

Contents

HEPATITIS B INFECTION.....	2
A. Etiologic Agent.....	2
B. Clinical Description.....	2
1) Acute HBV Infection.....	2
2) Chronic HBV Infection.....	2
C. Reservoirs.....	3
D. Modes of Transmission.....	3
E. Incubation Period.....	4
F. Period of Communicability or Infectious Period.....	4
HEPATITIS B SEROLOGY.....	4
HEPATITIS B EPIDEMIOLOGY.....	7
REPORTING CRITERIA.....	8
A. What to Report to the Colorado Department of Public Health and Environment (CDPHE) or local health agency.....	8
B. Purpose of Surveillance and Reporting.....	8
C. Important Phone Numbers and Web Resources.....	8
CASE INVESTIGATION.....	8
A. Case Investigation / Forms.....	9
1) Acute Hepatitis B:.....	9
2) Chronic Hepatitis B:.....	9
B. Identify and Evaluate Contacts:.....	9
C. Coordination with CDPHE Viral Hepatitis Program.....	10
D. Reported Incidence Is Higher than Usual/Outbreak Suspected.....	10
DISEASE CONTROL MEASURES.....	10
A. Prophylaxis.....	10
1) Hepatitis B Immune Globulin.....	10
2) Vaccination.....	10
B. Prevention Measures.....	11
1) Perinatal Hepatitis B Prevention.....	11
2) Screening High Risk Populations.....	11
3) Education and Counseling.....	12
C. Treatment.....	12
D. Managing Special Situations.....	13
1) Health-care Providers (HCPs).....	13
2) Inmates in Correctional Facilities.....	13
3) Dialysis Units.....	14
4) HIV-Infected Adults and Adolescents.....	14
5) Institutions and nonresidential day care facilities for developmentally disabled persons.....	14
6) Persons with Diabetes Mellitus (Type 1 and Type 2).....	15
7) Travelers to HBV-endemic regions.....	15
ENVIRONMENTAL MEASURES.....	16
REFERENCES.....	17

Hepatitis B

7-Day Reportable

HEPATITIS B INFECTION

A. Etiologic Agent

Hepatitis B virus (HBV) is a small, double-shelled virus in the Hepadnaviridae family. The virus has a circular, 42-nanometer, partially double stranded DNA genome; eight major genotypes have been identified. Following exposure in a susceptible person, HBV enters the liver – the primary site of viral replication – via the bloodstream. The virus contains numerous antigenic components, including hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBcAg), and hepatitis B e antigen (HBeAg). At room temperature HBV can remain viable on environmental surfaces for ≥ 7 days.

B. Clinical Description

HBV infection may result in acute or chronic disease, both of which can be asymptomatic. Infants and children aged <5 years and immunosuppressed adults with newly acquired HBV are typically asymptomatic, whereas 30-50% of children aged ≥ 5 years and adults have initial clinical signs and symptoms. When present, clinical signs or symptoms appearing during the preicteric or prodromal phase of infection (defined as the time from initial symptom onset to the appearance of jaundice, typically lasting 3-10 days) are nonspecific and may include anorexia, abdominal pain and discomfort, fatigue, nausea, vomiting, malaise, skin rashes, arthralgia, and arthritis. Liver enzyme levels are markedly elevated. Symptoms appearing during the icteric phase of infection, usually lasting from 1-3 weeks, include jaundice, light or gray stools, hepatic tenderness, and hepatomegaly. As convalescence begins, jaundice, anorexia, and other symptoms disappear, but malaise and fatigue may persist for weeks or months.

1) Acute HBV Infection

While most acute HBV infections in adults result in complete recovery and immunity, fulminant hepatitis (a severe and rapidly progressive form of hepatitis resulting in hepatic failure) occurs in about 1-2% of acutely infected persons. About 200-300 Americans die of fulminant disease each year (case fatality rate 63-93%). Although the consequences of acute HBV infection can be severe, most of the serious complications associated with HBV infection are due to chronic infection.

2) Chronic HBV Infection

Approximately 5% of all acute HBV infections progress to chronic infection, with the risk of chronic infection decreasing with age. Chronic infections occur in as many as 90% of infants who acquire HBV infection from their mothers at birth. This can involve continuing viral replication in the liver and persistent viremia. Of children who become infected with HBV between 1-5 years of age, 30-50% become chronically infected. By adulthood, the risk of acquiring chronic HBV infection is approximately 5%. Primary infections become chronic more frequently in adults who are immunosuppressed (e.g., hemodialysis patients and persons with HIV infections) and persons with diabetes.

