Hepatitis B

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify sources of infection and prevent further transmission from such sources.
2. To educate cases about transmission of hepatitis B and how to reduce the risk of transmission.
3. To identify contacts and recommend appropriate preventive measures.
4. To better understand the epidemiology of hepatitis B virus infection and the burden of morbidity from chronic infection.

B. Legal Reporting Requirements (See Appendix A)

1. Acute Hepatitis B

a. Health care providers: notifiable to local health jurisdiction within 3 work days

b. Hospitals: notifiable to local health jurisdiction within 3 work days

c. Laboratories: detection of viral antigen, antibody or nucleic acid notifiable on a monthly basis

d. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES) (206-418-5500) within 7 days of case investigation completion or summary information required within 21 days

2. Chronic Hepatitis B (initial diagnosis only)

a. Health care providers: notifiable to local health jurisdiction within one month

b. Hospitals: notifiable to local health jurisdiction within one month

c. Laboratories: detection of viral antigen, antibody or nucleic acid notifiable on a monthly basis

d. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Infectious Disease and Reproductive Health (IDRH) (866-917-4437) within 7 days of case investigation completion or summary information required within 21 days

3. Hepatitis B Surface Antigen Positive Pregnant Women (each pregnancy)

a. Health care providers: notifiable to local health jurisdiction within 3 work days

b. Hospitals: notifiable to local health jurisdiction within 3 work days

c. Laboratories: detection of viral antigen, antibody or nucleic acid notifiable on a monthly basis

d. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Immunization Program (360-236-3595) per the Perinatal Hepatitis B Prevention Program.

4. **Perinatal Hepatitis B**
    a. Health care providers: notifiable to local health jurisdiction within 3 work days of receiving confirming test result
    b. Hospitals: notifiable to local health jurisdiction within 3 work days of receiving test result
    c. Laboratories: detection of viral antigen, antibody or nucleic acid notifiable on a monthly basis
    d. Local health jurisdictions: notifiable to CDES (206-418-5500) and the Immunization Program (360-236-3595) within 7 days of case investigation completion or summary information required within 21 days

C. Local Health Jurisdiction Investigation Responsibilities

1. Acute hepatitis B
    a. Begin follow-up investigation within one working day.
    b. Recommend hepatitis B immune globulin (HBIG) and/or vaccine as indicated for susceptible contacts.
    c. Educate the case about hepatitis B and how to reduce the risk of transmission.
    d. Report all *confirmed* acute hepatitis B cases to CDES. Complete the case report form (http://www.doh.wa.gov/notify/forms/hepb.doc) and enter the data into the Public Health Issues Management System (PHIMS).
2. Chronic hepatitis B
    a. Report all *confirmed* and *probable* chronic hepatitis B cases to IDRH. Complete the case report form (http://www.doh.wa.gov/notify/forms/chronichepbc.doc) and enter the data into PHIMS.
    b. CDC recommends educating all persons with chronic hepatitis B regarding disease transmission and testing and vaccinating their contacts as described in Section 6 (based on MMWR 2008;57[RR-8]:12–15). If a local health jurisdiction does not have resources to investigate all persons with chronic infection, efforts should focus on women of child bearing age who might be pregnant and persons most likely to have a new diagnosis.
3. Hepatitis B surface antigen positive pregnant women and perinatal hepatitis B cases.
    a. Report all hepatitis B surface antigen positive pregnant women to the Immunization Program Perinatal Hepatitis B Prevention Program.
    b. Investigate pregnant woman if report is an initial diagnosis of an acute or chronic infection (see above).
    c. Track the pregnancy, ensure the infant is appropriately treated starting at birth, and test the infant at the appropriate time. See Section 7D for additional information.
    d. Report all infants who meet the case definition to the Immunization Program Perinatal Hepatitis B Prevention Program and enter the case into PHIMS as perinatal hepatitis B.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Hepatitis B virus (HBV) is a DNA virus in the Hepadnavididae family. It is one of several viruses known to cause hepatitis in humans. Hepatitis B virus is completely unrelated to the viruses that cause hepatitis A, C, D, and E.

B. Clinical Manifestations

Exposure to hepatitis B virus may result in transient or chronic infection, either of which can be asymptomatic. Onset of symptoms is usually insidious with loss of appetite, right upper quadrant abdominal discomfort, nausea and vomiting, fatigue, and sometimes arthralgias and rash, often progressing to jaundice. Liver enzyme levels may be markedly elevated. Fever may be absent or mild. Rarely, acute infections result in fulminant liver necrosis and death. Hepatitis B cannot be reliably distinguished clinically from hepatitis A, hepatitis C, or other viral hepatitides. Asymptomatic infections are the rule in young children, and are not uncommon even among adults. For this reason many people have serologic evidence of infection but do not recall a consistent illness.

Chronic infection greatly increases the risk of developing life-threatening sequelae (e.g., chronic active hepatitis, cirrhosis, or hepatic cancer) decades later. The likelihood of developing a chronic infection decreases with age at onset. Approximately 5% of acutely infected adults become chronically infected, compared with as many as 90% of perinatally infected infants.

