Section 4: Hepatitis B, Acute & Perinatal

BASIC EPIDEMIOLOGY

Infectious Agent
Hepatitis B virus (HBV) is the causative agent.

Transmission

- Transfusion of contaminated blood or blood products
- Sharing or reusing non-sterilized needles, syringes, razors, toothbrushes, manicure equipment, or any other items which may contain the blood or body fluid of an infected person
- Percutaneous or mucous membrane exposure to blood or body fluids of an infected person
- Sexual activity with an infected person
- Tattooing and/or body piercing
- Perinatally (either in utero or at delivery)

Incubation Period
The incubation period is 45–180 days with an average of 60–90 days.

Communicability
The blood of infected persons is infective many weeks before the onset of symptoms and remains infective through the acute clinical course of the disease and during the chronic carrier state, which may persist for life. The younger a person is when infected, the more likely it is he or she will become chronic disease carriers. Additionally, persons who are Hepatitis Be virus Antigen (HBeAg, also referred to as “little e antigen”) positive are highly infectious.

Clinical Illness
The clinical course of acute hepatitis B is indistinguishable from that of other types of acute viral hepatitis. Clinical signs and symptoms occur more often in adults than in infants or children, who usually have an asymptomatic acute course. However, approximately 50% of adults who have acute infections are asymptomatic.

The prodromal phase from initial symptoms to onset of jaundice usually lasts from 3 to l0 days. It is nonspecific and is characterized by a slow onset of malaise, anorexia, nausea, vomiting, right upper quadrant abdominal pain, fever, headache, myalgia, skin rashes, arthralgia and arthritis, and dark urine. The icteric phase is variable but usually lasts from l to 3 weeks and is characterized by jaundice, light or gray stools, hepatic tenderness and hepatomegaly (splenomegaly is less common). During convalescence, malaise and fatigue may persist for weeks or months, while jaundice, anorexia, and other symptoms disappear.

Most acute HBV infections in adults result in complete recovery with elimination of hepatitis B surface antigen (HBsAg) from the blood and the production of hepatitis B surface antibody (anti-HBs), creating immunity to future infection.

DEFINITIONS

Note: Refer to Table 1 for hepatitis B diagnostic test definitions and abbreviations and Table 2 for interpretation of hepatitis B serological tests.

Clinical Case Definition

- **Acute:** An acute illness with at least one of the following:
  - a) discrete onset of symptoms*, or
  - b) jaundice, or
  - c) elevated serum aminotransferase levels >100 IU/L.
- **Perinatal:** Perinatal hepatitis B in the newborn may range from asymptomatic to fulminant hepatitis.
- **Chronic:** Persons with chronic hepatitis B virus (HBV) infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer. Persons with chronic infection may be asymptomatic. **Please note that chronic hepatitis B is not a reportable condition in Texas.**

*A documented negative hepatitis B surface antigen (HBsAg) laboratory test result within 6 months prior to a positive test (either HBsAg, hepatitis H "e" antigen (HBeAg), or hepatitis B virus nucleic acid testing (HBV NAT) including genotype) result does not require an acute clinical presentation to meet the surveillance case definition.

Case Classifications and Laboratory Confirmation

- **Confirmed Acute:**
  - A case that meets the clinical case definition, is known not to have chronic hepatitis B** and also meets one of the following laboratory criteria:
    - IgM antibody to hepatitis B core antigen (anti-HBc IgM) positive, or
    - Hepatitis B surface antigen (HBsAg) positive

**A person should be considered chronically infected if the hepatitis B surface antigen (HBsAg) has been positive for 6 months or longer or if the patient has a history of chronic hepatitis B diagnosis.

Note: There is not a probable case status for Acute or Perinatal Hepatitis B.

- **Confirmed Perinatal:** HBsAg positivity in any infant 1-24 months of age who was born in the United States or in U.S. territories to an HBsAg-positive mother.

Note: A pregnant woman with hepatitis B should NOT be entered into NBS as a perinatal case. Perinatal cases must be 24 months of age or younger. Positive mothers with acute hepatitis B should be entered as acute cases. If a pregnant woman has chronic hepatitis B, she can be entered as a chronic case of hepatitis B, if the jurisdiction chooses to maintain a database of chronic hepatitis B patients.

