

Chronic Hepatitis B

Investigative Guidelines

July 2018

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. To determine whether cases may have exposed others or may be likely to do so in future.
2. To recommend appropriate preventive measures, including screening of close contacts and immunization of all susceptible contacts.
3. To guide intervention planning by characterizing disease distribution and sources of infection.

1.2 Laboratory and Physician Reporting Requirements

Physicians are required to report suspected or confirmed cases within one working day of identification/diagnosis. All positive tests must be reported by licensed laboratories within one working day.

1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive chronic cases (see definitions below) to the Acute and Communicable Disease Prevention Program (ACDP) as soon as possible, but no later than the end of the calendar week of initial physician/lab report. Unless they have been previously reported in Oregon for chronic hepatitis B, all persons testing positive for HBsAg must be reported and investigated. ACDP staff can search for reports back through 1988.
2. Begin follow-up investigation within one working day.
Submit all case data electronically to ACDP within seven days of initial report.
3. At time of initial report, and **upon receipt of new lab results for previously investigated cases**, verify the pregnancy status on women of child-bearing age (15–44 years).
4. All pregnant woman positive for HBsAg, HBeAg, or HBV DNA must be enrolled **with each pregnancy** into the Oregon Perinatal Hepatitis B Prevention Program (PHBPP), within one week of receiving the laboratory report. This includes creating a record of the pregnancy in Orpheus.

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

The hepatitis B virus (HBV) is one of several viruses known to cause hepatitis in humans. Until the 1970s, laboratory tests were not available to distinguish any of these clinically similar infections. HBV is completely unrelated to the viruses that cause hepatitis A, C, or other non-A, non-B (NANB) hepatitis.

2.2 Description of Illness

Chronic carriers are at greatly increased risk of developing life-threatening sequelae (e.g., chronic active hepatitis, cirrhosis, or hepatic cancer) decades later. Fewer than 5% of acutely infected adults in the U.S. become chronic carriers, compared with some 25% (with HBeAg-negative moms) to 90% (HBeAg-positive moms) of perinatally infected infants.

2.3 Reservoirs

Infected humans. While relatively few infected persons become chronic carriers, they are probably the most important sources of HBV transmission, because they are infectious for many years, rather than a few months. Efforts to identify chronic carriers and offer prophylaxis to their contacts, therefore, is at least as important as follow-up directed towards acute cases. How many of Oregon's other reportable infectious diseases carry a lifetime risk of death of 25%?

2.4 Serologic Markers

Serologic markers of HBV infection are identified by antigen and antibody assays and by nucleic acid amplification tests for HBV DNA (i.e., PCR). The markers most commonly tested for are shown in Table 1 on the next page.

Patients are most commonly identified as chronic HBV carriers based on their HBsAg or HBV DNA results. Many infections are asymptomatic, including the great majority of persons infected at an early age. A surprisingly high proportion of people have been exposed to hepatitis B, many of them without ever being sick or diagnosed, much less reported.