C. Hepatitis B in Washington

In recent years, Department of Health received approximately 60–100 reports of acute hepatitis B and 1100–1200 reports of chronic hepatitis B per year. There is typically one death each year associated with fulminant acute hepatitis B virus infection.

The Immunization Program's Perinatal Hepatitis B Prevention Program follows approximately 380 hepatitis B surface antigen positive pregnant women per year and receives reports of approximately 2–6 cases of perinatal hepatitis B virus infections per year.

D. Reservoir

Infected humans. While relatively few infected persons develop chronic infections, they are probably the most important sources of hepatitis B virus transmission because they are infectious for many years, compared to the few weeks that people with resolved acute hepatitis B are infectious. Therefore efforts to identify persons with chronic infections and to offer prophylaxis to their contacts are at least as important as follow-up directed towards acute cases. Infected pregnant women particularly need follow-up so prompt treatment can be given to the newborns, who if untreated are at high risk of chronic infection if hepatitis B is transmitted perinatally.

E. Modes of Transmission

Hepatitis B virus is usually transmitted by contact with the blood, semen or vaginal secretions of an infected (HBV DNA- or HBsAg-positive) person. The virus must be introduced through broken skin or come into contact with mucous membranes for infection to occur. HBV may also be found at low levels in saliva and other body fluids;

breast feeding is *not* a significant route of transmission, however. Infection can occur with minor exposures, such as within a household, and often a specific exposure event cannot be determined.

Well documented modes of transmission include sharing of blood-contaminated objects (e.g., needles, razor blades), sexual contact, perinatal transmission, and less commonly blood or sexual fluid contact with broken skin or a mucosal surface (e.g., blood splash in the eye), receipt of blood products or organs, or blood-contaminated equipment or medication vials. Under some conditions, hepatitis B virus can remain viable on environmental surfaces for more than a week (e.g., in dried blood) but the contribution to disease transmission is unknown.

F. Incubation Period

Varies from 45 to 180 days—usually between 60 and 90 days.

G. Period of Communicability

A person is communicable during the time that HBsAg or HBV DNA is detectable in the blood. Viremia begins several weeks before the onset of symptoms and persists for several months if the infection resolves, or indefinitely for those who become chronically infected. Persistence of viremia is the same with asymptomatic infections.

H. Treatment

Treatment during an acute infection is generally supportive. Antiviral drugs are available for the treatment of chronic hepatitis B.

3. CASE DEFINITIONS

A. Acute Hepatitis B (2000)

1. Clinical case definition: An acute illness with a) discrete onset of symptoms **and** b) jaundice or elevated serum aminotransferase levels
2. Laboratory criteria for diagnosis: IgM antibody to hepatitis B core antigen (anti-HBc) positive **or** hepatitis B surface antigen (HBsAg) positive; IgM anti-HAV negative (if done)
3. Case classification

   Confirmed: a case that meets the clinical case definition and is laboratory confirmed

B. Chronic Hepatitis B (2007)

1. Clinical description: Persons with chronic 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.
2. Laboratory criteria for diagnosis
   - IgM antibodies to hepatitis B core antigen (anti-HBc) negative **and** a positive result on one of the following tests: hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), or hepatitis B virus (HBV) DNA

     OR

- HBsAg positive **or** HBV DNA positive **or** HBeAg positive two times at least 6 months apart. (Any combination of two positive tests performed 6 months apart is acceptable.)

3. Case classification

   Confirmed: a case that meets either laboratory criterion for diagnosis

   Probable: a case with a single HBsAg positive **or** HBV DNA positive **or** HBeAg positive lab result when no IgM anti-HBc results are available

4. Comment: Multiple laboratory tests indicative of chronic hepatitis B virus infection may be performed simultaneously on the same patient specimen as part of a "hepatitis panel". Testing performed in this manner may lead to seemingly discordant results, e.g., HBsAg-negative **and** HBV DNA-positive. For the purposes of this case definition, any positive result among the three laboratory tests mentioned above is acceptable, regardless of other testing results. Negative HBeAg results and HBV DNA levels below positive cutoff level do not confirm the absence of hepatitis B virus infection.

C. Hepatitis B Surface Antigen Positive Pregnant Women

1. Case classification

   Confirmed: Any pregnant woman who tests positive for hepatitis B surface antigen

2. Comment: Infants born to HBsAg-positive mothers should receive hepatitis B immune globulin (HBIG) and the first dose of hepatitis B vaccine within 12 hours of birth, followed by the second and third doses of vaccine at 1 and 6 months of age, respectively. Post-vaccination testing for HBsAg and anti-HBs (antibody to HBsAg) is recommended from 3 to 6 months following completion of the vaccine series (at 9 to 12 months of age). If HBIG and the initial dose of vaccine are delayed for >1 month after birth, testing for HBsAg may determine if the infant is already infected.

D. Perinatal Hepatitis B (1995)

1. Clinical case definition: Perinatal hepatitis B in the newborn may range from asymptomatic to fulminant hepatitis
2. Laboratory criteria for diagnosis: Hepatitis B surface antigen (HBsAg) positive
3. Case classification

   Confirmed: HBsAg positivity in any infant aged >1–24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother

4. Comment: Perinatal hepatitis B cases are reported to CDC in the year of diagnosis of the infant.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Laboratory Diagnosis

Acute and chronic hepatitis B are most commonly diagnosed by identifying certain antigens or antibodies in the blood. The serologic markers most commonly tested and the interpretation are shown in Table 1. The typical serologic course of acute hepatitis B with recovery and with progression to chronic HBV infection is shown in Figures 1 and 2. An explanation of the antigens/antibodies tested can be found in Appendix B.

