

Chapter 5

Serology Testing



This page intentionally left blank.

Diagnostic Tests for Hepatitis B Virus (HBV)

Diagnosis of HBV infection (acute vs. chronic) is based on clinical, laboratory, and epidemiologic findings. HBV infection cannot be differentiated on the basis of clinical symptoms alone and definitive diagnosis depends on the results of laboratory testing. Serologic markers of HBV infection vary depending on whether the infection is acute or chronic. Commercial serological antigen tests are available to detect HBsAg and HBeAg.

For comprehensive information on interpretation of hepatitis B serology and assays not routinely required for the PHBPP, please refer to Appendix D.

Hepatitis B Surface Antigen (HBsAg) is the most commonly used test for HBV screening for infection. However, it does not differentiate between an acute and a chronic infection. HBsAg can be detected as early as 1 - 2 weeks and as late as 11 or 12 weeks after exposure to HBV. The presence of HBsAg indicates that a person is infectious, regardless of whether the HBV infection is acute or chronic. If the infection is self-limited (**acute infection**), HBsAg disappears in most patients within a few weeks to several months after infection. People with **chronic HBV infection** have circulating HBsAg.

Hepatitis B Surface Antibody (anti-HBs) is a protective, neutralizing antibody. The presence of anti-HBs following acute HBV infection generally indicates recovery and immunity against reinfection. Anti-HBs can also be acquired as an immune response to hepatitis B vaccine or passively transferred temporarily by administration of HBIG.

Hepatitis B 'little e' Antigen (HBeAg) is a marker associated with HBV infection and, when positive, indicates active viral replication within the liver and high infectivity. The presence of HBeAg in serum correlates with higher concentrations of HBV and greater infectivity. Testing for HBeAg is useful in the selection of candidates to receive antiviral therapy and to monitor the response to therapy.

Please refer to Appendix C for additional CDC resources on interpreting hepatitis B serology.

Diagnostic Tests for Hepatitis B Virus (HBV) Antigens and Antibodies

Factor To Be Tested	HBV Antigen or Antibody	Purpose
HBsAg	Hepatitis B surface antigen	Detection of acutely or chronically infected persons.
Anti-HBs	Antibody to HBsAg	Identification of persons who have resolved infections with HBV; determination of immunity after immunization.
HBeAg	Hepatitis B e antigen	Identification of infected persons at increased risk for transmitting HBV.

Maternal Screening

The DSHS Immunization Branch PHBPP requires maternal HBsAg serology to be case managed. In addition, HBeAg gives the DSHS Immunization Branch PHBPP additional information regarding infectivity; although this serologic test is not required for a case to be managed by the DSHS Immunization Branch PHBPP, it is desired.

According to Chapter 81, §81.090 of the Texas Health and Safety Code, providers who care for pregnant women are required to perform screening for hepatitis B at the first prenatal visit and at delivery. Providers should not select a viral hepatitis serology panel for testing; instead, they should select and order the individual hepatitis B serology markers. The serology markers are HBsAg, anti-HBs, and anti-HBc.

HBsAg screening should occur when other routine prenatal testing is done. The HBsAg test is widely available and can be added to the routine prenatal panel of tests without requiring additional patient visits. The advantages of routine HBsAg testing at the first prenatal visit are:

- determining early in the pregnancy if the mother is HBsAg-positive;
- determining HBV carrier status at the time of delivery;
- ensuring that the infant receives appropriate and timely PEP immediately after birth;
- providing appropriate counseling to families before delivery;
- obtaining the name of contacts ≤ 24 months of age for case management; and
- referral of household contacts > 24 months of age and sexual partner(s) to a health care provider for evaluation of susceptibility, vaccination status, and/or HBV infection.

Hepatitis B identified prenatally and or / at time of delivery is a reportable condition in Texas, as outlined in Chapter §81.041 of the Texas Health and Safety Code within one week of identification. All pregnant women identified as being HBsAg-positive at the time of delivery must be reported to the DSHS HSR or LHD.

Investigational Form

If maternal screening was not performed during pregnancy and / or at delivery, documentation of the reason(s) as to why the mother was not screened should be stated on the *Investigational Report form*. Specific training regarding the identified issues in lack of screening should be provided to the provider / delivery hospital by the DSHS HSR PHBPP Coordinator and / or the LHD.

