

HEPATITIS B (Perinatal)

REPORTING INFORMATION

- **Class B (perinatal hepatitis B):** Report by the end of the next business day after the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism: [Viral Hepatitis Case Report form, Ohio Confidential Reportable Disease form](#) (HEA 3334, rev. 1/09), [Positive Laboratory Findings for Reportable Disease form](#) (HEA 3333, rev. 8/05), the local health department via the Ohio Disease Reporting System (ODRS), or telephone.
- Special Notes on Reporting: Local health departments should report all new pregnancies for women identified with acute or chronic hepatitis B infection, even if the case was reported prior to the pregnancy or during a previous pregnancy.

AGENT

Hepatitis B virus is classified in the *Hepadnaviridae* family, and is a member of the *Orthohepadnavirus* genus. The hepatitis B virus is a partially double-stranded DNA virus, 40-48 nm in diameter.

TEST NAME ABBREVIATIONS

IgM anti-HAV	Immunoglobulin M antibody to hepatitis A virus
Anti-HBe	Antibody to hepatitis B e antigen
Anti-HBs	Antibody to hepatitis B surface antigen
HBeAg	Hepatitis B e antigen
HBsAg	Hepatitis B surface antigen
HBV DNA	Hepatitis B virus DNA
IgM anti-HBc	Immunoglobulin M antibody to hepatitis B core antigen
Total anti-HBc (IgM/IgG)	Immunoglobulin M and Immunoglobulin G antibodies to hepatitis B core antigen
Anti-HDV	Antibody to hepatitis D virus

CASE DEFINITION

Hepatitis B, Perinatal Virus Infection Acquired in the United States or U.S. Territories

Clinical Description

Perinatal hepatitis B in the newborn may range from asymptomatic to fulminant hepatitis.

Laboratory Criteria for Diagnosis

- HBsAg positive

Case Classification

Suspect: supportive serologic findings of hepatitis B infection in an infant aged 1-24 months. Does not include infants born outside of the United States or U.S. territories, or infants born to a HBsAg-negative mother.

Confirmed: HBsAg positivity in an infant aged 1-24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother.

Perinatal Hepatitis B Prevention: Public Health Management

I. Background about the Disease

Hepatitis B is an inflammatory liver disease caused by the hepatitis B virus (HBV). Infection with HBV can cause both acute and chronic hepatitis. The precise reasons why some people develop acute hepatitis and some people develop chronic hepatitis are unknown.

Acute hepatitis B is usually a self-limited process, although, in rare cases, fatal fulminant hepatitis can ensue. Chronic hepatitis B, which is the persistence of infection for six or more months, can result in the insidious development of cirrhosis, end-stage liver disease requiring liver transplantation and, in some cases, hepatocellular carcinoma. Hepatitis B infection can almost always be prevented by pre-exposure hepatitis B vaccination, which is the rationale for universal vaccination.

Another consequence of chronic or acute hepatitis B is the high likelihood of transmission of the virus from an HBsAg-positive pregnant female to her newborn at the time of delivery. Perinatally-acquired hepatitis B usually results in asymptomatic or subclinical chronic hepatitis in the newborn. The infants who acquire hepatitis B at birth are at very high risk of the eventual development of the complications of chronic hepatitis B mentioned above. As many as 25% of perinatally-infected infants will die as adults of chronic liver disease produced by chronic hepatitis B infection (1). Further, these chronically infected children remain infectious throughout their lives.

It is fortunate that perinatal hepatitis B can be prevented despite exposure of the newborn to maternal virus during delivery. In fact, the transmission of perinatal hepatitis B infection can be prevented in about 95% of infants born to HBsAg-positive mothers by early active and passive immunoprophylaxis of the infant (2).

Post-exposure immunoprophylaxis using hepatitis B immune globulin (HBIG) administered at birth (i.e. within 12 hours of birth), in combination with the first dose hepatitis B vaccine given at the same time, followed by the remainder of the series of hepatitis B vaccine given over the next six months, is very effective in preventing neonatal infection.

As many as 1.25 million persons in the United States have chronic hepatitis B infection, and more than 24,000 infants are born to HBsAg-positive females per year (1). In Ohio, more than 300 infants are born each year to HBsAg-positive females. It is paramount that these infants are protected from becoming infected.

II. Fundamentals of Perinatal Hepatitis B Prevention

A. Serologic screening of pregnant females

1. All pregnant females should be screened for hepatitis B infection (i.e. HBsAg) early in prenatal care.
 - a. This screening should be done on all pregnant females during each pregnancy.
 - b. Screening should be repeated later in the pregnancy in those females who are at high risk for the prenatal acquisition of hepatitis B.
2. For common hepatitis B serological profiles, see Table 1.

