Hepatitis B

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Module 1: STD Question Bank
Lesson 11: Hepatitis B

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References

- Abara WE, Qaseem A, Schillie S, McMahon BJ, Harris AM. Hepatitis B Vaccination, Screening, and Linkage to Care: Best Practice Advice From the American College of Physicians and the Centers for Disease Control and Prevention. Ann Intern Med. 2017;167:794-804. [PubMed Abstract] -
- Alter HJ, Purcell RH, Gerin JL, et al. Transmission of hepatitis B to chimpanzees by hepatitis B surface antigen-positive saliva and semen. Infect Immun. 1977;16:928-33. [PubMed Abstract] -
- Busch K, Thimme R. Natural history of chronic hepatitis B virus infection. Med Microbiol Immunol. 2015;204:5-10. [PubMed Abstract] -
- Colin JF, Cazals-Hatem D, Loriot MA, et al. Influence of human immunodeficiency virus infection on chronic hepatitis B in homosexual men. Hepatology. 1999;29:1306-10. [PubMed Abstract] -
- Davis LG, Weber DJ, Lemon SM. Horizontal transmission of hepatitis B virus. Lancet. 1989;1:889-93. [PubMed Abstract] -
- Dionne-Odom J, Tita AT, Silverman NS. #38: Hepatitis B in pregnancy screening, treatment, and prevention of vertical transmission. Am J Obstet Gynecol. 2016;214:6-14. [PubMed Abstract] -
- Ganem D, Prince AM. Hepatitis B virus infection--natural history and clinical consequences. N Engl J Med. 2004;350:1118-29. [PubMed Abstract] -
- Gupta I, Ratho RK. Immunogenicity and safety of two schedules of Hepatitis B vaccination during pregnancy. J Obstet Gynaecol Res. 2003;29:84-6. [PubMed Abstract] -
- Halperin SA, Dobson S, McNeil S, et al. Comparison of the safety and immunogenicity of hepatitis B virus surface antigen co-administered with an immunostimulatory phosphorothioate oligonucleotide and a licensed hepatitis B vaccine in healthy young adults. Vaccine. 2006;24:20-6.

[PubMed Abstract] -

- Halperin SA, Ward B, Cooper C, et al. Comparison of safety and immunogenicity of two doses of investigational hepatitis B virus surface antigen co-administered with an immunostimulatory phosphorothioate oligodeoxyribonucleotide and three doses of a licensed hepatitis B vaccine in healthy adults 18-55 years of age. Vaccine. 2012;30:2556-63.
[PubMed Abstract] -

- Halperin SA, Ward BJ, Dionne M, et al. Immunogenicity of an investigational hepatitis B vaccine (hepatitis B surface antigen co-administered with an immunostimulatory phosphorothioate oligodeoxyribonucleotide) in nonresponders to licensed hepatitis B vaccine. Hum Vaccin Immunother. 2013;9:1438-44.
[PubMed Abstract] -

- Heyward WL, Kyle M, Blumenau J, et al. Immunogenicity and safety of an investigational hepatitis B vaccine with a Toll-like receptor 9 agonist adjuvant (HBsAg-1018) compared to a licensed hepatitis B vaccine in healthy adults 40-70 years of age. Vaccine. 2013;31:5300-5.
[PubMed Abstract] -

- Hyams KC. Risks of chronicity following acute hepatitis B virus infection: a review. Clin Infect Dis. 1995;20:992-1000.
[PubMed Abstract] -

- Jackson S, Lentino J, Kopp J, et al. Immunogenicity of a two-dose investigational hepatitis B vaccine, HBsAg-1018, using a toll-like receptor 9 agonist adjuvant compared with a licensed hepatitis B vaccine in adults. Vaccine. 2018;36:668-674.
[PubMed Abstract] -

- Jourdain G, Ngo-Giang-Huong N, Harrison L, et al. Tenofovir versus Placebo to Prevent Perinatal Transmission of Hepatitis B. N Engl J Med. 2018;378:911-23.
[PubMed Abstract] -

- Launay O, van der Vliet D, Rosenberg AR, et al. Safety and immunogenicity of 4 intramuscular double doses and 4 intradermal low doses vs standard hepatitis B vaccine regimen in adults with HIV-1: a randomized controlled trial. JAMA. 2011;305:1432-40.
[PubMed Abstract] -

