

# HEPATITIS B

**Also known as:** Serum hepatitis, Australian antigen hepatitis, epidemic jaundice

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## **Responsibilities:**

**Hospital:** Report by IDSS, facsimile, phone, or mail

**Lab:** Report by IDSS, facsimile, phone, or mail

**Physician:** Report by facsimile, phone, or mail

**Local Public Health Agency (LPHA):** Follow-up is required. Report by IDSS, facsimile, phone, or mail

## **Iowa Department of Public Health**

**Disease Reporting Hotline: (800) 362-2736**

**Secure Fax: (515) 281-5698**

## **1) THE DISEASE AND ITS EPIDEMIOLOGY**

### **A. Agent**

Hepatitis B virus (HBV) is a small, double-shelled virus in the Hepadnaviridae family. The virus has a small circular DNA genome that is partially double-stranded. HBV contains numerous antigenic components, including HBsAg, hepatitis B core antigen (HBcAg), and hepatitis B e antigen (HBeAg).

### **B. Clinical Description**

Symptoms & Onset – The prodromal phase from initial symptoms to onset of jaundice usually lasts from 3 - 10 days. It is nonspecific and is characterized by insidious onset of malaise, anorexia, nausea, vomiting, right upper quadrant abdominal pain, fever, headache, myalgias, skin rashes, arthralgias and arthritis, and dark urine, beginning 1 to 2 days before the onset of jaundice. The jaundice phase is variable, but usually lasts from 1 - 3 weeks, 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. Less than 10% of children and approximately 30% of adults will experience jaundice.

Complications – Fulminant hepatitis occurs in about 1% - 2% of persons, with mortality rates of 63% - 93%. About 200 - 300 Americans die of fulminant disease each year. Although the consequences of acute HBV infection can be severe, most of the serious complications associated with HBV infection are due to chronic infection. Those that are chronically infected are infected for life and can pass the virus to others, even without symptoms. Approximately 10% of all acute HBV infections progress to chronic infection. As many as 90% of infants who acquire HBV infection from their mothers at birth become chronic carriers. Of children who become infected with HBV between 1 year and 5 years of age, 30% - 50% become chronic carriers. By adulthood, the risk of becoming a chronic carrier is decreased to 6% - 10%. Persons with chronic infection are often asymptomatic and may not be aware that they are infected, yet are capable of infecting others. Chronic infection is responsible for most HBV-related morbidity and mortality, including chronic hepatitis, cirrhosis, liver failure, and hepatocellular carcinoma. Chronic active hepatitis develops in more than 25% of chronic carriers, and often results in cirrhosis. An estimated 3,000 - 4,000 persons die of hepatitis B-related cirrhosis each year in the United States. Persons with chronic HBV infection are at 12 - 300 times higher risk of hepatocellular carcinoma than non-carriers. An estimated 1,000 - 1,500 die each year in the United States of hepatitis B-related liver cancer.

### **C. Reservoirs**

Humans are the only known reservoir.

### **D. Modes of Transmission**

Spread – HBV is transmitted by parenteral or mucosal exposure to HBsAg-positive body fluids from persons who are carriers or have acute HBV infection. The highest concentrations of the virus are in the blood and serum

fluids; lower titers are found in other fluids, such as saliva and semen. Saliva can be a vehicle of transmission through bites; however, other types of exposure to saliva, including kissing, are unlikely modes of transmission. There appears to be no transmission of HBV via tears, sweat, urine, stool, or droplet nuclei.

Person-to-person – In the United States, the most important route of transmission is by sexual contact, either heterosexual or homosexual, with an infected person. Fecal-oral transmission does not appear to occur. However, transmission among homosexual men occurs possibly via contamination from asymptomatic rectal mucosal lesions.

Direct percutaneous inoculation by needles during injection drug use is another mode of HBV transmission. Transmission of HBV may also occur by other percutaneous exposure, including tattooing, ear piercing, and acupuncture, as well as needle-sticks or other injuries from sharp instruments sustained by medical personnel. These encounters account for only a small proportion of reported cases in the United States. Breaks in the skin without overt needle puncture, such as fresh cutaneous scratches, abrasions, burns, or other lesions, may also serve as routes for entry.