SURVEILLANCE AND CASE INVESTIGATION

Acute hepatitis B surveillance is used to 1) identify contacts of case-patients who may require testing or prophylaxis; 2) detect outbreaks; 3) identify infected persons who need counseling and

referral for medical management; 4) monitor disease incidence and prevalence; and 5) determine the epidemiologic characteristics of infected persons, including the source of their infection, to assess and reduce missed opportunities for vaccination.

Getting the Most Out of Surveillance

- Provider education
  - Providers should be educated about the importance of performing appropriate serologic tests to determine the etiology of viral hepatitis and reporting all cases of acute and perinatal HBV. Providers are required by law to test pregnant women for hepatitis B.
  - Hospitals and infection control practitioners should be encouraged to report all persons with acute viral hepatitis (ICD-10 code B16), and all births to HBsAg-positive women. This is required by Texas Administrative Code.
- Case investigation
  - Case investigation is essential for determining contacts who are eligible for prophylaxis and for collection of risk factor data.
  - Analysis of risk factor data can identify populations where targeted interventions may be needed.
- Laboratory reporting
  - Laboratories should be encouraged to report all persons with serologic markers of acute or chronic hepatitis to the state or local health department.
    - Currently Texas receives over 50,000 hepatitis B laboratory results through NBS. At this time, only IgM antib-HBc and HbsAg results populate the "Documents Requiring Review" queue (where all electronic laboratory results first appear). All other hepatitis B laboratory results are automatically swept off that queue by the system. They are still stored in NBS and can be located by searching for a specific patient or by running a report for one or more specific laboratory result.
  - All IgM anti-HBc and HBsAg positive results should be reported.
  - To facilitate reporting, these laboratory results are included in the state's list of laboratory-reportable conditions.
- Monitoring surveillance indicators
  - Regular monitoring of surveillance indicators, including date of report, timeliness, and completeness of reporting, may identify specific areas of the surveillance and reporting system that need improvement. Important program indicators that can be monitored through the surveillance, reporting and case investigation system include the following:
    - Characteristics of cases of acute hepatitis B that occur in children and adolescents younger than 20 years of age and missed opportunities for vaccination.
    - Characteristics of cases of acute hepatitis in which death has occurred.
    - Characteristics of cases of acute hepatitis B in persons reporting a history of vaccination.
    - Characteristics of cases of acute hepatitis B in persons over 70 years of age.
    - Characteristics of cases of acute hepatitis B associated with healthcare transmission.
- Registries/databases for HBsAg-positive persons

- NBS can serve as a de facto chronic B registry and the positive hepatitis B results can be used to distinguish newly reported cases of infection from previously identified cases.

Information to Collect for Acute Hepatitis B

The following information is epidemiologically important to collect in a case investigation for acute hepatitis B. The CDC viral hepatitis form and the DSHS Hepatitis B case track include spaces to record most of this information. All information collected during investigation should be entered into NBS.

- Demographic information
- Clinical details
  - Date of illness onset
  - Symptoms, including jaundice
  - Hospitalization
  - Provider information
- Laboratory results
- Vaccination status
- Risk behaviors and exposures
  - Sexual
  - Drug use
  - Tattoos/piercings
  - Healthcare
    - Receipt of organs/blood products
    - Accidental needle stick
    - Medical/dental procedures
    - Hospitalization/resident in long term care facilities
  - Other blood exposure
  - Occupational
  - Incarceration
- Contact investigation and prophylaxis
  - Sexual contacts
  - Household contacts
  - Pregnancy status
  - Bloodborne exposures (e.g. recently donated blood or an organ)

Routine Case Investigation for Suspected Cases of Acute Hepatitis B

- Evaluate the diagnosis
  - Review laboratory tests
    - Identify all HBsAg+ and/or anti-Hep B IgM+ in NBS or received via fax
    - Check patient's name in NBS to see if patient has already been identified as a hepatitis B case or has previous (> 6 mos) positive lab results for hepatitis B.
      - If patient has a previous positive hep lab result or a hep B investigation, mark lab as reviewed. Share HBsAg+ results with the perinatal program for women 13-55.
  - Contact provider