- Lin K, Vickery J. Screening for hepatitis B virus infection in pregnant women: evidence for the U.S. Preventive Services Task Force reaffirmation recommendation statement. Ann Intern Med. 2009;150:874-6.
[PubMed Abstract] -

- Lu PJ, Byrd KK, Murphy TV, Weinbaum C. Hepatitis B vaccination coverage among high-risk adults 18-49 years, U.S., 2009. Vaccine. 2011;29:7049-57.
[PubMed Abstract] -

- Mast EE, Weinbaum CM, Fiore AE, et al. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) Part II: immunization of adults. MMWR Recomm Rep. 2006;55:1-33; quiz CE1-4.
[PubMed Abstract] -

- Owens DK, Davidson KW, Krist AH, et al. Screening for Hepatitis B Virus Infection in Pregnant Women: US Preventive Services Task Force Reaffirmation Recommendation Statement. JAMA.

2019;322:349-54.
[PubMed Abstract] -

- Pan CQ, Duan Z, Dai E, et al. Tenofovir to Prevent Hepatitis B Transmission in Mothers with High Viral Load. N Engl J Med. 2016;374:2324-34.
[PubMed Abstract] -

- Poovorawan Y, Chongsrisawat V, Theamboonlers A, Crasta PD, Messier M, Hardt K. Long-term anti-HBs antibody persistence following infant vaccination against hepatitis B and evaluation of anamnestic response: a 20-year follow-up study in Thailand. Hum Vaccin Immunother. 2013;9:1679-84.
[PubMed Abstract] -

- Poovorawan Y, Chongsrisawat V, Theamboonlers A, Leroux-Roels G, Crasta PD, Hardt K. Persistence and immune memory to hepatitis B vaccine 20 years after primary vaccination of Thai infants, born to HBsAg and HBeAg positive mothers. Hum Vaccin Immunother. 2012;8:896-904.
[PubMed Abstract] -

- Schillie S, Harris A, Link-Gelles R, Romero J, Ward J, Nelson N. Recommendations of the Advisory Committee on Immunization Practices for Use of a Hepatitis B Vaccine with a Novel Adjuvant. MMWR Morb Mortal Wkly Rep. 2018;67:455-8.
[PubMed Abstract] -

- Schillie S, Murphy TV, Sawyer M, et al. CDC guidance for evaluating health-care personnel for hepatitis B virus protection and for administering postexposure management. MMWR Recomm Rep. 2013;62:1-19.
[PubMed Abstract] -

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31.
[PubMed Abstract] -

- Spradling PR, Xing J, Williams R, et al. Immunity to hepatitis B virus (HBV) infection two decades after implementation of universal infant HBV vaccination: association of detectable residual antibodies and response to a single HBV challenge dose. Clin Vaccine Immunol. 2013;20:559-61.
[PubMed Abstract] -

- Terrault NA, Lok ASF, McMahon BJ, et al. Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance. Hepatology. 2018;67:1560-1599.
[PubMed Abstract] -

- Trépo C, Chan HL, Lok A. Hepatitis B virus infection. Lancet. 2014;384:2053-63.
[PubMed Abstract] -

- Workowski KA, Bachmann LH, Chan PA, et al. Sexually transmitted infections treatment guidelines, 2021. Viral hepatitis infections: hepatitis B virus (HBV) infection. MMWR Recomm Rep. 2021;70(No. RR-4):1-187.
[2021 STI Treatment Guidelines] -

- Wu T, Kwok RM, Tran TT. Isolated anti-HBc: The Relevance of Hepatitis B Core Antibody-A Review of New Issues. Am J Gastroenterol. 2017;112:1780-8.
[PubMed Abstract] -

- Zanetti AR, Van Damme P, Shouval D. The global impact of vaccination against hepatitis B: a historical

overview. Vaccine. 2008;26:6266-73. [PubMed Abstract] -

Table 1. Global Prevalence of HBV by Country
Table 1.

