

***Haemophilus influenzae* Type B Outbreak Control Guidelines**

Infectious agent

Bacteria: *Haemophilus influenzae* (*H. influenzae*)

- ◆ Type B (Hib) is one of six types, the most common type to cause invasive disease and the only one which is vaccine preventable.

Clinical manifestations

Vary depending on the site of infection.

Meningitis:

- ◆ Infection of the membranes covering the brain is the most common clinical syndrome.
- ◆ Symptoms include fever, decreased mental status, stiff neck and headache.
- ◆ Mortality rate is 2-5% even with appropriate antibiotics.
- ◆ Neurologic impairment occurs in 15-30% of survivors.

Bacteremia:

- ◆ The presence of bacteria in the bloodstream.
- ◆ Fever is the predominant symptom.
- ◆ If untreated can lead to sepsis and death.

Epiglottitis:

- ◆ Infection and swelling of the epiglottis which includes sudden onset of high fever, severe sore throat, drooling, inspiratory stridor, hoarseness and air hunger.
- ◆ May cause life-threatening airway obstruction.

Pneumonia:

- ◆ Infection of the lung.

Septic arthritis:

- ◆ Infection of a joint with fever, swelling, erythema, and tenderness.

Cellulitis:

- ◆ Infection of the skin with fever, erythema, and warmth of the affected area.

Other manifestations:

- ◆ Osteomyelitis, endocarditis and pericarditis also occur.

Complications

- ◆ Overall, the case fatality rate for invasive *H. influenzae* disease is 2-5% despite effective antibiotic therapy.

Incubation period

- ◆ Unknown

Period of communicability

- ◆ The contagious potential of invasive Hib disease is considered to be limited.
- ◆ Close contact with a case in household, daycare, or institutional settings, can lead to secondary transmission or outbreaks.

Transmission

- ◆ Hib does not survive in the environment or on inanimate objects.
- ◆ The primary mode of transmission is presumably by respiratory droplet spread.
- ◆ Humans are the only known reservoir.
- ◆ Asymptomatic carriage with transient nasopharyngeal colonization is frequent and may lead to transmission, except in immunized populations.

Basic epidemiology

- ◆ Hib disease occurs worldwide.
- ◆ Disease is most common in children under 5 years of age.
- ◆ In the U.S., Hib is seen more commonly in unvaccinated children or incompletely vaccinated children, the elderly, and immunocompromised individuals.
 - Before the introduction of effective vaccines, *H. influenzae* serotype b (Hib) was the cause of more than 95% of cases of invasive *H. influenzae* disease among children younger than 5 years of age. Hib was the leading cause of bacterial meningitis in the United States among children younger than 5 years of age and a major cause of other life-threatening invasive bacterial diseases in this age group.
 - Since the introduction of Hib polysaccharide and conjugate vaccines in 1985 and 1990, the incidence of invasive Hib disease in children less than 5 years of age has decreased by 99%, to less than 1 case per 100,000 in children younger than 5 years of age.

Case definition

Approved by CSTE 2015

Clinical description

Invasive disease caused by *H. influenzae* can produce any of several clinical syndromes, including meningitis, bacteremia, epiglottitis, pneumonia, septic arthritis, cellulitis, or purulent pericarditis; endocarditis and osteomyelitis occur less commonly.

Case Classification

Probable

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

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Confirmed

- ◆ Isolation of *Haemophilus influenzae* from a normally sterile body site (e.g., blood or CSF or, less commonly, joint, pleural, or pericardial fluid) which is then serotyped to identify type B, 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 PCR assay.

Note: Positive antigen detection tests from urine or serum samples are unreliable for diagnosis of *H. influenzae* disease. 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.

Testing and Diagnosis

- ◆ Confirmation of a case of Hib requires culturing and isolating the bacterium from a normally sterile body site.
 - Submit positive cultures to Wadsworth Center for confirmation and serotyping.
- ◆ Serotyping distinguishes encapsulated strains, including Hib, from unencapsulated strains which can not be typed (nontypeable).

Specimen collection

H. influenzae culture specimen collection

Collection kit

- ◆ Providers should contact individual laboratories to obtain the proper kits and instructions for obtaining the necessary specimen.
- ◆ Use a separate kit for each specimen and avoid taking kits apart.
- ◆ Carefully complete the history form, including the clinical information.

Specimen source

- ◆ Serum/whole blood, CSF, joint fluid, pleural and pericardial effusion, peritoneal fluid, subcutaneous tissue fluid, placenta and amniotic fluid are acceptable specimens.