- If patient is not identified as a chronic case, contact healthcare provider for additional laboratory and clinical information, and pregnancy status if age/gender appropriate.
    - If patient is pregnant, refer to perinatal program
    - If patient is not pregnant and the provider indicates the patient is a known chronic case OR the patient's clinical information is not consistent with acute hepatitis B, investigation can be closed.
        - Mark lab as reviewed in NBS OR
        - If an acute investigation was opened in NBS, close as "not a case" (and do not send a notification) OR
        - If desired and appropriate, enter the case in NBS as a chronic hep B case. Do not submit a notification.
    - If patient is identified as acute by provider or has a clinical presentation consistent with acute hepatitis B, continue investigation.
    - Contacting the provider can be done by fax, phone, e-mail or mail.
        - Some health departments find it useful to initiate contact with a form letter that the provider completes with information on pregnancy status, chronic status, and any additional liver test results.

Any woman that has a positive hepatitis B laboratory result AND is known to be pregnant must be referred to a perinatal hepatitis B program for case management. Any woman age 13-55 that has an unknown pregnancy status and a positive hepatitis B lab result should also be referred to a perinatal hepatitis B program for further investigation of pregnancy status.

- Interview the patient
    - Identify the Source of Infection
        - Obtain information on high risk behaviors, medical/dental/commercial procedures in 45-180 days prior to onset
            - Close contact with any household or sexual contact with acute or chronic hepatitis B infection
            - Receipt of blood transfusion or other blood products
            - History of dental or surgical care including renal dialysis
            - Blood exposure through needles, tattooing, piercing or acupuncture
            - Accidental exposure of skin, eyes, mucous membranes, or a wound to blood of another person
            - Work in occupational settings with elevated risk of exposures (e.g. medical, dental, or clinical laboratory work, or employment in facilities for mentally disabled persons)
            - Sexual contact with multiple sex partners or a sex partner with a risk factor
        - Possible sources should be pursued if additional exposures may be prevented (e.g. illegal tattooing, likely healthcare transmission, etc)
    - Identify Potentially Exposed Persons
        - Identify persons potentially exposed to the case during the communicable period

        - Household members
        - Sexual contacts
        - Needle-sharing contacts
        - Others potentially exposed to blood/sexual fluids
    - Evaluation special situations (see "Managing Special Situations" below)
        - If patient is a healthcare worker, evaluation potential for exposing patients.
        - If patient has recently donated blood/plasma, notify the blood bank.
        - If patient is pregnant, refer patient to perinatal program.
- Contact Investigation
    - Evaluate immunization and disease history of household and sexual contacts
        - **Susceptible:** persons who are not immune to HBV or who have not been appropriately vaccinated against HBV
        - **Protected:** persons with adequate antibody response (anti-HBs $\geq$ 10 milli-IUs/mL) due to vaccination or natural infection
        - **Primary non-responder:** persons who do not demonstrate adequate antibody response after three doses of hepatitis B vaccine
        - **Non-responder:** persons who have received two complete series of the hepatitis B vaccine but still do not demonstrate adequate antibody response
        - **Unknown:** persons whose anti-HBs status is unknown are always considered susceptible
    - Test or refer for testing as appropriate
    - Offer vaccine or refer to provider for vaccine, if susceptible (see Table 3)
        - Sexual contacts: Susceptible sexual partners should receive both a single dose of .06 mL/kg hepatitis B immune globulin (HBIG) and the first dose of hepatitis B vaccine at the same time and within 14 days of their last sexual contact. The remaining two doses of hepatitis B vaccine should be administered at one (1) and six (6) months from the date of the first vaccine. Sexual contacts whose immune status is unknown are considered susceptible.
        - Non-sexual household contacts: Infants who have not completed the three-dose hepatitis B vaccine series, and who have close contact with acutely infected primary care givers, should receive HBIG and complete the hepatitis B vaccine series. Other susceptible household contacts should begin the hepatitis B vaccine series, but HBIG is not indicated unless there has been an identified blood exposure such as the sharing of toothbrushes or razors. Contacts whose immune status is unknown should be considered susceptible.
    - Offer education on preventing hep B
    - Refer to prevention and/or treatment resources
- Follow-up
    - Refer acute cases to provider for follow up testing to establish resolution or carrier status
        - Offer education on reducing risk of further transmission
        - Refer to treatment
- Date entry (also see "Reporting and Data Entry Requirements" below)
    - Enter information into NBS within 30 days of initial report
        - Demographic

        - Clinical
        - Laboratory
        - Vaccination history
        - Risk factor/exposure information
    - Submit notification to Central Office
    - Fax or mail case track to Central Office (or regional office as appropriate)

Information to Collect for Perinatal Hepatitis B

The Texas Perinatal Hepatitis B Prevention Program has extensive information on diagnosis, case management, and follow-up of pregnant women with hepatitis B and their infants. Their program can be accessed at: http://www.dshs.state.tx.us/idcu/disease/hepatitis/hepatitis_b/perinatal/.