Contamination of mucosal surfaces with infective serum or plasma may occur in the laboratory during mouth pipetting, or by eye splashes or other direct contact with mucous membranes of the eyes or mouth, such as hand-to-mouth or hand-to-eye when contaminated with infective blood or serum. Transfer of infective material to skin lesions or mucous membranes via inanimate environmental surfaces may occur by touching surfaces of various types of contaminated hospital equipment. Contamination of mucosal surfaces with infective secretions could also occur with contact of semen.

Perinatal transmission from mother to infant at birth is very efficient. If the mother is positive for both HBsAg and HBeAg, 70% - 90% of infants will become infected in the absence of postexposure prophylaxis. The risk of perinatal transmission is about 20% if the mother is positive only for HBsAg; up to 90% of these infected infants will become HBV carriers. An estimated 15% - 25% of these carriers will ultimately die at an early age of liver failure secondary to chronic active hepatitis, cirrhosis, or primary hepatocellular carcinoma.

## **E. Incubation period**

The incubation period of HBV infection is an average of 60 - 90 days, with a range of 45 - 180 days.

## **F. Period of Communicability or Infectious Period**

Persons with either acute or chronic HBV infection should be considered infectious any time that HBsAg is present in the blood. When symptoms are present in persons with acute HBV infection, HBsAg can be found in the blood and body fluids of infected persons for several weeks before and days, weeks, or months after the onset of symptoms. Persons who have chronic hepatitis B (known as carriers) will be positive for HBsAg and remain infectious indefinitely.

## **G. Epidemiology**

The frequency of infection and patterns of transmission vary in different parts of the world. Approximately 45% of the global population live in areas with a high prevalence of chronic HBV infection ( $\geq 8\%$  of the population is HBsAg-positive); 43% in areas with a moderate prevalence (2% to 7% of the population is HBsAg-positive); and 12% in areas with a low prevalence ( $< 2\%$  of the population is HBsAg-positive).

In China, Southeast Asia, most of Africa, most Pacific Islands, parts of the Middle East, and the Amazon Basin, 8% to 15% of the population carry the virus. The lifetime risk of HBV infection is greater than 60%, and most infections are acquired at birth or during early childhood, when the risk of developing chronic infections is greatest. In these areas, because most infections are asymptomatic, very little acute disease related to HBV occurs, but rates of chronic liver disease and liver cancer among adults are very high. In the United States, Western Europe, and Australia, HBV infection is a disease of low endemicity. Infection occurs primarily during adulthood, and only 0.1% to 0.5% of the population is chronically infected. Lifetime risk of HBV infection is less than 20% in low prevalence areas.

The incidence of reported hepatitis B in the U.S. peaked in the mid-1980s with about 26,000 cases reported each year. Reported cases have declined since that time and fell below 10,000 cases for the first time in 1996. In

1999, a provisional total of 6,495 cases were reported. The decline in cases during the 1980s and early 1990s is generally attributed to reduction of transmission among homosexual men and injection drug users as a result of HIV prevention.

Reported cases of HBV infection represent only a fraction of cases that actually occur. In 2013, a total of 3,050 cases of acute hepatitis B were reported to CDC, resulting from an estimated 29,764 new infections. Because many HBV infections are either asymptomatic or never reported, the actual number of new infections is estimated to be approximately tenfold higher. An estimated 800,000 to 1.4 million persons in the United States are chronically infected with HBV and an additional 5,000 – 8,000 persons become chronically infected each year.

**H. Bioterrorism Potential**

None

**2) DISEASE REPORTING AND CASE INVESTIGATION**

**A. Purpose of Surveillance and Reporting**

1. To identify sources/sites of transmission and to prevent spread from such sources.
2. To ensure identification of infected pregnant women and prevent perinatal transmission.

The following table contains selected hepatitis B serologic markers (what’s looked for in blood samples) and their definitions. These results help determine which phase of infection, resolution or immunity a person is in. These are results relevant to the reporting requirements.