Persons with chronic infection (carriers) are often asymptomatic but 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. Overall, approximately 25% of persons who become chronically infected in childhood and 15% of those who become chronically infected after childhood die prematurely from cirrhosis or liver cancer. An estimated 3,000-4,000 persons die of hepatitis B-related cirrhosis each year in the United States. Persons with chronic HBV

infection have a 12 to 300 times higher risk of hepatocellular carcinoma than noncarriers. An estimated 1,000-1,500 persons die each year in the United States of hepatitis B-related liver cancer.

C. Reservoirs

Humans are the only known reservoir for HBV.

D. Modes of Transmission

HBV is transmitted by parenteral or mucosal exposure to HBsAg-positive blood or body fluids from persons who are acutely or chronically infected. Although HBsAg has been detected in multiple body fluids, only serum, semen, and saliva have been associated with infection. The highest concentrations of virus are found in blood and serous fluids, while lower titers are found in other fluids. Saliva can be a vehicle of transmission through bites; however, other types of exposure, including kissing, are unlikely modes of transmission. There appears to be no transmission of HBV by tears, sweat, urine, stool, breastmilk, or droplet nuclei. Many hepatitis B cases report no known risk for transmission of the virus.

Sexual Transmission

In the US, the most important route of adult HBV transmission is by sexual contact, either heterosexual or homosexual, with an infected person. Risk factors associated with sexual transmission among heterosexuals include: having unprotected sex with an infected partner, having unprotected sex with more than one partner, and having a history of another sexually transmitted disease (STD). Risk factors associated with sexual transmission among men who have sex with men (MSM) include: sex with multiple partners, a history of another STD, and anal intercourse.

Percutaneous transmission: HBV is readily transmitted by needles during injection drug use and is an important mode of transmission among intravenous drug users (IDUs) in the US. The risk of transmission increases with the number of years of injection drug use, and is associated with the frequency of injection and the sharing of drug preparation equipment (e.g., cottons, cookers, and rinse water) independent of needle sharing.

Transmission of HBV can occur through other types of percutaneous exposure, including tattooing, body piercing, acupuncture, and injuries from sharp instruments sustained by medical personnel or accidental stick or puncture with a needle or other object contaminated with blood. Transmission occurs when sharps (needles) and/or the injection equipment or injectable preparation become contaminated. Such exposures account for only a small proportion of cases reported in the US. 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: Contamination of mucosal surfaces with infective serum or plasma may occur during mouth pipetting, eye splashes, or other direct contact with mucous of the eyes or mouth, such as hand-to-mouth or hand-to-eye contact when hands are contaminated with infective blood or serum. In addition, the hepatitis B virus can survive outside of the body at least 7 days and still be capable of causing infection.

Perinatal transmission: A mother can efficiently transmit the hepatitis B virus to her infant at birth. If the mother is positive for both HBsAg and HBeAg, 70-90% of infants will become infected without postexposure prophylaxis, and up to 90% of these infected infants will become chronically infected with HBV. New treatment protocols promote antiviral treatment of women with high viral loads during the third trimester. These treatments are intended to reduce the risk of perinatal transmission. The risk of perinatal transmission is <10% if the mother is positive for HBsAg only.

Person-Person: Person to person transmission can occur in nonsexual settings with interpersonal contact over a long period of time. In general, three conditions are necessary for person to person spread of hepatitis B. First, the infected person must be sufficiently viremic (i.e., have infectious virus circulating in the bloodstream). Second, the infected person must have an injury (e.g., a puncture wound) or a condition (e.g., nonintact skin) that allows exposure to his/her blood or other infectious body fluids. Third, the infected person's blood or infectious body fluid must come in direct contact with the exposed person's wound, traumatized tissue, mucous membranes, or similar portal of entry. Hepatitis B has been spread through household contact with a chronically infected person and among disabled persons living in long-term care facilities. The modes of transmission are unclear but are likely due to sharing personal items (e.g., razors, toothbrushes), contact with exudates from dermatologic lesions, or contact with HBsAg-contaminated surfaces.

Healthcare Related Exposures: Hepatitis B has been transmitted in healthcare settings. These events are rare and typically associated with lapses in infection-control practices. Exposures may involve an individual healthcare worker exposed to an infected patient or an infected healthcare worker that infects multiple people. It is critical that healthcare workers know whether or not they are infected with the hepatitis B virus or immune to it. See more under disease control measures.

E. Incubation Period

The average incubation period for HBV is 60 days (range: 40-90 days) from exposure to onset of abnormal serum alanine aminotransferase (ALT) levels and 90 days (range: 45-150 days) from exposure to onset of symptoms.

F. Period of Communicability or Infectious Period

A person is considered infectious as long as HBsAg is detectable in the blood. All HBsAg positive individuals are infectious. Persons with acute HBV who are symptomatic can have HBsAg in their blood and body fluids for 1-2 months before and after the onset of symptoms. Persons who have chronic HBV (carriers) remain infectious indefinitely. Persons with acute and chronic HBV with circulating HBeAg are more infectious than those who are HBeAg negative. Measurable levels of HBeAg are associated with higher levels of HBV replication.