Table 1. Selected Serologic Markers of hepatitis B

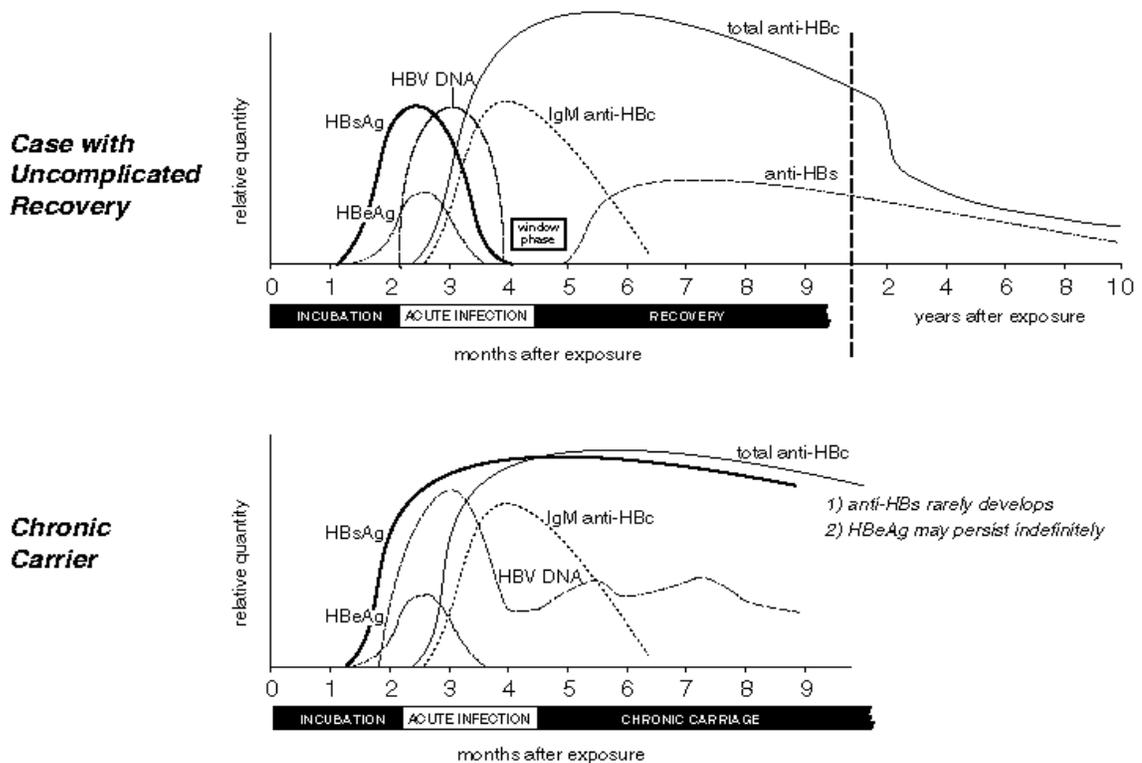
Marker	Abbreviation(s)	Significance/Interpretation
Surface antigen	HBsAg	Marker of infectivity. Persists indefinitely in chronic carriers.
Surface antibody	anti-HBs	Usually indicates the development of immunity, either from past infection or immunization. Most carriers never develop anti-HBs (but if they do, they remain HBsAg positive as well). Anti-HBs levels may decline to undetectable levels over time (years), especially if resulting from immunization and not infection.

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Viral DNA	HBV DNA/HBV NAT	Marker of infectivity. Rises to high concentrations during incubation and falls with the onset of hepatic disease in transient infection. Detectable in about 50% of chronic carriers; can be present when HBsAg is undetectable.
Core antibody (total)	anti-HBc total anti-HBc core anti-HBc	Marker of past infection. Generally remains elevated for at least two years after transient infection and may remain elevated for life. Vaccination does not produce anti-HBc.
Core antibody (IgM)	IgM anti-HBc	Indicative of infection in the recent past (usually <6 months).
e antigen	HBeAg	Marker of enhanced infectivity. Seen transiently in most infections, and persists in some carriers indefinitely. Needlestick exposure data suggest that HBeAg-positive individuals are 3-5x more infectious than HBeAg-negative counterparts.
e antibody	HBeAb	Antibody to HBeAg

Figure 1. Serologic Markers

Appearance of Serologic Markers in Typical Hepatitis B Infections



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2.5 Sources and Routes of Transmission

HBV is usually transmitted by contact with the blood, semen or vaginal secretions of an infected (HBV DNA or HBsAg-positive) person. Because of the high concentration of virus in blood, an extremely small inoculum is sufficient to transmit infection. The virus must be introduced through broken skin or come into contact with mucous membranes for infection to occur. HBV may also be found in saliva and other body fluids. (Breastfeeding is not a significant route of transmission, however.) Under some conditions, HBV can remain viable on environmental surfaces for up to a week (e.g., in dried blood).

The most common modes of transmission include:

1. Sharing of contaminated objects or use of contaminated equipment that may penetrate the skin, for example: hypodermic needles and other injection paraphernalia, razor blades, renal dialysis machines, blood glucose monitoring equipment, inappropriately shared multiuse;
2. Sexual contact (homosexual or heterosexual);
3. Perinatal transmission from an infected mother to the fetus or newborn;
4. Needlestick or similar accident.

