

HEPATITIS B
Acute, Chronic, and Delta
(Not Perinatal)

REPORTING INFORMATION

- **Class B (hepatitis B [including delta], not perinatal):** Report the case, suspected case and/or a positive laboratory result to the local public health department where the patient resides by the close of the next business day. If patient residence is unknown, report to the local public health department in which the reporting healthcare provider or laboratory is located.
- Health care providers and laboratories report using the following form(s) and/or mechanism: [Viral Hepatitis Case Report form, Ohio Confidential Reportable Disease form](#) (HEA 3334, rev. 5/2014), [Positive Laboratory Findings for Reportable Disease form](#) (HEA 3333, rev. 8/2005), Ohio Disease Reporting System (ODRS), electronic laboratory reporting, or telephone.
- Local public health departments report the case, suspected case and/or a positive laboratory result to the Ohio Department of Health (ODH) via ODRS by the end of the next business day. Information should not be mailed or faxed to ODH unless otherwise requested.
- Key fields for ODRS reporting include:
 - Patient Demographics
 - First and last name
 - Date of birth or age (including age type)
 - Sex
 - Race
 - Pregnant: enter current pregnancy status for all females 10-50 years of age who have labs indicating active chronic infection
 - Laboratory Information
 - Test name
 - Result (qualitative)
 - Numeric results
 - Reference range for numeric results
 - Organism does not need to be entered if the test is IgM anti-HBc, HBsAg, HBeAg, HBV DNA, or ALT (aminotransferase) as these tests do not identify the organism.
 - Clinical Information (For acute HBV)
 - Is patient symptomatic?
 - Symptom onset date
 - Was patient jaundiced?
 - Elevated ALT (enter in Laboratory Information)
 - Did Condition Resolve?
 - If yes, As of Date
 - Epidemiology Information - pay special attention to questions related to healthcare associated transmission (e.g., transfusion, dental work), drug use, tattooing and piercing, and incarceration
 - Vaccination Information – complete for those receiving vaccine
 - Pregnancy Information – this section is triggered by the Pregnant question in Person Demographics
 - Contact Information – complete as appropriate to track contact status
 - Travel History – complete as appropriate to track patient travel history

AGENTS

Hepatitis B is a 40-42 nanometer virus classified in the *Hepadnaviridae* family. It contains a circular, partially double-stranded DNA virus. Replication occurs primarily in the liver. There are ten HBV genotypes (A-J). Infection or immunization with one genotype generally confers immunity to all genotypes.

Hepatitis D (delta) virus is a defective single-stranded RNA virus that requires the helper function of the hepatitis B virus to replicate.

TEST NAME ABBREVIATIONS

ALT	Alanine aminotransferase
Anti-HBe	Antibody to hepatitis B e antigen
Anti-HBs	Antibody to hepatitis B surface antigen
Anti-HDV	Antibody to hepatitis D virus
HBeAg	Hepatitis B e antigen
HBsAg	Hepatitis B surface antigen
HBV DNA	Hepatitis B virus deoxyribonucleic acid
HDsAg	Hepatitis D surface antigen
HDV RNA	Hepatitis D ribonucleic acid
IgM anti-HAV	Immunoglobulin M (IgM) antibody to hepatitis A virus
IgM anti-HBc	IgM antibody to hepatitis B core antigen
IgM anti-HDV	IgM antibody to hepatitis D
NAT	Nucleic acid test
Total anti-HBc (IgM/IgG)	Combination of Immunoglobulin M (IgM) and Immunoglobulin G (IgG) antibodies to hepatitis B core antigen
Total anti-HDV	Combination of IgM and IgG antibodies to hepatitis D

CASE DEFINITION

Hepatitis B, Acute

Clinical Case Definition

An acute illness with a discrete onset of any sign or symptom* consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain) and either a) jaundice or b) elevated serum alanine aminotransferase (ALT) levels >100 IU/L.

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

Laboratory Criteria for Diagnosis

- HBsAg positive AND
- IgM anti-HBc positive (if done)

Case Classification

Confirmed: A person that meets the clinical case definition, is laboratory confirmed, and is not known to have chronic hepatitis B.

Hepatitis B, Chronic Clinical Description

No symptoms are required. Persons with chronic hepatitis B virus (HBV) infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer.

Laboratory Criteria for Diagnosis

- Immunoglobulin M antibodies to hepatitis B core antigen (IgM anti-HBc) negative AND a positive result on one of the following tests: hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), or nucleic acid test for hepatitis B virus DNA (including qualitative, quantitative and genotype testing), OR
- HBsAg positive or nucleic acid test for HBV DNA positive (including qualitative, quantitative, and genotype testing) or HBeAg positive two times at least six months apart. (Any combination of these tests performed six months apart is acceptable.)

Case Classification

Probable: A person with a single HBsAg positive or HBV DNA positive (including qualitative, quantitative and genotype testing) or HBeAg positive lab result and does not meet the case definition for acute hepatitis B.

Confirmed: A person who meets either of the above laboratory criteria for diagnosis.

Comments

Cases should be reported in the following manner:

- If a positive test result has a specimen collection date greater than six months after an acute specimen collection date, create a new ODRS record with a reportable condition of chronic hepatitis B for the new laboratory result.
 - Example: If the first positive laboratory result was collected on October 1, 2013 and the new positive laboratory result was collected on May 12, 2014, create a new ODRS record with a reportable condition of chronic hepatitis B for the 2014 laboratory result.
- If a positive test result has a specimen collection date less than six months after an acute specimen collection date, update the existing acute hepatitis B case with the new laboratory result.

