

## Viral Hepatitis Guide

Hepatitis is a general term that means inflammation of the liver. Many factors can cause hepatitis, including infection by a virus. To date, five viruses known to target the liver have been identified: hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV) and hepatitis E virus (HEV). In the United States and in North Dakota, HAV, HBV and HCV are the most common types (information about HDV and HEV can be found on the Centers for Disease Control and Prevention website, [www.cdc.gov/ncidod/diseases/hepatitis/index.htm](http://www.cdc.gov/ncidod/diseases/hepatitis/index.htm)). An estimated 1.25 and 2.7 million people in the U.S. are chronically infected with HBV and HCV, respectively. In North Dakota, these numbers translate to an estimated 3,200 and 8,400 North Dakotans chronically infected with HBV and HCV, respectively.

Viral hepatitis is a mandatory reportable condition in North Dakota (North Dakota Administrative Code 33-06-01, North Dakota Century Code 23-07-01). Physicians and other health-care providers, hospitals, health-care facilities

and medical diagnostic laboratories are required to report cases of viral hepatitis to the North Dakota Department of Health (NDDoH). In September 2004, with funding from the CDC, the NDDoH hired a hepatitis coordinator specifically to perform follow-up and to provide education to health-care providers and patients.

As part of the effort to educate health-care providers, the NDDoH has developed this guide to clarify differences among HAV, HBV and HCV (i.e., modes of transmission, prevention strategies, treatment options, etc.) and to assist health-care providers in identifying, testing and diagnosing people at risk for viral hepatitis. The resources contained in this guide were extracted from recommendations and guidelines published by the U.S. Centers for Disease Control and Prevention and the American Academy of Pediatrics. Additionally, several resources in this guide were adapted from materials developed by the Minnesota Department of Health.

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## Hepatitis A Virus (HAV) Fact Sheet

(adapted from materials developed by the U.S. Centers for Disease Control and Prevention)

<b>Report to NDDoH</b>	<b>Acute HAV infection (positive anti-HAV IgM)</b>
Etiology	HAV is an RNA virus in the picornavirus family.
Signs and Symptoms	<ul style="list-style-type: none"> <li>• May be asymptomatic</li> <li>• Older people are more likely to have symptoms; symptoms usually occur abruptly and may include fever, tiredness, loss of appetite, nausea, abdominal discomfort, dark urine or jaundice.</li> <li>• Symptoms generally last less than two months; occasionally, prolonged or relapsing illness can last up to one year.</li> <li>• Average incubation period is 28 to 30 days (range: 15 to 50 days).</li> </ul>
Long-Term Effects	<ul style="list-style-type: none"> <li>• Chronic infection does not occur.</li> <li>• HAV infection confers lifelong immunity.</li> <li>• 15 percent of HAV-infected people will have prolonged or relapsing symptoms for up to one year.</li> </ul>
Transmission	Fecal-oral transmission by: <ul style="list-style-type: none"> <li>• Person-to-person contact or</li> <li>• Ingestion of contaminated food or water</li> </ul>
Communicability	14 days before to seven days after onset of symptoms
Risk Groups	<ul style="list-style-type: none"> <li>• Household contacts of infected people</li> <li>• Sexual contacts of infected people</li> <li>• People, especially children, living in areas with increased rates of HAV infection during the baseline period from 1987 through 1997</li> <li>• People traveling to countries where HAV infection is common</li> <li>• Men who have sex with men</li> <li>• Injection and non-injection drug users</li> </ul>
Prevention	<ul style="list-style-type: none"> <li>• HAV vaccine is the best protection.</li> <li>• Immune globulin (IG) provides short-term protection against HAV; IG is appropriate for both pre- and postexposure prophylaxis; postexposure prophylaxis can be given within 14 days after exposure to HAV.</li> <li>• Hand washing with soap and water after using the bathroom, changing a diaper and before preparing or eating food</li> </ul>
Vaccine Recommendations	HAV vaccine is recommended for the following people age two or older: <ul style="list-style-type: none"> <li>• Travelers to areas with increased rates of HAV infection</li> <li>• Men who have sex with men</li> <li>• Injection and non-injection drug users</li> <li>• People with chronic liver disease</li> <li>• People with clotting-factor disorders (e.g., hemophilia)</li> <li>• Children living in areas with increased rates of hepatitis A during the baseline period from 1987 to 1997</li> <li>• Anyone who wants to be protected from contracting HAV infection</li> </ul>
Medical Management	Supportive care
Postexposure Management	Immune globulin (IG) for contacts of cases within 14 days of exposure. Contacts determined case-by-case, based on potential for transmission.
Trends and Statistics	<ul style="list-style-type: none"> <li>• Occurs in epidemics nationally and locally</li> <li>• During epidemic years, the number of HAV cases reported in the U.S. has reached 35,000.</li> <li>• Since the HAV vaccine was licensed in 1995, vaccine use has increased in the U.S. and morbidity has reached historic lows.</li> <li>• One-third of people in the U.S. are immune to HAV (i.e., have evidence of past infection).</li> </ul>