Occasionally, in the later stages of acute clinical illness, a person will have neither HBsAg nor anti-HBs detectable in the blood. The person may still be infectious, however, for 1–2 weeks. During this so-called "window phase," the only positive serological test may be for core antibodies (anti-HBc).

Recently, newer molecular tests have been developed to detect HBV DNA in serum. These tests are primarily used in patients with chronic hepatitis B to determine candidacy for and response to antiviral therapies.

Table 1: Typical interpretation of serologic test results for hepatitis B virus infection

Serologic marker				
HBsAg	Total anti-HBc	IgM anti-HBc	Anti-HBs	Interpretation
–	–	–	–	Never infected; no immunity from vaccine
+*	–	–	–	Early acute infection; transient (up to 18 days) after vaccination
+	+	+	–	Acute infection
–	+	+	+ or –	Acute resolving infection
–	+	–	+	Recovered from past infection and immune
+	+	–	–	Chronic infection
–	+	–	–	False-positive (i.e., susceptible); past infection; "low-level" chronic infection;** or passive transfer of anti-HBc to infant born to HBsAg-positive mother
–	–	–	+	Immune if concentration is $\geq$ 10mIU/mL after vaccine series completion; passive transfer after hepatitis immune globulin administration

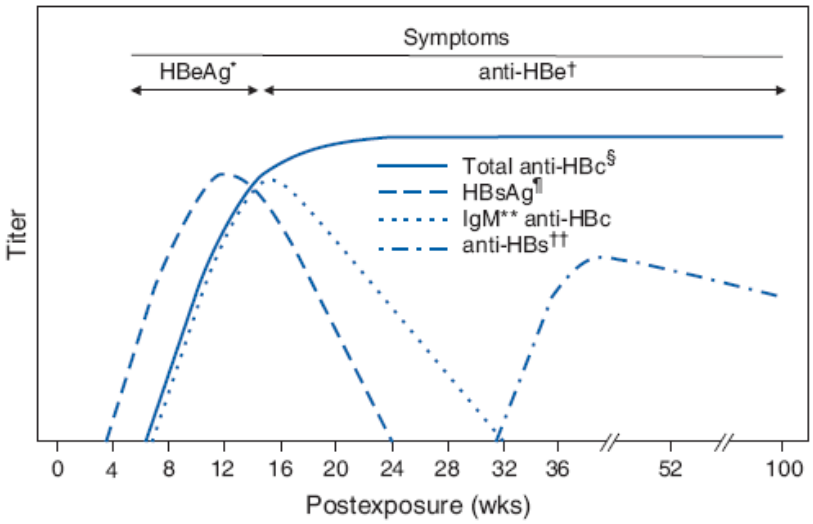
HBsAg = hepatitis B surface antigen; anti-HBc = antibody to hepatitis B core antigen; IgM = immunoglobulin M; anti-HBs = antibody to hepatitis B surface antigen; "–" = negative test result; "+" = positive test result

*To ensure that an HBsAg-positive test result is not a false-positive, samples with reactive HBsAg results should be tested with a licensed neutralizing confirmatory test if recommended in the manufacturer's package insert.

**Persons positive only for anti-HBc are unlikely to be infectious except under unusual circumstances in which they are the source for direct percutaneous exposure of susceptible recipients to large quantities of virus (e.g., blood transfusion or organ transplantation).

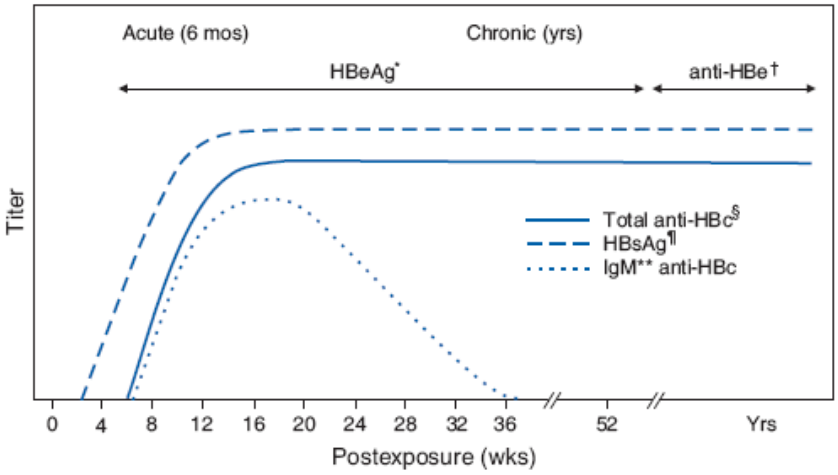
Source: MMWR 2006; 55(RR-16):4.