Multiple laboratory tests indicative of chronic HBV 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 HBV infection.

If a person has an initial positive HBsAg that becomes negative within six months, and neither the HBeAg or the HBV DNA are positive, this is evidence of a resolved infection and the person will be verified as a confirmed acute case, regardless of the presence of symptoms or the IgM anti-HBc result (per guidance from CDC).

An anti-HBs positive test result indicates immunity to the hepatitis B virus due to vaccination or resolution of a previous hepatitis B infection. Test result may be added to the record of a previously reported case to indicate that the case has resolved.

Hepatitis D (delta hepatitis)

Clinical Description

Hepatitis D, also known as "delta hepatitis", is a serious liver disease caused by infection with the hepatitis D virus (HDV), which is an RNA virus structurally unrelated to hepatitis A, B, or C viruses. Hepatitis D, which can be acute or chronic, is uncommon in the United States. HDV is an incomplete virus that requires the helper function of HBV to replicate and

only occurs among people who are infected with HBV. HDV is transmitted through percutaneous or mucosal contact with infectious blood and can be acquired either as a coinfection with HBV or as superinfection in a person who is already infected with HBV.

Laboratory Criteria for Diagnosis

- Meet the case definition for either acute or chronic hepatitis B AND
- One of the following tests positive for hepatitis D:
 - Total Anti-HDV positive OR
 - IgM anti-HDV positive OR
 - HDV RNA OR
 - HDsAg

Case Classification

Probable or Confirmed: Case classification for a hepatitis D virus case that is laboratory confirmed will follow the case classification designated for the associated hepatitis B virus case.

HEPATITIS B

SIGNS AND SYMPTOMS

The onset of acute hepatitis B is generally insidious. Clinical signs and symptoms include various combinations of fever, fatigue, anorexia, malaise, nausea, vomiting, abdominal pain, dark urine, clay-colored stools, and jaundice. Skin rashes, arthralgia, and arthritis can also occur. Symptoms of acute hepatitis B vary by age. Most children less than 5 years of age and newly infected, immunosuppressed adults are asymptomatic. In adults, approximately half of newly acquired HBV infections are symptomatic. Symptoms begin an average of 90 days (range: 60–150 days) after exposure to the virus. Disease is more severe among persons older than 60 years of age. Approximately one percent of reported cases result in acute liver failure and death.

Persons with chronic HBV infection might be asymptomatic, have no evidence of liver disease, or have a spectrum of disease ranging from chronic hepatitis to cirrhosis or hepatocellular carcinoma (a type of liver cancer). Most chronic hepatitis B virus carriers are asymptomatic. Approximately 25% of those who become chronically infected during childhood and 15% of those who become chronically infected after childhood die prematurely from cirrhosis or liver cancer, and the majority remain asymptomatic until onset of cirrhosis or end-stage liver disease. In the United States, chronic HBV infection results in an estimated 2,000-4,000 deaths per year.

DIAGNOSIS

Hepatitis B is distinguished from other forms of hepatitis through laboratory testing.

Serologic Diagnosis

Hepatitis B virus antigens and antibodies typically appear and disappear in serum in a predictable sequence over time. Different combinations of these markers are detected in a single serum sample, depending on when during the illness testing is done. The serologic profile contributes to the diagnosis of hepatitis B virus infection and indicates the stage of illness, degree of infectivity, carrier state, or state of immunity.

Serologic Markers

HBsAg: HBsAg (hepatitis B surface antigen) is a protein on the surface of the virus and is the antigen used to make the hepatitis B vaccine. It is the first serologic marker to appear and can be detected in an infected person's blood an average of four weeks (range: 1–9 weeks) after exposure to the virus. About one of two patients will no longer be infectious by

seven weeks after onset of symptoms, and all patients who do not remain chronically infected will be HBsAg-negative by 15 weeks after onset of symptoms. Its presence is indicative of active infection.

When HBsAg is positive in patients with apparent acute hepatitis, acute hepatitis B is suggested; however, superimposed hepatitis caused by another agent may give similar symptoms in a patient chronically infected with the hepatitis B virus. To differentiate an acute from a chronic infection in a person who is HBsAg-positive, it is necessary to test for IgM anti-HBc. If the IgM anti-HBc is positive, acute hepatitis B infection is suspected.

HBsAg positivity persisting beyond six months is indicative of chronic hepatitis B. The risk for chronic infection varies according to the age at infection and is greatest among young children. Approximately 90% of infants and 25%–50% of children aged 1–5 years will remain chronically infected with HBV. By contrast, approximately 95% of adults recover completely from HBV infection and do not become chronically infected. Chronic hepatitis B virus carriers are likely to remain HBsAg positive indefinitely. All HBsAg positive persons are potentially infectious, regardless of the presence or absence of any other serologic markers and the duration of infection. Undetectable levels of HBsAg are present in many patients with subclinical hepatitis.

Note regarding bilirubin levels: Jaundice appears four weeks (range of 1-7 weeks) after the appearance of HBsAg. The severity of the hepatitis, as measured by bilirubin levels, correlates with the duration of HBsAg positivity. As bilirubin clears, HBsAg titers fall, and generally become undetectable within several weeks.