The information provided below is the information that is needed for perinatal hepatitis B surveillance information that is shared with the CDC via NBS.

- Demographic information
    - Infant
    - Mother
- Clinical details
    - Laboratory results for mother
    - Laboratory results for infant
- Vaccination
    - Dates
    - HBIG information
    - Was series given more than once

All information collected for perinatal hepatitis B investigations should be entered into NBS within 30 days of the report of a positive hepatitis B lab on the infant. Investigation forms (or a copy of the infant and mother's perinatal program case management forms) should be submitted to the Infectious Disease Control Unit.

MANAGING SPECIAL SITUATIONS

Positive Lab Results Received on a Child Under 4

All positive laboratory results indicative of hepatitis B infection in children under 4 should be investigated to ensure the child is not a case of perinatal hepatitis B.

1. Ascertain if additional laboratory results exist in NBS
2. Contact the submitting laboratory or provider to find additional laboratory results and information on the mother's hepatitis B status.
3. If mother is positive and child has acute or chronic infection, investigate as a potential perinatal case.

Case is a Health Care Worker (HCW)

If the case is a dentist, physician, nurse, or other health care worker (HCW) with potential for exposing patients by blood or other body fluids:

1. The HCW should be discouraged from working until the acute clinical illness has resolved;
2. Upon returning to work, special precautions should be practiced until the HCW is no longer infectious, including:

a. Wearing gloves for all procedures during which the hands will be in contact with the patients' mucosal surfaces or broken skin;
b. Avoiding situations involving sharps that could lead to exposures of susceptible individuals to blood or objects contaminated with blood of the case;
c. Careful and frequent hand washing.

Health Care Associated Infection is Suspected
If two or more iatrogenic (health care associated) cases occur in patients of the same dental or health care provider, residential care facility, or nonhospital health care facility (e.g. dialysis center); and the cases have no other identified plausible source of infection; or if other circumstances suggest the possibility of iatrogenic infection, notify Infectious Disease Control Unit (IDCU) at **(800) 252-8239 or (512) 776-7676**.

Case is a Recent Blood Donor
If the case has donated blood or plasma within the eight weeks prior to onset of symptoms, the agency that received the blood or plasma should be notified so that any unused product can be recalled.

Case is a Recent Transfusion Recipient
If transfused blood or blood products are suspected as the possible source of infection, the blood bank or other agency that provided the implicated lot should be notified so that aliquots of the blood still on hand (or the donors themselves) can be retested for HBsAg or tested for anti-HBc. Lot numbers for tracking are usually available through the blood bank at the hospital where the units were transfused.

Case is Pregnant or Has Recently Delivered
Preventing perinatal transmission is perhaps the most important part of case follow-up, and for this reason the Texas Department of State Health Services has an official Perinatal Hepatitis B Prevention Program for Texas. Please contact the program at **512-776-6535** or go to their website http://www.dshs.state.tx.us/idcu/disease/hepatitis/hepatitis_b/perinatal/ for more information or to refer a pregnant or recently delivered woman for evaluation.

Possible Common-Source Outbreaks
Report immediately to the Infectious Disease Control Unit (IDCU) at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements
Acute hepatitis B cases are required to be reported within one week. Perinatal hepatitis B cases are required to be reported within one work day 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**.

Local and Regional Reporting and Follow-up Responsibilities
Investigate any reported cases of acute or perinatal hepatitis B. Identify and evaluate close contacts. Implement control measures and provide education to prevent further spread of disease. Investigation forms for perinatal hepatitis B must be sent to DSHS IDCU. In the event of a death, please provide copies of the hospital discharge summary, death certificate, and autopsy report to DSHS. Records must be faxed within 30 days of initial report to **(512) 776-7676** 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

Note: HBsAg-positive pregnant women (acute and chronic infections) should also be reported to the Texas Department of State Health Services, Perinatal Hepatitis B Prevention Program at **(512) 776-6535**. For information on perinatal hepatitis B prevention activities, please refer to the Perinatal Hepatitis B Prevention Program Manual at http://www.dshs.state.tx.us/idcu/disease/hepatitis/hepatitis%5Fb/perinatal/manual/.