FIGURE 1. Typical serologic course of acute hepatitis B virus infection with recovery



* Hepatitis B e antigen.
† Antibody to HBeAg.
§ Antibody to hepatitis B core antigen.
¶ Hepatitis B surface antigen.
** Immunoglobulin M.
†† Antibody to HBsAg.

FIGURE 2. Typical serologic course of acute hepatitis B virus (HBV) infection with progression to chronic HBV infection



* Hepatitis B e antigen.
† Antibody to HBeAg.
§ Antibody to hepatitis B core antigen.
¶ Hepatitis B surface antigen.
** Immunoglobulin M.

Source: Centers for Disease Control and Prevention. Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis B Virus Infection. MMWR 2008;57(No. RR-8):1–20.

B. Tests Available at the Washington State Public Health Laboratories (PHL)

PHL does not perform serologic tests for hepatitis B, but tests are widely available at commercial laboratories. In certain circumstances, CDES may request a specimen from a case for molecular sequencing at the Centers for Disease Control and Prevention.

C. Specimen Collection

Serum can be collected from patients from the onset of symptoms.

5. ROUTINE CASE INVESTIGATION

A. Evaluate the Diagnosis

Review laboratory tests to distinguish between acute cases of hepatitis B and chronic infections.

1. Laboratory Evidence of Acute Infection (i.e., IgM anti-HBc positive):
   - Obtain information from the health care provider, hospital infection control staff, or patient to determine if the patient meets the acute hepatitis B case definition.
   - If the patient meets the acute hepatitis B case definition, proceed to Section 5B.
2. Laboratory Evidence of Confirmed Chronic Infection: (i.e., IgM anti-HBc negative and HBsAg positive or HBsAg or HBV DNA positive two times at least 6 months apart)
   - Check PHIMS and/or your other local hepatitis B registry to determine if the patient was previously reported as either acute or chronic hepatitis B. If the patient was previously reported as a confirmed chronic case, no further investigation is needed. If the patient was previously reported as only a probable chronic case and the new laboratory evidence indicated confirmed infection, update the case. If the patient was previously reported as an acute hepatitis B case and is confirmed to have a chronic infection, report the case as a confirmed chronic infection.
   - CDC recommends educating all persons with chronic hepatitis B regarding disease transmission and testing, and vaccinating their contacts as described in Section 6 (MMWR 2008;57[RR-8]:12–15). If a local health jurisdiction does not have resources to investigate all persons with chronic infection, efforts should focus on women of child bearing age who might be pregnant and persons most likely to have a new diagnosis.
   - If the patient was not previously reported, complete as much of the chronic hepatitis B form as is possible and enter the information into PHIMS as a confirmed chronic hepatitis B case.
3. Laboratory Evidence of Probable Chronic Infection: (i.e., HBsAg positive with no additional testing)
   - Check PHIMS and/or your other local hepatitis B registry to determine if the patient was previously reported as either acute or chronic hepatitis B. If the patient was previously reported as a chronic hepatitis B case, no further investigation is needed. If the patient was previously reported as an acute infection and now meets the chronic hepatitis B case definition, enter the case as a chronic infection.

- CDC recommends educating all HBsAg- or HBV DNA-positive persons regarding disease transmission and testing and vaccinating contacts as described in Section 6 (MMWR 2008;57[RR-8]:12–15). Local health jurisdictions should also encourage the provider to perform additional testing to confirm the diagnosis of chronic hepatitis B. If a local health jurisdiction does not have adequate resources to investigate all HBsAg-positive persons, efforts should focus on women of child bearing age who might be pregnant and persons most likely to have a new diagnosis.
- If the patient was not previously reported, complete as much of the chronic hepatitis B form as is possible and enter the information into PHIMS as a probable chronic hepatitis B case.

B. Identify the Source of Infection

For acute infections and those suspected to have been infected through medical, dental or commercial procedures, collect information about possible exposures, including high risk behaviors, during the period 45–180 days before the onset of illness. Particular emphasis should be placed on the 60–90 days before onset. Exposure information should include:

- Close contact with any household member, sexual partner or acquaintance with recent hepatitis or known to have a chronic infection (obtain names, phone numbers, and addresses).
- 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 exposure (e.g., medical, dental, or clinical laboratory work, or employment in facilities for mentally disabled persons).
- Sexual contact (homosexual or heterosexual) with multiple sex partners or a sex partner with a risk.

Identifying a specific source of infection for recently identified chronically infected persons may be difficult, if not impossible. Possible sources should be pursued if there is a good chance of identifying additional chronic hepatitis B infections or a preventable source. For example, if the carrier is a child, it would be reasonable to screen parents and other household members for evidence of infection. Likely health or dental care associated exposures should also be investigated.

C. Identify Potentially Exposed Persons

1. Identify persons potentially exposed to the case during the communicable period. These include household members, sexual contacts, and needle sharing contacts and others potentially exposed to blood or sexual fluids. See Section 6 below for additional information regarding contact management.
2. If the case is a dentist, surgeon, or other health care worker, evaluate the potential for exposing patients (see Section 7A).

3. If the case has recently donated blood or plasma, notify the blood bank so that any unused product can be recalled.
4. If the patient is pregnant, see Section 7D.