Table 1: Common Hepatitis B Serological Profiles

HBsAg	Anti-HBs	IgM anti-HBc	IgG anti-HBc	HBeAg	Interpretation
+	-	+	-	+	Acute hepatitis B
-	-	+	-	+ or -	Acute hepatitis B
+	-	-	+	-	Chronic hepatitis B, low viral replication
+	--	- (very rarely +)	+	+	Chronic hepatitis B, high viral replication
-	+	-	-	-	Vaccination-induced immunity
-	+	-	+	-	Natural recovery from hepatitis B infection (now immune)

B. Hepatitis B vaccine and HBIG usage in term infants born to HBsAg-positive mothers

1. At birth (within 12 hours of birth): Give first dose of vaccine plus HBIG.
2. At 1-2 months of age: Give second dose of vaccine.
3. At 6 months of age: Give third dose of vaccine.
4. For doses, see Table 2.
5. For immunoprophylaxis of preterm and low birth weight infants, see Table 3.

Table 2: Recommended Dosages of Hepatitis B Vaccine [Adapted from the *Red Book: 2012 Report of the Committee on Infectious Diseases]**

Patients	Recombivax** Dose: µg (ml)	Engerix-B** Dose: µg (ml)
Infants of HBsAg-positive mothers (HBIG) [0.5 mL] is also recommended	5 (0.5)	10 (0.5)
Infants of HBsAg-negative mothers and children and adolescents younger than 20 years of age	5 (0.5)	10 (0.5)
Adults 20 years of age or older	10 (1.0)	20 (1.0)
Patients undergoing dialysis and other immunosuppressed adults	40 (1.0) special formulation for dialysis patients	40 (2.0) two 1.0 ml doses given in one site in a 4- dose schedule

* American Academy of Pediatrics. Pickering LK, ed. *Red Book: 2012 Report of the Committee on Infectious Diseases*. 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2012: 369-390.

** For other hepatitis B-containing vaccine, multiple antigen vaccines such as Pediarix and Comvax, which cannot be used for the birth dose, see the Ohio Department of Health's Vaccine Protocol Manual.

Table 3: Hepatitis B immunoprophylaxis for preterm and low birth weight infants, born to HBsAg-positive or HBsAg-unknown mothers (including abandoned and safe haven babies) [Adapted from the *Red Book: 2012 Report of the Committee on Infectious Diseases]**

Maternal Serostatus	Infant = or >2,000g	Infant <2,000 g
HBsAg-positive	<ul style="list-style-type: none"> • Hepatitis B vaccine and HBIG within 12 hours of birth • Immunize with three vaccine doses at 0, 1, and 6 months of chronological age 	<ul style="list-style-type: none"> • Hepatitis B vaccine and HBIG within 12 hours of birth • Immunize with four vaccine doses at 0, 1, 2-3 and 6-7 months of chronological age
HBsAg-unknown (including abandoned and safe haven babies)	<ul style="list-style-type: none"> • Test mother immediately for HBsAg • Hepatitis B vaccine and HBIG within 12 hours of birth (preferred by ODH Perinatal Hepatitis B Prevention Program and ODH Immunization Program)** • Or await HBsAg result and if positive, give HBIG as soon as possible but in less than seven days (<i>Red Book</i> recommendation) • If HBsAg is positive, immunize with three vaccine doses at 0, 1 and 6 months of chronological age 	<ul style="list-style-type: none"> • Test mother immediately for HBsAg • Hepatitis B vaccine and HBIG within 12 hours of birth • If HBsAg is positive, immunize with four vaccine doses at 0, 1, 2-3 and 6-7 months of chronological age

* American Academy of Pediatrics. Pickering LK, ed. *Red Book: 2012 Report of the Committee on Infectious Diseases*. 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2012: 369-390.

** The rationale for giving HBIG within 12 hours (unless HBsAg is determined to be negative within 12 hours) is that the ODH Perinatal Hepatitis B Prevention Program has seen cases where HBIG was held pending the HBsAg determination (which proved to be positive); the patient was discharged and lost to follow-up, and, therefore, did not receive HBIG.

C. Hepatitis B vaccine and HBIG usage in term infants born to mothers of unknown HBsAg status (including abandoned and safe haven babies)

1. At birth (within 12 hours): Give first dose of vaccine. Draw maternal blood for HBsAg.
2. Given HBIG within 12 hours of birth (preferred by the ODH Perinatal Hepatitis B Prevention Program [PHBPP] and the ODH Immunization Program) or await HBsAg result and, if positive, give HBIG as soon as possible but in less than seven days (American Academy of Pediatrics *Red Book* recommendation).
3. At 1-2 months of age: Give second dose of vaccine.
4. At 6 months of age: Give third dose of vaccine (if mother is found to be positive). If mother is found to be negative, give third dose of vaccine at 6-18 months of age.
5. For doses, see Table 2.
6. For preterm and low birth weight infants, see Table 3.