Interpretation of the Hepatitis B Panel		
Tests	Results	Interpretation
HBsAg anti-HBc anti-HBs	negative negative negative	Susceptible
HBsAg anti-HBc anti-HBs	negative positive positive	Immune due to natural infection
HBsAg anti-HBc anti-HBs	negative negative positive	Immune due to hepatitis B vaccination**
HBsAg anti-HBc IgM anti-HBc anti-HBs	positive positive positive negative	Acutely infected
HBsAg anti-HBc IgM anti-HBc anti-HBs	positive positive negative negative	Chronically infected
HBsAg anti-HBc anti-HBs	negative positive negative	Four interpretations possible *

\* Four Interpretations:

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

\*\* Antibody response (anti-HBs) can be measured quantitatively or qualitatively. A protective antibody response is reported quantitatively as 10 or more milliinternational units ( $\geq 10$  mIU/mL) or qualitatively as positive. Post-vaccination testing should be completed 1-2 months after the third vaccine dose for results to be meaningful.

### Definitions

- **Hepatitis B Surface Antigen (HBsAg):** Present in acute and chronic cases and persists in chronic carriers. The presence of HBsAg indicates that the person is infectious. The body normally produces antibodies to HBsAg as part of the normal immune response to infection.
- **Hepatitis B Surface Antibody (anti-HBs):** The presence of anti-HBs is generally interpreted as indicating recovery and immunity from HBV infection. Anti-HBs also develop in a person who has been successfully vaccinated against hepatitis B.
- **Total Hepatitis B Core Antibody (anti-HBc):** Appears at the onset of symptoms in acute hepatitis B and persists for life. The presence of anti-HBc indicates previous or ongoing infection with hepatitis B virus (HBV) in an undefined time frame.
- **IgM Antibody to Hepatitis B Core Antigen (IgM anti-HBc):** This antibody appears during acute or recent HBV infection and is present for about 6 months. This is the best test to diagnose acute hepatitis B.

### Additional Tests

- **Hepatitis B e antigen (HBeAg):** This marker is used to identify persons infected with hepatitis B who are at increased risk for transmitting HBV. E antigen is seen transiently in most infections and persists indefinitely in some carriers.
- **Hepatitis B DNA:** May be ordered by a physician to determine the viral load in a patient. The test indicates infection with hepatitis B but does not distinguish between acute and chronic infection.

## B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available, the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515), 281-5698, mailing address:

IDPH, CADE  
Lucas State Office Building, 5<sup>th</sup> Floor  
321 E. 12<sup>th</sup> St.  
Des Moines, IA 50319-0075

*Note:* Healthcare providers, hospitals and laboratories are reminded to report all cases of HBsAg-positive pregnant women.

## C. Local Public Health Agency Follow-up Responsibilities

### Case Investigation

1. **Confirm the diagnosis.** Contact the patient's health care provider to verify the test result and interpretation. Also verify that the patient has been informed of his or her diagnosis. If a provider cannot be reached within 72 hours of the initial attempt to contact the provider, proceed with the investigation. Be

sure to inform the patient that you were unable to contact his/her provider and that additional follow-up with that provider may be needed to confirm the diagnosis and/or discuss treatment options.

- a. See the "Interpretation of the Hepatitis Panel" above for test result interpretation.
  - b. Acute cases of hepatitis B must have symptoms of hepatitis B to be counted as an acute case according to CDC case definitions (see Additional Information). If symptoms are not present then the case should still be investigated and reported to CADE.
  - c. Symptomatic reported cases without profile results may be considered confirmed cases when found to be epidemiologically related to an HBsAg-positive case within the previous 6 months of their onset (e.g., jaundiced IV drug user who relates sharing a needle with a case reported 3 months ago).
2. Complete a Hepatitis B case investigation (in IDSS) for all suspected or confirmed cases of hepatitis B.
  3. Make appropriate recommendations for prevention of transmission and identify contacts at risk. Efforts should be made to locate contacts and inform them of their exposure, making certain to maintain client confidentiality. Locating contacts who are at high risk of infection or who may have significant consequences (e.g., a sexual contact that is pregnant) is especially important. Language-specific materials can be found at [www.cdc.gov/hepatitis/Resources/PatientEdMaterials.htm](http://www.cdc.gov/hepatitis/Resources/PatientEdMaterials.htm)
  4. Make necessary interventions to stop transmission to others (e.g., blood banks must be notified if the case donated or received blood or blood products within the past 6 months, physicians of pregnant clients should be contacted to ensure proper follow-up of the newborn, etc.). If it appears that an outbreak may be occurring (i.e., two or more current cases with suspected common source), contact the Center for Acute Disease Epidemiology (CADE) at 800-362-2736.
  5. Many risk factors are common to hepatitis B and HIV, therefore clients who may also be at risk of HIV infection (e.g., IV drug users), should be tested for HIV. A list of current confidential HIV test sites is available through the HIV/AIDS/Hepatitis Program at (515) 281-6801 or [www.idph.state.ia.us/HivStdHep/HIV-AIDS.aspx?prog=Hiv&pg=HivPrev](http://www.idph.state.ia.us/HivStdHep/HIV-AIDS.aspx?prog=Hiv&pg=HivPrev)