HEPATITIS B SEROLOGY

- **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 indicates immunity from HBV infection. Anti-HBs develops in a person who has been successfully vaccinated against hepatitis B, or who has developed natural immunity by resolving a past infection.
- **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.
- **Hepatitis B total core antibody (anti-HBc):** This is a marker of current or past infection with the hepatitis B virus. If a person is positive for anti-HBc, the person will either continue to have a positive HBsAg or hepatitis B DNA (infection), or will develop immunity as detected with a hepatitis B antibody test (anti-HBs).
- **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.

Interpretation of Hepatitis B Serologic Tests		
Tests	Results	Interpretation
HBsAg anti-HBc anti-HBs	Negative Negative Negative	Susceptible
HBsAg anti-HBc anti-HBs	Negative Negative Positive with $\geq 10\text{mIU/mL}^*$	Immune due to vaccination
HBsAg anti-HBc anti-HBs	Negative Positive Positive	Immune due to natural infection
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**

*Postvaccination testing, when it is recommended, should be performed 1-2 months following dose #3.

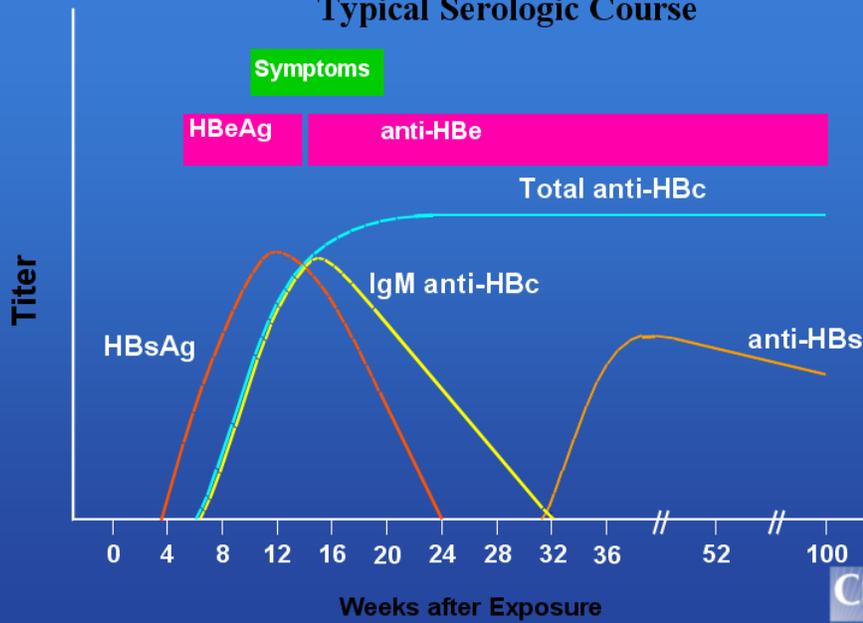
**1. Might be recovering from acute HBV infection.

2. Might be distantly immune and the test is not sensitive enough to detect a very low level of anti-HBs in serum.

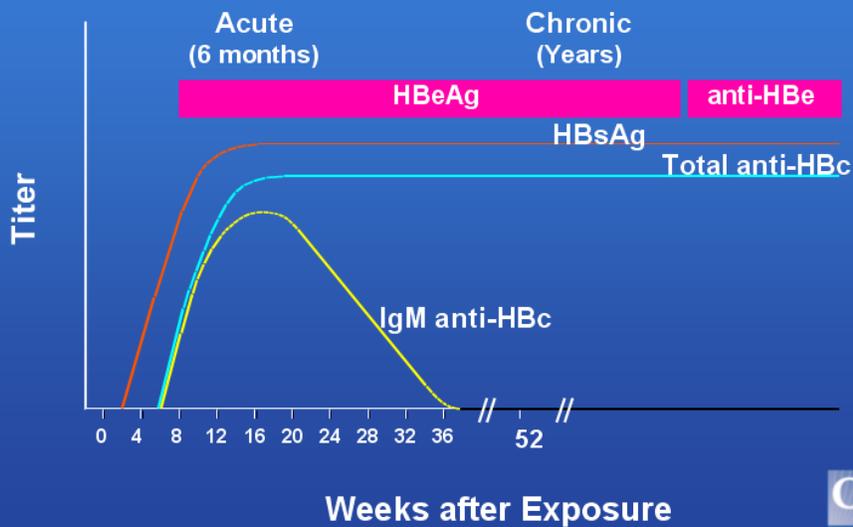
3. Might be susceptible with a false positive anti-HBc.