## Hepatitis B Virus (HBV) Fact Sheet

(adapted from materials developed by the U.S. Centers for Disease Control and Prevention)

<b>Report to NDDoH</b>	<ul style="list-style-type: none"> <li>• <b>Acute HBV infection</b></li> <li>• <b>Chronic HBV infection</b></li> <li>• <b>Hepatitis B surface antigen (HBsAg)-positive pregnant women</b></li> </ul>
Etiology	HBV is a DNA-containing virus classified as a hepadnavirus. Important components include hepatitis B surface antigen (HBsAg), hepatitis B core antigen (HBcAg), and hepatitis B e antigen (HBeAg).
Signs and Symptoms	<ul style="list-style-type: none"> <li>• May be asymptomatic (about 30 percent of people have no signs or symptoms)</li> <li>• Older people are more likely to have symptoms; onset of symptoms is usually gradual and may include jaundice, fatigue, abdominal discomfort, loss of appetite, nausea, vomiting, joint pain or rash.</li> <li>• Average incubation period is 60 to 90 days (range: two weeks to nine months)</li> </ul>
Long-Term Effects	<p>A person is considered to have chronic HBV infection if HBsAg-positive for six months or longer or HBsAg-positive and IgM anti-HBc-negative. Chronic infection occurs in:</p> <ul style="list-style-type: none"> <li>• 90 percent of infants infected at birth</li> <li>• 30 percent of children infected at age one to five.</li> <li>• 6 percent of people infected after age five.</li> <li>• Death from chronic liver disease (cirrhosis or hepatocellular carcinoma) occurs in 15 to 25 percent of chronically infected people.</li> </ul>
Transmission	<ul style="list-style-type: none"> <li>• Transmitted in blood or body fluids (e.g., wound exudates, semen and vaginal secretions or saliva of HBsAg-positive people) via: <ul style="list-style-type: none"> <li>▪ Unprotected sex with an infected partner</li> <li>▪ Sharing needles or “works” when “shooting” drugs</li> <li>▪ Needlesticks or sharps exposure on the job</li> <li>▪ Sharing personal care items that could be contaminated with blood (e.g., razor, toothbrush)</li> <li>▪ From an infected mother to her baby during birth</li> </ul> </li> <li>• Blood and serum contain the highest concentrations of virus.</li> <li>• Risk of transmission via saliva is unknown and not common.</li> </ul>
Communicability	All people who are HBsAg-positive are potentially infectious.
Risk Groups	<ul style="list-style-type: none"> <li>• People with multiple sex partners or sexually transmitted disease(s)</li> <li>• Men who have sex with men</li> <li>• Sex contacts of infected people</li> <li>• Injection drug users</li> <li>• Household contacts of chronically infected people</li> <li>• Infants born to HBV-infected mothers</li> <li>• Infants/children born to women from areas with high rates of HBV infection</li> <li>• Health-care and public safety workers</li> <li>• Hemodialysis patients</li> </ul>
Prevention	<ul style="list-style-type: none"> <li>• HBV vaccine is the best protection.</li> <li>• Latex condoms are recommended for sexually active people, especially those who have sex with more than one partner (the efficacy of latex condoms in preventing infection with HBV is unknown, but their proper use may reduce transmission).</li> <li>• Pregnant women should be tested for HBV. Infants born to HBV-infected mothers should be given HBIG (hepatitis B immune globulin) and vaccine within 12 hours after birth.</li> <li>• Injection drug users should be encouraged to discontinue injection drug use and to enroll in a treatment program; to never share needles, syringes, water or “works”; and to receive HAV and HBV vaccines.</li> <li>• Do not share personal care items that may be contaminated with blood (e.g., razor, toothbrush).</li> </ul>

Prevention cont.	<ul style="list-style-type: none"> <li>• People should be encouraged to consider the risks associated with tattoos and body piercings before receiving either.</li> <li>• People who have had HBV infection should not donate blood, organs or tissue.</li> <li>• Health-care or public safety workers should receive HBV vaccine, follow routine barrier precautions and handle needles and other sharps safely.</li> </ul>
Vaccine Recommendations	<ul style="list-style-type: none"> <li>• HBV vaccination of people age 18 or younger.</li> <li>• Vaccination of risk groups of all ages (see section on risk groups)</li> </ul>
Treatment and Medical Management	<ul style="list-style-type: none"> <li>• HBV-infected people should be evaluated for liver disease and receive HAV vaccine, if indicated.</li> <li>• Adefovir dipivoxil, alpha interferon, lamivudine and entecavir are licensed for the treatment of people with chronic HBV infection. These drugs are effective in up to 40 percent of patients. These drugs should not be used by pregnant women.</li> <li>• Advise against alcohol consumption and, if necessary, provide counseling for alcohol abuse.</li> </ul>
Postexposure Management	See Tables on pages 11 and 12
Trends and Statistics	<ul style="list-style-type: none"> <li>• Number of new infections per year has declined from an estimated 260,000 in the 1980s to about 78,000 in 2001.</li> <li>• Highest rate of disease occurs in people age 20 to 49.</li> <li>• Greatest decline in incidence has occurred among children and adolescents due to routine HBV vaccination.</li> <li>• An estimated 1.25 million people in the U.S. are chronically infected; 20 to 30 percent acquired their infection in childhood.</li> </ul>