D. Environmental Evaluation

Usually none, unless transmission occurs in a child care center, dialysis center, or health care facility by means of environmental surfaces or inanimate objects.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

1. Hospitalized patients should be cared for using standard precautions. All health care providers with risk for blood exposure should complete the hepatitis B vaccine series.
2. Residential or child care restrictions: The risk of transmission of hepatitis B virus in the residential or child care setting is usually low, and can be reduced through sound infection control procedures and environmental cleanliness. Personal items that could be contaminated with blood or saliva should not be shared. Contaminated objects or surfaces should be cleaned and disinfected as soon as possible. The risk is greatest if the individual has an HBeAg-positive chronic infection, or has open skin lesions, demonstrates aggressive scratching or biting behavior, has a bleeding disorder, or manifests frank breaches of personal hygiene. Immunization is recommended for staff and patients in residential care settings with developmentally disabled patients. In situations involving child care, the health department should carefully evaluate the situation to determine whether or not exclusion of the child from child care or vaccination of classroom contacts is indicated.
3. Health care work restrictions: If the case is a health care worker with potential for exposing patients, see Section 7A.
4. Persons who are HBV DNA or HBsAg-positive should be instructed that their blood and other secretions (particularly semen and vaginal secretions) are infectious to others. They should be educated about ways to reduce the spread of their infection to others.
    - Surfaces contaminated with saliva and blood should be cleaned and properly disinfected.
    - Cuts and skin lesions should be kept covered.
    - Cases should not share items potentially contaminated with blood (e.g., needles, syringes, razors, toothbrushes).
    - Infected persons should not share hypodermic needles, syringes, or drug works with other people. Disposable needles should be used only once. As a last resort, undiluted household bleach can be used to clean syringes and needles. Active injection drug users should be directed to needle exchange programs and drug rehabilitation services.
    - Patients should be educated to practice abstinence, use barrier methods, or otherwise practice "safer" sex with potentially susceptible partners. Susceptible partners should be vaccinated against hepatitis B.

- Infected persons should not donate blood, plasma, tissue, organs or semen.
- HBsAg-positive persons who seek medical or dental care should notify involved personnel of their hepatitis B status.

5. Persons with acute hepatitis B should have a repeat test for HBV DNA or HBsAg 6 months after the first test to determine the clearance or continued presence of viremia. Those who continue to be HBV DNA-positive or HBsAg-positive are considered confirmed chronic infections, and should be counseled accordingly.
6. Persons with chronic hepatitis B should be educated to prevent their liver from further harm. They should:
   - See a provider with experience managing chronic hepatitis B.
   - Ask their provider about use of over-the-counter drugs (e.g., acetaminophen) that can damage the liver.
   - Stop behaviors that could result in transmission of hepatitis C virus.
   - Not drink alcohol.
   - Get vaccinated against hepatitis A if susceptible.
7. Pregnant or sexually active women who could become pregnant should be told about the risk of hepatitis B infection for newborns of infected mothers, and of the importance of prophylaxis for such newborns. If the woman is pregnant, see Section 7D.

B. Contact Management

1. Postexposure Prophylaxis

Passive immunization with HBIG and active vaccination with hepatitis B vaccine are both used to prevent infection in contacts of acute case and those newly exposed to a chronic case (e.g., needle stick injuries in health care providers or new sexual partner). For greatest effectiveness, prophylaxis should be given as soon as possible after exposure. The exposed person's prior history of hepatitis B infection, vaccination, and vaccine response status (if known) should always be considered, but treatment should not be unduly delayed while awaiting test results.

Postexposure prophylaxis is appropriate in the following situations:

- Perinatal exposure to HBV DNA or HBsAg-positive mother (see Section 7D)
- Nonoccupational exposure to a HBV DNA or HBsAg-positive individual through sexual contact or percutaneous/permucosal exposure to blood. For greatest effectiveness, prophylaxis should be given as soon as possible after exposure. There are no data to indicate that HBIG is of any value more than 7 days after a percutaneous exposure or 14 days after a sexual exposure. See Table 2.
- Occupational exposure to a HBV DNA or HBsAg-positive or potentially infected individual. For greatest effectiveness, prophylaxis should be give as soon as possible after exposure. There are no data to indicate that HBIG is of any value more than 7 days after a percutaneous exposure. See Table 3.

- Household exposure of an infant less than 12 months old to a primary care giver who has acute hepatitis B.

Table 2: Guidelines for postexposure prophylaxis* of persons with non-occupational exposure to blood or infected body fluids of a HBV DNA or HBsAg-positive individual

Vaccination status of exposed person	Treatment
Unvaccinated	HBIG[§] x 1 and initiate HB vaccine
Incomplete vaccine series	HBIG[§] x 1 and complete vaccine series
Written documentation of a completed series but antibody response unknown	Single vaccine booster dose

* When indicated, immunoprophylaxis should be initiated as soon as possible, preferably within 24 hours. Studies are limited on the maximum interval after exposure during which postexposure prophylaxis is effective, but the interval is unlikely to exceed 7 days for percutaneous exposures or 14 days for sexual exposures. The hepatitis B vaccine series should be completed.
[§] Hepatitis B immunoglobulin; dose is 0.06 ml/kg administered IM
Adapted from: MMWR 2006;55(RR-16):30.