Global Prevalence of Chronic HBV Infection, by Country

Prevalence Category	Country
High (≥8%)	Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Haiti, Kiribati, Kyrgyzstan, Laos, Liberia, Malawi, Mali, Mauritania, Mongolia, Mozambique, Namibia, Nauru, Niger, Nigeria, Niue, Papua New Guinea, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Swaziland, Togo, Tonga, Uganda, Vanuatu, Vietnam, Yemen, and Zimbabwe.
Intermediate (5.0-7.9%)	Albania, Bhutan, Cape Verde, China, Democratic Republic of the Congo, Ethiopia, Kazakhstan, Kenya, Marshall Islands, Moldova, Oman, Romania, Rwanda, Samoa, South Africa, Tajikistan, Tanzania, Thailand, Tunisia, Tuvalu, Uzbekistan, and Zambia.
Low Intermediate (2.0-4.9%)	Algeria, Azerbaijan, Bangladesh, Belarus, Belize, Brunei Darussalam, Bulgaria, Cambodia, Colombia, Cyprus, Dominican Republic, Ecuador, Eritrea, Federated States of Micronesia, Fiji, Georgia, Italy, Jamaica, Kosovo, Libya, Madagascar, Myanmar, New Zealand, Pakistan, Palau, Philippines, Peru, Russia, Saudi Arabia, Singapore, South Korea, Sri Lanka, Suriname, Syria, Tahiti, and Turkey.
Low (≤1.9%)	Afghanistan, Argentina, Australia, Austria, Bahrain,

Prevalence Category	Country
	Barbados, Belgium, Bolivia, Bosnia and Herzegovina, Brazil, Canada, Chile, Costa Rica, Croatia, Cuba, Czech Republic, Denmark, Egypt, France, Germany, Greece, Guatemala, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Japan, Jordan, Kuwait, Lebanon, Lithuania, Malaysia, Mexico, Morocco, Nepal, Netherlands, Nicaragua, Norway, Palestine, Panama, Poland, Portugal, Qatar, Serbia, Seychelles, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United Arab Emirates, United States of America, and Venezuela.
No data	Andorra, Antigua and Barbuda, Armenia, The Bahamas, Botswana, Chad, Comoros, Cook Islands, Dominica, El Salvador, Finland, Grenada, Guinea-Bissau, Guyana, Honduras, Latvia, Lesotho, Lithuania, Luxembourg, Macedonia, Maldives, Malta, Mauritius, Monaco, Montenegro, North Korea, Paraguay, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, San Marino, Sao Tome and Principe, Timor-Leste, Trinidad and Tobago, Turkmenistan, and Uruguay.

NOTE: This table is based on data from the Travelers' Health Branch of the Centers for Disease Control and Prevention (CDC) Division of Global Migration and Quarantine.the Centers for Disease Control and Prevention (CDC)
Source:

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31. [PubMed Abstract]

Table 2. Potential HBV Serologic Results and Recommended Course of Action

Table 2.

Baseline HBV Serologic Results

HBsAg	anti-HBs	anti-HBc	Interpretation	Recommended Action
(+)	(-)	(+)	Chronic HBV infection	Link to care for HBV treatment
(+)	(-)	IgM (+)	Acute HBV infection	Link to care for management and follow-up
(-)	(+)	(+)	Resolved HBV infection	Reassurance
(-)	(+)	(-)	Immune to HBV	Reassurance
(-)	(-)	(-)	Susceptible to HBV (non immune)	Vaccinate
(-)	(-)	(+)	"Isolated anti-HBc" may represent (1) prior HBV infection, (2) a false-positive test, (3) occult HBV infection, or (4) window phase of acute HBV infection	Expert consultation advised to determing optional further evaluation and management.

Abbreviations: HBV= hepatitis B Virus; HbsAg = hepatitis B surface antigen; anti-HBs = hepatitis B surface antibody; anti-HBc = hepatitis B core antibody

Table 3. Persons Recommended to Receive Hepatitis B Vaccination

Table 3.