## Hepatitis C Virus (HCV) Fact Sheet

(adapted from materials developed by the U.S. Centers for Disease Control and Prevention)

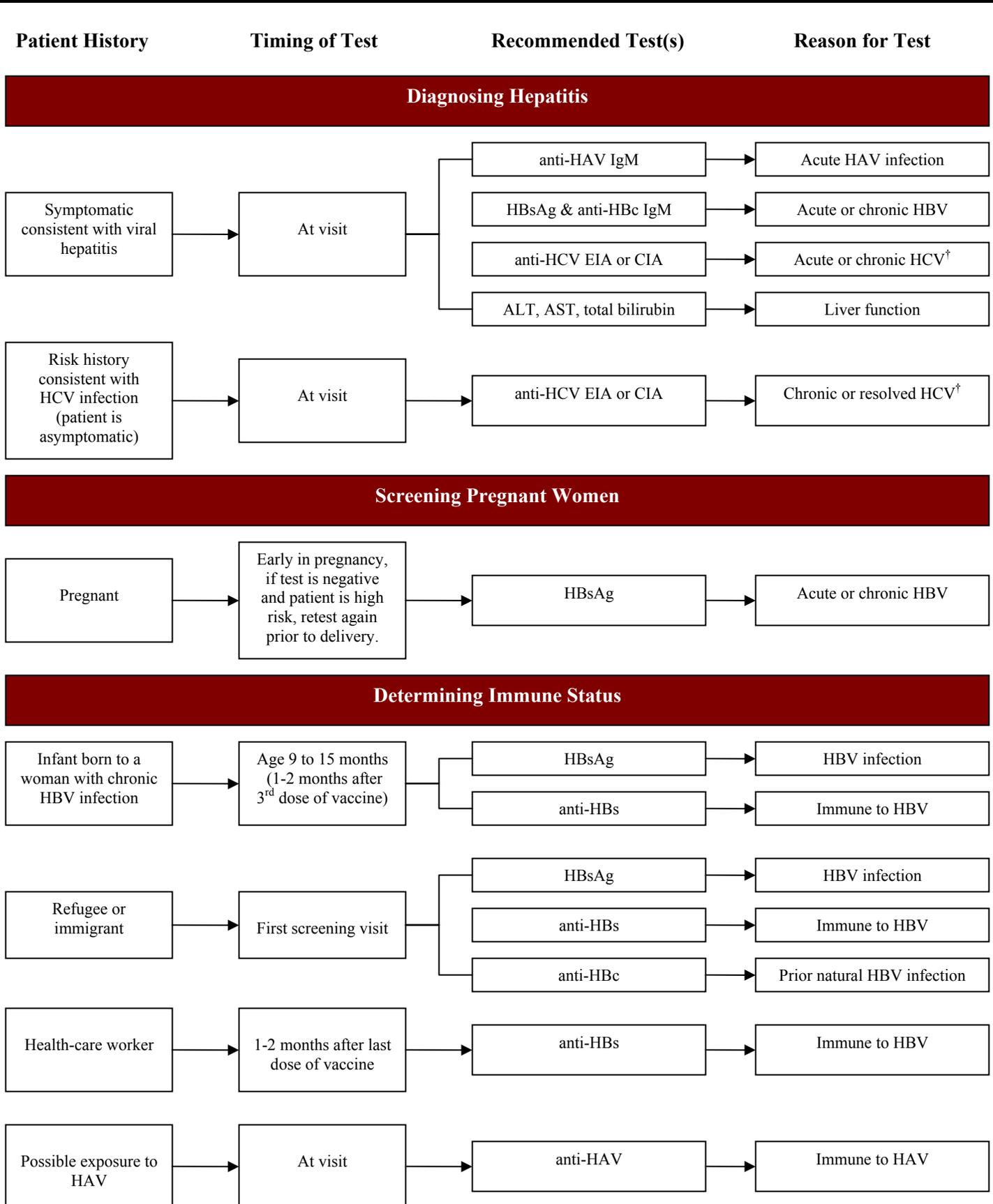
<b>Report to NDDoH</b>	<ul style="list-style-type: none"> <li>• <b>Acute HCV infection (newly acquired symptomatic HCV infection)</b></li> <li>• <b>Chronic and past HCV infection (i.e., persistent infection with HCV, characterized by detection of HCV RNA greater than six months after newly acquired infection)</b></li> <li>• <b>All available positive serology and nucleic acid PCR testing results (i.e., EIA or CIA with signal to cut-off ratio, RIBA, qualitative and quantitative PCR, HCV genotype)</b></li> </ul>
Etiology	HCV is an enveloped RNA virus in the flavivirus family.
Signs and Symptoms	<ul style="list-style-type: none"> <li>• 80 percent of people are asymptomatic.</li> <li>• Onset of symptoms is usually gradual and may include jaundice, fatigue, abdominal discomfort, loss of appetite, nausea, vomiting or dark urine.</li> <li>• Average incubation period is six to nine weeks (range: two weeks to six months).</li> </ul>
Long-Term Effects	<ul style="list-style-type: none"> <li>• Chronic infection: 55 to 85 percent of infected people</li> <li>• Chronic liver disease: 70 percent of chronically infected people</li> <li>• Deaths from chronic liver disease: one to five percent of chronically infected people</li> <li>• HCV is the leading indication for liver transplant in the United States.</li> </ul>
Transmission	<ul style="list-style-type: none"> <li>• Primarily transmitted through large or repeated direct percutaneous exposures to blood or blood products including: <ul style="list-style-type: none"> <li>▪ Sharing needles or “works” when “shooting” drugs</li> <li>▪ Needlesticks or sharps exposure on the job</li> <li>▪ From an infected mother to her baby during birth</li> </ul> </li> <li>• Less than 20 percent of cases are sexually transmitted.</li> <li>• Perinatal transmission accounts for 5 percent of cases.</li> </ul>
Communicability	All people with HCV antibody or HCV RNA in their blood are considered infectious.
Risk Groups and Recommendations for Testing	<ul style="list-style-type: none"> <li>• High risk (testing recommended) <ul style="list-style-type: none"> <li>▪ Injection drug users</li> <li>▪ Recipients of clotting factors made before 1987</li> </ul> </li> <li>• Intermediate risk (testing recommended) <ul style="list-style-type: none"> <li>▪ Hemodialysis patients</li> <li>▪ Recipients of blood and/or solid organs before 1992</li> <li>▪ People with undiagnosed liver problems</li> <li>▪ Infants born to HCV-infected mothers (testing recommended after 12 to 18 months of age)</li> </ul> </li> <li>• Low risk (testing not routinely recommended) <ul style="list-style-type: none"> <li>▪ Health-care/public safety worker (testing recommended only after known exposure)</li> <li>▪ People who have sex with multiple partners*</li> <li>▪ People who have sex with an infected steady partner*</li> </ul> </li> </ul> <p>*Anyone who wants to get tested should ask their doctor</p>
Prevention	<ul style="list-style-type: none"> <li>• There is no vaccine to prevent HCV infection.</li> <li>• People who use or inject illegal drugs should be advised to: <ul style="list-style-type: none"> <li>▪ Stop using and injecting drugs.</li> <li>▪ Enroll in a substance abuse treatment program, including relapse prevention program.</li> <li>▪ If continuing to inject drugs to: <ul style="list-style-type: none"> <li>• Never reuse or share needles, syringes, water, or “works”; if injection equipment has been used by other persons, clean with bleach and water.</li> <li>• Use only syringes obtained from a reliable source (e.g., pharmacy).</li> <li>• Use a new sterile syringe to prepare and inject drugs.</li> <li>• Use sterile water to prepare drugs, otherwise use clean water from a reliable source (e.g., tap water).</li> </ul> </li> </ul> </li> </ul>