IgM Anti-HBc. IgM anti-HBc (IgM antibody to hepatitis B core antigen) is often detectable at the time of clinical onset and declines to sub-detectable levels within six months. It is a diagnostic marker for acute hepatitis B virus infection, useful clinically for differentiating acute or recent infection from chronic carrier state or resolved hepatitis B virus infection. It is also useful in the 'window' period, when HBsAg has become negative, but the patient has not yet developed the antibody to HBsAg (anti-HBs). A negative test for IgM anti-HBc in association with a positive test for HBsAg, a positive test for total anti-HBc and a negative anti-HBs test usually indicates that an individual has chronic hepatitis B virus infection.

Total anti-HBc: Total (combination of IgM and IgG) anti-HBc (hepatitis B core antibody) is generally detectable in serum by the onset of clinical illness. Total anti-HBc persists for many years, both in persons who have cleared the hepatitis B virus and in those who become chronic carriers. In patients with chronic hepatitis B virus infection, both HBsAg and total anti-HBc usually remain detectable for life.

Anti-HBs: Anti-HBs (hepatitis B surface antibody) titers rise slowly during convalescence, after the disappearance of HBsAg in patients who do not progress to chronic infection. Presence of anti-HBs generally indicates recovery and immunity from infection. Anti-HBs also develops in those who have been successfully vaccinated against hepatitis B. In approximately 50% of patients with self-limited hepatitis B virus infection, there is a time interval of up to several months between the disappearance of detectable HBsAg and the appearance of anti-HBs. During this time, only the total anti-HBc is detectable; this period is referred to as the "core window" or "window period". Approximately 5% of patients with self-limited hepatitis B virus infection will have cleared the HBsAg by the time they are seen by a clinician. Therefore, the initial diagnostic tests performed on patients presenting with a recent history of symptoms of viral hepatitis should include an IgM anti-HBc, as well as an HBsAg.

A positive IgM anti-HBc in the absence of HBsAg is indicative of a recent resolved hepatitis B virus infection. Low titers of total anti-HBc and IgM anti-HBc, and high titers of anti-HBs may be present; their presence in conjunction with liver function abnormalities, appearing in a time frame consistent with the hepatitis B virus incubation period, suggests that hepatitis B virus infection has occurred and is probably resolving. Some persons who are HBsAg-positive will develop detectable anti-HBs; however, these persons are still considered infectious due to the presence of HBsAg. Since seroconversion to anti-HBs indicates immunity, anti-HBs is generally not detected in chronic infections. Anti-HBs also develops in a person who has been successfully vaccinated against hepatitis B.

HBeAg: HBeAg (hepatitis B e antigen) is a secreted product of the nucleocapsid gene of HBV that is found in serum during acute and chronic hepatitis B. It appears a few days after HBsAg becomes detectable and typically disappears before HBsAg is gone, although it might persist for years in a chronic carrier of hepatitis B virus. HBeAg is variably present in patients with chronic hepatitis B virus infection with 25%-50% of patients having detectable HBeAg. The presence of HBeAg correlates with higher titers of circulating hepatitis B virus and increased infectivity. It is not generally necessary to test for HBeAg or its antibody (anti-HBe), unless it is of importance that the patient's relative infectivity be determined. The HBeAg or anti-HBe status should not alter the general recommendations given to patients and their contacts, since all HBsAg-positive individuals are at risk of transmitting hepatitis B. Testing for HBeAg, if done at all, should be reserved for persons who have already been shown to be HBsAg-positive, as HBeAg is not found in the absence of HBsAg.

Anti-HBe: Anti-HBe (hepatitis B e antibody) is produced by the immune system temporarily during acute HBV infection or consistently during or after a burst in viral replication. It appears at about the time that HBeAg disappears. Spontaneous conversion from e antigen to e antibody (a change known as seroconversion) is a predictor of long-term clearance of HBV in patients undergoing antiviral therapy and indicates lower levels of HBV. Failure of an HBeAg-positive patient to seroconvert to anti-HBe is associated with disease activity and probable chronicity. Anti-HBe is present in 50%-75% of patients with chronic hepatitis B virus infection.

HBV DNA: HBV DNA appears soon after HBsAg. It rises to high concentrations during the late incubation period and falls with the onset of clinical disease. Most chronic carriers have high titers of infectious hepatitis B virus in the serum. Detectable hepatitis B virus DNA in the serum is associated with a highly contagious state, and undetectable hepatitis B virus DNA indicates that the patient has no detectable infectious virus but does not mean that the patient has resolved the infection.

The table below summarizes interpretation of laboratory findings:

Laboratory Findings	Results	Interpretation
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Negative Negative Negative Negative Negative	– Never infected
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Positive Negative Negative Negative Positive or Negative	– Early acute infection – Transient (up to 18 days) results after vaccination
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Positive Positive Positive Negative Positive	– Acute infection
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Negative Positive Positive Positive or Negative Positive or Negative	– Acute resolving infection
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Negative Positive Negative Positive Negative	– Recovered from past infection and immune
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Positive Positive Negative Negative Positive	– Chronic infection
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Negative Positive Negative Negative Positive or Negative	– False-positive (i.e., susceptible) – Past infection – “Low-level” chronic infection – Passive transfer of anti-HBc to infant born to HBsAg-positive mother
HBsAg Total anti-HBc IgM anti HBc anti-HBs HBV DNA	Negative Negative Negative Positive Negative	– Immune if anti-HBs concentration is ≥ 10 mIU/mL after vaccine series completion – Passive transfer after hepatitis B immune globulin administration

EPIDEMIOLOGY

Source

Hepatitis B virus is found in highest concentrations in blood and lower concentrations in other body fluids (e.g., semen, vaginal secretions, and wound exudates). It is highly infectious and can be transmitted in the absence of visible blood. The virus can survive outside the body at least seven days and still can cause infection.