The following are some of the less common routes, but have been documented in literature:

1. Transfusion, infusion or inoculation of blood or blood products from an infected person or plasma pool (in the U.S., however, all blood is routinely screened for HBV markers [HBsAg, HBV DNA and anti-HBc] before use, so this risk is now extremely low);
2. Contact of infective fluid with a mucosal surface (e.g., a splash of blood to the mouth or eye);
3. Contact of lacerated, scratched, or otherwise broken skin with blood or contaminated environmental surfaces (for example, countertops, blood-smear slides, or specimen tubes in laboratories);
4. Biting by an infected person or scratching with saliva-contaminated nails leading to percutaneous introduction of virus.

HBV transmission patterns and the prevalence of chronic HBV infection vary worldwide. Approximately 45% of the world's population lives in regions of high HBV endemicity (i.e., where prevalence of chronic HBV infection is >8%), and 43% live in areas of intermediate endemicity (where prevalence of chronic HBV infection is 2%–8%). Regions of high or intermediate prevalence include much of Eastern Europe, Asia, Africa, the Middle East, and the Pacific Islands (see map below). In Oregon, the risks of household, perinatal, and sexual transmission may be elevated among immigrant and refugee populations with origins in these regions.

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Figure 2. Prevalence of hepatitis B virus infection, by country



MAP 3-4. Prevalence of hepatitis B virus infection

¹ Disease data source: Schweitzer A, Horn J, Mikolajczyk R, Krause G, Ott J. Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013. *www.thelancet.com*. 2015;Vol 386.

Table 2. Estimated prevalence of HBsAg-positive persons by population segment, United States

Population group	Prevalence of HBsAg (%)
Alaska Natives/Pacific Islanders	5–15 ¹
Injection drug users	3.5–20 ²
Men who have sex with men (HIV-negative)	1–3 ¹
HIV-Positive persons	6–14 ²
Sexual contacts and sex partners of HBV carriers	3.5–9 ³
Household contacts of HBV carriers	3–20 ^{4,5}
Persons incarcerated in correctional institutions	1.0–3.7 ²
“General” U.S.-born population, noninstitutionalized	0.3 ¹
U.S. population, foreign-born	3.5 ²

2.6 Incubation Period

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

2.7 Period of Communicability

Persons are infectious as long as HBsAg or HBV DNA is detectable in the blood. Viremia begins several weeks before the onset of symptoms and persists for several months (in most instances), or, for those who become chronic carriers,

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indefinitely. A similar period of viremia occurs among asymptotically infected individuals.

2.7 Treatment

Because 15%–25% of persons with chronic HBV infection are at risk for premature death from cirrhosis and liver cancers, persons with chronic HBV infection need medical management to monitor the onset and progression of liver disease and to screen for liver cancer. Antiviral therapy should be initiated with patients who are likely to respond to treatment and are at high risk for liver-related morbidity.² Currently approved treatment regimens include interferons and nucleoside/nucleotide analogues.

Pregnant women who are HBsAg-positive should be tested for HBV DNA. For pregnant women whose HBV DNA is >200,000 IU/mL, maternal antiviral therapy is recommended to reduce perinatal transmission.²

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Confirmed Case Definition

An individual with:

1. IgM anti-HBc negative and a positive result on one of the following tests: HBsAg, HBeAg, or HBV DNA (including qualitative, quantitative, and genotype testing); or
2. Documented HBsAg positive, HBeAg positive, or HBV DNA positive laboratory result two times at least six months apart. Any combination of these tests is acceptable. An oral patient history of a previous diagnosis is NOT adequate for reporting purposes.

3.2 Presumptive Case Definitions

An individual with a single HBsAg positive, HBeAg positive, or HBV DNA positive laboratory result and does not meet the case definition for acute hepatitis B.

3.3 Suspect Case (*not reportable to Oregon PHD*)

These have been defined out of existence; suspect should not be used as a case classification.

3.5 Services Available at the Oregon State Public Health Laboratories

The OSPHL offers serologic testing for HBsAg, anti-HBs, anti-HBc, and IgM anti-HBc. E antigen testing is not routinely available, but may be arranged under special circumstances; consult with the ACDP. For more information, refer to the OSPHL Test Menu Search pages for Hepatitis B testing at

<https://www.oregon.gov/oha/PH/LABORATORYSERVICES/Pages/test.aspx>.