Prevention cont.	<ul style="list-style-type: none"> <li>• Use a new or disinfected container (“cooker”) and a new filter (“cotton”) to prepare drugs.</li> <li>• Clean the injection site with a new alcohol swab prior to injection.</li> <li>• Safely dispose of syringes after one use. <ul style="list-style-type: none"> <li>▪ Receive HAV and HBV vaccines</li> </ul> </li> <li>• Do not share personal care items that may be contaminated with blood (e.g., razor, toothbrush).</li> <li>• People should be encouraged to consider the risks associated with tattoos and body piercings before receiving either.</li> <li>• Health-care or public workers should follow routine barrier precautions, handle needles and other sharps safely and get vaccinated against HBV.</li> <li>• Latex condoms are recommended for people diagnosed with a sexually transmitted disease and sexually active people, especially those who have sex with more than one partner (the efficacy of latex condoms in preventing infection with HCV is unknown, but their proper use may reduce transmission); these people should also get vaccinated against HBV.</li> <li>• People who have had HCV infection should not donate blood, organs or tissue.</li> </ul>
Treatment and Medical Management	<ul style="list-style-type: none"> <li>• HCV-infected people should be evaluated for liver disease.</li> <li>• Interferon, pegylated interferon and ribavirin are licensed for the treatment of people with chronic HCV infection. Given alone, interferon yields a sustained response in 15 to 25 percent of patients; combination therapy results in a sustained response in up to 50 percent of people with genotype 1 and in up to 80 percent of people with genotypes 2 or 3.</li> <li>• Evaluate patient for HAV and HBV immunity; vaccinate if indicated.</li> <li>• Advise against alcohol consumption and, if necessary, provide counseling for alcohol abuse.</li> </ul>
Postexposure Management	<ul style="list-style-type: none"> <li>• Follow-up of occupational HCV exposures: <ul style="list-style-type: none"> <li>▪ Perform anti-HCV testing of source</li> <li>▪ For the person exposed to an HCV-positive source: <ul style="list-style-type: none"> <li>• Perform baseline testing for anti-HCV and ALT activity, with follow-up testing at four to six months (for earlier diagnosis, testing for HCV RNA may be performed at four to six weeks)</li> <li>• Confirm all positive anti-HCV results obtained by immunoassay (EIA or CIA) using supplemental anti-HCV testing (e.g., RIBA).</li> </ul> </li> </ul> </li> <li>• Immune globulin and antiviral agents are not recommended after exposure to HCV-positive blood or body fluids.</li> <li>• Institutions should establish policies and procedures for HCV testing after percutaneous or mucosal exposures to blood or body fluids and ensure that staff are familiar with them.</li> </ul>
Trends and Statistics	<ul style="list-style-type: none"> <li>• Number of new infections per year has declined from an average of 240,000 in the 1980s to about 25,000 in 2001.</li> <li>• Most infections are due to illegal injection drug use.</li> <li>• Transfusion-associated cases occurred prior to blood donor screening; now occurs in less than one per million transfused units of blood.</li> <li>• An estimated 3.9 million (1.8 percent) people in the U.S. have been infected with HCV, of whom 2.7 million are chronically infected.</li> </ul>

