

Hepatitis B

1. Case Definition

1.1 Confirmed Case of Acute Infection (1)

Laboratory confirmation of infection as demonstrated by:

- hepatitis B surface antigen (HBsAg) positive PLUS immunoglobulin M antibody to hepatitis B core antigen (anti-HBc IgM) positive in the context of a compatible clinical history or probable exposure.
- OR
- loss of HBsAg within a six month period after testing HBsAg positive in the context of a compatible clinical history or probable exposure.

1.2 Confirmed Case of Chronic Infection (1, 2)

Laboratory confirmation of infection as demonstrated by:

- HBsAg positive for longer than six months with or without symptoms
- OR
- HBsAg positive, anti-HBc IgM negative and anti-HBc total positive
- OR
- detection of hepatitis B virus (HBV) DNA over a period greater than six months by a validated nucleic acid amplification test.

1.3 Confirmed Unspecified Case (1)

- HBsAg positive
- OR
- detection of HBV DNA by a validated nucleic acid amplification test
- AND

- does not fit the criteria for either acute or chronic case definitions above.

2. Reporting Requirements

2.1 Reporting to Manitoba Health and Healthy Living

- All positive laboratory results noted in the case definition are reportable to the Communicable Disease Control Branch, Manitoba Health and Healthy Living.
- All acute cases, newly identified chronic cases and unspecified cases are reportable to the Communicable Disease Control Branch, Manitoba Health and Healthy Living by the attending health care professional.
- Cases are referred to the health jurisdiction (i.e., Regional Health Authority [RHA], First Nations Inuit Health Branch [FNIHB]) of residence for follow-up.
- The *Manitoba Health and Healthy Living Investigation Form for Hepatitis B and C Positive Cases* should be completed by Public Health for all clients testing positive (this applies to all cases new to Manitoba) and forwarded to the Communicable Disease Control Branch, Manitoba Health and Healthy Living.
- Operators of Manitoba clinical laboratories are required to submit the residual serum or plasma specimens from individuals who tested positive for hepatitis B virus to Cadham Provincial Laboratory within seven days of report for surveillance purposes.
- Positive test results identified through the local Canadian Blood Services are reportable to the Communicable Disease Control Branch, Manitoba Health and Healthy Living.

2.2 Reporting to Canadian Blood Services

- If there is reasonable possibility that the source of infection in a client testing positive for hepatitis B is the receipt of blood or blood products, or there is a history of blood donation, Manitoba Health and Healthy Living will inform Canadian Blood Services.

3. Clinical Presentation/Natural History

3.1 Acute Infection

Initial infection with hepatitis B virus (HBV) may be asymptomatic in up to 50 per cent of adults and 90 per cent of children (3, 4). When symptoms occur, they may include anorexia, vague abdominal pain, nausea, vomiting and jaundice (3, 4). Fever may be absent or mild (4). Extrahepatic manifestations such as arthralgias, arthritis, macular rashes, thrombocytopenia or papular acrodermatitis (Gianotti-Crosti syndrome) can occur early in the course of the illness and may precede jaundice (5). Acute illness may last up to three months and has a case fatality rate of one to two per cent, which increases with age (3). Acute HBV infection cannot be distinguished from other forms of acute viral hepatitis on the basis of clinical signs and symptoms or nonspecific laboratory findings (5).

3.2 Chronic Infection

While the majority of individuals infected with HBV are able to clear the virus, some individuals fail to mount an adequate immune response, leading to chronic infection (6). The exact mechanisms by which chronic liver injury occurs in HBV infection are not known (7). Hepatitis B virus infection becomes chronic in approximately 90 per cent of infants infected at birth (5), 20 to 50 per cent of children infected from one to five years (5) and one to 10 per cent of individuals infected as older children and adults (3-5). Individuals with chronic infection may present in one of four phases of infection: 1) immune tolerant, 2) immune clearance (hepatitis B early antigen [HBeAg] positive chronic HBV), 3) the inactive carrier state or 4) reactivation (HBeAg negative chronic HBV

(6, 8-10). Not all patients go through every phase (9). Individuals in the HBeAg positive (immune clearance) or HBeAg negative (reactivation) chronic hepatitis phases are the ones requiring treatment. If chronic infection is established, the spectrum of illness ranges from the healthy carrier state to all of the sequelae of chronic hepatitis, including mild to moderate fibrosis, compensated cirrhosis, hepatic decompensation and hepatocellular carcinoma (HCC) (3, 8). The single most important risk factor for HCC is cirrhosis (8). Individuals who are immunosuppressed or have an underlying chronic illness are at increased risk of developing chronic infection (4, 5). Factors that may influence the natural history of chronic infection include gender, race, alcohol use, and co-infection with hepatitis A, hepatitis C or hepatitis D viruses (5). Reactivation of resolved chronic infection is possible with immunosuppression (5). Although HCC is more common in the fifth decade of life, HCC occasionally occurs in children who become infected perinatally or in early childhood (5). It is estimated that 15 to 25 per cent of individuals with chronic HBV infection will die prematurely of either cirrhosis or HCC (5). Antiviral therapy can modify the natural history of chronic HBV infection (9).