The OSPHL does not perform PCR testing for the hepatitis B virus.

4. ROUTINE CASE INVESTIGATION

4.1 Confirm the Diagnosis

It is important to distinguish between acute cases of hepatitis B and newly identified chronic carriers. If only a single positive result (HBsAg, HBeAg, or HBV DNA) is available, try to get information from the ordering provider about presence/absence of symptoms, prior history, whether an IgM anti-HBc test has been performed or can be ordered, and other information that may help to establish a diagnosis. It may also be helpful to check whether the individual was recently vaccinated, or if test results have been confirmed (e.g., by HBsAg neutralization), as the results may be falsely positive.

4.2 Investigation of Newly Reported Cases (never before reported in Oregon)

Identify the Source of Infection

Identifying a specific source of infection for recently identified carriers may be difficult, if not impossible. The chronic hepatitis B questions focus on selected lifetime risk factors, and these data will be used mainly to help inform programmatic efforts towards disease control. Try to get the case's country of birth, as high rates of chronic hepatitis B have been observed among foreign-born individuals.

Identify Potentially Exposed Persons

The purpose of the current disease investigation is to identify persons who: 1) may be candidates for prophylaxis or 2) are at risk for being chronic carriers themselves, such as long-term sexual partners, household contacts (particularly in immigrants from endemic countries), and offspring. Immunization is recommended for susceptible individuals who anticipate continued sexual contact with an infected person or with multiple partners, and condom use can be recommended until the series is completed. The first dose of hepatitis B vaccine should be administered during the same visit with serologic testing. However, HBsAg testing is not a requirement for vaccination, and in settings where testing is not feasible, vaccination of recommended populations should continue.

In the event that the case has had sexual contact with a new partner in the past two weeks, hepatitis B immune globulin (HBIG) is recommended. Partners whose sexual history with the case goes back more than two weeks are unlikely to benefit from prophylaxis, but they should be informed of their exposure and tested by LHD staff or encouraged to seek testing elsewhere.

In the unlikely event that someone has had percutaneous or percutaneous contact with the case's body fluids (e.g., by needle sharing, blood splashes) within the last 7 days, HBIG is recommended (see §5.4). Those exposed >7 days ago should be advised of their exposure.

If the case is a dentist, surgeon, or other health care worker, evaluate the potential for exposing patients (see §6.1).

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If the case has donated blood or plasma in the 8 weeks before onset, see §6.3. If the patient is pregnant, see §6.4 and the [Perinatal Hepatitis B Investigative Guidelines](#).

4.3 Cases Previously Reported as Acute Hepatitis B

Individuals who have been reported in the past as acute HBV cases and contacted for case investigation need not be re-interviewed for risk factor information. However, these cases should be contacted to ensure that they have been notified of their chronic status and likely lifetime infectivity. HBsAg testing (and, if appropriate, immunization) should be offered to any new household or sexual contacts. Case education should reinforce bloodborne pathogen precautions (see §5.1). Women of childbearing age should be checked for pregnancy status (via a call to provider or to the case herself); cases who are pregnant should be enrolled in the Perinatal Hepatitis B Prevention Program (see §6.4) within two weeks of receipt of report. If the case cannot be reached directly, a letter should be sent reviewing basic information about HBV transmission and offering contact screening at LHD.

4.4 Cases Previously Reported as Chronic Hepatitis B

For individuals previously reported and investigated as chronic cases, a re-interview is not necessary. Updated lab results and demographic/contact information should be entered into Orpheus. HBsAg testing (and, if appropriate, immunization) should be offered to any new household and sexual contacts. Case education should reinforce bloodborne pathogen precautions (see §5.1). Women of childbearing age should be checked for pregnancy status (via a call to provider or to the case herself); cases who are pregnant should be enrolled in the Perinatal Hepatitis B Prevention Program (refer to the Perinatal Hepatitis B Investigative Guidelines) within two weeks of receipt of report. If diagnosis status has changed from Presumptive to Confirmed, this should be reflected in the case record.

4.5 Cases who are Institutionalized or Incarcerated

If the case cannot be interviewed because he/she is a jail or prison inmate or resides in a drug treatment facility, mental health treatment center, or other residential institution, case investigation can be completed by facility staff using the case report form. Completed forms should be forwarded to the local health department.

