

Section 2: *Haemophilus influenzae*, type B (HIB)

BASIC EPIDEMIOLOGY

Infectious Agent

Haemophilus influenzae (*H.flu*) is a small, gram-negative bacillus, a bacterium capable of causing a range of diseases including ear infections, [cellulitis](#) (soft tissue infection), upper respiratory infections, [pneumonia](#), and such serious invasive infections as meningitis with potential brain damage and epiglottitis with airway obstruction. There are at least six serotypes of *H. influenzae* (designated a-f) distinguished by their capsular antigens, as well as unencapsulated (nontypable) strains. *Haemophilus influenzae*, type B (HIB), however, often causes the most severe disease and is the only type which is preventable by vaccine. Despite its name, this bacterium has nothing to do with the influenza viruses. (Note also that it is spelled differently.)

Transmission

Haemophilus influenzae bacteria are found in the nose and throat, usually without causing symptoms, and are spread mainly by breathing, coughing and sneezing. *H.flu* is transmitted by direct contact with respiratory droplets and discharges from the nose and throat of infected/colonized persons.

Incubation Period

The incubation period is hard to define, because most persons who acquire *Haemophilus influenzae* infections are asymptotically colonized. Those who become ill following exposure to a case usually do so within 10 days, although the risk may be slightly elevated for up to 60 days.

Communicability

As long as the organism is present in discharges from the nose or throat. Communicability ends within 24 hours of initiation of appropriate chemoprophylaxis. Note, however, that treatment of invasive disease does not necessarily eradicate the organism from the nose/throat. Those exposed more than 7 days before onset of illness in the case are not at significantly increased risk. Hib cases are probably most infectious during the 3 days prior to onset of symptoms.

Clinical Illness

Disease can take many forms, including:

- Meningitis- brain swelling
- Bacteremia- blood infection
- Periorbital or other cellulitis- skin lesions

- Septic arthritis- joint infection
- Osteomyelitis- bone infection
- Pericarditis- infection of the sac around the heart
- Pneumonia- lung infection

Onset of symptoms is usually abrupt, and may include:

- Fever
- Headache
- Lethargy
- Anorexia
- Nausea
- Vomiting
- Irritability

Progressive stupor or coma is common with meningitis. Infections spread via the bloodstream after penetration of the mucous membranes of the nasopharynx. The exact mechanism allowing the penetration is unknown, but a recent upper respiratory tract infection may facilitate invasion. Recently, having a cochlear implant procedure has been identified as a possible risk factor for invasive disease. Asymptomatic carriage of Hib is not uncommon; in the pre-vaccine era the organism was recovered from the upper respiratory tract of 2–5% of healthy children. Thus, isolates from sputum or other not-normally-sterile sites are *not* indicative of invasive disease. Neonatal sepsis and non-invasive upper respiratory tract disease, including otitis media, sinusitis, and bronchitis are often caused by other, nonencapsulated strains (non-type b) of *H. influenzae*. These organisms are extremely common and can be recovered from the nasopharynx of 40% to 80% of healthy children.

DEFINITIONS

Clinical Case Definition

Haemophilus influenzae type b may produce any of several clinical syndromes. Only invasive manifestations, however, are reportable. These include meningitis, bacteremia/septicemia, epiglottitis, pericarditis, osteomyelitis, septic arthritis, and cellulitis.

Laboratory Confirmation

Isolation of *H. influenzae* b from a normally sterile site (e.g., blood, cerebrospinal fluid [CSF] or, less commonly, joint fluid, or pericardial fluid).

Note: *Haemophilus influenzae* that is not typed or is not type b is not reportable as *H. flu* type b. Serotyping of isolates can be performed at the DSHS laboratory.

Case Classifications

- **Confirmed:** A clinically compatible case that is culture confirmed and identified specifically as *H. influenzae* type b.

- **Probable:** A clinically compatible illness with detection of *Haemophilus influenzae* type b antigen in cerebrospinal fluid (CSF). (Antigen test results in urine or serum are unreliable for diagnosis of *H. influenzae* disease.)