Superinfection or co-infection is not uncommon in patients with chronic HBV infection. Acute hepatitis delta virus (HDV) may be acquired as a co-infection simultaneously with HBV or as a superinfection in a patient who is already a carrier of HBV (10). Infection with HDV in HBV infected individuals is associated with more severe and/or progressive liver disease than is HBV mono-infection (10).

The natural course following acute hepatitis C virus (HCV) superinfection has not been well studied. The long-term prognosis following acute HCV superinfection is worse than that following HDV superinfection (11).

HIV co-infection tends to accelerate the natural history of HBV (19). Individuals co-infected with the parasite *Schistosoma* (Schistosomiasis) are more likely to have more severe hepatitis B manifestations and become chronic carriers of HBV (12).

4. Etiology

Hepatitis B virus, belonging to the Hepadnaviridae family, is a small enveloped DNA virus whose partially double-stranded DNA genome is maintained in a circular conformation (4, 6, 7, 13, 14). The nucleocapsid core antigen (HBcAg) is surrounded by an outer lipoprotein coat containing the surface antigen (HBsAg) (5). On the basis of the antibody response to HBsAg, four major subtypes of HBsAg have been recognized and designated adw, ayw, adr and ayr (5). The distribution of the four subtypes varies geographically; however, because of the common “a” antigen, protection against one subtype appears to confer protection against the other subtypes (4). No differences in clinical features have been related to subtype (4).

Eight HBV genotypes (A-H) have been described (4, 6), with genotype A being the most common in northern Europe and North America (6). Recent data suggest that HBV genotype may play a role in the progression from acute to chronic HBV infection (6, 15-17).

Hepatitis B virus primarily infects hepatocytes (7). The existence of asymptomatic hepatitis B carriers with normal liver histology and function suggests that the virus is not directly cytopathic (7). Protection from HBV infection is conferred by antibody to HBsAg (5).

5. Epidemiology

5.1 Reservoir and Source

Humans are the only known reservoir, although chimpanzees are susceptible to human strains (4). Individuals with chronic HBV infection are the main reservoir for infection (5). Other primates such as gibbons, orangutans, African green monkeys and squirrel monkeys have been found positive for HBsAg (7).

5.2 Transmission

The virus may be transmitted from individuals having acute or chronic infection (18). Hepatitis B virus is found mainly in the blood, vaginal

secretions, semen and serous fluids of an infected individual (3). HBV is present in saliva at concentrations 1,000 to 10,000 times less than in blood (3). There appears to be no transmission of HBV through tears, sweat, urine, stool or droplet nuclei (18).

Transmission occurs by percutaneous (IV, IM, SC or intradermal) and permucosal exposure to infective body fluids (4). The most common transmission route reported in Manitoba is sexual contact. Risk factors associated with sexual transmission among heterosexuals include having unprotected sexual contact with an infected partner, having unprotected sexual contact with multiple partners, and history of another sexually transmitted infection (STI) (14, 19, 20). Risk factors associated with sexual transmission among men who have sex with men (MSM) include having multiple sex partners, history of another STI and anal intercourse (19).

Percutaneous exposures that could result in HBV transmission include: transfusion of blood or blood products, human bites, sharing needles during injection drug use, hemodialysis, acupuncture, tattooing, body piercing and needlesticks or other injuries from sharp instruments sustained by health care personnel (21). The risk of transfusion-related hepatitis B is extremely low in Canada because of exclusion of donors at risk of infection and routine HBsAg and anti-HBc screening of donated blood (3). Blood products, including immune globulins (IG), heat-treated plasma protein fraction, albumin and fibrinolytic are considered safe in Canada (21). The precise role of saliva in the transmission of HBV is not clearly known; however, saliva is considered potentially infectious in bite wounds with broken skin involving the percutaneous inoculation of saliva, or when it is visibly tainted with blood (3). Other types of exposure to saliva such as kissing are unlikely modes of transmission (18).

Perinatal transmission of HBV is highly efficient and usually occurs from blood exposures during labour and delivery (5). In utero transmission of HBV is rare (5).