4. Might be chronically infected and have an undetectable level of HBsAg present in the serum.

Acute Hepatitis B Virus Infection with Recovery Typical Serologic Course



Progression to Chronic Hepatitis B Virus Infection Typical Serologic Course



HEPATITIS B EPIDEMIOLOGY

Geographic regions with high, intermediate and low hepatitis B virus infections



CDC Health Information for International Travel 2012

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

In the US, the incidence of acute HBV infection declined 75% from 1990-2004. The greatest decrease occurred among children and adolescents (94%), coincident with an increase in hepatitis B vaccine coverage. However, reported cases represent only a fraction of new HBV infections that actually occur. The CDC currently estimates that 800,000-1.4 million persons in the U.S. are chronically infected with HBV, and an additional 5,000-8,000 persons die from these infections each year.

Despite the declining incidence of acute HBV infection, the number of people living with chronic HBV infection in the US may be increasing as a result of immigration from highly endemic countries. Current estimates indicate that 40,000–45,000 people legally enter the US each year from HBV-endemic countries. Certain populations are at higher risk for chronic HBV infection, such as Asian-Pacific Islander Americans, who make up only 4.5% of the general US population but account for more than 50% of Americans living with chronic HBV infection.

Colorado Hepatitis B statistics are available on the CDPHE website:
[www. Hepatitiscolorado.info](http://www.Hepatitiscolorado.info)

REPORTING CRITERIA

A. What to Report to the Colorado Department of Public Health and Environment (CDPHE) or local health agency

- Any laboratory specimen diagnostic for hepatitis B within 7 days (confirmed positive HBsAg, IgM anti-HBc, HBeAg, or HBV DNA).
- Any suspected case of hepatitis B within 7 days, whether or not supporting laboratory data are available.
- To report a suspected case of hepatitis B, complete the [CDPHE Communicable Disease Reporting Form](#), available on the communicable disease or hepatitiscolorado.info website.

B. Purpose of Surveillance and Reporting

- To identify sources/sites of transmission and to prevent spread.
- To ensure identification of infected pregnant women and prevent perinatal transmission.
- To monitor trends in disease incidence in the vaccine era
- Monitor changing age-specific epidemiology
- Facilitate more timely disease control
- Guide future immunization policy

C. Important Phone Numbers and Web Resources

- CDPHE Viral Hepatitis Program
 - Phone: 303-692-2780
 - Fax: 303-759-5257
- [Colorado Department of Public Health and Environment, Communicable Disease Manual](#) (CD Manual)
- [Colorado Department of Public Health and Environment, Viral Hepatitis Program](#) (VHP) website

CASE INVESTIGATION

The CDPHE surveillance unit identifies hepatitis B cases by laboratory tests that are reported to CDPHE and imported by CDPHE staff into the Colorado Electronic Disease Reporting System (CEDRS). To determine whether or not the case should be classified as acute, chronic, or perinatal in CEDRS, the surveillance unit reviews the cases. As needed, staff follows up with the patient's medical provider(s) and laboratories to collect additional information about patient symptoms and any additional lab work (including liver function tests and other hepatitis A, B or C test results.) All information is included in the CEDRS record and available to the local health department in which the case resides. As described below, the CDPHE surveillance unit staff coordinates with local health agencies to conduct the case investigation.

Acute Hepatitis B: In January 2004, CDPHE's Viral Hepatitis Program (VHP) began more closely monitoring all reported acute hepatitis B cases. Once staff collects enough information on the case to meet the case definition, it will be assigned to a county. Staff from CDPHE and some local public health staff will attempt to interview and collect additional testing information on all reported acute cases.

Chronic Hepatitis B: The VHP conducts follow-up on all newly reported chronic hepatitis B cases. Additional information is collected from healthcare providers and laboratories to better define the case status, and complete demographic variables. Pregnancy status is ascertained for all reported female hepatitis B cases between the ages of 14-45.

Perinatal Hepatitis B: The VHP Perinatal Hepatitis B Prevention Project provides case management for all pregnant women with hepatitis B. This includes investigation of any cases of perinatal hepatitis B infection. For a more detailed description of the Perinatal Hepatitis B Prevention Program, go to our [website](#)

A. Case Investigation / Forms

1) Acute Hepatitis B:

- a) Conduct an interview using the [Acute Hepatitis B Questionnaire](#), which can be found on the VHP website (www.hepatitiscolorado.info). Local health agencies are encouraged to use the standard CDPHE investigation form for single cases.
- b) Investigation forms/questionnaires should collect the following information:
 - *Patient demographics (including address, date of birth, gender, ethnicity and race);*
 - *Clinical and diagnostic data;*
 - *Symptoms and onset date (if available);*
 - *Risk factors;*
 - *Hepatitis A and B vaccination history; and*
 - *Information on contacts.*
- c) Following the interview, complete the CEDRS record. **Fax a copy of the questionnaire to the VHP Epidemiologist at 303-759-5257.**

2) Chronic Hepatitis B:

The amount and type of follow-up for chronic hepatitis B varies.

a) For newly reported chronic hepatitis B cases:

CDPHE surveillance staff contacts the patient's medical provider to collect the patient's demographics, risk factors, symptoms, additional testing, and vaccination history for hepatitis A and B.

b) Hepatitis B cases among females age 14-45 years :

CDPHE surveillance staff sends a form to the patient's medical provider to ascertain pregnancy status, patient's knowledge of their positive result(s), demographic information, OB provider information, pregnancy information (gravida, para, EDD, and delivery hospital), and additional testing information. If the patient is not pregnant, her CEDRS record is updated with her current pregnancy status and the information received on the fax form.

c) For perinatal cases (cases <2 years of age and born in the U.S)

- i. Followed by either CDPHE surveillance staff or the Perinatal Hepatitis B Case Manager
- ii. To be entered into CEDRS as a perinatal HBV case.

B. Identify and Evaluate Contacts:

The goal of acute and chronic hepatitis B case follow-up is to prevent additional cases of infection among close contacts of the index case. When conducting an initial case investigation interview with the index case, obtain a list of the individual's close contacts (i.e., sexual partners, injection partners, household members).

- a) To evaluate the contacts of a suspected acute case of hepatitis B, refer all contacts for HBsAg and HBcIgM testing
- b) If the contact is positive for HBsAg and/or HBcIgM, begin an acute case investigation, and enter their information into CEDRS as a new case.
- c) If the contact is negative for HBsAg and HBcIgM, refer the contact for hepatitis B vaccination.
- d) Provide the VHP Epidemiologist with the following information for those contacts being tested: name, address, DOB, index's, CEDRS ID #, and approximate date when the contact intends to be tested.
- e) Provide contacts and HBV results
- f) Recommend HBV vaccine as necessary.

C. Coordination with CDPHE Viral Hepatitis Program

VHP Epidemiologist will review questionnaire and CEDRS data imputed by local health agencies to ensure accuracy of the data. VHP Epidemiologist will review case to ensure case meets the case definitions. Based on a review of the CEDRS case report, case interview questionnaire, and knowledge of other cases in the state, the VHP will monitoring any emerging trends or possible outbreaks.

D. Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of Hepatitis B cases reported are unusually high in a jurisdiction or if an outbreak is suspected, CDPHE in collaboration with local health agencies will investigate to determine the source of infection and mode of transmission. VHP staff will assist local health agencies with the investigation of outbreaks and determine a course of action to prevent further cases.

DISEASE CONTROL MEASURES

A. Prophylaxis

1) Hepatitis B Immune Globulin

The mainstay of HBV post-exposure prophylaxis (PEP) is hepatitis B vaccine, but, in certain circumstances, hepatitis B immune globulin (HBIG) is recommended in addition to vaccine. HBIG, prepared from human plasma known to contain a high titer of anti-HBs (at least 1:100,000) provides passively acquired anti-HBs and temporary protection (i.e., 3-6 months) when administered in standard doses. For nonresponders to hepatitis B vaccination, HBIG administered alone is the primary means of protection after an HBV exposure.

Additional resources – Occupational Exposures:

- [Postexposure Prophylaxis](#) – CDC webpage
- Updated U.S. Public Health Service Guidelines for the [Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis](#), *MMWR* 2001;56(RR-11):1-42

Additional resources – Nonoccupational Exposures:

- [Postexposure Prophylaxis to Prevent Hepatitis B Virus Infection](#), *MMWR* 2006;56(RR-16, Appendix B):30-31

2) Vaccination

Hepatitis B vaccines have been available in the United States since 1981, and are the central component of the CDC's comprehensive strategy to eliminate hepatitis B transmission in the United States. Current vaccine recommendations for hepatitis B are:

- Routine vaccination of all infants
- Vaccination of all children and adolescents through age 18 years
- Vaccination of adults at high risk for infection, including:
 - Adults at risk for sexual exposure – sexual partners of HBsAg-positive persons; sexually active persons not in a long-term, mutually monogamous relationship (persons with more than one sex partner during the previous 6 months); persons seeking treatment for a STD; and MSM;
 - Adults at risk for percutaneous or mucosal exposure to blood – current or recent IDU; household contacts of HBs-AG positive persons; residents and staff of facilities for developmentally disabled persons; healthcare and public safety workers with risk for exposure to blood or blood-contaminated fluids; persons with end-stage renal disease; and persons with diabetes mellitus (type 1 or type 2);
 - Other risk groups – international travelers to regions with high or intermediate level (HBsAg prevalence of 2% or higher) of endemic HBV infection; and persons with HIV infection.

- Complete vaccination schedules for infants, children, adults, and healthcare workers are available on the CDPHE Immunization Section website.

