PUBLIC HEALTH REFERENCE SHEET
Hepatitis B

Name	Hepatitis B Virus (HBV)
Reservoir & Transmission	Humans Sexual transmission, perinatal transmission, intravenous drug use
Incubation Period	Usually 45–180 days, average 60–90 days As short as 2 weeks to the appearance of HBsAg, and rarely as long as 6–9 months
Common Symptoms	Acute infection: fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, abdominal pain with jaundice or elevated ALT levels Chronic infection: ranges from asymptomatic to evidence of liver disease such as cirrhosis or liver cancer
Gold Standard Diagnostic Test	Serum specific antigens and/or antibodies confirm diagnosis. Three antigen-antibody systems are identified for hepatitis B: HBsAg and antibody to HBsAg (anti-HBs) HBcAg and antibody to HBcAg (anti-HBc) Hepatitis B e antigen (HBeAg) and antibody to HBeAg (anti-HBe)
Risk Groups	Sexual partners and household contacts with infected persons; men who have sex with men; intravenous drug users; hemodialysis patients; inmates of juvenile detention facilities, prisons, and jails; healthcare and public safety workers who perform tasks involving contact with blood or blood-contaminated body fluids; clients and staff of institutions for the developmentally disabled who are bitten by patients; STI-positive patients and history of sexual activity with more than one partner in the previous 6 months; international travelers who plan to spend more than 6 months in areas with greater than 2% rates of chronic HBV infection and who will have close contact with the local population; and persons with diabetes who require blood glucose monitoring and other chronic conditions requiring frequent injections
Geographic Significance	Worldwide, endemic in many countries

What is hepatitis B?
Hepatitis B virus (HBV) is a small, circular, partially double-stranded DNA virus in the family Hepadnaviridae. Hepatitis B can be either acute or chronic.

Acute hepatitis B is a short-term illness that occurs within the first 6 months after someone is exposed to the hepatitis B virus. Some people with acute hepatitis B have no symptoms at all or only mild illness. For others, acute hepatitis B shows 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 jaundice or elevated serum alanine aminotransferase (ALT) levels >100 IU/L. Laboratory criteria for diagnosis of acute hepatitis B is HBsAg positive, and immunoglobulin M (IgM) antibody to hepatitis B core antigen (IgM anti-HBc) positive (if done).

Chronic HBV infection is a long-term illness that 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 of chronic hepatis B is immunoglobulin M (IgM) 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 6 months apart.

What is the occurrence of hepatitis B?

HBV is a leading cause of chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma worldwide. In 2015, an estimated 257 million people globally were living with chronic HBV infection, and HBV caused an estimated 887,000 deaths. However, HBV infections are likely underestimated because accurate data are lacking from many countries (Map 5-07).

Data demonstrating the specific risk to travelers are lacking; however, published reports of travelers acquiring hepatitis B are rare and the risk for travelers who do not have high-risk behaviors or exposures is low. The risk for HBV infection might be higher in countries where the prevalence of chronic HBV infection is ≥2% (e.g., in the western Pacific and African regions); expatriates, missionaries, and long-term development workers in those regions might be at increased risk for HBV infection.

How is hepatitis B transmitted?

HBV is transmitted by contact with contaminated blood, blood products, and other body fluids (e.g., semen). Travelers could be exposed to HBV through poor infection control during dental or medical procedures, receipt of blood products, injection drug use, tattooing or acupuncture, or unprotected sex.

Who is at risk for hepatitis B?

There are a variety of populations, activities, exposures, or conditions associated with an increased risk for HBV infection, including:

- Infants born to hepatitis B surface antigen (HBsAg)–positive pregnant people.
- People born in regions of the world with HBV infection prevalence of >2%.
- U.S.-born people not vaccinated as infants whose parents were born in regions with HBV infection prevalence of >8%.
- Injection drug use.
- Incarceration in a jail, prison, or other detention setting.
- HIV or Hepatitis C virus infection.
- Men who have sex with men.
- Sexually transmitted infections or multiple sex partners.
- Household contacts of people with known HBV infection.
- Needle-sharing or sexual contacts of people with known HBV infection.
- Maintenance dialysis, including in-center or home hemodialysis and peritoneal dialysis.
- Elevated alanine aminotransferase or aspartate aminotransferase levels of unknown origin.

