacts of cases with non-type b invasive infection.

1. It is unknown whether people (particularly young children) are in contact with a person with invasive non-type b *H. influenzae* disease are at an increased risk for disease. Also unknown is whether chemoprophylaxis is efficacious under these circumstances. There have been very few documented cases of secondary disease in close contacts of invasive non-type b *H. influenzae* disease. Therefore, currently,

NMDOH does not recommend chemoprophylaxis for contacts of non-type b *H. influenzae* cases.

2. Testing of asymptomatic contacts is not recommended.

[1] Similar criterion may be used for Hia; except Hib immunization criteria is not applicable.

[2] Defined as people residing with the index patient or nonresidents who spent four or more hours with the index case for at least 5 of the 7 days preceding the day of hospital admission of the index case.

[3] Complete immunization is defined as having had at least one dose of conjugate vaccine at 15 months of age or older; two doses between 12 and 14 months of age; or 2 or 3 dose primary series depending on vaccine type (see below Vaccine Section).

2.3. Surveillance

Careful observation of exposed unimmunized or incompletely immunized household, childcare, or nursery contacts is essential. Exposed children who develop febrile illness should be evaluated immediately.

Vaccination:

Haemophilus influenzae type b (Hib) vaccination is recommended for children younger than 5 years old. Hib vaccination is only recommended for older children and adults under special situations. Additional information can be found here: https://www.cdc.gov/hi-disease/hcp/vaccine-recommendations/index.html

Management of Invasive H. influenzae, type b (Hib) Disease in Child Care Centers:

When two or more cases of invasive Hib disease have occurred within 60 days and unimmunized or incompletely immunized children attend the childcare facility or preschool, rifampin prophylaxis of all attendees (irrespective of their age and vaccine status) and childcare providers should be considered. In addition to these recommendations for chemoprophylaxis, unimmunized or incompletely immunized children should receive a dose of vaccine and should be scheduled for completion of the recommended age-specific immunization schedule. Data is insufficient regarding the risk of secondary transmission to recommend chemoprophylaxis for attendees and childcare providers when a single case of invasive Hib disease occurs. The decision to provide chemoprophylaxis in this situation is at the discretion of the NMDOH's medical epidemiologists.

References:

American Academy of Pediatrics. In: Kimberlin, DW, et al eds. Red Book: 2024-2027 Report of the Committee on Infectious Diseases. 33rd ed. Itasca, IL: American Academy of Pediatrics; 2024.

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hall E., Wodi A.P., Hamborsky J., et al., eds. 14th ed. Washington, D.C. Public Health Foundation, 2021.

CDC – Haemophilus influenzae Disease– Clinical Overview. https://www.cdc.gov/hi-disease/hcp/clinicians/. July 25, 2025.

CDC – Haemophilus influenzae Disease– Hib Vaccine Recommendations. https://www.cdc.gov/hi-disease/hcp/vaccine-recommendations/. July 25, 2025.

See *Haemophilus influenzae* Invasive Disease Fact Sheets (English) (Spanish).