Household and community transmission may occur through sharing inanimate objects such as

washcloths, towels, razors or toothbrushes (4, 5). Hepatitis B virus can survive for long periods on environmental surfaces (at least seven days) (4, 5, 7). As such, exposure to even minute amounts of blood or contaminated secretions may transmit the virus (7). Infection can occur in settings of prolonged personal contact, such as that which occurs between children or among residents of institutions for the developmentally disabled (7). Fecal-oral or vectorborne transmission has not been demonstrated (4, 5). Approximately one-third of infections identified in Canada are acquired with no apparent risk factors (3).

Perinatal transmission is the major mode of transmission in high-prevalence¹ areas, whereas horizontal transmission accounts for most cases of chronic HBV infection in intermediate-prevalence² areas (7). Unprotected sexual intercourse and intravenous drug use in adults are the primary routes of spread in low-prevalence³ areas (7).

5.3 Occurrence

5.31 General

Hepatitis B virus is endemic worldwide with little seasonal variation (4). It is estimated that HBV infection affects approximately two billion persons worldwide (8). Approximately 350 million of these individuals have chronic infection (4). Regions of highest prevalence include Africa and Southeast Asia (3). Most areas of the United States, Canada, Western Europe, Australia and southern South America have a low endemicity of HBV infection (5). In Western countries, the disease is acquired primarily in adulthood, whereas in Asia and most of Africa, chronic HBV infection is common and usually acquired perinatally or in childhood (22).

5.32 Canada

With increased use of HBV vaccine, the incidence of hepatitis B has decreased in all age groups in recent years (3, 10); however, immigration continues to introduce additional HBV-infected individuals to Canada (10). The decline in the incidence of acute hepatitis B virus infection is only partly due to vaccination as the reduction in incidence extends to adults too old to have been included in adolescent

vaccination strategies (10). In general, Canada is considered an area of low endemicity; however, prevalence varies in different subgroups as identified in the “Host Susceptibility and Resistance” and “Transmission” sections of the protocol. It is estimated that less than five per cent of Canadian residents have markers of past infection and less than one per cent are HBsAg carriers (3). The incidence rate of clinically recognized acute hepatitis B has been estimated to be 2.3 per 100,000 population, indicating approximately 700 cases per year (20). The rate is higher among males (3.0 per 100,000) than females (1.5 per 100,000) and peaks for those aged 15-29 (2.7 per 100,000) and 40-59 (1.8 per 100,000) (20). The prevalence of chronic hepatitis B in Canada is unknown (10). Immigrants constitute the largest group of HBV carriers, particularly those from geographical regions with high endemic rates of HBV, such as Asia (10). As immigrants have a tendency to favour urban areas in Canada, hepatitis B is not evenly distributed across the country (10).

5.33 Manitoba

The total number of hepatitis B cases reported to Manitoba Health and Healthy Living in 2004 was 158 cases (23). In 2005, 148 cases were reported and 190 and 179 cases were reported for 2006 and 2007 respectively (23). Case numbers reported include acute cases, newly identified chronic cases as well as unknown or unspecified cases (23). As asymptomatic cases would not be detected and reported, the true number of HBV cases is likely higher. It is difficult to accurately determine the breakdown of acute and newly identified chronic cases as this distinction is not always known or specified. For example, in 2007, six acute cases, 69 chronic cases and 103 cases where the status of infection (acute or chronic) was either unknown or unspecified were reported to Manitoba Health and Healthy Living (23). The number of reported cases in 2007 was highest in the 30 to 39-year-old age group (age at diagnosis) followed by the 40 to 49-year-old age group (23).

1 HBsAg prevalence is 8% or higher (4).

2 HBsAg prevalence is from 2% to 7% (4).

3 HBsAg prevalence is under 2% (4).

The 0-1 and 1-4 year age groups had the lowest numbers of reported cases (23). For most years since reporting began in 1975, the number of cases reported in males was considerably higher than the number of cases reported in females (23).

5.4 Incubation

The incubation period for HBV ranges from 45 to 180 days with an average of 60 to 90 days (4). Hepatitis B surface antigen (HBsAg) may be detected as early as two weeks post-infection. Incubation is dependent upon inoculum size, mode of transmission and host factors (4).