## Viral Hepatitis Markers and Their Significance

Marker	Definition	Common Terminology	Meaning of a Positive Test
<b>Hepatitis A Virus (HAV)</b>			
anti-HAV IgM	antibody to hepatitis A virus, IgM fraction	HAV IgM	acute illness (within six months) or recent HAV vaccination (rarely)
anti-HAV	antibody to hepatitis A virus (combined total of IgM and IgG)	total HAV	recent or previous illness or immunity due to vaccination (does not distinguish between IgG and IgM; anti-HAV IgM test needed to determine acute status)
<b>Hepatitis B Virus (HBV)</b>			
HBsAg	hepatitis B surface antigen	surface antigen	HBV infection (additional tests needed to determine chronic or acute status)
anti-HBs	antibody to hepatitis B surface antigen	surface antibody	immunity to HBV (due to natural infection or HBV vaccination)
HBeAg	hepatitis B “e” antigen	e antigen	active viral replication; increased risk of transmitting HBV
anti-HBe	antibody to hepatitis B “e” antigen	e antibody	low viral replication in HBsAg-positive people
anti-HBc	antibody to hepatitis B core antigen	total core antibody	Natural infection (acute, resolved or chronic); not present after vaccination
HBcAg	hepatitis B core antigen	-----	(test not commercially available)
anti-HBc IgM	antibody to hepatitis B core antigen, IgM fraction	core IgM	current or recent HBV infection (within six months); presence of anti-HBc IgM without HBsAg denotes “window” phase late in some acute HBV infections where HBsAg has dropped below detectable levels; can persist in some chronic HBV infections
anti-HBc IgG	antibody to hepatitis B core antigen, IgG fraction	core IgG	past or chronic HBV infection
HBV DNA	quantitative assay for hepatitis B virus DNA	HBV DNA, quantitative	measures viral load; used to monitor response to HBV antiviral therapy
<b>Hepatitis C Virus (HCV)</b>			
anti-HCV EIA	enzyme immunoassay for antibody to hepatitis C virus	anti-HCV EIA	acute, chronic or resolved HCV infection
anti-HCV CIA	chemiluminescent immunoassay for antibody to hepatitis C virus	anti-HCV CIA	acute, chronic or resolved HCV infection
anti-HCV RIBA	recombinant immunoblot assay for antibody to hepatitis C virus	RIBA	supplemental antibody test used to verify a positive anti-HCV EIA or CIA result
HCV RNA, qualitative	qualitative assay for the detection of hepatitis C virus RNA	HCV RNA, qualitative	supplemental HCV RNA test used to verify an anti-HCV EIA or CIA result; a single negative test result is not conclusive, as viral RNA detection may be intermittent
HCV RNA, quantitative	quantitative assay for hepatitis C virus RNA	HCV RNA, quantitative	supplemental HCV RNA test to measure viral load; used to monitor response to antiviral therapy (results difficult to compare between assays; one test currently FDA-approved)