Table 3: Recommended Postexposure Prophylaxis for Occupational Exposure to HBV

Vaccination and antibody status of exposed person*		Treatment		
		Source HBsAg Positive	*Source HBsAg Negative*	*Source unknown or not available for testing*
Unvaccinated		HBIG[§] x 1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Vaccinated	Known responder**	No treatment	No treatment	No treatment
	Known nonresponder[††]	HBIG x 1 and initiate revaccination or HBIG x 2[§§]	No treatment	If known high-risk source, treat as if source were HBsAg-positive
	Antibody response unknown	Test exposed person for anti-HBs - *If adequate*,** no treatment is necessary - *If inadequate*, [††] administer HBIG x 1 and vaccine booster	No treatment	Test exposed persons for anti-HBs - *If adequate*,** no treatment is necessary - *If inadequate*, [††] administer vaccine booster and recheck titer in 1-2 months

*Persons who have previously been infected with HBV are immune to reinfection and do not require postexposure prophylaxis
[§] Hepatitis B immunoglobulin; dose is 0.06 ml/kg administered IM
**A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs $\geq$ 10mIU/mL)
[††]A nonresponder is a person with inadequate response to vaccination (i.e., anti-HBs < 10mIU/mL)
[§§] The option of giving one doses of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second series but failed to respond, two doses of HBIG are preferred.
Source: MMWR 2001;50(RR-11):22

2. Contacts of Persons with Chronic Hepatitis B

Longstanding household, sexual and needle sharing contacts of persons with chronic hepatitis B should be tested for HBsAg and HBsAb if they are not known to be immune or infected. Vaccination can be started when testing is initiated if the contact is unlikely to return for results. If susceptible, they should complete the hepatitis B vaccine series. Contacts found to be HBsAg-positive should be evaluated as cases.

C. Environmental Measures

Ensure that surfaces and objects contaminated with blood are properly disinfected using gloves and appropriate disinfectant solutions

7. MANAGING SPECIAL SITUATIONS

A. Case is a Health Care Worker

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

1. The person should be discouraged from working until the acute clinical illness has resolved;
2. Upon return to work, special precautions should be practiced until the worker is no longer infectious, including:
   - Wearing gloves for all procedures during which the hands will be in contact with the patients' mucosal surfaces or broken skin;
   - Avoiding situations involving sharps that could lead to exposures of susceptibles to blood or objects contaminated with blood of the case;
   - Careful and frequent hand washing.
3. Chronically infected health care workers, particularly those who may be HBeAg-positive, should be encouraged to voluntarily seek confidential counseling from employee health services regarding risk reduction strategies, which evaluation would include a review of their practice by an expert panel.

B. Case is a Suspected Iatrogenic Infection

If a case underwent a medical or dental procedure and has no other identified plausible source of infection, contact the provider and review infection control procedures. Consider storing a blood specimen (if available) for genotyping in the event an additional case is identified with a potential shared exposure.

If two or more iatrogenic cases occur in patients of the same dental or health care provider, and the cases have no other identified plausible source of infection, or other circumstances suggesting the possibility of iatrogenic infection, notify Communicable Disease Epidemiology Section.

C. Testing Pregnant Women for Hepatitis B

All women should be tested early in each pregnancy for HBsAg. High-risk women who are HBsAg negative early in pregnancy should be tested late in pregnancy so that results are available at the time of delivery. Women who test positive for HBsAg should have a

complete hepatitis panel performed, receive educated about hepatitis B, and be enrolled in the Perinatal Hepatitis B Prevention Program.

D. Perinatal Hepatitis B Prevention Program (PHBPP)

Each state (and several of the U.S. territories) maintains a perinatal hepatitis B prevention program (PHBPP). In 1989, the Department of Health (DOH) received grant funds from CDC to establish such a program in Washington State. This program is part of the activities of the DOH Immunization Program / CHILD Profile. The goal of the PHBPP is to reduce the incidence of hepatitis B in infants born to infected (HBsAg positive) mothers by identifying HBsAg positive pregnant women and their household/sexual contacts and establishing an effective follow-up system to assure that each infant born to a HBsAg positive woman receives appropriate post-exposure prophylaxis and that susceptible contacts receive a 3-dose series of hepatitis B vaccine. Information about this program can be found at http://www.doh.wa.gov/cfh/Immunize/diseases/hepatitis_b/hep-b-perinatal.htm.

Each health jurisdiction in Washington should have an established local PHBPP and designated PHBPP coordinator. Pregnant women who test positive for HBV DNA or HBsAg should be enrolled in the Perinatal Hepatitis B Prevention Program during each pregnancy. The Immunization Program should be notified each time a woman is enrolled and informed when hepatitis B immunoglobulin (HBIG) and vaccine doses have been given to the infant. PHBPP guidance for local coordinators (including information regarding the management of premature infants) is available in DOH Perinatal Hepatitis B Prevention Program Manual which can be obtained by contacting the Immunization Program / CHILD Profile state PHBPP coordinator (http://www.doh.wa.gov/cfh/Immunize/immunization/contact.htm).