5. CONTROLLING FURTHER SPREAD

5.1 Education

Persons who are HBV DNA or HBsAg-positive should be instructed that their blood and other secretions are infectious to others; chronic carriers usually are infectious for life. (A few do lose measurable HBsAg over time.)

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Objects potentially contaminated with blood (e.g., razors, toothbrushes) should not be shared with other people. Contaminated sharps should be stored in an approved sharps container. Cuts and skin lesions should be covered to prevent the spread of infectious secretions or blood.

Persons who are HBV DNA or HBsAg-positive should be advised that the virus may be transmitted through sexual contact. Patients should be educated to practice “safer” sex. Sex partners who are anti-HBc positive (from previous infection) are not at risk; vaccination has an estimated 95% efficacy and should be recommended for partners found to be susceptible.

Persons who are HBV DNA or HBsAg-positive should be advised not to donate blood, plasma, tissue, or semen.

Infected persons (among others) should not share hypodermic needles with other people. Disposable needles should only be used once. As a last resort, undiluted household bleach can be used to clean syringes and needles

Pregnant or sexually active women should be told about the risk of hepatitis B infection to newborns of infected mothers, and of the importance of prophylaxis for such newborns. If the woman is pregnant, refer to the Perinatal Hepatitis B Investigation Guidelines.

Parents or guardians of HBV DNA or HBsAg-positive persons with functional disabilities should be alerted to the risk of HBV infection associated with excessive drooling or aggressive behavior, such as biting and scratching.

To protect the liver from further harm, HBsAg-positive persons should be advised to:

- Seek health-care services from a provider experienced in the management of hepatitis B;
- Avoid or limit alcohol consumption because of the effect of alcohol on the liver, with referral to care provided for persons needing evaluation or treatment for alcohol abuse; and
- Obtain vaccination against hepatitis A (2 doses, 6–18 months apart) if chronic liver disease is present.
- HBsAg-positive persons who seek medical or dental care should notify personnel of their hepatitis B status.

Other counseling messages including the following:

- HBV is not spread by breastfeeding, kissing, hugging, coughing, ingesting food or water, sharing eating utensils or drinking glasses, or casual touching.
- Persons should not be excluded from school, play, child care, work, or other settings on the basis of their HBsAg status, unless they are prone to biting.

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- HBV-infected health-care workers should follow published guidelines and applicable state laws and regulations regarding recommended practices to reduce the risk of HBV transmission in the workplace. See §6.1.

5.2 Isolation and Work or Day Care Restrictions

Hospitalized patients with acute or chronic HBV infections pose a minimal risk to staff or other patients, given the implementation of standard precautions, and the appropriate pre-exposure use of hepatitis B vaccine.

If the case is a health care worker with potential for exposing patients, see §6.1.

The risk of transmission of HBV in the school or day care setting is usually low, and can be reduced through sound infection control procedures and environmental cleanliness. Toiletry items that could be contaminated with blood or saliva should not be shared. Toys and other contaminated objects should be cleaned and disinfected as soon as possible, to prevent transmission. The risk is greatest if the individual is a HBeAg-positive carrier, or is a child under three with excessive drooling, or who has open skin lesions, demonstrates aggressive scratching or biting behavior, has a bleeding disorder, or manifests breaches of personal hygiene. In these cases, the health department should carefully evaluate the situation to determine whether or not exclusion of the child from day care or vaccination of classroom contacts is indicated. ACDP epidemiologists are available for consultation; refer also to OAR 333-019-0010 and the Oregon School Health Services Manual.^{6,7} Ultimately, the local health officer has the authority to exclude children from day care or school.

5.3 Case Follow-up

A repeat test for HBV DNA or HBsAg should be obtained after six months in persons who only have a single positive test documented to determine the clearance or continued presence of viremia. Those still HBV DNA-positive or HBsAg-positive are considered confirmed chronic carriers.

Household contacts of carriers should be screened to determine persons susceptible to HBV infection; these individuals should be immunized. When appropriate, follow-up calls should be made to ensure that household contacts begin and complete their immunization series.

5.4 Prophylaxis

Vaccination

Refer to the [Immunization Standing Orders](#) for the recommended hepatitis B vaccine doses and schedules.