## Patient Evaluation for Viral Hepatitis\*



\*Adapted from materials developed by the Minnesota Department of Health

†Additional testing may be needed for diagnosis (see page 10)

## Interpretation of Hepatitis Laboratory Test Results\*

Test	Result	Interpretation	Follow-up
anti-HAV	Negative	Susceptible to HAV	Vaccinate for HAV
anti-HAV anti-HAV IgM	Positive Negative	Immune to HAV	None required
anti-HAV anti-HAV IgM	Positive Positive	Acute HAV infection	Report and counsel <sup>†</sup>
HBsAg anti-HBc anti-HBs	Negative Negative Negative	Susceptible to HBV	Vaccinate for HBV
HBsAg anti-HBc anti-HBs	Negative Negative Positive	Immune to HBV due to vaccination	None required
HBsAg anti-HBc anti-HBs	Negative Positive Positive	Immune to HBV due to infection	None required
HBsAg anti-HBc anti-HBc IgM anti-HBs	Positive Positive Positive Negative	Acute HBV infection	Report and counsel <sup>†</sup>
HBsAg anti-HBc anti-HBc IgM anti-HBs	Positive Positive Negative Negative	Chronic HBV infection	Report and counsel <sup>†</sup>
HBsAg anti-HBc anti-HBs	Negative Positive Negative	Four possible interpretations <sup>§</sup>	Report and counsel <sup>†</sup>
anti-HCV	Positive <sup>‡</sup>	Acute, chronic or resolved infection	Report, perform additional testing and counsel <sup>†</sup>

\*Adapted from materials developed by the Hennepin County Community Health Department and the Minnesota Department of Health

<sup>†</sup>See corresponding viral hepatitis fact sheet

<sup>§</sup>Possible interpretations: 1) recovering from acute HBV infection; 2) distantly immune, test not sensitive enough to detect very low levels of anti-HBs in serum; 3) susceptible with a false positive anti-HBc; or 4) chronically infected with an undetectable level of HBsAg in serum

<sup>‡</sup>Additional testing may be needed for diagnosis (see page 10)

## Interpretation of Hepatitis C Laboratory Test Results \*

Anti-HCV screening test results (EIA or CIA)	RIBA results	HCV RNA results	Interpretation	Comments
Negative	N/A	N/A	Negative	Not infected with HCV
Negative	Negative	Positive	Confirmed HCV case	Active HCV infection; test subject is likely immunocompromised
Positive	Positive	Positive	Confirmed HCV case	Active HCV infection
Positive	(not done)	Positive	Confirmed HCV case	Active HCV infection
Positive	Positive	Negative	Confirmed HCV case	Possible resolved infection; however, a single negative HCV RNA result does not rule out active infection; follow-up HCV RNA test needed in $\geq 6$ months
Positive	Indeterminate	Negative	Indeterminate	Anti-HCV screening test probably a false positive, which indicates no HCV infection; follow-up testing may be needed
Positive	Negative	Negative	Negative	Not infected with HCV; false positive screening test
Positive	(not done)	Negative	Possible HCV case	Possible false positive screening test or resolved infection; however, a single negative HCV RNA result does not rule out active infection; follow-up HCV RNA test needed in $\geq 6$ months
Positive	Positive	(not done)	Confirmed HCV case	Active or resolved HCV infection; HCV RNA test needed
Positive	Indeterminate	(not done)	Indeterminate	HCV infection status not determined; HCV RNA test needed or repeat anti-HCV test needed in $> 1$ month
Positive	Negative	(not done)	Negative	Not infected with HCV
Positive with high signal to cut-off ratio	(not done)	(not done)	Confirmed HCV case	Active or resolved infection; HCV RNA test needed
Positive with low signal to cut-off ratio	(not done)	(not done)	Possible HCV case	RIBA or HCV RNA test needed

\*Adapted from U.S. Centers for Disease Control and Prevention. Guidelines for laboratory testing and result reporting of antibody to hepatitis C virus. MMWR 2003;52(No. RR-3):11 and from materials developed by the Wisconsin Department of Health and Family Services.

## Postexposure Guidelines Following Sexual Contact with a Hepatitis B Surface Antigen (HBsAg)-Positive Person\*

Follow-up when hepatitis B virus (HBV) status of source is found to be:

Vaccination Status of Exposed Person	Time of Exposure(s)	Acute Infection	Chronic Infection	Unknown
Unvaccinated	last sexual contact ≤14 days ago	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise, administer HBV vaccine at zero, one, six months.  HBIG† 0.06 mL/kg, IM	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise administer HBV vaccine at zero, one, six months.  Consider testing for anti-HBs at one to two months post-vaccination.	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise, administer HBV vaccine at zero, one, six months.
Unvaccinated	last sexual contact >14 days ago	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise, administer HBV vaccine at zero, one, six months.	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise administer HBV vaccine at zero, one, six months.  Consider testing for anti-HBs at one to two months post-vaccination.	Test for HBsAg and anti-HBs. If either is positive, no vaccine needed. Otherwise, administer HBV vaccine at zero, one, six months.
Previously vaccinated		No follow-up indicated	No follow-up indicated	No follow-up indicated

\*Adapted from U.S. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Hamborsky J, Wolfe S, eds. 8<sup>th</sup> ed. Washington DC: Public Health Foundation, 2004, and from materials developed by the Minnesota Department of Health

†Hepatitis B immune globulin (HBIG). Do not wait for serology results > 14 days postexposure to give HBIG. Timing of HBIG does not affect vaccine efficacy.