The key steps of the program are briefly summarized below:

1. Treat Infants at Birth with HBIG and Hepatitis B Vaccine

Within 12 hours of birth, infants of HBV DNA or HBsAg-positive mothers (including preterm and low birth weight infants) should have received hepatitis B immune globulin [HBIG] (0.5 ml IM) and, like all other newborns, the first dose in the hepatitis B vaccination series (0.5 ml IM). HBIG and vaccine can be given simultaneously, but should be administered at different body sites.

2. Complete Hepatitis B Vaccine Series

Full term infants should receive the second and third doses of vaccine at 1–2 months and 6 months of age. It is the local health jurisdiction's responsibility to encourage providers to adhere to this schedule as much as possible. In addition to the vaccine dose at birth, infants weighing <2 kg at birth should receive a full 3-dose hepatitis B vaccine series initiated at 1 month of age (4 doses of vaccine all together).

3. Test Infants

Perinatally-exposed infants should be tested for both anti-HBs and HBsAg 3–6 months following the last dose of vaccine (usually ~9–12 months of age). The presence of anti-HBs indicates immunity to hepatitis B. Hepatitis B-immunized children who do not show serologic evidence of immunity after the initial series

should repeat the 3-dose series. Children who don't respond to the receipt of 6 doses of vaccine probably never will.

The local PHBPP coordinator should notify the state PHBPP coordinator when children who have completed the appropriate immunization series are nevertheless HBsAg positive at the time post-immunization serologic testing is done. In addition, the child should be reported to the communicable disease section of the health jurisdiction so that they can be reported to Communicable Disease Epidemiology Section (CDES) and to CDC as perinatal hepatitis B cases.

8. ROUTINE PREVENTION

A. Immunization Recommendations

Hepatitis B vaccination is recommended for all infants and children ages 0–18 years old who have not been previously vaccinated. For infants the usual vaccine schedule includes a series of 3 vaccine doses administered at birth, 1–2 months, and 6–18 months.

Hepatitis B vaccination is also indicated for anyone at increased risk of infection because of lifestyle, medical history, occupation, or ongoing intimate contact with a chronically infected case.

Routine vaccination is recommended for the following persons, if susceptible:

- Persons at risk for infection by sexual exposure, particularly those with a sexually transmitted disease, those with more than one partner in the previous 6 months, men who have sex with men, and sexual contacts of infected persons;
- Injection-drug users;
- Household contacts of persons with chronic HBV infection;
- Developmentally disabled persons and staff in long-term and nonresidential child care facilities;
- Persons at risk for occupational exposure to hepatitis B virus, particularly health care workers;
- Hemodialysis patients;
- Persons with chronic liver disease;
- Inmates of correctional facilities;
- Travelers to HBV-endemic areas;
- HIV-positive persons;
- Infants/children of immigrants from areas with high rates of HBV infection;
- All other persons seeking protection from HBV infection (regardless of risk factors).

For additional information regarding vaccine scheduling, dosing, contraindications, and testing for seroconversion, please see:

Centers for Disease Control and Prevention. 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) Part 1: Immunization of infants, children and adolescents.

MMWR 2005; 54(RR-16):1–33. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5416a1.htm?s_cid=rr5416a1_e.

Centers for Disease Control and Prevention. 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) Part II: Immunization of adults. MMWR 2006; 55(RR-16):1–33. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5516a1.htm?s_cid=rr5516a1_e.

B. Routine Prevention (Source: http://www.cdc.gov/ncidod/diseases/hepatitis/b/fact.htm)

Provide the following information to persons at risk of infection:

- Hepatitis B vaccine is the best protection. Everybody should be vaccinated.
- If you are having sex, but not with one steady partner, use barrier methods correctly and every time you have sex. The efficacy of barrier methods in preventing infection with hepatitis B virus is unknown, but their proper use might reduce transmission.
- If you are pregnant, you should get a blood test for hepatitis B. Infants born to HBV-infected mothers should be given HBIG (hepatitis B immune globulin) and vaccine within 12 hours after birth.
- Do not shoot drugs; if you shoot drugs, stop and get into a treatment program; if you can't stop, never share drugs, needles, syringes, water, cleaning material, or "works", and also get vaccinated against hepatitis A.
- Do not share personal care items that might have blood on them (razors, toothbrushes).
- Consider the risks if you are thinking about getting a tattoo or body piercing. You might get infected if the tools have someone else's blood on them or if the artist or piercer does not follow good infection control practices.
- If you have or had hepatitis B, do not donate blood, organs, or tissue.
- If you are a health-care or public safety worker, get vaccinated against hepatitis B, and always follow routine barrier precautions and safely handle needles and other sharps.

ACKNOWLEDGEMENTS

This document is a revision of the Washington State Guidelines for Notifiable Condition Reporting and Surveillance published in 2002 which were originally based on the Control of Communicable Diseases Manual (CCDM), 17th Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format and select content of this document.