### 3) CONTROLLING FURTHER SPREAD

#### A. Isolation and Quarantine Requirements

There are no isolation restrictions or quarantine requirements for patients with HBV, except for exclusion from organ and blood donation. Patients should also be provided with counseling to modify activities to prevent further transmission.

#### B. Protection of Contacts of a Case

**Immunization of contacts:** Products available for postexposure prophylaxis include hepatitis B immune globulin (HBIG) and hepatitis B vaccine.

1. **Infants born to HBsAg-positive mothers** should be treated as follows:
  - a. Give HBIG (0.5 ml IM) and hepatitis B vaccine (0.5ml IM) according to the following table.

Immunoprophylaxis of Infants Born to HBsAg-positive Mothers

Vaccine/HBIG Dose	Age
First hepatitis B vaccine	Birth (within 12 hours)
HBIG <sup>1</sup>	Birth (within 12 hours)
Second hepatitis B vaccine	1–2 months
Third hepatitis B vaccine	6 months

<sup>1</sup> Give HBIG (0.5ml IM) simultaneously with, but at a different site from, the first dose of hepatitis B vaccine.

- b. Screen the infant for HBsAg and anti-HBs 1 to 2 months and after the third dose of hepatitis B vaccine, when the child is at least 9 to 15 months of age, to monitor the success or failure of the immunization. If HBsAg is not present and anti-HBs antibody is present, children can be considered protected.
  - c. Infants who do not respond to the initial vaccine series (anti-HBs-negative) and are not HBsAg-positive should be given a second 3-dose series of hepatitis B vaccine (same schedule as initial series) and be re-screened at 1 to 2 months after the last dose.
  - d. Infants weighing less than 2,000 grams (4.4 lbs) should receive single-antigen hepatitis B vaccine (birth dose) and HBIG within 12 hours of birth, administered at different injection sites.
  - e. For preterm infant weighing less than 2,000 grams, the initial vaccine dose (birth dose) should not be counted as part of the vaccine series because of the potentially reduced immunogenicity of hepatitis B vaccine in these infants.
  - f. The second dose of HBV vaccine should be given when the infant is chronologically one month of age regardless of weight. The third dose should be administered one month following the second dose, and the fourth dose should be given six months following the second dose. Thus, a total of four doses of HBV vaccine are recommended in this circumstance.
  - g. **Infants who become HBsAg-positive** should be referred to a pediatric hepatologist for follow-up and the parents should be counseled. Since HBV infection is a reportable disease, the HBsAg-positive infant should be reported to Iowa Department of Public Health.
2. **Infants born to mothers whose HBsAg status is not known** should be treated as follows:
    - a. The hepatitis B vaccine should be given within 12 hours of birth while awaiting HBsAg test results on the mother. If the mother is determined to be positive, the infant should receive HBIG as soon as possible, within 7 days of birth. This child should then complete the 3-dose hepatitis B vaccination series according to the table in Section 3) B. The child should then be screened for HBsAg and anti-HBs at 9 to 15 months of age, as described in Section 3) B above.
    - b. If the mother is determined to be **HBsAg-negative**, the infant should complete the 3-dose hepatitis B vaccine series according to ACIP recommendations, as in chart above.
    - c. Infants weighing less than 2,000 grams (4.4 lbs) should receive hepatitis B vaccine (birth dose) and HBIG within 12 hours of birth if the mother's status is not determined within that timeframe.
  3. **Unvaccinated infants exposed to a primary caretaker with acute hepatitis B** should receive HBIG (0.5 mL) and should initiate and complete the 3-dose hepatitis B vaccine series according to the table above as soon as possible. Infants who have already started the vaccine series **do not** need HBIG, and should complete the vaccination series on schedule.
  4. **Sexual contacts of a person with acute hepatitis B**, if susceptible, should receive a single dose of HBIG (0.06 mL/kg), if the HBIG can be given within 14 days of the last sexual exposure. In addition, sexual contacts should initiate and complete a 3-dose series of hepatitis B vaccine according to the table in Section 3) D.
  5. **Sexual contacts of persons with chronic hepatitis B**, if susceptible, should initiate and complete the 3-dose series of hepatitis B vaccine according to the table in Section 3) D.
  6. **Nonsexual household contacts of a person with acute hepatitis B**, if susceptible, who have had a blood exposure to the index patient (such as sharing toothbrushes or razors) should receive a single dose of HBIG (0.06 mL/kg) and should initiate and complete the 3-dose series of hepatitis B vaccine according to the table in section 3) D. The 3-dose hepatitis B vaccination series should also be considered for contacts who do not have a blood exposure; children and adolescents, especially, should be vaccinated according to the table in Section 3) D.
  7. **All household contacts, including infants, of persons with chronic hepatitis B**, if susceptible, should initiate and complete the 3-dose series of hepatitis B vaccine according to the table in Sections 3) D.
  8. **Persons with percutaneous or mucous membrane exposures** to either an acute or chronic case, if susceptible, should receive postexposure prophylaxis according to the table below.