Procedure

- ◆ Culture
 - Collect 3 separate samples in a 24 hour period as soon as possible after onset of symptoms.
 - Most hospital and commercial microbiology labs have the ability to isolate *H. influenzae*.
 - Avoid shipping on Fridays to Wadsworth Center for serotyping unless special arrangements are made to receive the specimen.

Case Investigation

Demographics

- ◆ Name
- ◆ Address
- ◆ DOB/age
- ◆ Occupation/Setting
- ◆ Race
- ◆ Ethnicity
- ◆ Gender
- ◆ Pregnancy status

Outcome

- ◆ Survived/did not survive

Reporting source

- ◆ Date reported
- ◆ Source
- ◆ Provider
- ◆ County

Clinical information

- ◆ Date of onset
- ◆ Type of infection caused by organism
- ◆ Underlying or associated illness
- ◆ Hospitalization

Laboratory results

- ◆ Laboratory name
- ◆ Date of specimen
- ◆ Date of first positive culture obtained
- ◆ Serotyping results
- ◆ Specimen source (blood, CSF, pleural fluid, peritoneal fluid, pericardial fluid, joint fluid, amniotic fluid)
- ◆ Antibiotic susceptibility

Treatment

- ◆ Medications given
- ◆ Duration of treatment
- ◆ Antibiotic susceptibility

Vaccine history

- ◆ Type
- ◆ Manufacturer
- ◆ Number of doses

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- ◆ Vaccination dates
- ◆ Lot numbers
- ◆ Reason if not vaccinated

Epidemiology

- ◆ Epidemiological link
- ◆ Transmission setting
- ◆ Outbreak association

Control measures

Observation

- ◆ Observation is essential for exposed household, childcare or nursery contacts, especially for unimmunized or incompletely immunized children.
- ◆ Exposed children in whom a febrile illness develops should receive prompt medical evaluation irrespective of Hib vaccination status.

Treatment and chemoprophylaxis

Index case

- ◆ Treatment of Hib disease with cefotaxime or ceftriaxone eradicates Hib colonization, eliminating the need for prophylaxis of the index case.
- ◆ Patients who are treated with meropenem, ampicillin, or chloramphenicol and are younger than 2 years of age or have susceptible household contacts should receive rifampin prophylaxis at the end of therapy for invasive infection.

Household contacts

- ◆ Household contacts are defined as persons residing with the index patient OR
- ◆ Nonresidents who cumulatively spent 4 or more hours with the index case for at least 5 of the 7 days prior to the day of hospital admission of the index case.
- ◆ Chemoprophylaxis is recommended when a person is a household contact of the index case as described above AND
 - There is a member of the contact's household who is:
 - Younger than 4 years of age and is unimmunized or incompletely immunized;
 - Younger than 12 months of age and has not received the complete primary series of Hib vaccine; OR
 - Is an immunocompromised child, regardless of the child's immunization status.
 - Chemoprophylaxis is recommended for the entire household.

Daycare/Nursery School contacts

- ◆ When two or more cases occur within a childcare setting within 60 days AND
- ◆ Unimmunized or incompletely immunized children attend the facility,
 - Rifampin should be considered for all attendees and staff.

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- If a single case occurs, chemoprophylaxis should be done on a case-by-case basis only.

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 to 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 nursery school and childcare contacts of 1 index case, especially those older than 2 years of age AND
- ◆ For pregnant women.

Rifampin chemoprophylaxis

- ◆ Medication is used to eliminate nasopharyngeal carriage of Hib.
- ◆ Duration of therapy for prophylaxis is 4 days.
- ◆ Dosage
 - Adults: 600 mg given once-a-day.
 - Neonates (<1 month): 10 mg / kg / day given once-a-day.
 - Children (>1 month of age): 20 mg / kg / day given once-a-day.
 - Maximum daily dose = 600 mg.
- ◆ Rifampin should be given as soon as possible to prevent secondary cases.
- ◆ Side effects may occur in 20% of recipients and include: nausea, vomiting, diarrhea, headache and dizziness.
- ◆ Rifampin temporarily interferes with the effectiveness of oral contraceptives.
- ◆ It will temporarily turn urine, tears and saliva an orange-red color, which can stain soft contact lenses and lens implants.

Immunization:

- ◆ In all instances, children under 5 years of age who are unimmunized or incompletely immunized against Hib disease should be given doses of Hib conjugate vaccine until their immunizations are up to date.
- ◆ Follow age-appropriate recommendations for immunization according to the childhood schedule or the catch-up schedule.

Reporting

- ◆ Submit a Confidential Case Report Form (DOH-389) and *Haemophilus influenzae* Supplemental Report.