5.5 Host Susceptibility and Resistance

Susceptibility in humans is general. Disease is often milder in children and is usually asymptomatic in infants (4). Individuals with Down's syndrome, lymphoproliferative disease, human immunodeficiency virus (HIV) infection and those on hemodialysis appear more likely to develop chronic infection (4). Protective immunity follows infection if antibodies to HBsAg (anti-HBs) develop and the individual becomes HBsAg negative (4). In most individuals who recover from acute HBV infection, anti-HBs persists for life, conferring long-term immunity (7). Immunity against HBV is believed to persist for at least 15 years after successful immunization (4). However; antibody response rate is lower in immunocompromised individuals such as those with diabetes mellitus and individuals infected with HIV (20). Groups at higher risk of acquiring HBV infection due to behavioural factors are described in the "Transmission" section.

5.6 Period of Communicability

All chronic cases should be considered infectious (3). When symptoms are present in individuals with acute HBV infection, HBsAg can be found in blood and body fluids for one to two months before and after the onset of symptoms (18). The presence of HBsAg, HBeAg and/or high levels of HBV DNA in individuals are indicators of communicability.

6. Diagnosis

NOTE: Where the testing for HBV is being done pursuant to an order issued under *The Testing of*

Bodily Fluids and Disclosure Act, see Manitoba Health and Healthy Living's *Integrated Post-Exposure Protocol for HIV, HBV and HCV: Guidelines for Managing Exposures to Blood and Body Fluids* for testing procedure.

Diagnosis of acute or chronic hepatitis B virus infection may sometimes be very difficult. Often one needs a clear history, physical and serological tests to try to determine this. See "Case Definition" section. Patient history is also important to assist the laboratory in determining testing needs.

6.1 Acute Cases

Diagnosis of acute HBV infection is typically based upon the detection of both HBsAg and anti-HBc IgM. HBsAg can be detected in serum from several weeks before onset of symptoms to days, weeks or months after in acute cases. HBsAg declines, disappears and is followed by the appearance of anti-HBs in acute cases which resolve. Anti-HBc IgM is present in high titer in acute cases and usually disappears within six months. See Table 1 for interpretation of serologic test results.

6.2 Chronic Cases

The diagnosis of chronic HBV infection is based upon the persistence of HBsAg for more than six months. The presence of HBsAg and anti-HBc total antibody, in the absence of anti-HBc IgM is also diagnostic of chronic infection. Other markers that may be tested for include HBeAg and anti-HBe. See Table 1 for interpretation of serologic test results.

6.3 Unspecified Cases

Cases that are HBsAg positive or in which HBV DNA has been detected by a validated nucleic acid amplification test, but which do not fit the acute or chronic case definition, are termed "unspecified." It is recommended that repeat testing (HBsAg) be performed six months after initial testing to determine if chronicity has developed.

Testing for hepatitis B DNA is not routinely performed except by reference laboratories. Testing for HBV DNA may be used to improve the diagnosis, to determine candidacy for treatment or to monitor the effectiveness of therapy.

Table 1: Interpretation of Hepatitis B Virus Test Results (7)

Test	Acute Hepatitis B	Immunity Through Infection	Immunity Through Vaccination	Chronic Hepatitis B	“Inactive” Carrier
HBsAg*	+	-	-	+	+
Anti-HBs	-	+	+	-	-
HBeAg*	+/-	-	-	+/-	-
Anti-HBe	-	+/-	-	+/-	+
Anti-HBc	+	+	-	+	+
Anti-HBc IgM	+	-	-	-	-
HBV DNA*	+	-	-	+	-

NOTE: While occult HBV infections are believed to occur, they are still under investigation.

* Patients having positive tests for one or more of these markers are considered to be infectious (3, 5).

Abbreviation	Marker
HBsAg	hepatitis B surface antigen
Anti-HBs	antibody to hepatitis B surface antigen
HBeAg	hepatitis B early antigen
Anti-HBe	antibody to hepatitis B early antigen
Anti-HBc	antibody to hepatitis B core antigen
Anti-HBc IgM	IgM antibody to hepatitis B core antigen
HBV DNA	hepatitis B virus nucleic acid

7. Key Investigations

- Determination of risk factors for acquisition of hepatitis B
- Contact identification to determine source and extent of transmission of infection and to prevent further spread by immunization
- Immunization history

8. Control

For the purposes of this protocol, “Public Health” refers to provincial regional public health authorities as well as First Nations Inuit Health.

8.1 Management of Cases

For the purposes of case and contact management, unspecified cases should be managed as acute cases unless and until further testing indicates that they fit the case definition for chronic infection.

- Any patient with hepatitis B infection believed to have been acquired sexually should be considered at high risk for other STIs, including HIV, and should be offered testing for gonorrhea, chlamydia, syphilis and HIV (14).
- Any patient with hepatitis B infection believed to have been acquired parenterally should be considered to be at risk for HIV and HCV, and should be offered testing for both (14).