UPDATES

Appendix A: Hepatitis B Reporting Requirements

HEPATITIS B
REPORTING REQUIREMENTS
Washington State

	Health Care Providers	Hospitals	Laboratories	Department of Corrections	Local Health Jurisdictions
	Report to Local Health Jurisdiction	**Report to Local Health Jurisdiction**	**Report to Local Health Jurisdiction**	**Report to DOH -** locations listed below	**Report to DOH -** locations listed below
				Within 7 days of case investigation completion. or summary information required within 21 days	Within 7 days of case investigation completion, or summary information required within 21 days
Acute	Within 3 working days	Within 3 working days	Within 1 month	Communicable Disease Epidemiology	Communicable Disease Epidemiology
Pregnancy in HBV surface antigen + women, ***each*** pregnancy	Within 3 working days	Within 3 working days	Within 1 month	Immunization Program	Immunization Program
Perinatal Hepatitis B *	Within 3 working days of receiving test result	Within 3 working days of receiving test result	Within 1 month	Communicable Disease Epidemiology	Communicable Disease Epidemiology & Immunization Program
Chronic	Within 1 month	Within 1 month	Within 1 month	Infectious Disease & Reproductive Health	To DOH through PHIMS

* Perinatal Hepatitis B is defined as a child:
1) under 24 months of age
2) born to a Hepatitis B surface antigen positive (HBsAg+) mother
3) testing positive for HBsAg

* These infants are reported as acute Hepatitis B, even though most have no symptoms

DOH Infectious Disease and Reproductive Health
PO Box 47838
Olympia, WA 98504-7838
360-236-3440

DOH Communicable Disease Epidemiology
1610 NE 150th Street
Shoreline, WA 98155
206-418-5500
877-539-4344 (24 hr)

DOH Immunization Program
PO Box 47843
Olympia, WA 98504-7843
360-236-3595

Appendix B: GLOSSARY OF TERMS

ALT/AST: these are both liver enzymes classified as serum aminotransferases or transaminases and are useful indicators of liver damage. Alanine aminotransferase is usually abbreviated as ALT (or SGOT) and is particularly sensitive for assessing liver damage secondary to HCV. Aspartate aminotransferase is referred to as AST (or SGPT). In acute hepatitis A or B, an elevation in either one is required to meet the case definition, while the hepatitis C case definition requires an elevation in the ALT to over 400 IU/L.

Hepatitis A Testing

IgM anti-HAV: IgM antibody to HAV. Indicates acute infection with HAV.

Anti-HAV total: combined antibody to HAV including IgM with acute infection and IgG with long term protection.

Hepatitis B Testing

HBsAg: hepatitis B surface antigen, a marker of replicating virus. It occurs as part of acute infection and persists in chronic infection. Its presence indicates that the patient is considered to be infectious.

Anti-HBs: hepatitis B surface antibody. It demonstrates immunity through infection or vaccination.

IgM Anti-HBc: IgM antibody to hepatitis B core antigen, indicative of recent infection with hepatitis B virus. Antibody to core antigen only occurs following infection, not immunization.

Anti-HBc: total antibody to hepatitis B core antigen. This marker becomes positive at the onset of symptoms in acute hepatitis B then persists for life. Therefore, it does not distinguish between recent, past, or chronic infection.

HBeAg: hepatitis B e antigen, a core protein exported from infected liver cells and a marker of high levels of infectivity. Similar to HBsAg, it occurs (albeit transiently) as part of acute infection and may persist in chronic infections.

HBeAb: hepatitis B e antibody is produced by the immune system temporarily during acute HBV infection and may persist in chronic infections. Spontaneous conversion from e antigen to e antibody is a predictor of long-term clearance of HBV in patients undergoing antiviral therapy and indicates lower levels of HBV. Chronic hepatitis B surface antigen carriers can be positive for either HBeAg or anti-HBe, but are less infectious when anti-HBe is present.

Hepatitis B virus DNA: signifies active replication of the virus and indicates that the patient is infectious. It is usually measured to test for chronic infection, and the viral load may be used to decide whether treatment is warranted.

Hepatitis C

Anti-HCV EIA: enzyme immunoassay to measure HCV antibody. Indicates presence of antibody only and cannot be used to distinguish between recent and past infection. Additional testing is required to determine if the individual is chronically infected.

Signal-cutoff ratio: can be used to help determine the likelihood that a positive anti-HCV EIA represents a true positive. Each assay has a cut-off value that is considered a "positive" result; the signal-cutoff ratio can be calculated by dividing the optical density (OD) value of the sample being tested (e.g., the client's test result) by that particular assay's cut-off value. Each test kit or assay has a signal-cutoff ratio above which the client has a 95% probability of being HCV-positive and should be reported as a case.

RIBA: recombinant immunoblot assay, a more *specific* test for anti-HCV antibody (in other words, it's good for ruling out false positives). It is not as *sensitive* as the anti-HCV EIA and should not be used as an initial screening test, but it is useful for ruling out false-positive EIA tests.

PCR: polymerase chain reaction, used to measure HCV RNA and indicates active replication of the virus (e.g., the chronic carrier state). The qualitative PCR is more sensitive than the quantitative assay and is preferred for the initial test. The quantitative PCR is often used to guide initial treatment decisions and to follow the progress of individuals undergoing treatment.

HCV genotype: HCV can be divided into at least 6 different genotypes. Genotype 1 is the most common in the United States, accounting for 70–75% of infections. A positive genotype indicates the presence of HCV RNA.