D. Post-vaccination serological testing among infants born to HBsAg-positive mothers (and mothers whose serostatus remains unknown)

1. After the completion of the vaccine series, these infants should be tested for HBsAg (to determine whether immunoprophylaxis failed) and anti-HBs (to determine whether the immune response was sufficient to ensure continuing protection).
2. This should be done after completion of the primary vaccination series at 9-18 months of age (three to nine months after the completion of the series, but never earlier than nine months of age).

E. Additional Vaccination

1. Infants who test HBsAg-negative and anti-HBs-negative should receive a second 3-dose series of vaccine followed by testing for HBsAg and anti-HBs 1-3 months after series completion.
2. If after the sixth dose, the child does not seroconvert, no more doses are indicated, and the child should be considered still susceptible to disease.

F. Screening of household and sexual contacts of pregnant HBsAg-positive females

1. Household and sexual contacts who have a history of three doses of hepatitis B vaccine and are immune to HBV, or who have been found previously to be hepatitis B positive, need not be screened.
2. If the contact has no history of disease or vaccination, they should have serology drawn and vaccine started.

G. Hepatitis B vaccine and HBIG usage among household and sexual contacts of pregnant HBsAg-positive females

1. Household and sexual contacts of pregnant HBsAg-positive females should have screening serology drawn and receive the full series of hepatitis B vaccine.
 - a. If a household contact or sexual partner received an exposure (in the past 14 days) to blood from a pregnant HBsAg-positive female regardless of whether the female has acute or chronic hepatitis, HBIG should be given at the same time as the first dose of vaccine (in a different anatomical site).
2. Post vaccine serology testing should be performed on sexual contacts 1-2 months after administration of the last dose of vaccine.
 - a. Sexual contacts who do not seroconvert, should receive a second 3-dose series of vaccine, followed by repeat serology 1-2 months after the last dose.
 - b. If, after the sixth dose, the contact has not seroconverted, no more doses are indicated.
 - c. If it has been greater than 6 months since the last vaccine was administered, give one dose of vaccine and test one month later.

III. Identification and Reporting of HBsAg-positive Pregnant Females: Local Health District Recommendations

A. All pregnant females should be screened for HBsAg during each pregnancy.

B. All positive laboratory test results

1. All positive laboratory test results of Class B reportable diseases, such as perinatal hepatitis B, are required to be reported to the local health district (LHD) within the jurisdiction the pregnant female resides per Ohio Administrative Code rules.
2. This means that any physician, healthcare agency, or laboratory that detects a positive result for one or more hepatitis B serological markers (except anti-HBs) is required to report it to the appropriate LHD. (The presence of anti-HBs indicates immunity from either previous vaccination or resolved infection.)

C. All females of childbearing age (i.e. 10-50 years of age) and both male and female children (age 15 and below) with one or more positive hepatitis B markers should be entered into the electronic Ohio Disease Reporting System (ODRS) regardless of clinical status as acute or chronic hepatitis B.

1. The pregnancy status of all females of childbearing age should be entered into ODRS.

2. If the pregnancy status is unknown for a female of childbearing age who has one or more positive serological markers for hepatitis B (e.g. HBsAg, IgM anti-HBc, IgG anti-HBc, total anti-HBc, Heat, anti-Heat, hepatitis B virus DNA), the female's physician should be contacted to determine the pregnancy status. This should be entered into ODRS.
 - a. If the physician does not know the pregnancy status, the female should be contacted directly.
 - b. If the female has recently delivered, the LHD should collect clinical, diagnostic, and serological marker data that allows a determination of the status of hepatitis B (e.g. acute, chronic, resolved). This should be entered into ODRS.

D. Case information should be entered into ODRS.

IV. Case Management of HBsAg-positive Pregnant Females: Local Health District Recommendations

A. The pregnant female should be interviewed by the LHD within five business days to identify all household and current sexual contact(s). If the pregnant female has been followed by the ODH PHBPP during a previous pregnancy, she should be asked if there have been new household and/or sexual contact(s).