8.11 Management of Acute Cases

- There is no specific therapy for acute HBV infection. Treatment is supportive (18).
- Routine Practices are indicated for hospitalized patients (4, 5).
- Medication lists should be reviewed and patients should be reminded to avoid medications metabolized by the liver (e.g., acetaminophen) if possible, or limit the doses (7).
- Acute cases should be tested for both HBsAg and anti-HBs six months after initial detection of HBsAg, to assess whether chronicity has developed and to determine the need for ongoing precautions. See “Education of Acute and Chronic Cases” below.
- All current sexual, needle/razor/toothbrush sharing and/or household contacts as well as those contacts within the previous six months should be identified (21). See “Management of Contacts” below.
- Public Health will contact cases to advise on follow-up testing and for contact identification and follow-up.
- See “Education of Acute and Chronic Cases” below.

8.12 Management of Chronic Cases

- The objective of treatment in chronic hepatitis B is to prevent the development of cirrhosis and its consequences, liver failure and hepatocellular carcinoma (HCC) (10).
- All patients diagnosed with chronic hepatitis B should be referred to an expert in the field or the Viral Hepatitis Investigative Unit (204-787-3630) for evaluation, treatment if indicated and for advice on over-the-counter medications.
- Treatment may be indicated for

individuals presenting with HBeAg positive or HBeAg negative chronic hepatitis B.

- Therapeutic options currently licensed for treatment of hepatitis B in Canada include standard interferon, pegylated interferon, lamivudine, adefovir, entecavir and telbivudine.
- Routine Practices are indicated for hospitalized patients (5, 18).
- All patients with chronic HBV infection who are not immune to hepatitis A should receive hepatitis A vaccine (5, 15).
- See “Education of Acute and Chronic Cases” below.
- All current sexual, needle/razor/toothbrush sharing and/or household contacts as well as those contacts within the previous six months should be identified (21). This timeframe should be extended further back if contact was frequent and after infection developed (when this can be estimated). See “Management of Contacts” below.
- Public Health will contact cases to identify and arrange for follow-up of contacts.

8.13 Special Considerations for Management of Pregnant Women

- Pregnant women or women who wish to become pregnant and who have hepatitis B infection should be counselled on the risk of transmission to the newborn and the method of preventing such transmission (e.g., hepatitis B immune globulin and HBV vaccine for the infant)(7).
- Pregnant women with acute HBV infection should be retested one month prior to expected date of delivery to determine HBV status. If the pregnant woman is still positive, follow immunization procedures detailed under “Neonatal Contacts” below at time of delivery.

- The same procedures detailed under “Neonatal Contacts” should be followed for infants born to women with chronic HBV infection.

8.14 Education of Acute and Chronic Cases

Cases should be educated about how hepatitis B virus is spread and counselled on how to limit/prevent transmission to others (e.g., immunization of household, sexual, needle, razor or toothbrush-sharing contacts, barrier methods for sexual partners) (7, 15).

- Cases should be instructed not to share toothbrushes, razors or injection drug use equipment (e.g., needles), or donate blood or organs (18, 21).
- Individuals with HBV infection should be instructed to prevent their blood (e.g., cover open wounds) and other potentially infective body fluids (e.g., saliva) from contacting other individuals (7, 18).
- Patients should be educated on how to properly clean up blood spills (21).
- Patients should be advised on the need to inform individuals providing health care or other personal services to them that they have been infected with HBV (21).
- Cases who are medical or dental personnel should be advised not to perform exposure-prone procedures unless they have sought counsel from an expert review panel and have been advised under what circumstances, if any, they may continue to perform these procedures (21).
- Cases should be advised to limit or avoid alcohol consumption as alcohol consumption is a risk factor for more rapid progression to cirrhosis (7).

8.2 Management of Contacts

Contacts of cases are: all sexual, household as well as needle, razor or toothbrush-sharing contacts within the six months prior to the symptom onset date of the case.

Public Health will attempt to locate contacts of cases and inform them of the potential risk of acquiring infection and the need for immunization, unless screening indicates immunity. For sexual partners, barrier methods should be used until immunizations have been administered and adequate anti-HBs demonstrated or until the case is determined to be HBsAg negative and anti-HBs positive (21).

Public Health can also assist in identifying and following up contacts of previously identified carriers, as well as contacts in complicated exposure to blood and body fluids situations that are not covered in this protocol (e. g., motor vehicle accidents, occupational needlestick injuries).

Consult a physician specializing in infectious diseases for the post-exposure management of immunocompromised contacts.