Additional resources:

- [Colorado Immunization Manual](#) – CDPHE website
- [A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Vaccine in the United States. Recommendations of the Advisory Committee on Immunization Practices \(ACIP\). Part I: Immunization of Infants, Children, and Adolescents](#), *MMWR* 2005;54(RR-16)
- [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)
- [Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis B Virus Infection](#), *MMWR* 2008;57(RR-8)
- [Recommendations of the Advisory Committee on Immunizations](#), *MMWR* 2011;60(RR05):1-60

B. Prevention Measures

Two goals of prevention are to stop the spread of the hepatitis B virus and to stop the ill effects of the infection. Prevention includes vaccination as described above. It also includes:

- Prenatal testing for pregnant women for HBsAg and appropriate immunoprophylaxis of infants at birth
- Screening high risk populations
- Education and Counseling

1) Perinatal Hepatitis B Prevention

The Perinatal Hepatitis B Prevention Unit at CDPHE exists to prevent the spread of the hepatitis B virus to newborn children and to any household and/or sexual contacts of a HBsAg-positive pregnant woman. The unit can provide:

- Hepatitis B education to HBsAg-positive pregnant women;
- Hepatitis B screening to household and/or sexual contacts of a HBsAg-positive pregnant woman;
- Hepatitis B vaccination to susceptible contacts of an HBsAg-positive pregnant woman;
- Clinical staff training on issues related to perinatal hepatitis B
- Patient education materials and services are provided in a variety of languages.

2) Screening High Risk Populations

The US Centers for Disease Control and Prevention (CDC), The Institute of Medicine (IOM), National Institutes for Health (NIH), and The U.S. Preventive Services Taskforce make recommendations for whom to screen for hepatitis B and C. Screening typically involves testing for hepatitis B infection (HBsAg) and/or hepatitis B immunity (anti-HBs). The following groups are recommended for hepatitis B screening:

- All pregnant women (IOM, CDC, NIH, USPSTF rating = A)
- Children born to hepatitis B infected mothers (NIH, IOM, CDC)
- Household contacts (NIH, CDC)
- Sexual contacts (NIH, CDC)
- People born in regions with high rates of HBV infection (NIH, IOM, CDC)
- Persons who have ever injected drugs not prescribed by a healthcare provider (NIH, IOM, CDC)
- Persons with multiple sexual partners (IOM, CDC)

- Persons with a history of sexually transmitted infections (IOM, CDC)
- Men who have sex with men (NIH, CDC)
- Inmates of correctional facilities (IOM, CDC)
- Persons with HIV (IOM, CDC)
- Healthcare workers at risk for percutaneous and permucosal exposures (CDC)

3) Education and Counseling

Education material is provided on the Viral Hepatitis Website: www.hepatitiscolorado.info

The educational and counseling messages change based on the person's risks and current infection status. For people who have risk but are not infected, important educational messages to remember are:

- Get vaccinated to prevent infection
- Practice safe sex (i.e. condom use)
- Do not sharing personal items (i.e. razor, toothbrushes, etc.)
- Do not sharing needles (i.e. piercing, tattooing, IVDU, etc.)
- Practice Infection Control Precautions

For people who are currently infected, important educational messages are:

- Consider vaccination for hepatitis A to prevent another assault on the liver.
- Practice safe sex (i.e. condom use)
- Do not sharing personal items (i.e. razor, toothbrushes, etc.)
- Do not sharing needles (i.e. piercing, tattooing, IVDU, etc.)
- Practice infection control precautions

For people that are infected, the following issues may be a concern:

- Chronic Infection: retest six months after the first positive hepatitis B tests to know whether or not you are chronically infected or have resolved your infection. If you are chronically infected, check-in with a specialist routinely to monitor liver disease.
- Persons with hepatitis B do not need to be restricted from work unless the person is involved in healthcare and their job requires invasive procedures. *See Managing Special Situations*
- Persons with hepatitis B do not need eat separately or use a separate bathroom.
- Children with hepatitis B do not need to be restricted from daycare or school.
- A person infected with hepatitis B is not required to disclose their hepatitis B infection to school officials or employers unless routine testing and/or vaccination is an established part of their workplace and complies with the Occupational Safety and Health Administration's Bloodborne Pathogen rules.

C. Treatment

Treatment is not available for acute HBV infections. The goals of treatment for chronic hepatitis B infection are to sustain suppression of HBV replication, normalize liver functions, prevent or delay progression of liver disease, and/or resolve infection.

All chronic cases should be referred to specialty care to assess the progression of their infection and whether or not they are a candidate for treatment. This is especially true for the following groups:

- Africans >20 years
- Asian men > 40 years
- Asian women >50 years
- Any carrier >40 years with persistently elevated ALT or DNA >2,000 IU/ml
- Stage 4 cirrhotic

- Family history of hepatocellular carcinoma

Hepatitis B treatment is complicated. Candidates must undergo specific assessments, and be strictly monitored over the course of several months of treatment. Several drugs are available to treat hepatitis B and many new ones are currently being studied.