### National Hepatitis Awareness Month – May 2005

May is National Hepatitis Awareness Month. Hepatitis A, B and C are the most common types of viral hepatitis in the United States. Prevention of viral hepatitis is a major challenge for the nation's public health, scientific and medical communities. Hepatitis A is a disease transmitted through the fecal-oral route where children are often the reservoir for infection. Hepatitis A vaccine is the best protection against hepatitis A virus infection. During the late 1990s, when hepatitis A vaccine became more widely used, the number of cases reached historic lows.

Hepatitis B and C are both bloodborne diseases transmitted when blood or body fluids from an infected person enter the body of a susceptible person. Both hepatitis B and C can cause chronic infection that can lead to cirrhosis and hepatocellular carcinoma. Hepatitis B vaccine is the best protection against infection with hepatitis B. The greatest decline in hepatitis B infections has occurred among children and adolescents as the result of routine hepatitis B vaccination. No vaccine exists to prevent hepatitis C infection, therefore, prevention of new hepatitis C infections depends on directing primary prevention activities to persons of increased risk of infection.

Additional information about hepatitis A, B and C is available at [www.health.state.nd.us/disease/Hepatitis/default.htm](http://www.health.state.nd.us/disease/Hepatitis/default.htm).

# Recommended Postexposure Prophylaxis for Percutaneous Exposure to Hepatitis B Virus (HBV)<sup>\*\*†</sup>

Treatment when source is found to be:

Vaccination and antibody response status of exposed person <sup>  </sup>		Treatment when source is found to be:		
		HBsAg <sup>§</sup> positive	HBsAg <sup>§</sup> negative	Unknown or not available for testing
Unvaccinated		HBIG <sup>**</sup> (one dose) and initiate HBV vaccine series	Initiate HBV vaccine series	Initiate HBV vaccine series
Previously vaccinated	Vaccine responder <sup>††</sup>	No treatment	No treatment	No treatment
	Vaccine nonresponder <sup>§§</sup> , no revaccination	HBIG <sup>**</sup> (one dose) and re-initiate HBV vaccine series	No treatment; consider revaccination	If known high-risk source, treat as if source were HBsAg <sup>§</sup> -positive
	Vaccine nonresponder <sup>§§</sup> to initial and revaccination series	HBIG <sup>**</sup> (two doses); second dose one month after first dose	No treatment	If known high-risk source, treat as if source were HBsAg <sup>§</sup> -positive
	Antibody response unknown	Test exposed person for anti-HBs <sup>¶</sup> ; if $\geq 10$ mIU/mL, no treatment; if $< 10$ mIU/mL, HBIG <sup>**</sup> (one dose) and HBV vaccine booster <sup>¶¶</sup>	No treatment	Test exposed person for anti-HBs <sup>¶</sup> ; if $\geq 10$ mIU/mL, no treatment; if $< 10$ mIU/mL, HBV vaccine booster <sup>¶¶</sup>

\*Adapted from 1) U.S. Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Atkinson W, Hamborsky J, Wolfe S, eds. 8<sup>th</sup> ed. Washington DC: Public Health Foundation, 2004; 2) Pickering LK, ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26<sup>th</sup> ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003:335; and 3) U.S. Centers for Disease Control and Prevention. Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. *MMWR* 2001;50(No. RR-11):22.

†Postexposure recommendations apply  $\leq 7$  days after exposure.

|| People who have previously been infected with HBV are immune to reinfection and do not require postexposure prophylaxis.

§Hepatitis B surface antigen

\*\*Hepatitis B immune globulin (HBIG); dose is 0.06 mL/kg intramuscularly

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

§§A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs  $< 10$  mIU/mL).

¶Antibody to HBsAg

¶¶The person should be evaluated for antibody response after the vaccine booster dose. For people who receive HBIG, anti-HBs testing should be performed when passively acquired antibody from HBIG is no longer detectable (i.e., four to six months); for people who did not receive HBIG, anti-HBs testing should be performed one to two months after the vaccine booster dose. If anti-HBs is inadequate ( $< 10$  mIU/mL) after the vaccine booster dose, two additional doses should be administered to complete a three-dose revaccination series and anti-HBs testing should be performed one to two months after completion of the three-dose revaccination series.