**Recommended Post-exposure Prophylaxis for Percutaneous or Permucosal Exposure to Hepatitis B Virus**

Vaccination status of <i>Exposed person</i>	Treatment when <i>source</i> is found to be:		
	HBsAg <sup>1</sup> -positive	HBsAg-negative	Unknown or not tested
Unvaccinated	Administer 1 dose of HBIG <sup>3</sup> and initiate hepatitis B vaccine series	Initiate hepatitis B vaccine series	Initiate hepatitis B vaccine series
Previously vaccinated: Known responder <sup>2</sup>	No treatment	No treatment	No treatment
Previously vaccinated: Known non-responder	2 doses of HBIG, or 1 dose of HBIG <b>and</b> initiate revaccination <sup>4</sup>	No treatment	If known high-risk source, treat as if source were HBsAg-positive
Previously vaccinated: Response unknown	Test exposed person for anti-HBs <sup>5</sup> <ul style="list-style-type: none"> <li>• If adequate, no treatment</li> <li>• If inadequate, 1 dose of HBIG <b>and</b> a vaccine booster dose<sup>6</sup></li> </ul>	No treatment	Test exposed person for anti-HBs <sup>5</sup> <ul style="list-style-type: none"> <li>• If adequate, no treatment</li> <li>• If inadequate, vaccine booster dose<sup>6</sup></li> </ul>

<sup>1</sup> Hepatitis B surface antigen.

<sup>2</sup> Responder is defined as a vaccinated person with adequate levels of serum antibody to HBsAg (*i.e.*, anti HBs > 10 mIU/mL).

<sup>3</sup> Hepatitis B immune globulin; dose 0.06 mL/kg, intramuscularly.

<sup>4</sup> Persons known not to have responded to a 3-dose vaccine series and to revaccination with 3 additional doses should be given 2 doses of HBIG (0.06 ml/kg), one dose as soon as possible after exposure and the second 1 month later.

<sup>5</sup> Adequate serum antibody response to hepatitis B surface antigen is  $\geq 10$  mIU/mL.