Post-Exposure

HBIG is rarely indicated for contacts of chronic carriers due to the difficulty of determining onset date (see §4.2).

Pre-Exposure

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Universal infant immunization has been recommended since early 1992. Hepatitis B vaccination is also indicated for unvaccinated children aged <19 years and anyone at increased risk of infection because of lifestyle, medical history, occupation, or ongoing intimate contact with a HBV carrier. Vaccination should be recommended to persons at risk who are identified in the course of a HBV case investigation. Vaccination is also recommended for nonsexual household contacts of acute HBV cases, especially children and adolescents. Questions about vaccine availability should be directed to the Immunization Program (971-673-0300).

Pre-exposure prophylaxis is recommended for the following persons:²

- All infants
- Unvaccinated children aged <19 years
- Persons at risk for infection by sexual exposure:
 - sex partners of HBsAg positive persons;
 - sexually active persons who are not in a long-term, mutually monogamous relationship (e.g., persons with more than one sex partner during the previous 6 months);
 - persons seeking evaluation or treatment for a sexually transmitted disease; and
 - men who have sex with men.
- Persons at risk for infection by percutaneous or mucosal exposure to blood:
 - current or recent injection-drug users;
 - household contacts of HBsAg-positive persons;
 - residents and staff of facilities for developmentally disabled persons;
 - health-care and public safety workers with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids;
 - hemodialysis patients and predialysis, peritoneal dialysis, and home dialysis patients; and
 - persons with diabetes aged 19–59 years; persons with diabetes aged ≥60 years at the discretion of the treating clinician.
- Others:
 - international travelers to regions with high or intermediate levels (HBsAg prevalence of >2%) of endemic HBV infection;
 - persons with hepatitis C virus infection;
 - persons with chronic liver disease (including, but not limited to, persons with cirrhosis, fatty liver disease, alcoholic liver disease, autoimmune hepatitis, and an alanine aminotransferase [ALT] or aspartate aminotransferase [AST] level greater than twice the upper limit of normal);
 - persons with HIV infection;
 - incarcerated persons; and

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- all other persons seeking protection from HBV infection.

Occupational Risks. Persons with jobs that put them at risk for occupational exposures may be eligible for vaccination at their employer's expense. For more information, contact OR-OSHA (main office, Salem, 503-378-3272; field offices in Portland, 503-229-5910; Eugene, 541-686-7562; Bend, 541-388-6066; and Medford, 541-776-6030).

Alternative Schedules. For a variety of reasons, some individuals cannot be immunized on the recommended schedule. In fact, many alternatives work almost as well (and some conceivably better). An interrupted vaccination schedule can be resumed at any time without modifying the number or timing of subsequent doses. For example, with the 3-dose vaccine series there is no problem (other than delayed benefit) with giving the second "one-month" dose at two months (or later), or the third "six-month" dose at eight months (or eight years). If an accelerated schedule is considered, the third dose should not be given <2 months after the second, unless a fourth dose is scheduled >4 months after the third dose.

Testing for Seroconversion. A minority of persons do not seroconvert after immunization, and they continue to be at risk for infection. However, serologic testing for immunity following a complete series of Hepatitis B vaccination is not recommended for all individuals but for specific populations, including:

- Infants born to HBsAg-positive mothers or mothers whose HBsAg status remains unknown;
- Healthcare personnel and public safety workers at risk for blood or body fluid exposure;
- Hemodialysis patients and others who might require outpatient hemodialysis;
- HIV-infected persons;
- Other immunocompromised persons; and
- Sex partners of HBsAg-positive persons.

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Table 3. Recommended Post-Exposure Prophylaxis for Occupational Exposure to hepatitis B Virus^{2,8}

Vaccination and antibody response status of exposed workers*	Source HBsAg status	
	Unknown or not available for testing	Negative
Unvaccinated	Hepatitis B immune globulin (HBIG) [†] x 1 and initiate HB vaccine series	Initiate HB vaccine series
Previously Vaccinated		
Known responder [§]	No treatment	No treatment
Known nonresponder ^{**}	HBIG x 1 and initiate revaccination or HBIG x 2 [¶]	No treatment
Response unknown	Test exposed person for anti-HBs 1. If adequate, no treatment is necessary 2. If inadequate, administer HBIG x 1 and vaccine booster	No treatment

*Persons who have previously been infected with HBV are immune to reinfection and do not require post-exposure prophylaxis.