1. This information should be entered into ODRS.
2. This information should also be directly reported to the ODH PHBPP.

V. Management of infants born to HBsAg-positive mothers or mothers of unknown serostatus (including abandoned and safe haven babies)

A. Ensure/facilitate the receipt of the full series of hepatitis B vaccination and HBIG administration as needed.

1. Birth information will be sent to the LHD from the ODH BPHBPP.
2. If notification of delivery is not received within three weeks of estimated date of delivery, the LHD should contact the ODH PHBPP to check the newborn screening database for the date of birth. If no birth data are found, the LHD should contact the prenatal care provider to determine pregnancy/delivery status.

B. Ensure/facilitate the determination of post-vaccination serology.

1. Upon completion of the full vaccination series, a post-vaccination serology letter should be mailed to the infant's medical provider as well as the mother. A congratulatory letter should be included in the letter to the mother.

C. Determine whether additional vaccination is needed.

1. If post-vaccination serology results are not received from the medical provider, the LHD should contact the infant's medical provider for the results.
2. If post-vaccination serology results indicate hepatitis B infection in the infant, the LHD should
 - a. Contact the ODH PHBPP.
 - b. Report the infected infant as a new case in ODRS per ODRS guidelines. The mother's ODRS case number should be indicated in the infant's record.
 - c. Refer the infant for further medical follow-up.
3. If post-vaccination serology indicates that the infant has had an insufficient immune response, the LHD should ensure/facilitate a second three-dose vaccine series, followed one month after the last dose by repeat testing.

D. ODRS should be used to record and track the entire management and follow-up of the infant.

VI. Management of Household and Sexual Contacts

A. Household and sexual contacts that have a history of three doses of vaccine and immune to HBV, or who have been found previously to be hepatitis B positive, need not be screened or vaccinated.

B. Serologic testing should be done on all household and sexual contacts that have no history of disease or vaccination.

1. The LHD should provide appropriate educational counseling to each household and

- sexual contact regarding the importance of screening and vaccination. ODH provides funding through the ODH Immunization Program for hepatitis B testing and for the provision of hepatitis B vaccine.
2. The serologic testing information should be entered into ODRS.
 3. Any new cases of hepatitis B infection (including those in a pregnant female) need to be entered into ODRS.
- C. Susceptible household and sexual contacts should be immunized.**
1. The first dose of vaccine should be given at the same visit the serology is drawn
 2. If a household contact or sexual partner received an exposure (in the past 14 days) to blood from a pregnant HBsAg-positive female regardless of whether the female has acute or chronic hepatitis, HBIG should be given at the same time as the first dose of vaccine (in a different anatomical site).
- D. Sexual contacts should have post-vaccination serology (PVS) done 1-2 months after the administration of the last dose of vaccine.**
1. Sexual contacts that do not seroconvert should receive a second three-dose series of vaccine, followed by testing for anti-HBs and HBsAg.
 2. If, after the sixth dose, the contact has not seroconverted, no more doses are indicated.

VII. Case Closure

- A. Upon both completion of the infant's three-dose series (or six doses if indicated) and documentation of seroconversion with post-vaccination serology (i.e. anti-HBs 10 mU/MI or more), the infant case in ODRS should be closed.**
1. As noted above, if seroconversion does not occur after six doses, the infant case in ODRS can still be closed because no further vaccination is recommended.
 2. HBsAg should be drawn simultaneously with anti-HBs.
- B. By the time the infant is 18 months of age, the LHD should make at least three contacts with the infant's parents, guardians or physician' contacts can be via phone, mail or in person.**
- C. The household and sexual contact section can be closed if reasonable attempts have been made to complete this part of the investigation and case management.**
- D. In the event that a pregnant HBsAg-0positive pregnant female and/or an exposed infant transfers out of the jurisdiction, the LHD should contact the ODH PHBPP which will convey the information to the state health district within the state or U.S. territory of the female's and/or infant's new residence. The ODH PHBPP will update ODRS.**

References

1. CDC, Immunization Practices Advisory Commission (ACIP). Hepatitis B virus: a comprehensive strategy for eliminating transmission in the United States through universal childhood vaccination: recommendations of the Immunization Practices Advisory Commission (ACIP). *MMWR* 1991; 40(RR-13): 1-19. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/00033405.htm>
2. American Academy of Pediatrics. Hepatitis B. In: Pickering LK, ed. *Red Book: 2012 Report of the Committee on Infectious Diseases*. 29th ed., Elk Grove Village, IL: American Academy of Pediatrics; 2012: 369-390.
3. ODH Perinatal Hepatitis B Prevention Program, 2005.
4. CDC, ACIP. Hepatitis B virus infection: a comprehensive immunization strategy to eliminate transmission in the United States: December 23, 2005/Vol.54/No. RR-16

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5416a1.htm>.