What are the signs and symptoms of hepatitis B?

HBV infection primarily affects the liver. Typically, the incubation period for hepatitis B is 90 days (range 60–150 days). Newly acquired acute HBV infections only cause symptoms some of the time, and signs and symptoms vary by age. Most children <5 years of age and immunosuppressed adults are asymptomatic when newly infected, whereas 30%–50% of newly infected people aged ≥5 years have signs and symptoms. When present, typical signs and symptoms of acute infection include abdominal pain, anorexia, fatigue, fever, jaundice, joint

pain, malaise, nausea and vomiting, light (clay-colored) stool, and dark urine. The overall case-fatality ratio of acute hepatitis B is ≈1%.

Some acute HBV infections resolve on their own, but some develop into chronic infection. The risk for acute hepatitis B to progress to chronic HBV infection depends on the age at the time of initial infection as follows: >90% of neonates and infants, 25%–50% of children aged 1–5 years, and <5% of older children and adults. Most people with chronic HBV infection are asymptomatic and have no evidence of liver disease. However, 15%–40% of people with chronic HBV infection will develop liver cirrhosis, hepatocellular carcinoma, or liver failure, and 25% of chronically-infected people die prematurely from these complications. People infected with HBV are susceptible to infection with hepatitis D virus; coinfection increases the risk for fulminant hepatitis and rapidly progressive liver disease.

What are potential complications of hepatitis B?
Chronic hepatitis B can lead to serious health problems, including cirrhosis, liver cancer, and death. HBV reactivation is the abrupt reappearance or rise in HBV DNA in a patient with previously inactive chronic or resolved hepatitis B. It is often accompanied by a flare in disease activity with elevation of liver enzymes and with or without symptoms. HBV reactivation can be severe, resulting in death.

How is hepatitis B diagnosed?
Hepatitis B is a nationally notifiable disease. The clinical diagnosis of acute HBV infection is based on signs or symptoms consistent with viral hepatitis and elevated hepatic transaminases and cannot be distinguished from other causes of acute hepatitis. Serologic markers specific for hepatitis B are necessary to diagnose HBV infection and for appropriate clinical management. These markers can differentiate between acute, resolving, and chronic infection. Select Hepatitis B Genotyping for research use only, and Hepatitis B Serology and Quantitative PCR if testing regulated by Clinical Laboratory Improvement Amendments is needed.

How is hepatitis B treated?
No medications are available to treat acute HBV infection; treatment is supportive. Several antiviral medications are available for people with chronic HBV infection. People with chronic HBV infection should be under the care of a health professional, receive a thorough physical examination and laboratory testing to determine the need for antiviral therapy, and ongoing monitoring for hepatocellular carcinoma and liver damage. See American Association for the Study of Liver Diseases (AASLD) practice guidelines for the treatment of chronic HBV infection at https://www.aasld.org/practice-guidelines.

How can hepatitis B be prevented?
Vaccination is the best way to prevent hepatitis B infection. Vaccines licensed in different parts of the world may have varying dosages and schedules. In the U.S., booster doses are not recommended for immunocompetent persons vaccinated at any age.

As part of the pretravel education process, educate all travelers about exposure risks for hepatitis B and other bloodborne pathogens, including activities or procedures that involve piercing the skin or mucosa; receiving blood products; contaminated equipment used during cosmetic (e.g., tattooing or piercing), dental, or medical procedures; injection drug use; and unprotected sexual activity. Caution travelers against providers who use inadequately sterilized or disinfected equipment, who reuse contaminated equipment, or who do not use safe injection practices (e.g., reusing disposable needles and syringes).

PUBLIC HEALTH REFERENCE SHEET
Hepatitis B

In the U.S., the Advisory Committee on Immunization Practices (ACIP) recommends hepatitis B vaccination among all infants, children, and adolescents younger than 19 years of age, all adults aged 19 through 59 years, all adults aged 60 years and older with risk factors for hepatitis B, as well as adults 60 years and older without known risk factors.