† Dose is 0.06 mL/kg intramuscularly

§ A responder is a person with adequate levels of serum antibody to HBsAg (i.e., anti-HBs ≥ 10 mIU/mL).

** A non-responder is a person with inadequate levels of serum antibody to HBsAg (i.e., anti-HBs < 10 mIU/mL).

¶ The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine

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Table 4. Recommended Post-exposure prophylaxis* for Non-occupational Exposure to hepatitis B virus⁹

Exposure	Treatment	
	Unvaccinated person [†]	Previously vaccinated person [§]
Percutaneous (e.g., bite or needlestick) or mucosal exposure to HBsAg- <i>positive</i> blood or body fluids	Administer hepatitis B vaccine series, along with hepatitis B immune globulin (HBIG), 0.06 mL/kg intramuscularly	Administer hepatitis B vaccine booster dose
Sex or needle-sharing contact of an HBsAg- <i>positive</i> person		
Victim of sexual assault/abuse by a perpetrator who is HBsAg- <i>positive</i>		
Perinatal exposure to HBsAg- <i>positive</i> mother	Initiate hepatitis B vaccine series and hepatitis B immune globulin (HBIG) within 12 hours of birth	Not applicable
Percutaneous (e.g., bite or needlestick) or mucosal exposure to potentially infectious blood or body fluids from a source with <i>unknown</i> HBsAg status	Administer hepatitis B vaccine series	No treatment
Sex or needle-sharing contact of a person with <i>unknown</i> HBsAg status		
Victim of sexual assault/abuse by a perpetrator with <i>unknown</i> HBsAg status		

*When indicated, immunoprophylaxis should be initiated as soon as possible, preferable within 24 hours. Studies are limited on the maximum interval after exposure during which postexposure prophylaxis is effective, but the interval is unlikely to exceed 7 days for percutaneous exposures or 14 days for sexual exposures. The hepatitis B vaccine series should be completed.

† A person who is in the process of being vaccinated but who has not completed the vaccine series should complete the series and receive treatment as indicated.

§ A person who has written documentation of a complete hepatitis B vaccine series and who did not receive post-vaccination testing.

6. MANAGING SPECIAL SITUATIONS

6.1 Case is a Health Care Worker

HBV-infected health care providers should not be prohibited from participating in patient-care activities solely on the basis of their HBV infection; standard precautions should be adhered to rigorously in all healthcare settings for the protection of both patient and provider.¹⁴ The Society for Healthcare Epidemiology of America (SHEA) guidelines suggest that health care providers

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who test either HBeAg positive or who have circulating HBV burdens $\geq 10^4$ genome equivalents (GE) per milliliter (mL) of blood should routinely double-glove for all invasive procedures, for all contact with mucous membranes or non-intact skin, and for all instances in patient care for which gloving is recommended. Additionally, health care providers who are HBeAg positive or have titers of HBV DNA greater or equal to 10^4 GE/mL should not perform Category III procedures (see SHEA guidelines¹⁰ which include many surgical procedures or non-elective procedures in the emergency department such as open resuscitation efforts.

6.2 Case is a Suspected Iatrogenic Infection

If two or more iatrogenic cases occur in patients of the same dental or health care provider, residential care facility, or nonhospital health care facility (i.e. dialysis center); and the cases have no other identified plausible source of infection; or if other circumstances suggest the possibility of iatrogenic infection, notify ACDP at 971-673-1111.

6.3 Cases is a Recent Blood Donor

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

6.4 Case is Pregnant or has just Delivered

Pregnant women who are HBsAg positive should be tested for HBV DNA. For pregnant women whose HBV DNA is $>200,000$ IU/mL, maternal antiviral therapy is recommended to reduce perinatal transmission.²

Preventing perinatal transmission is perhaps the most important part of case follow-up, and for this reason the Oregon Immunization Program has an official Perinatal Hepatitis B Prevention Program. Participation in this program is mandatory for local health departments, who are paid for their “case management” activities by the Immunization Program. Case management activities and requirements for reporting these activities are described in detail in the [Perinatal Hepatitis B Investigative Guidelines](#).