Occurrence

Hepatitis B virus infection is a major cause of acute and chronic hepatitis, cirrhosis, and primary hepatocellular carcinoma. Every year, over four million acute cases of HBV occur. More than 2,000 million people alive today have been infected with HBV at some time in their lives, and, of these, about 350 million remain infected chronically and become carriers of the virus. Three quarters of the world's population live in areas where there are high levels of infection. Approximately one million people a year die from cirrhosis or primary liver cancer due to chronic infection.

The prevalence of hepatitis B virus infection varies markedly in different parts of the world. In North America, Western Europe, Australia, and some part of South America, it is a disease of low endemicity, where <2% of the population are carriers and infection occurs primarily during adulthood and <20% of the population is infected with the virus. In contrast, hepatitis B virus infection is highly endemic (>8% prevalence) in south-east Asia and the Pacific Basin (excluding Japan, Australia, and New Zealand), sub-Saharan Africa, the Amazon Basin, parts of the Middle East, the central Asian Republics, and some countries in Eastern Europe. In these areas, most persons acquire infection at birth or during childhood, with 70-90% of the population becoming HBV-infected before the age of 40, and 8%-20% of people are carriers. In other parts of the world, hepatitis B virus is a disease of intermediate endemicity, where 2%-8% of persons are hepatitis B virus carriers.

The rate of new HBV infections has declined by approximately 82% since 1991 in the United States, when a national strategy to eliminate HBV infection was implemented. The decline has been greatest among children born since 1991, when routine vaccination of children was first recommended. In 2015, 3,370 cases of acute hepatitis B in the United States were reported to the CDC, which resulted in a rate of 1.1 cases per 100,000 population. CDC estimates the actual number of new infections to be approximately tenfold higher, an estimated 18,760 persons, due to many infections being either asymptomatic or not reported. Rates of disease are highest among adults, particularly males, aged 25-44 years. Acute infection ranges from asymptomatic or mild disease to, rarely, fulminant hepatitis. Disease is more severe in older adults (>60 years). The fatality rate among acute cases reported to CDC is 0.5-1.0%.

An estimated 800,000-1.4 million persons in the United States have chronic HBV infection. Risk for chronic infection is inversely related to age at infection with approximately 90% of infected infants and 30% of infected children aged <5 years becoming chronically infected, compared with two to six percent of adults. Approximately 25% of those who become chronically infected during childhood and 15% of those who become chronically infected after childhood die prematurely from cirrhosis or liver cancer, and the majority remain asymptomatic until onset of cirrhosis or end-stage liver disease. Among persons with chronic HBV infection, the risk for premature death from cirrhosis or hepatocellular carcinoma is 15%-25%. In 2011, the mortality rate for hepatitis B was 0.5 deaths per 100,000 population (n=1,804). In the United States, chronic HBV infection results in an estimated 2,000-4,000 deaths per year.

Hepatitis B virus infection in a pregnant woman poses a serious risk to her infant at birth. Without post-exposure immunoprophylaxis, approximately 40% of infants born to HBV-infected mothers in the United States will develop chronic HBV infection, with approximately one out of four dying from chronic liver disease.

Mode of Transmission

Hepatitis B virus is transmitted by percutaneous or mucosal exposure to HBsAg-positive blood and/or body fluids from persons who have acute or chronic HBV infection.

Modes of transmission include the following:

- Sex with an infected partner
- Injection drug use that involves sharing needles, syringes, or drug-preparation equipment
- Birth to an infected mother
- Contact with blood or open sores of an infected person
- Needle sticks or sharp instrument exposures
- Sharing items such as razors or toothbrushes with an infected person

HBV is not spread through food or water, sharing eating utensils, breastfeeding, hugging, kissing, hand holding, coughing, or sneezing. Infection can occur in settings of continuous close personal contact, such as in households or among residents in via inapparent or unnoticed contact of infectious secretions with skin lesions or mucosal surfaces. The virus is stable on environmental surfaces for at least seven days. While minimal amounts of virus can be found in saliva, it is not an effective vehicle for transmission of disease unless it also contains blood. Any blood spills – including dried blood, which can still be infectious – should be cleaned using 1:10 dilution of one part household bleach to 10 parts of water for disinfecting the area. Gloves should be used when cleaning up any blood spills.

Period of Communicability

The role of the hepatitis B virus carrier is central in the epidemiology of hepatitis B virus transmission. A person who is HBsAg positive and IgM anti-HBc negative or whose HBsAg positivity persists for six months or more is considered a carrier. Although the degree of infectivity is best correlated with HBeAg-positivity, any person positive for HBsAg is potentially infectious. The likelihood of developing the carrier state varies inversely with the age at which infection occurs. Approximately 90% of infected infants and 25-50% of children aged 1-5 years will remain chronically infected with hepatitis B, while in adults only five percent will remain chronically infected.