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### Reporting Viral Hepatitis

Physicians and other health-care providers, hospitals, health-care facilities and laboratories may report viral hepatitis cases (i.e., all positive viral hepatitis markers) online at [www.health.state.nd.us/disease/Disease%20Reporting/DiseaseCard.htm](http://www.health.state.nd.us/disease/Disease%20Reporting/DiseaseCard.htm) or by calling Kim Weis, hepatitis coordinator, at 800.472.2180.

## Summary of Selected Reportable Conditions

### North Dakota, 2004-2005

Reportable Condition	March-April 2005*	January-April 2005*	March-April 2004	January-April 2004
Campylobacteriosis	16	21	18	25
Chlamydia	305	564	400	693
Cryptosporidiosis	0	0	0	0
<i>E. coli</i> , shiga toxin positive (non-O157)	1	1	0	3
<i>E. coli</i> O157:H7	2	3	1	2
Enterococcus, Vancomycin-resistant (VRE)	0	8	1	4
Giardiasis	1	3	10	12
Gonorrhea	13	28	26	51
Haemophilus influenzae (invasive)	0	1	2	2
Hepatitis A	0	5	1	1
Hepatitis B	0	1	0	1
HIV/AIDS	4	5	3	7
Legionellosis	0	3	1	0
Lyme Disease	0	0	0	0
Malaria	0	0	2	2
Meningitis, bacterial <sup>1</sup> (non meningococcal)	1	3	4	4
Meningococcal disease	0	2	0	0
Mumps	0	1	0	0
Pertussis	34	76	4	9
Q fever	0	1	0	0
Rabies (animal)	7	8	12	22
Salmonellosis	9	21	5	13
Shigellosis	0	2	0	1
<i>Staphylococcus aureus</i> , Methicillin-resistant (MRSA)	115	339	238	492
Streptococcal disease, Group A <sup>2</sup> (invasive)	3	6	3	6
Streptococcal disease, Group B <sup>2</sup> (infant < 3 months of age)	0	0	0	0
Streptococcal disease, Group B <sup>2</sup> (invasive <sup>3</sup> )	5	12	9	15
Streptococcal disease, other <sup>2</sup> (invasive)	5	9	1	1
Streptococcal pneumoniae <sup>2</sup> , (invasive, children < 5 years of age)	2	3	0	0
Streptococcal pneumoniae <sup>2</sup> (invasive <sup>4</sup> )	13	24	13	25
<i>Streptococcus pneumoniae</i> <sup>2</sup> , drug-resistant	0	0	0	0
Tuberculosis	2	3	2	3
West Nile Virus Infection	0	0	0	0

\*Provisional data

<sup>1</sup> Meningitis caused by *Staphylococcus aureus* and *Streptococcus pneumoniae*.

<sup>2</sup> Includes invasive infections caused by streptococcal disease not including those classified as meningitis.

<sup>3</sup> Includes invasive infections of streptococcal, Group B, disease in persons  $\geq$  3 months of age.

<sup>4</sup> Includes invasive infections caused by *Streptococcus pneumoniae* in persons  $\geq$  5 years of age.

## Additional Viral Hepatitis Resources

North Dakota Viral Hepatitis Prevention and Control Program

701.328.2378 or 800.472.2180

[www.health.state.nd.us/disease/Hepatitis/](http://www.health.state.nd.us/disease/Hepatitis/)



U.S. Centers for Disease Control and Prevention, National Center for Infectious Diseases, Division of Viral Hepatitis  
888.4HEPCDC (888.443.7232) (24-hour hotline)

[www.cdc.gov/ncidod/diseases/hepatitis/](http://www.cdc.gov/ncidod/diseases/hepatitis/)

North Dakota Immunization Program

701.328.2378 or 800.472.2180

[www.health.state.nd.us/disease/Immunization/](http://www.health.state.nd.us/disease/Immunization/)

National Digestive Diseases Information Clearinghouse (NDDIC)

800.891.5389

<http://digestive.niddk.nih.gov/ddiseases/topics/hepatitis.asp>

Hepatitis B Foundation

215.489.4900

[www.hepb.org/](http://www.hepb.org/)

American Liver Foundation

800.GO.LIVER (800.465.4837) or 888.4HEP.USA (888.443.7872)

[www.liverfoundation.org](http://www.liverfoundation.org)

American Association for the Study of Liver Diseases

703.299.9766

[www.aasld.org](http://www.aasld.org)

Hepatitis Foundation International

800.891.0707 or 301.622.4200

[www.hepfi.org](http://www.hepfi.org)

National Clinicians' Post-Exposure Prophylaxis Hotline (PEpline)

888.HIV.4911 (888.448.4911) (24-hour hotline)

[www.ucsf.edu/hivcntr](http://www.ucsf.edu/hivcntr)