D. Managing Special Situations

1) Health-care Providers (HCPs)

Because of their contact with patients or infective material from patients, many health-care providers (e.g., physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students laboratory technicians, hospital volunteers, and administrative staff) are at risk for exposure to and possible transmission of vaccine-preventable diseases, including hepatitis B. The Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC) therefore recommends that any medical facility or health department that provides direct patient care formulate a comprehensive immunization policy for all HCWs.

For hepatitis B, it is also important to test healthcare workers for immunity following vaccination. If the healthcare worker is not immune, he or she should be tested for infection. Healthcare workers should not be removed from work solely on the basis of a positive HBsAg tests. See the *Updated CDC Recommendations for the Management of Hepatitis B Virus-Infected Health-Care Providers and Students* (link provided below).

HCPs risk of exposure to hepatitis B depends on the tasks that they are performing. OSHA requires that employers have an exposure plan specific to their worksite(s). Healthcare workers exposed via needlestick or other exposure to HBsAg-positive material should be immediately referred to a physician to determine the need for hepatitis B immune globulin (HBIG) and to begin the vaccine series if they are not previously unvaccinated. The following resources are available to prevent and address workplace exposures to bloodborne pathogens such as hepatitis B:

If an investigation suggests that individuals were exposed to hepatitis B in a healthcare setting, CDPHE should be alerted and can assist with the investigation.

Additional Resources:

- [OSHA Bloodborne Pathogen Regulation 1910.1030\(f\)\(1\)\(1\)](#)
- [Tools for Protecting Healthcare Personnel – CDC website](#)
- [Sharps Injuries – CDC website](#)
- [Updated CDC Recommendations for the Management of Hepatitis B Virus-Infected Health-Care Providers and Students, MMWR 2012;61\(No.3\):1-16.](#)
- [Guidelines for Infection Control in Dental Health-Care Settings – 2003, MMWR 2003;53\(RR17\):1-61](#)

2) Inmates in Correctional Facilities

Adults in correctional facilities are at risk for HBV infection through sex with HBV-infected persons, injecting drug use, and sharing close living quarters with other inmates infected with HBV. Hepatitis B vaccination is recommended for adults in correctional settings because of their increased risk of infection, both inside and outside of prisons and jails. Specific recommendations to address HBV transmission among prison inmates have been developed at the Federal and State levels.

Additional Resources:

- [Correctional Facilities and Viral Hepatitis – CDC website](#)
- [Prevention and Control of Infections with Hepatitis Viruses in Correction Settings, MMWR 2003;52\(RR01\):1-33](#)
- [Preventative Health Care: Federal Bureau of Prisons Clinical Practice Guidelines](#)
- [Blood Pathogen Exposure Reduction, Colorado Department of Corrections Administrative Regulation 700-08](#)

3) Dialysis Units

Hepatitis B vaccine is recommended for all persons with end-stage renal disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients. Other recommendations specific to this population include

- Hepatitis B vaccination is recommended for pre-end-stage renal dialysis patients before they become dialysis dependent
- Higher hepatitis B vaccine doses are recommended for adult dialysis patients and other immunocompromised persons
- Serologic testing of hemodialysis patients and other immunocompromised persons is recommended 1-2 months after administration of the final dose of the primary vaccine series to determine the need for revaccination
- For hemodialysis patients, the need for hepatitis B vaccine booster doses should be assessed by annual testing for antibody to HBsAg; a booster dose should be administered when anti-HBs levels decline to <20 mIU/mL.

Additional Resources:

- [Hemodialysis and Viral Hepatitis – CDC website](#)
- [Recommendations for Preventing Transmission of Infections Among Chronic Hemodialysis Patients, MMWR 2001;50\(RR-5\)](#)

4) HIV-Infected Adults and Adolescents

HIV-1 infection is associated with increased risk for the development of chronic hepatitis B after HBV exposure. Limited data also indicate that HIV-1 patients co-infected with chronic hepatitis B infection have higher HBV DNA levels and are more likely to have detectable hepatitis B e antigen, accelerated loss of protective hepatitis B surface antibody, and an increased risk for liver-related mortality and morbidity. To address HBV and other opportunistic infections among HIV-infected adults and adolescents, the CDC recommends:

- All HIV infected persons should be tested for HBV
- Person should be tested for HBsAg, hepatitis B core antibody (anti-HBc), and hepatitis B surface antibody (anti-HBs), as this strategy will detect the majority of chronic hepatitis B and identify those who need vaccination
- Persons who are susceptible should be properly vaccinated
- Persons with chronic hepatitis B should have HBeAg and antibody to HBeAg (anti-HBe) tests, as well as an assessment of their liver to check the severity of liver disease
- Persons with persistent HBsAg, especially those in a high risk group, should be monitored every 6-12 months due to an increased risk of hepatocellular carcinomas