- Contacts should be identified and interviewed as soon as possible to initiate and maximize efficacy of immunoprophylaxis. If the case is asymptomatic, the date of onset is the date testing was done. These contacts should be tested for hepatitis B infection (HBsAg) and susceptibility or immunity (anti-HBs). They should be offered the first dose of hepatitis B vaccine. See “Acquisition and Administration of HBV Vaccine and HBIG.” If indicated, second and third doses of vaccine should be given one and six months after the first dose to complete the immunization series (21).
- **For contacts of acute hepatitis B cases:** The following groups should be offered hepatitis B immune globulin (HBIG) (23). See section “Acquisition and Administration of HBV Vaccine and HBIG” for indications and clinical use information:
 - all sexual contacts within the last 14 days
 - all needle/toothbrush/razor-sharing contacts within the last seven days

- all sexual and needle/toothbrush/razor-sharing contacts, regardless of the interval since last exposure, if there is any chance of future, similar exposures to the case
- all household contacts under the age of five years
- **For contacts of chronic hepatitis B cases:** HBIG should be considered if sexual or needle/razor/toothbrush contact occurred for the first time in the previous two weeks (21). See section below “Acquisition and Administration of HBV Vaccine and HBIG” for indications and clinical use information.
- Pre-immunization screening of all contacts for markers of infection may be performed at the same time as the first dose of vaccine or vaccine plus HBIG are given (21). In these situations, the blood for pre-immunization screening should be drawn before the administration of hepatitis B vaccine and HBIG to prevent the immunization(s) from interfering with testing results. **When requesting screening tests, please indicate “High Risk Pre-Immunization Hep B Screening.”** Cadham Provincial Laboratory (CPL) will then automatically screen for HBsAg and anti-HBsAg. See Table 2 below for follow-up.

NOTE: Vaccine and HBIG may be given at the same time but at different sites (3).

- Post-immunization testing for anti-HBs should be undertaken for individuals

likely to have ongoing household, sexual or needle-sharing contact with a case. The post-immunization testing should be performed one to two months after the third vaccine dose or four months after receipt of HBIG, whichever is later (21). If the individual tests anti-HBs negative, administration of additional doses of hepatitis B vaccine (up to three doses) with testing for response after each dose should be undertaken when the response to vaccine needs to be ensured (3). Individuals who fail to respond to three additional doses of vaccine are unlikely to benefit from further immunization (3).

- For management of neonatal contacts, see “Neonatal Contacts” below.

8.21 Neonatal Contacts

Infants Born to HBsAg-Positive Mothers:

- Babies born to HBsAg-positive mothers should receive HBIG and HBV vaccine after birth (10). Vaccine and HBIG may be given at the same time but at different sites (3).
- All infants born to HBV-infected mothers should be given the initial dose of HBV vaccine 0.5 mL (5 µg) within 12 hours of birth (3). The second and third dose of the vaccine series should be given one and six months after the first dose (3). See “Acquisition and Administration of HBV Vaccine and HBIG” below for indications and clinical use information.

Table 2: Recommended Follow-up of Contacts Based on Pre-immunization Serological Test Results

	HBsAg Positive	HBsAg Negative
Anti-HBs Positive	Rare inconsistent finding: Call CPL for clarification and possible repeat testing.	Individual is immune. No further HBV immunization is required.
Anti-HBs Negative	Individual is infected. See “Case Management.” Discontinue immunization if already started.	Individual is susceptible. Complete HBV immunization series. Administer HBIG in the indicated groups detailed above.

- Give HBIG (0.5 mL) immediately after birth (within 12 hours) (3). See “Acquisition and Administration of HBV Vaccine and HBIG” below for indications and clinical use information.
- If immediate administration of vaccine and HBIG are not possible, they should be given at the first possible opportunity (3).
- Health care providers are asked to complete the *Hepatitis B-Prophylaxis-Record Sheet for Infants* as well as the *Manitoba Immunization Monitoring System (MIMS) Immunization Monitoring Form for Hospitals and Clinics* at the time of prophylaxis. These forms are provided with each vial of HBIG and should be returned along with the infant’s post-partum referral to the regional public health office of the parent/guardian’s region of residence for appropriate public health follow-up including:
 - generating follow-up form letters (to be signed by Regional Medical Officer of Health or First Nations Inuit Health) to the infant’s physician/practitioner and parent/guardian. The follow-up letters will advise that two additional doses of HBV vaccine should be given at one and six months following the first dose.
 - ensuring that HBIG and the HBV vaccine immunization series have been administered and entered into MIMS (by either infant’s physician/practitioner or Public Health), once the infant’s Personal Health Information Number (PHIN) is assigned.
 - ensuring that arrangements for performing post-immunization testing have been initiated by either the infant’s physician/practitioner or Public Health.
- Post-immunization testing of infants for HBsAg and anti-HBs is recommended one to two months after completion of the HBV vaccine series to determine if

protective antibody levels have been achieved in infants born to HBsAg positive mothers (3, 21). If the infant tests anti-HBs negative and the infant is HBsAg negative, an additional three doses of vaccine at zero, one and six months should be given, followed by anti-HBs and HBsAg testing as above (21). If HBsAg is found, the child is likely to become a chronic carrier (see “Management of Chronic Cases”).