“At Risk” Groups

Serologic surveys demonstrate that although hepatitis B virus infection is uncommon among adults in the general population it is highly prevalent in certain groups. Those at risk, based on the prevalence of serologic markers of infection, include:

- Infants born to infected mothers
- Sex partners of infected persons
- Sexually active person who are not in a long-term mutually monogamous relationship (e.g., more than one sex partner during the previous six months)
- Men who have sex with men
- Injection drug users
- Household contacts of person with chronic HBV infection
- Health care and public safety workers at risk for occupational exposure to blood or blood-contaminated body fluids
- Hemodialysis patients
- Residents and staff of facilities for developmentally disabled persons
- Inmates of correctional facilities
- Persons with hepatitis C infection
- Persons with HIV
- Persons with diabetes
- Persons with chronic liver disease
- Travelers to [countries with intermediate or high prevalence of HBV infection](#)

Incubation Period

The average incubation period is 60 days (range: 40-90 days) to onset of abnormal serum ALT levels and 90 days (range: 60-150 days) to onset of jaundice.

HEPATITIS D (delta hepatitis) DIAGNOSIS

Serologic Markers

The serologic course of hepatitis D virus infection varies depending on whether the virus is acquired as a coinfection with hepatitis B virus or as a superinfection of a person with chronic hepatitis B virus infection. In most persons with HBV/HDV coinfection, both IgM anti-HDV and IgG anti-HDV are detectable during infection. However, in about 15% of patients, the only evidence of hepatitis D virus infection may be the detection of either IgM anti-HDV alone during the early acute period of illness or IgG anti-HDV alone during convalescence. Total anti-HDV generally declines to undetectable levels after the infection resolves. There is no serologic marker that persists to indicate that the patient was ever infected with the hepatitis D virus.

Hepatitis delta antigen (HDAg) can be detected in serum in only about 25% of patients with HBV/HDV coinfection. When HDAg is detectable, it generally disappears as HBsAg disappears and most patients do not develop chronic infection.

In patients with chronic hepatitis B virus infection who are superinfected with hepatitis D virus, several characteristic serologic features generally occur, including:

- Concentration of HBsAg declines at the time HDAg appears in the serum;
- HDAg and HDV RNA remain detectable in the serum because chronic hepatitis D virus infection occurs in most patients with hepatitis D virus superinfection, unlike the case with coinfection;
- High concentration of both IgM and IgG anti-HDV are detectable, which persist indefinitely.

EPIDEMIOLOGY

Source

Hepatitis D virus is found in human blood and blood products, semen, vaginal secretions, and serous fluids.

Occurrence

In general, in countries with a low prevalence of chronic hepatitis B virus infection, such as the United States, hepatitis D virus prevalence is generally low among both asymptomatic hepatitis B virus carriers (<10%) and patients with chronic hepatitis B virus-related liver disease (<25%). Hepatitis D virus infection in these countries occurs most commonly among injecting drug users and persons with hemophilia.

Hepatitis D virus infection is acquired as either a coinfection with HBV or a superinfection in persons with chronic HBV infection. Persons with HBV/HDV coinfection may have more severe acute disease and a higher risk of hepatitis with rapid liver failure (2%-20%) compared to those infected with HBV alone; however, chronic HBV infection appears to occur less frequently in persons with coinfection. Chronic HBV carriers who acquire hepatitis D virus superinfection usually develop chronic HDV infection (80%). Superinfection is associated with a higher occurrence of fulminant disease (2-20%), cirrhosis, (60-70%), and may progress to hepatocellular carcinoma.

Mode of Transmission

The modes of hepatitis D virus transmission are like those for hepatitis B virus, with

percutaneous exposures the most common. Sexual transmission of hepatitis D virus is less efficient than with hepatitis B virus. Perinatal hepatitis D virus transmission is rare. There is no vaccine for hepatitis D, but it can be prevented in persons who are not already HBV-infected by hepatitis B vaccination.

Incubation Period

The incubation period for hepatitis D ranges from six weeks to 26 weeks.

HEPATITIS B (including delta)

PUBLIC HEALTH MANAGEMENT

Case Investigation

Determine through the patient's physician if the patient is/was acutely ill and meets the case definition. If the patient is pregnant, follow the detailed guidance in the Perinatal Hepatitis B chapter.

Treatment

For persons with acute infection, treatment at this time is only supportive as no medication is available to treat the infection. There are several antiviral drugs available to treat chronic infection. Persons with chronic HBV infection require medical evaluation and regular monitoring to determine whether disease is progressing and to identify liver damage or hepatocellular cancer.

Isolation

Because hepatitis B is transmitted only through percutaneous or permucosal inoculation of hepatitis B virus, isolation of infected persons is unnecessary and inappropriate. Hospitalized patients should be placed on Standard Precautions. Physicians, nurses, dentists and others who draw blood or perform surgical procedures should be informed of the patient's status, but Standard Precautions should always be followed.

Hepatitis B has been transmitted in healthcare settings by HBsAg-positive healthcare workers (HCWs), but such cases are rare, and patient contacts of infected HCWs are generally not at risk.