CASE INVESTIGATION & TREATMENT

Control Measures

- Reports of invasive Hib disease should be investigated immediately.
- In households with a child younger than 12 months of age who has not received the three-dose primary series of Hib conjugate vaccine, all household members should receive rifampin prophylaxis.
- In households with at least one contact who is younger than 48 months of age and unvaccinated or incompletely vaccinated against Hib, rifampin prophylaxis is recommended for all household contacts regardless of age.
- In households with an immunocompromised child, even if the child is older than 48 months and fully vaccinated, all members of the household should receive rifampin because of the possibility that the vaccination may not have been effective.
- Chemoprophylaxis is not recommended for occupants of households that do not have children younger than 48 months of age (other than the index case) or when all household contacts 12 to 48 months of age are immunocompetent and have completed their Hib vaccination series.
- If a case of Hib disease occurs in a child-care facility, and a child <2 years of age has been exposed, all parents should be notified. All students and staff in the classroom where this case occurred should receive rifampin prophylaxis; however, rifampin is not necessary if ALL children <4 years of age are fully vaccinated.
- Hospital personnel exposed to a child with invasive Hib disease do not need prophylaxis.
- The recommended dose of rifampin is 20 mg/kg as a single daily dose (maximum daily dose 600 mg) for 4 days. Neonates (<1 month of age) should receive 10 mg/kg once daily for 4 days.
- Rifampin prophylaxis should be instituted as rapidly as possible.
- The index patient should also receive rifampin prophylaxis preferably just before hospital discharge.
- Children <24 months of age who have had invasive Hib disease (culture confirmed) should still receive Hib vaccine, since many children of that age fail to develop adequate immunity following natural disease.

Exclusion

Exclude all children with proven Hib infection until treatment is completed. Do not exclude exposed children and staff as long as they have no other reasons for exclusion.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements

Invasive Hib cases are required to be reported immediately to the local or regional health department or the Texas Department of State Health Services (DSHS), Infectious Disease Control Unit (IDCU) at **(800) 252-8239 or (512) 776-7676**. Conjunctivitis, otitis media, and bronchitis caused by *H. influenzae* are not invasive infections, and do not need to be reported.

Local and Regional Reporting and Follow-up Responsibilities

Immediately investigate any reported cases of invasive Hib. Facilitate the typing of untyped specimens as soon as possible. Identify and evaluate close contacts. Implement control measures and provide education to prevent further spread of disease. Investigation forms for invasive *Haemophilus influenzae* type b must be sent to DSHS IDCU. In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS IDCU. Records must be faxed within 30 days of initial report to **(512) 776-7616** or mailed to the following address:

Infectious Disease Control Unit,
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

Data Entry

The principle investigator (Local or Regional health department) is required to enter all Hib investigations with a confirmed or probable case status and submit notification in the NEDSS Base System (NBS) within 30 days of initial report. Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

LABORATORY PROCEDURES

SPECIFIC LABORATORY PROCEDURES

Although not required by law, serotyping of *H. flu* isolates is an important process. Only *H. flu* type b is reportable in Texas and is the only type that is preventable by vaccine. Serotyping of *H. flu* isolates allows us to understand the epidemiology of *H. flu* and how the vaccine has affected *H. flu* in Texas. The DSHS laboratory can perform serotyping for *H. flu* isolates collected from sterile sites. **DO NOT** submit isolates from sputum for serotyping.

Isolate submission

- Submit isolates of *H. influenzae* on chocolate agar slants (or media that has the necessary growth requirements for *Haemophilus*) at ambient temperature.
- Ship isolate to the DSHS laboratory via overnight delivery. The viability of the organism is short lived; therefore, isolate must arrive at the DSHS lab in Austin within 48 hours after subculture.

- If a delay of more than 48 hours in transport is anticipated, use a CO₂ generator bag.
- Use Specimen Submission form G-2B.

Specimen Shipping

- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

H. influenzae is considered an infectious agent, biosafety level 2. The isolate should be triple contained in accordance with federal regulations.

Causes for Rejection

- Discrepant or missing information between isolate and paperwork.
- Expired media used.