Low Birth Weight and Premature Infants Born to HBsAg-Positive Mothers:

- The response to hepatitis B vaccine may be diminished in infants of low birth weight (less than 2,000 g) (3). Infants of low birth weight should receive prophylaxis in the same way as other newborns (see *Infants Born to HBsAg Positive Mothers*), except that an additional fourth dose of vaccine should be given approximately two months after the third dose (3, 24, 25).
- Infants whose birth weight is more than 2,000 g, but who are premature (less than 37 weeks gestation) should also receive an additional fourth dose of vaccine approximately two months after the third dose.
- Post-immunization testing is as for other newborns above except that testing would be done one to two months after the fourth vaccine dose (21).

Unscreened Mother About to Deliver:

- If an unscreened mother is about to deliver and maternal HBV status is not available within 12 hours of delivery (call CPL at 204-945-6123 to determine status), consideration should be given to administering vaccine and HBIG while the results are pending, taking into account the mother’s risk factors for infection (e.g., no prenatal care, intravenous drug use, multiple sexual partners, immigration from an area of

high endemicity⁴ or person of Inuit descent). Health care practitioners should err on the side of providing vaccine if there is any suspicion that the mother could be infected (3). If serologic test results will not be available in the timeframe indicated above and risk assessment concludes that immunoprophylaxis is warranted, administer HBIG and initial HBV vaccine dose as described under *Infants Born to HBsAg-Positive Mothers* above. NOTE: Completion of the HBV vaccination series in the infant and post-immunization testing of the infant are not necessary if the mother tests HBV negative subsequent to initiation of HBIG and HBV vaccine immunoprophylaxis.

- If the mother's serologic test results are available within 12 hours of delivery and she is found to have HBV infection, both HBIG and hepatitis B vaccine should be administered as described above under *Infants Born to HBsAg-Positive Mothers* (3).

Other HBsAg-Positive Household Members:

- If the father or other household member is HBsAg positive and will be the primary caregiver, or there is an acute case in the household, both HBIG and hepatitis B vaccine should be administered as described above under *Infants Born to HBsAg-Positive Mothers* (21).
- If there is a carrier in the household (other than the mother or primary care giver), only the HBV vaccine series is required as described under *Infants Born to HBsAg-Positive Mothers* (21). See section below "Acquisition and Administration of HBV Vaccine and HBIG."

Mother's Infection Recognized During the First Year of the Infant's Life:

- The infant's HBV status should be assessed urgently and the infant started immediately on the full immunoprophylaxis with hepatitis B vaccine and HBIG as described

above under *Infants Born to HBsAg-Positive Mothers*. Immunoprophylaxis should be completed if the infant is found not to be already infected or immune (3).

8.3 Acquisition and Administration of HBV Vaccine and HBIG

Sites authorized to stock adult and pediatric formulations of HBIG and hepatitis B vaccines are listed below; specific formulations may or may not be stocked at these sites. To obtain HBIG and HBV vaccine from sites other than those listed below, contact the Provincial Vaccine Warehouse (weekdays 8:30 a.m.-5 p.m.) at 204-633-2621 or 1- 800-665-7315, fax: 204-694-2380. After 5:00 p.m., call 204-781-5342. A current Biologics/Vaccine Order Form is available by calling the warehouse.

Assistance in determining the need for HBIG and HBV vaccine can be obtained from the local or on-call Medical Officer of Health by calling (204) 788-8666. HBIG and HBV vaccine can be released to a Public Health Unit or physician.

Hospitals in Winnipeg:

Concordia Hospital
Grace Hospital
Health Sciences Centre (Children's and Adult Emergency)
Misericordia Urgent Care
Seven Oaks General Hospital
St. Boniface General Hospital
Victoria General Hospital

⁴ Africa, Southeast Asia, China, Hong Kong, Mongolia, North and South Korea, Taiwan, South Pacific (excluding Australia, Guam and New Zealand), Middle East (Jordan and Saudi Arabia), Eastern Europe and Northern Asia, Western Europe (Malta and indigenous populations in Greenland), Alaska Natives, Amazonian areas of Bolivia, Brazil, Colombia, Peru and Venezuela, and Turks and Caicos in the Caribbean (19).