There is no evidence that HBsAg-positive food handlers pose a health risk in an occupational setting. Hepatitis B has never been documented as being foodborne; nevertheless, it is reasonable to educate infected food handlers about the sources of hepatitis B virus and routes of transmission and the importance of good personal hygiene, frequent handwashing, and avoidance of hand injuries. Food handlers who are HBsAg-positive should not be restricted from work.

In the community setting, it is important to avoid placing unreasonable restrictions on persons who are HBsAg-positive. Instructions to the patient should include a thorough explanation of the modes of transmission of hepatitis B virus. Personal toiletry items (e.g. toothbrushes, razors) and tools (e.g. nail scissors, nail files) which may potentially cause cutting injuries should not be shared with susceptible individuals. The patient should avoid sexual contact with susceptible individuals and should not donate blood or blood products.

Hepatitis B Vaccination

High vaccination coverage rates, with subsequent declines in acute hepatitis B incidence, have been achieved among infants and adolescents. In contrast, vaccination coverage among most high-risk adult groups (e.g., persons with more than one sex partner in the previous six months, men who have sex with men, and injection drug users) have remained low, and most new infections occur in these high-risk groups.

Two single-antigen vaccines and three combination vaccines are currently licensed in the United States for prevention of hepatitis B infection.

The [Advisory Committee on Immunization Practices \(ACIP\)](#) recommends that the following persons be vaccinated against hepatitis B:

- All infants, beginning at birth
- Pregnant women at risk for HBV infection
- All children aged <19 years who have not been vaccinated previously
- Susceptible sex partner of hepatitis B surface antigen (HBsAg)-positive persons
- Sexually active person who are not in a long-term, mutually monogamous relationship (e.g., more than one sex partner during the previous six months)
- Persons seeking evaluation or treatment for a sexually-transmitted disease
- Men who have sex with men
- Injection drug users
- Susceptible household contacts of HBsAg-positive persons
- Health care and public safety workers at risk for exposure to blood or blood-contaminated body fluids
- Persons with end-stage renal disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients
- Residents and staff of facilities for developmentally disabled persons
- Travelers to regions with intermediate or high rates of endemic HBV infection
- Persons with chronic liver disease
- Persons with HIV infection
- Persons with hepatitis C infection
- Incarcerated persons
- Unvaccinated adults with diabetes mellitus who are aged 19-59 years (discretion of clinicians for unvaccinated adults with diabetes mellitus who are aged ≥ 60 years)
- All other person seeking protection from HBV infection – acknowledgment of a specific risk factor is not a requirement for vaccination

Hepatitis B vaccination is recommended in certain settings with a high proportion of clients who have known risk factors for HBV infection. The [ACIP](#) recommends universal vaccination of adults who receive care in those settings, including:

- Sexually-transmitted disease treatment facilities
- HIV testing and treatment facilities
- Facilities providing drug-abuse treatment and prevention services
- Health care settings targeting services to injection drug users
- Correctional facilities
- Health care settings targeting services to men who have sex with men
- Chronic hemodialysis facilities and end-stage renal disease programs
- Institutions and nonresidential day care facilities for developmentally disabled persons

The vaccination schedule most often used for children and adults is three intramuscular injections, the second and third doses administered one to six months, respectively, after the first dose. Alternate schedules have been approved for certain vaccines and/or populations. For more information on vaccination schedules, click on the following links:

- [Child and Adolescent Immunization Schedules](#)
- [Adult Immunization Schedule](#)

Anyone who has had a serious allergic reaction to a prior dose of hepatitis B vaccine, a component of the hepatitis B vaccine, or yeast should not receive hepatitis B vaccine.

Historically, routine pre-vaccination testing has not been recommended because it has not generally been found to be cost-effective regarding vaccination. However, with the availability of antiviral agents to treat chronic HBV infection, new recommendations for identifying persons with chronic HBV infection are being developed. CDC currently recommends that certain populations undergo testing for HBV infection, with serologic assays for HBsAg and anti-HBs, to determine infection or immunity prior to vaccination. The groups include:

- Hemodialysis patients
- Pregnant women
- Persons with known or suspected exposure to HBV including:
 - Infants born to HBV-infected mothers
 - Household contacts of HBV-infected person
 - Persons with known occupational or other exposures to infectious blood or body fluids
- Foreign-born persons from countries of high HBV endemicity
- HIV-positive persons

Post-vaccination testing or testing for immunity is advised only for person whose subsequent clinical management depends on knowledge of their immune status. This testing should be performed one to two months after completion of the vaccine series and test for anti-HBs.

The groups recommended to receive post-vaccination testing include:

- Infants born to HBsAg-positive mothers
- Health care and public safety workers at high risk for continued percutaneous or mucosal exposure to blood or body fluids
- Chronic hemodialysis patients, HIV-infected persons, and other immunocompromised persons (e.g., hematopoietic stem-cell transplant recipients or person receiving chemotherapy)
- Sex partners of persons with chronic HBV infection

Studies indicate that immunologic memory remains intact for at least 20 years among health vaccinated individuals who initiated hepatitis B vaccination after six months of age. The vaccine confers long-term protection against clinical illness and chronic hepatitis B virus infection. Cellular immunity appears to persist even though antibody levels might become low or decline below detectable levels. Among vaccinated cohorts who initiated hepatitis B vaccination at birth, long-term follow-up studies are ongoing to determine the duration of vaccine-induced immunity. Booster doses of hepatitis B vaccine are not recommended for persons with normal immune status who have been vaccinated. Booster doses are recommended in certain circumstances:

- Hemodialysis patients – the need for booster doses should be assessed by annual testing for anti-HBs. A booster dose should be administered when anti-HBs levels decline to <10 IU/mL.
- Other immunocompromised persons (e.g., HIV-infected persons, hematopoietic stem-cell transplant recipients, and persons receiving chemotherapy) – the need for booster doses has not been determined. When anti-HBs levels decline to <10 IU/mL, annual anti-HBs testing and booster doses should be considered for those with an ongoing risk for exposures.