<sup>6</sup> The person should be evaluated for antibody response after the vaccine booster dose. For persons who received HBIG, anti-HBs testing should be done when passively acquired antibody from HBIG is no longer detectable (*e.g.*, 4–6 mo.); if they did not receive HBIG, anti-HBs testing should be done 1–2 months after the vaccine booster dose. If anti-HBs is found to be inadequate (< 10 mIU/mL) after the vaccine booster dose, 2 additional doses should be administered to complete a 3-dose revaccination series.

Table adapted from: American Academy of Pediatrics. *Red Book 2006: Report of the Committee on Infectious Diseases, 27<sup>th</sup> Edition*. Illinois, American Academy of Pediatrics, 2006:302.

**C. Managing Special Situations**

**1. School and Child care**

- a. The risk of transmission of HBV in school and child care settings has always been very low. This risk is now even lower because the proportion of susceptible children is decreasing as requirements for hepatitis B immunization for entry into kindergarten have been implemented. To prevent the transmission of hepatitis B and other bloodborne disease in these settings, however, the following guidelines should be followed:
- b. **Primary prevention:** Ensure compliance with all hepatitis B immunization requirements. Vaccination is also recommended for unvaccinated classmates of hepatitis B carriers who behave aggressively (*e.g.*, biting) or who have medical conditions, such as open skin lesions (*e.g.*, generalized dermatitis or bleeding problems), that increase the risk of exposing others to infectious blood or serous secretions.
- c. **Secondary prevention:** Persons exposed to potentially infectious blood or other body fluids should be treated according to the guidelines for "Postexposure Prophylaxis for Percutaneous or Permucosal Exposure to Hepatitis B Virus" outlined in the table above. However, in the case of a bite by a person whose hepatitis B status is unknown, it is unlikely that it will result in transmission and blood testing is not recommended for either biter or victim. The risk of HBV acquisition when a susceptible child bites an HBV carrier is not known. However, most experts would not give HBIG to the susceptible biting child who does not have oral mucosal disease when the amount of blood transferred is small.
- d. **Notification:** Parents may wish to inform the school nurse or child care program director about a child who is a known hepatitis B carrier to allow for proper precautions and assessment of behavior issues that could facilitate transmission. However, this is not necessary since policies and procedures to manage exposure to

blood or blood-containing materials should already be established and implemented. Parents of other children attending the school/child care **do not** need to be informed.

- e. **Exclusions:** Adults and children ill with acute hepatitis B should stay home until they feel well, and fever and jaundice are gone. There is no reason to exclude a person with hepatitis B from employment or attendance once they have recovered from acute infection. Admission of a known hepatitis B carrier with specific risk factors, such as biting, open rashes or sores that can't be covered or bleeding problems should be assessed on an individual basis by the child's doctor, school/child care and responsible public health authorities. Because these children pose a risk to others in child care, consideration may be given to exclusion from child care until the aggressive behavior ceases or until all contacts have been vaccinated. However, as the proportion of children who are immunized over time has increased, concern about bites and HBV transmission has also decreased.
- f. **Prevention Guidelines:** Whether or not individual hepatitis B carriers have been identified, it is important that school staff receive regular training on the prevention of bloodborne disease. Personnel should be educated about Standard Precautions for handling blood or blood-containing materials. All students should receive age-appropriate instruction regarding the potential dangers of contact with other people's blood and other body fluids. Some Standard Precautions include:
  - Follow all procedures for handwashing and cleanliness.
  - Always treat all blood as potentially dangerous fluid and observe universal precautions, including using disposable gloves when cleaning or removing blood or body fluid spills.
  - Do not permit sharing of personal items that may become contaminated with blood or body fluids, such as toothbrushes, eating utensils, etc.
  - Cover open skin lesions.
  - Place disposable items contaminated with blood or body fluids in plastic bags in covered containers.
  - Store contaminated clothing or washable items separately in plastic bag, and send them home with the owner for proper cleaning.
  - Wash and sanitize surfaces of contaminated objects with a dilute solution of 1/4 cup household bleach in 1 gallon of water (1:100 dilution) applied for at least 30 seconds, made up on a daily basis, or disinfect objects by boiling objects for 10 minutes.
  - Supervise closely to discourage and prevent aggressive behavior.
  - Provide age-appropriate education to adolescents and young adults about prevention of sexually transmitted diseases, including hepatitis B.