Additional resources:

- [Treating Opportunistic Infections Among HIV-Infected Adults and Adolescents, MMWR 2004;53\(RR15\):1-112](#)

5) Institutions and nonresidential day care facilities for developmentally disabled persons

Developmentally disabled persons in residential and nonresidential facilities have historically had high rates of HBV infection, but the prevalence of infection has declined substantially since the implementation of routine hepatitis B vaccination in these settings. Nonetheless, because HBsAg-positive persons reside in such facilities, clients and staff continue to be at risk for infection. The ACIP currently recommends:

- Hepatitis B vaccination for all residents and staff of facilities for persons with developmental disabilities
- Staff should practice infectious control precautions

6) Persons with Diabetes Mellitus (Type 1 and Type 2)

HBV can be transmitted by medical equipment that is contaminated with blood that is not visible to the unaided eye. Among adults with diabetes (type 1 or type 2), percutaneous exposures to HBV occurs as a result of assisted monitoring of blood glucose and other procedures involving instruments or parenteral treatments shared between persons. Lapses in infection control during assisted blood glucose monitoring leading to HBV transmission include: multi-patient use of finger stick devices designed for single-patient use, and inadequate disinfection and cleaning of blood glucose monitors between patients. Breaches have been documented in various settings, including long-term care (LTC) facilities, nursing homes, assisted living facilities, hospitals, community health centers, ambulatory surgical centers, private offices, homes, and health fairs. To prevent HBV transmission among adults diagnosed with diabetes, the Advisory Committee on Immunization Practices (ACIP) currently recommends:

- All previously unvaccinated adults aged 19 through 59 years with diabetes mellitus (type 1 and type 2) be vaccinated against hepatitis B as soon as possible after a diagnosis of diabetes is made (recommendation category A)
- Unvaccinated adults aged ≥ 60 years with diabetes may be vaccinated at the discretion of the treating clinician after assessing their risk and the likelihood of an adequate immune response to vaccination (recommendation category B).

Additional Resources:

- [Diabetes and Viral Hepatitis: Important Information on Glucose Monitoring – CDC website](#)
- [Use of Hepatitis B vaccination for adults with diabetes mellitus. Recommendations of the Advisory Committee on Immunization Practices \(ACIP\), *MMWR* 2011;60\(No50\):1709-11](#)

7) Travelers to HBV-endemic regions

Hepatitis B vaccination is recommended for all unvaccinated people traveling to areas with intermediate or high prevalence of chronic hepatitis B (HBsAg prevalence $\geq 2\%$). Ideally, vaccination should begin 6 months before travel so the full vaccine series can be completed before departure. Because some protection is provided by 1 or 2 doses, the vaccine series should be initiated, if indicated, even if it cannot be completed before departure. Recommendations for specific travel situations include:

- An accelerated vaccine schedule for Twinrix[®] (a combined hepatitis A and hepatitis B vaccine) was approved by the FDA in 2007. Those traveling to endemic areas at short notice and facing imminent exposure or for emergency responders to disaster areas.
 - Using the alternative 4-dose schedule, Twinrix[®] doses can be administered at 1, 7, and 21-30 days, followed by a dose at 12 months
- Pre-travel booster doses are not recommended for children and adults with normal immune status who received the recommended vaccine series.
- Serologic testing to assess antibody levels is not necessary for most fully vaccinated people.

Additional Resources:

- [International Travelers](#) – CPDHE website
- [Travelers' Health](#) – CDC website
- [The Yellow Book: CDC Health Information for International Travel 2012, Chapter 3 – Infectious Diseases Related to Travel](#), available on the CDC website

ENVIRONMENTAL MEASURES

Handwashing is critical to minimizing the spread of hepatitis B in the environment. To remove HBV from environmental surfaces, any blood spills – including dried blood, which can still be infectious – should be cleaned with germicides registered on the EPA Lists D and E (i.e., products with specific label claims for HIV or hepatitis B virus) in accordance with label instructions to decontaminate spills of blood and other body fluids. Glove should be worn when cleaning up any blood spills.

Additional Resources for Healthcare Facilities:

- [Guidelines for Hand Hygiene in Health-Care Settings: Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force](#), *MMWR* 2002;51(RR-16):1-56
- [Guidelines on Environmental Infection Control in Health-Care Facilities: Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee](#), *MMWR* 2003;52(RR-10):1-48

- a) If the patient does not clear the virus (6 months after infection), enter the patient into CEDRS as a chronic case and complete the extended record
- b) A [Hepatitis B Fact Sheet](#) is available on the CDPHE Viral Hepatitis Program website.

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