Indications for Hepatitis B Vaccination

Groups with Indication for Hepatitis B Vaccination
All infants
Unvaccinated Children Younger than 19 Years of Age
Persons at Risk for HBV 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 infection • Men who have sex with men
Persons at Risk for Infection by Percutaneous Exposure • Persons who currently or recently injected drugs • Household contacts of HBsAg-positive persons • Residents and staff of facilities for developmentally disabled persons • Health care and public safety personnel with reasonably anticipated risk for exposure to blood or blood-contaminated body fluids • Hemodialysis, predialysis, peritoneal dialysis, and home dialysis patients • Persons with diabetes aged 19-59 years of age • Persons with diabetes 60 years of age and older at the discretion of the treating clinician
Others at Increased Risk of Acquiring HBV Infection • International travelers to countries with high or intermediate levels of endemic HBV infection (HBsAg prevalence of 2% or greater) • 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 ALT or AST level greater than twice the upper limit of normal) • Persons with HIV infection • Incarcerated persons
Persons Desiring Protection Against HBV
Abbreviations: ACIP = Advisory Committee on Immunization Practices; HBsAg: hepatitis B surface antigen; HBV = hepatitis B virus; ALT = alanine aminotransferase; AST = aspartate aminotransferase

Source:

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31. [PubMed Abstract]

Table 4. Interpretation of Serologic Test Results for HBV Infection

Table 4.

Interpretation of Test Results for Hepatitis B Virus Infection

HBsAg	Total anti-HBc	IgM anti-HBc	Anti-HBs	HBV DNA	Interpretation
-	-	-	-	-	Never infected; susceptible
+	-	-	-	+ or -	Early acute infection, *or* Transient (up to 18 days) after vacci
+	+	+	-	+	Acute infection
-	+	+	+ or -	+ or -	Acute resolving infection
-	+	-	+	-	Recovered from past infection and im
+	+	-	-	+	Chronic infection
-	+	-	-	+ or -	Isolated core antibody False-positive (susceptible), *or* Past infection (resolved), *or* "low-level" chronic infection (unlikely Passive transfer of anti-HBc to infant
-	-	-	+	-	Immune if anti-HBs concentration is 1 completing vaccine series, *or* Passive transfer after hepatitis B imm 3 to 6 months)

Abbreviations: anti-HBc = antibody to hepatitis B core antigen; anti-HBs = antibody to hepatitis B surface antigen antigen; HBV DNA = hepatitis B virus deoxyribonucleic acid; IgM = immunoglobulin class M.

Source:

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31. [PubMed Abstract]

Table 5. Interpretation of Hepatitis B Triple Screen Serologic Tests

Table 5.

Interpretation of Test Results for Hepatitis B Virus Infection

HBsAg	Anti-HBc	Anti-HBs	Interpretation
Negative	Negative	Negative	Never infected; susceptible
Positive	Negative	Negative	Early acute infection, *or* Transient (up to 18 days) after vaccination
Negative	Positive	Positive	Recovered from past infection and immune
Positive	Positive	Negative	Chronic infection
Negative	Positive	Negative	Isolated core antibody • Past infection (resolved), *or* • False-positive (susceptible), *or* • "Low-level" chronic infection (unlikely to be infectious), *or* • Passive transfer of anti-HBc to infant born to HBsAg-positive mother
Negative	Negative	Positive	Immune if anti-HBs concentration is 10 mIU/mL or greater after completing the vaccine series, *or* Passive transfer after hepatitis B immune globulin administration (for 3 to 6 months)

Abbreviations: anti-HBc = antibody to hepatitis B core antigen; anti-HBs = antibody to hepatitis B surface antigen; HBsAg = hepatitis B surface antigen.

Source:

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31. [PubMed Abstract]

Table 6. Postexposure Management of Health Care Personnel after Occupational Exposure to HBV

Table 6.

Postexposure Management of Health Care Personnel after Occupational Exposure to HBV

	Postexposure Testing			Postexposur
HCP Status	Source Patient (HBsAg)	HCP testing (anti-HBs)	HBIG	Vaccinati
Documented responder after completing series (≥3 doses)	No action needed			
Documented nonresponder after two complete series	Positive/unknown	Not indicated	HBIG x 2 separated by 1 month	—
	Negative	No action needed		
Response unknown after complete series	Positive/unknown	<10 mIU/mL	HBIG x 1	Initiate revac
	Negative	<10 mIU/mL	None	Initiate revac
	Any result	≥10 mIU/mL	No action needed	
Unvaccinated/incompletely vaccinated or persons who refuse HBV vaccine	Positive/unknown	Not indicated	HBIG x 1	Complete vac
	Negative	Not indicated	None	Complete vac

Abbreviations: HCP = health care personnel; HBsAg = hepatitis B surface antigen; anti-HBs = antibody to hepatitis B hepatitis B immune globulin; N/A = not applicable.

Source:

- Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31. [PubMed Abstract]