Post-Exposure Prophylaxis

Hepatitis B vaccine is used as prophylaxis when someone has been exposed to the hepatitis B virus. The vaccine, when given as soon as possible but preferably within 24 hours, can effectively prevent infection. The mainstay of postexposure prophylaxis is hepatitis B vaccine, but in certain circumstances the addition of hepatitis B immune globulin (HBIG) will provide increased protection.

The following factors and considerations are important in an assessment for post-exposure prophylaxis:

- Perinatal exposure
- Maternal screening
- Acute exposure to blood that contains (or might contain) HBsAg
 - Exposed person not previously vaccinated
 - Source known, HBsAg-positive
 - Source known, HBsAg status unknown
 - Source unknown
 - Exposed person previously vaccinated against hepatitis B
 - Source known, HBsAg-positive
 - Source known, HBsAg status unknown
 - Source unknown
- Sexual contacts of persons with acute hepatitis B virus infection
- Household contacts of persons with acute hepatitis B virus infection

Comment

Because hepatitis D virus is dependent on hepatitis B virus for replication, hepatitis B virus-hepatitis D virus coinfection can be prevented with either pre- or post-exposure prophylaxis for hepatitis B virus. However, no products exist to prevent hepatitis D virus superinfection of persons with chronic hepatitis B virus infection. Thus, prevention of hepatitis D virus superinfection depends primarily on education to reduce risk behaviors.

SPECIAL INFORMATION

Questions about reporting, surveillance, and epidemiology for non-perinatal hepatitis B or requests for data should be directed to the Hepatitis Surveillance Program at 614-387-2722.

Questions about the testing, prevention, and control of non-perinatal hepatitis B should be directed to the Hepatitis Prevention Program at 614-387-2722.

Questions about perinatal hepatitis B should be directed to the Perinatal Hepatitis B Prevention Program at 614-995-5599.

Questions about immunization for hepatitis B should be directed to the Immunization Program at 614-466-4643 or 800-282-0546.

The Division of Viral Hepatitis at the Centers for Disease Control and Prevention (CDC) has a web site with comprehensive information about viral hepatitis: <http://www.cdc.gov/hepatitis>.

What is hepatitis B?

Hepatitis B is a serious disease caused by a virus that attacks the liver. It can range in severity from a mild illness lasting a few weeks to a serious, lifelong infection potentially resulting in cirrhosis (scarring) of the liver, liver cancer, liver failure and death.

Who is at risk?

Hepatitis B can affect anyone. Each year in the United States, thousands of people of all ages get hepatitis B and close to 2,000 die because of hepatitis B. If you have had other forms of hepatitis, you can still get hepatitis B.

Get vaccinated!

Hepatitis B is preventable.

How great is your risk for hepatitis B?

In 2012, there were an estimated 18,760 new hepatitis B virus infections in the United States. However, the official number of reported hepatitis B cases is much lower. Many people don't know they are infected or may not have symptoms and therefore never seek the attention of medical or public health officials.

Although anyone can get hepatitis B, some people are at greater risk, such as those who:

- Have sex with an infected person
- Have multiple sex partners
- Are men who have sexual contact with other men
- Inject drugs or share needles, syringes, or other drug equipment
- Live with a person who has chronic hepatitis B
- Are infants born to infected mothers
- Are exposed to blood on the job (health care and public safety workers)
- Are hemodialysis patients
- Travel to countries with moderate to high rates of hepatitis B
- Are residents and staff of facilities for developmentally disabled persons
- Are diabetic (due to risk from shared blood glucose monitoring equipment)

If you are at risk for hepatitis B virus infection, ask your healthcare provider about hepatitis B vaccine.

How do you get hepatitis B?

You get hepatitis B by direct contact with the blood or body fluids of an infected person; for example, you can become infected by having sex or sharing needles with an infected person. A baby can get hepatitis B from an infected mother during childbirth. Hepatitis B is not spread through food or water or by casual contact.

Who is a carrier of hepatitis B virus?

Sometimes, people who are infected with hepatitis B virus never recover fully from the infection; they carry the virus and can infect others for the rest of their lives. In the United States, about 800,000-1.4 million people carry hepatitis B virus.

How do you know if you have hepatitis B?

You may have hepatitis B (and be spreading the disease) and not know it; sometimes a person with hepatitis B virus infection has no symptoms at all. Your doctor can do a test to

determine if you are infected.

If you have symptoms:

- Your eyes or skin may turn yellow (jaundice)
- You may lose your appetite
- You may have nausea, vomiting, fever, and/or stomach or joint pain
- You may feel extremely tired and not be able to work for weeks or months
- You may have clay-colored bowel movements

How is hepatitis B treated?