Data Entry

The principle investigator (Local or Regional health department) is required to enter all acute hepatitis B and perinatal hepatitis B investigations with a confirmed case status and submit notification in the NEDSS Base System (NBS) within 30 days of initial report. **Please do not submit notifications on chronic hepatitis B cases entered into NBS.** Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

LABORATORY PROCEDURES

Testing for hepatitis B is widely available from most private laboratories. If hepatitis B testing is needed through the DSHS State Laboratory, please contact the Infectious Disease Control Unit (IDCU) at **(800) 252-8239 or (512) 776-7676**.

For testing in regard to a possible perinatal case, please contact the Perinatal Hepatitis B program at **(512) 776-6535**.

TABLES

Table 1. Diagnostic Tests for Hepatitis B Virus (HBV) Antigens and Antibodies

Abbreviation	Marker	Use
HBsAg	Hepatitis B surface antigen	Detection of acutely or chronically infected persons; antigen used in hepatitis B vaccine
IgM Anti-HBc	M class immunoglobulin antibody to hepatitis B core antigen	Identification of acute or recent HBV infections (including HBsAg-negative persons during the "window" phase of infection)
Anti-HBc	Antibody to hepatitis B core antigen	Identification of persons with acute, resolved, or chronic HBV infection (not present after vaccination)
HBeAg	Hepatitis B e antigen	Identification of infected persons at increased risk for transmitting HBV
Anti-HBe	Antibody to Hepatitis B e antigen	Identification of infected person with lower risk for transmitting HBV

Source: American Academy of Pediatrics. Hepatitis B. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. *Red Book: 2006 Report of the Committee on Infectious Diseases.* 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006: 339.

Table 2. Interpretation of Hepatitis B Serological Tests and Health Department Response

Tests	Results	Interpretation	Health Department Response
HBsAg Anti-HBc Anti-HBs	Negative Negative Negative	Susceptible (Never infected or vaccinated)	Vaccinate or refer for vaccine if appropriate
HBsAg Anti-HBc Anti-HBs	Negative Negative Positive	Immune due to vaccination	No further action needed
HBsAg Anti-HBc Anti-HBs	Negative Positive Positive	Immune due to past infection	No further action needed
HBsAg Anti-HBc IgM anti-HBc Anti-HBs	Positive Positive Positive Negative	Acutely Infected	Initiate case investigation. If case is pregnant, refer to Perinatal hepatitis B program. Enter case into NBS if meets confirmed case status (no probable case status for acute hepatitis b).
HBsAg Anti-HBc IgM anti-HBc Anti-HBs	Positive Positive Negative Negative	Chronically Infected	Follow-up to determine if patient may be pregnant. If pregnant, refer case to Perinatal hepatitis B program. If case is chronic, it is not required to be reported. No NBS entry required. If entry is made, please do not submit notification.
HBsAg Anti-HBc Anti-HBs	Negative Positive Negative	Four interpretations possible*	Recommend patient follow-up with physician and/or recommend more testing be completed if applicable.

* 1. May be recovering from acute HBV infection.
2. May be distantly immune and test not sensitive enough to detect very low level of anti-HBs in serum
3. May be susceptible with a false positive anti-HBc.
4. May be undetectable level of HBsAg present in the serum and the person is actually a carrier.

Source: Adapted from Centers for Disease Control and Prevention (CDC).

Table 3. Postexposure Prophylaxis for Perinatal and Sexual Exposures

	HBIG		Vaccine	
Exposure	Dose	Recommended timing	Dose	Recommended timing
Perinatal	0.5 ml IM	Within 12 hours of birth	0.5 ml IM	Within 12 hours of birth
Sexual	0.06 ml/kg IM	Single dose ASAP, but not more than 14 days after last sexual contact	Administer age-appropriate hepatitis B vaccine series	First dose at same time as HBIG; but give in a different site

*For premature infants born to positive moms, be sure to contact Perinatal Hepatitis B Program.
**For age-specific doses, refer to current hepatitis B vaccine schedule .