For information on hepatitis B vaccination for infants, children, and adolescents see Hepatitis B Vaccination of Infants – Adolescents | CDC https://www.cdc.gov/hepatitis/hbv/vaccchildren.htm. For additional information on hepatitis B vaccination for adults see Hepatitis B – Vaccination of Adults | CDC https://www.cdc.gov/hepatitis/hbv/vaccadults.htm.

Postexposure prophylaxis (PEP) against HBV from an exposure to HBV should be given as soon as possible, but preferably within 24 hours, to effectively prevent infection. PEP includes hepatitis B vaccine, and in certain circumstances, Hepatitis B Immune Globulin (HBIG).

Testing is not a requirement for vaccination, and in settings where testing is not feasible or is refused by the patient, the clinician should recommend the person proceed with vaccination. Providers should administer the first vaccine dose immediately after the blood sample is collected and sent for serologic testing. There is no benefit and no risk to people who have already been infected with HBV and receive vaccination.

Infants born to HBsAg positive mothers should receive a single dose of vaccine within 12 hours of birth and, where available and depending on the epidemiology, HBIG. The first dose of vaccine should be given concurrently with HBIG, but at a separate site; second and third doses of vaccine (without HBIG) should be given 1–2 months and 6 months later, respectively.

What are some public health considerations?

- In the United States, case reports of viral hepatitis are classified as hepatitis A, acute hepatitis B, acute hepatitis C, perinatal HBV infection, chronic hepatitis B, hepatitis C, past or present, and perinatal HCV infection. Serologic testing is necessary to determine the etiology of viral hepatitis, and case reports should be based on laboratory confirmation. Each state and territory (jurisdiction) has a list of reportable diseases and conditions of public health importance.
- Guidelines for investigating a suspected case of acute viral hepatitis include:
    - Determining a discrete onset of illness,
    - Confirming evidence of acute liver disease (jaundice or elevated aminotransferase levels), and
    - Obtaining serologic laboratory results.
- The minimum recommended elements for investigating cases of chronic HBV infection and perinatal HBV infection include obtaining the serologic laboratory results needed to establish the case. Further investigation to determine the clinical characteristics of these cases may also be considered, although it is not required to confirm the case.
- The following information is epidemiologically important to collect in a case investigation for acute hepatitis B infection. Additional information may also be collected at the direction of the state health department.
    - Demographic information (clinical details, date of illness onset)
    - Symptoms, including jaundice
    - Laboratory results
    - Vaccination status
    - Risk behaviors/exposures
    - Contact investigation and prophylaxis

PUBLIC HEALTH REFERENCE SHEET
Hepatitis B

- The following information is epidemiologically important to collect in a case investigation for chronic hepatitis B infection. Additional information may also be collected at the direction/jurisdiction of the state health department.
    - Demographic information
    - Laboratory results
    - Risk behaviors/exposures
    - Pregnancy status. All HBsAg-positive pregnant women should be reported to the Perinatal Hepatitis B Prevention Program manager so that they can be tracked, and their infants can receive appropriate case management.
- The recommended elements of case investigation and follow-up of persons with chronic hepatitis B virus infection are detailed elsewhere. The following should be included:
    - Contact investigation and prophylaxis: Provision of hepatitis B vaccination for sexual, household, and other (needle-sharing) contacts of persons with hepatitis B, and counseling to prevent transmission to others
    - Counseling and referral for medical management, including assessing for biochemical evidence of chronic liver disease, and evaluating eligibility for antiviral treatment
- The following information is epidemiologically important to collect in a case investigation for perinatal HBV infection:
    - Demographic information about the child and mother
    - Laboratory results
    - Birth weight is useful because infants <2,000 grams will require an additional vaccine dose
    - Immunization history of the child, including date/time and doses of hepatitis B vaccine and HBIG
- Case investigation and follow-up of infants with hepatitis B virus infection should include the following:
    - Referral for medical management, including assessing for biochemical evidence of chronic liver disease, and evaluating eligibility for antiviral treatment
    - Identification of other susceptible infants and children in the household who require vaccination
- Persons reporting these conditions should contact their state/jurisdiction health department for jurisdiction-specific reporting requirements.
- Surveillance guidelines and forms are available from the CDC at https://www.cdc.gov/hepatitis/statistics/GuidelinesAndForms.htm.

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