Hospitals and Health Centres Outside Winnipeg:

Brandon Regional Health Centre
Boundary Trails Health Centre
Churchill Health Centre Pharmacy
Dauphin Regional Health Centre
Flin Flon General Hospital
Portage District General Hospital
Swan River Health Centre
Thompson General Hospital

Immunization providers should consult the respective product monograph prior to administering HBIG and HBV vaccine for information such as storage and handling requirements, administration schedule, injection site, dose specific to age and weight (for HBIG) etc.

- HBIG:
 - Administration is intramuscular (anterolateral thigh muscle of infants; deltoid muscle of children and adults) (3).
 - The standard HBIG dose for newborns and children up to 8.3 kg is 0.5 mL; the dose for children over 8.3 kg and adults is 0.06 mL/kg.
- HBV Vaccine:
 - Administration is intramuscular (anterolateral thigh muscle of infants; deltoid muscle of children and adults) (3).
 - There are various HBV vaccine schedules, formats, strengths. The pediatric preparation used in Manitoba is thimerosal-free.
 - Infants born to HBV-positive (or suspected to be positive) mothers should receive 0.5 mL (5 µg) of the thimerosal-free pediatric formulation for each dose.
 - Preferred schedule: second and third doses of HBV vaccine should be administered one and six months after the start of the immunization series unless otherwise indicated (e.g., serologic testing demonstrates HBsAg positivity).

8.4 Management of Outbreaks

- A thorough investigation should be undertaken to determine source and institute preventive measures if possible.
- See *Manitoba Provincial Outbreak Response Plan* (ORP).
- Consider mass immunization in situations where control of transmission is likely to be difficult (e.g., correctional facilities).

8.5 Preventive Measures

8.51 Screening

- Prenatal screening is strongly recommended for all women for each pregnancy, even if they were HBsAg positive in the past, so that newborns can receive prophylaxis if necessary (21). Practitioners are requested to tick-off the “prenatal” box on the Cadham Provincial Laboratory (CPL) requisition.
- Screening of individuals at high risk of infection, including individuals entering a health care profession, blood donors, adopted children from countries or family situations in which there is a high prevalence of infection, men who have sex with men, bisexual males and heterosexual males or females with multiple sexual partners or with a recent history of sexually transmitted infection and injection drug users (21).

8.52 Immunization

- Universal pre-exposure immunization programs as well as ongoing immunization of populations at increased risk. Please see the eligibility criteria for provision of publicly funded vaccine on the Communicable Disease Control Branch web site at www.gov.mb.ca/health/publichealth/cdc/vaccineeligibility.html.
- Please refer to the most recent edition of the *Canadian Immunization Guide* for indications and clinical use information.

8.53 Contact Investigation and Follow-up

Appropriate identification and follow-up of:

- Contacts of acute and chronic cases
- Perinatal contacts
- Individuals who have sustained an exposure to blood and body fluids (e.g., needlestick injury in a health care worker) and are deemed at risk of acquiring infection. See Manitoba Health and Healthy Living's *Integrated Post-Exposure Protocol for HIV, HBV and HCV: Guidelines for Managing Exposures to Blood and Body Fluids*.

8.54 Post-immunization Testing

- Post-immunization testing for individuals at high risk of exposure or re-exposure to HBV-infected individuals which may include the following (3):
 - infants born to HBV-infected mothers;
 - sexual partners and household contacts of chronic carriers; and
 - those who have been immunized because of occupational exposure.

8.55 Health Care Precautions

- Routine Practices including safe disposal of sharps.
- Adequate sterilization of instruments used in invasive procedures, including personal care services (e.g., piercing, tattooing).
- Avoidance of personal care services (e.g., piercing, tattooing).
- Appropriate disinfection measures following body fluid spills.
- Restricting the performing of exposure-prone procedures for medical and dental personnel who are infected with HBV, unless they have sought counsel from an expert review panel and have been advised under what circumstances, if any, they may continue to perform these procedures (21).

8.56 Harm Reduction Activities

- The risk of HBV transmission through injection drug use (IDU) can be significantly reduced by use of a new needle, syringe, and all other IDU equipment (e.g., filters, water, spoon) for each injection.
- Harm reduction activities such as safe injection practices may help to reduce HBV transmission within injection drug using populations.

9. Additional Resources

9.1 Canadian Liver Foundation

9.2 Canadian Association for the Study of the Liver

9.3 *Cadham Provincial Laboratory Guide to Services*

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