For acute infection, no medication is available; treatment is supportive. For chronic infection, several antiviral drugs are available. Persons with chronic HBV infection require medical evaluation and regular monitoring to determine whether disease is progressing and to identify liver damage or hepatocellular carcinoma.

If you are pregnant, should you worry about hepatitis B?

If you have hepatitis B virus in your blood, you can give hepatitis B to your baby, which poses a serious risk to the infant at birth. Without postexposure immunoprophylaxis, approximately 40% of infants born to HBV-infected mothers in the United States will develop chronic HBV infection, with approximately one out of every four dying from chronic liver disease.

All pregnant women should be tested for hepatitis B virus early in their pregnancy. If the blood test is positive, the baby should receive vaccine along with another shot, hepatitis B immune globulin (HBIG), within 12 hours of birth. The vaccine series should be completed during the first 6 months of life.

Who should be vaccinated?

- All babies, at birth
- All children and adolescents aged < 19 years who have not been vaccinated
- Persons of any age whose behavior puts them at high risk for hepatitis B virus infection
- Persons whose jobs expose them to human blood
- Household contacts of HBV-infected persons
- Residents and staff of facilities for developmentally disabled persons
- Persons with end-stage renal disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients
- International travelers' regions with moderate or high rates of hepatitis B
- Persons with chronic liver disease
- Persons with HIV infection
- Adults with diabetes
- All other persons seeking protection from hepatitis B virus infection

Healthcare Settings and Hepatitis B

The delivery of healthcare has the potential to transmit hepatitis B virus (HBV) to both healthcare workers (HCWs) and patients. Outbreaks of HBV have occurred in outpatient settings, hemodialysis units, long-term care facilities, and hospitals, primarily because of unsafe injection practices; reuse of needles, finger stick devices, and syringes; or lapses in infection control. To prevent transmission of bloodborne pathogens, HCWs should adhere to recommended standard precautions and fundamental infection control principles, including safe injection practices and appropriate aseptic techniques.

For continued protection, the Advisory Committee on Immunization Practices (ACIP) recommends that healthcare and public safety workers with reasonably anticipated risk for exposures to blood or infectious body fluids receive the complete hepatitis B vaccine series and have their immunity documented through post-vaccination testing. For additional information, visit the CDC's website, <http://www.cdc.gov/hepatitis/Settings/HealthcareSettings.htm>.

Is hepatitis B vaccination recommended in certain settings?

Yes, in certain healthcare, evaluation, or treatment settings, a high proportion of clients have known risk factors for HBV infection. The Advisory Committee on Immunization Practices (ACIP) recommends universal vaccination of adults who receive care in those settings, including:

- Sexually-transmitted disease treatment facilities
- HIV testing and treatment facilities
- Facilities providing drug-abuse treatment and prevention services
- Healthcare settings targeting services to injection drug users
- Correctional facilities
- Healthcare settings targeting services to men who have sex with men
- Chronic hemodialysis facilities and end-stage renal disease programs
- Institutions and non-residential day care facilities for developmentally disabled persons

Is there an increased risk of hepatitis B transmission in long-term care facilities?

Yes, and it is primarily related to glucose monitoring. Any time blood glucose monitoring equipment is shared between individuals there is a risk of transmitting hepatitis and other bloodborne pathogens. When possible, equipment such as glucometers should be assigned to individual patients. Standard Precautions should always be followed.

What is the risk for hepatitis B virus infection from a needle stick exposure to HBV contaminated blood?

The risk of clinical hepatitis from a needle stick from an HBeAg-positive source is 22-31%, while the risk from an HBsAg-positive source is 1-6%.

Other than needle sticks, do other exposures, such as mucous membrane exposure, pose a risk to healthcare personnel for hepatitis B transmission?

Transmission of HBV infection among hospital-based workers has been linked to percutaneous and mucous membrane exposures, and HBV infection has been primarily associated with percutaneous exposure. Transmission of HBV has not been associated with intact skin exposures. Avoiding occupational exposure to blood by following Standard Precautions is the primary way to prevent transmission of bloodborne infections among healthcare personnel. Depending on the medical procedure involved, Standard Precautions may include the appropriate use of personal protective equipment such as

gloves, masks, gowns, and protective eyewear.

Can hepatitis B vaccine be given after exposure to HBV?

Yes, after an unvaccinated person has been exposed to HBV, appropriate prophylaxis, given as soon as possible, but preferably within 24 hours can effectively prevent infection. The mainstay of postexposure immunoprophylaxis is hepatitis B vaccine, but in certain circumstances the addition of hepatitis B immune globulin (HBIG) will provide increased protection. Postexposure prophylaxis including hepatitis B immune globulin (HBIG) and HBV vaccine is believed to be 85-95% effective, while either one alone is thought to be 70-75% effective.

Should hepatitis B virus-infected healthcare workers be restricted in their work?

No, as currently available data provide no basis for restricting the practice of HCWs infected with HBV who perform invasive procedures not identified as exposure-prone. Exposure-prone procedures should be identified by medical/surgical/dental organizations and by institutions at which such procedures are performed. HCWs infected with hepatitis B virus should not perform exposure-prone procedures unless they have been advised and counseled by an expert review panel concerning under what circumstances, if any, they may continue to do so. CDC updated guidelines for the management of hepatitis B virus-infected healthcare workers and students in July 2012 which can be accessed at <http://www.cdc.gov/mmwr/PDF/rr/rr6103.pdf>.