#### **D. Reported Incidence Is Higher than Usual/Outbreak Suspected**

If the number of reported cases in your city/town is higher than usual, or if an outbreak is suspected, investigate clustered cases in an area or institution to determine source of infection. If evidence indicates a common source, applicable preventive or control measures should be instituted. Consult with an epidemiologist at the Center for Acute Disease Epidemiology at (800) 362-2736 for assistance in investigation and the implementation and recommendation of other control measures.

#### **E. Preventive Measures**

General control and prevention measures include implementing all hepatitis B immunization requirements and recommendations, as described below.

1. **Pre-exposure Prophylaxis:** The Iowa Department of Public Health recommends hepatitis B vaccine for the following groups:
  - a. **Newborns**
    - i. All newborns should receive monovalent hepatitis B vaccine soon after birth and before hospital discharge.
    - ii. Following the birth dose, the hepatitis B series should be completed with either monovalent hepatitis B or a combination vaccine containing hepatitis B. The second dose should be administered at 1-2 months of age. The final dose should be administered at 6 months of age. Administering 4 doses of hepatitis B vaccine is permissible (e.g., when combination vaccines are administered after the birth dose).



**Routine Schedule for Infant Hepatitis B Vaccination**

Dose	Usual Age	Minimum Interval
1	Birth - 2 months	--
2	1-2 months	1 month
3	6 months	2 months <sup>1</sup> and 4 months from 1st dose

<sup>1</sup> Do not administer before 6 months of age

**b. Children and adolescents 18 years or younger**

- i. State Immunization Requirements: Hepatitis B vaccine is required for all children who enroll in kindergarten if born on or after July 1, 1994.

**c. Adults over 18 who are at risk**

- i. Adults at risk for HBV infection include:
  - People who have more than one sex partner in 6 months
  - Men who have sex with other men
  - Sex contacts of infected people
  - People who inject illegal drugs
  - People whose jobs expose them to human blood (The Occupational Safety and Health Administration (OSHA) of the US Department of Labor has issued a regulation requiring employers of workers at risk for occupational exposure to HBV to offer HBV immunization to these employees at the employer's expense)
  - Household contacts of persons with chronic HBV infection
  - Hemodialysis patients

**Routine Schedule for Adolescent & Adult Hepatitis B Vaccination**

Dose	Usual Interval	Minimum Interval
1	--	--
2	1 month	4 weeks
3	5 months	8 weeks *

**\*Third dose must be separated from first dose by at least 16 weeks**

- ii. Hepatitis B vaccine is produced by 2 manufacturers; both vaccines are available in pediatric and adult formulations.
  1. Birth through 19 years (pediatric formulation)
  2. Adults ( $\geq$  20 years of age) (adult formulation)
- iii. Doses given at less than the minimum intervals should not be counted as part of the vaccination series. Do not restart series, no matter how long since previous dose.
- iv. For adults and children with normal immune status, booster doses of vaccine are not recommended, nor are routine serologic testing to assess immune status of vaccinees indicated.

**4) ADDITIONAL INFORMATION**

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Hepatitis B can be found at: [www.cdc.gov/osels/ph\\_surveillance/nndss/phs/infdis.htm#top](http://www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top)

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

## References

- American Academy of Pediatrics. *2006 Red Book: Report of the Committee on Infectious Diseases, 27<sup>th</sup> Edition*. Illinois, American Academy of Pediatrics, 2006.
- CDC. A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2005; 54(RR16);1-23
- CDC. Immunization of Healthcare Workers: Recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR*. 1997; 46:RR-18
- Heymann, David L., ed., *Control of Communicable Diseases Manual, 20<sup>th</sup> Edition*. Washington, DC, American Public Health Association, 2015.
- Epidemiology and Prevention of Vaccine Preventable Diseases, Ninth Edition, January 2006, Department of Health and Human Services, Centers for Disease Control and Prevention.

## Resources

[www.cdc.gov/ncidod/diseases/hepatitis/b/index.htm](http://www.cdc.gov/ncidod/diseases/hepatitis/b/index.htm)