6.5 Case is a Recent Transfusion Recipient

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

6.6 Case is IgM anti-HBc Positive, without Documented HBsAg

The physician ordering the test should be contacted about additional tests performed. It is important to rule out HBsAg antigenemia. Persons who are in

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fact HBsAg-negative may be in the window phase (see Figure 1.). Otherwise, they most likely have acute infection (with or without symptoms).

6.7 Case is Co-infected or Superinfected with Hepatitis D

If the patient's serology results include antibody to hepatitis D virus (HDV) or another marker of HDV infection, create a separate case report for this disease. Hepatitis D, an unrelated virus whose modes of transmission are similar to HBV, is a "defective" virus that can only infect persons with HBV. Approximately 15 million persons worldwide are infected with HDV,¹¹ but it is not routinely screened for in the United States. No special investigative measures are called for, assuming that the patient has been investigated according to the HBV guidelines.

6.8 Possible Common-source Outbreaks

Contact communicable disease epidemiologists at ACDP immediately at 971-673-1111.

GLOSSARY OF TERMS

ALT & AST: these are both liver enzymes classified as serum aminotransferases or transaminases and are useful indicators of liver damage. Alanine aminotransferase is usually abbreviated as ALT and is particularly sensitive for assessing liver damage secondary to HCV. Aspartate aminotransferase is abbreviated to AST.

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

HBsAg: hepatitis B surface antigen, a marker of replicating virus. It occurs as part of acute infection and persists in chronic infection. Unless associated with vaccination, its presence indicates that the patient is considered to be infectious. N.b.: the vaccine consists of recombinant HBsAg, so recently vaccinated persons may have detectable HBsAg in their serum.

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

HBeAb: hepatitis B e antibody is produced by the immune system temporarily during acute HBV infection and may persist in chronic infections. Spontaneous conversion from e antigen to e antibody (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. Chronic hepatitis B surface antigen carriers can be positive for either HBeAg or anti-HBe, but are less infectious when anti-HBe is present.

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

HCV genotype: HCV can be divided into at least 6 different genotypes. Genotype 1 is the most common in the US, accounting for 70%–75% of infections.

IgM anti-HAV: IgM antibody to HAV. A true positive indicates acute infection with HAV.

IgM Anti-HBc: IgM antibody to hepatitis B core antigen, indicative of recent infection with HBV. Antibody to core antigen only occurs following infection, not immunization. Used in the identification of people with acute or recent HBV infections (including HBsAg-negative people during the “window” phase of infection).

RIBA: recombinant immunoblot assay. **This test is no longer available.**

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

Signal-cutoff ratio: can be used to help determine the likelihood that a positive anti-HCV EIA represents a true positive. **Since January 1, 2016, the s/co ratio is no longer used in the acute or chronic hepatitis C case definitions.**

REFERENCES

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UPDATE LOG

- July 2018: Updates for alignment with the new ACIP recommendations and the acute and perinatal hep B guidelines; added figure 2 (world map), updated table 2, added tables 3 and 4 for post-exposure prophylaxis guidance, referenced standing orders for vaccine recommendations; removed summary of perinatal hepatitis B investigation in section 6.4; edits for clarity and consistency between all hep B guidelines. (Takeuchi)
- April 2011: Updated guidelines for cases who are institutionalized or incarcerated. (Grace Van Ness and Margaret Cunningham)
- April 2009: New chronic-HBV-specific document adapted from previous hepatitis B (acute and chronic) guidelines. Expanded (4.A-E) contact investigation and (5.E) case education sections; (4.B-D) added specific procedures for investigation of previously reported cases; updated (2.E) population prevalence table and (5.D) pre-exposure prophylaxis guidelines to reflect CDC recommendations issued September 2008.
- March 2008: IC.4 LHDs encouraged to verify pregnancy status on women of child-bearing age (15–44 years).
- May 2007: D2. Pre-exposure vaccination recommendations expanded to include non-sexual household contacts of acute HBV cases, especially children and adolescents, and household and sexual contacts of all HBsAg+ persons. Eliminated “indeterminate” case definition. Expanded the acute case definition to include +HBsAg results.