Medical Records

Maternal HBsAg results, along with dates of testing, should be documented in all infant medical records. If HBsAg testing was not done prenatally or at delivery, it is the responsibility of the hospital and obstetrical care provider to ensure that the test is done before hospital discharge. If HBsAg results are positive, the hospital and obstetrical care provider are also responsible for administering the appropriate PEP to the infant in addition to reporting the positive result to the LHD as soon as possible, but no later than one week after results are obtained.

Standing Delegation Orders (SDOs)

Hospitals should develop written policies to ensure screening of all pregnant women and administration of PEP to all at-risk neonates. These policies should be assessed by the DSHS HSR and LHD each time the hospital is notified of an HBsAg-positive mother's plans to deliver at that hospital. These policies should include standing orders for the following key elements:

- Review prenatal HBsAg results of all pregnant women;
- Test all mothers for HBsAg at each delivery;
- Provide the first dose of the hepatitis B vaccine to all infants within 12 hours of birth, or, before hospital discharge regardless of mother's HBsAg status;
- Provide appropriate PEP* (HBIG and birth dose of the hepatitis B vaccine) to all infants of HBsAg-positive mothers (prenatally and / or at delivery);
- If the mother's HBsAg status is unknown at the time of delivery, the mother's blood should be drawn as soon as possible to determine her HBsAg status. If positive, the infant should receive HBIG as soon as possible but no later than seven days after birth*;
and
- Report all HBsAg-positive mothers to the DSHS HSR or LHD within one week of identification.

** For additional guidance on PEP of infants born to women who are HBsAg-positive or HBsAg-unknown status, please refer to Chapter 4 of this manual.*

Serologic Testing of Infants and Children

Pre-vaccination Serologic Testing

Serologic testing is not recommended before routine vaccination of infants and children nor is it recommended for infants born to HBsAg-positive women immediately after birth. *Please see below guidelines and recommendations for the appropriate timing of serology testing of at-risk infants.*

Serologic Testing for Immunity of Infants and Contacts ≤ 24 Months of Age

Testing for immunity following vaccination is routinely recommended for at-risk infants who are born to HBsAg-positive women. For these infants, (PVST), for HBsAg and its corresponding antibody (anti-HBs), should be performed. The CDC recently updated their recommendations and general guidance for PVST, which can be found in the October 9, 2015 MMWR titled, "Update: Shortened Interval for Postvaccination Serologic Testing of Infants Born to Hepatitis B - Infected Mothers" accessible at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6439a6.htm>. In summation, the updated MMWR states that PVST should be done one to two months after completion of the vaccine series. However, testing is not recommended before age nine months to avoid possible detection of anti-HBs from HBIG administered during infancy and to maximize the likelihood of detecting late HBV infection. Therefore, infants who received their final dose of hepatitis B vaccine at six months of age must wait three months for PVST to be done; ideally at the next well-child visit at nine months to determine the success of PEP. It is important to test for HBsAg and anti-HBs to determine the success or failure of vaccination, as up to five percent of infants may not respond adequately to vaccination. Please note, testing delays after series completion can lead to false negative anti-HBs results.

Providers should order the individual serology markers, HBsAg and anti-HBs. Providers should not order a hepatitis panel when performing PVST, as it typically does not include testing for immunity, but rather only screens for acute hepatitis infection.

For contacts \leq 24 months of age, the same serologic testing (HBsAg and anti-HBs) should be done at the appropriate age, at least one month after the final dose of the hepatitis B vaccine series was given, so long as the child is at least nine months of age.

Postvaccination Serologic Testing Interpretation

Test Results	Interpretation	Action
HBsAg (-) Anti-HBs (+)	Immune due to vaccination	Notify the DSHS HSR or LHD, no further action needed.
HBsAg (-) Anti-HBs (-)	Susceptible / Non-responder	See guidance below and notify the DSHS HSR or LHD.
HBsAg (+) Anti-HBs (-)	Infant infected with hepatitis B virus	Notify the DSHS HSR or LHD, provide education / counseling and refer for evaluation.

Susceptible / Non-responder

Children that fail to respond to the first complete hepatitis B vaccine series should complete a second three-dose series on the usual 0, 1, and 6 month schedule. They should then receive PVST again 1 - 2 months after completion of the second hepatitis B vaccine series. Although fewer than five percent of individuals who receive six doses of hepatitis B vaccine will not respond, immunity should not be assumed and PVST should still be repeated after completion of the second series.

Children that fail to respond to two complete series of hepatitis B vaccine are considered non-responders and parents / guardians should be counseled regarding susceptibility and prevention of virus transmission.

Serologic Testing for Immunity on Contacts > 24 months of Age

Services are not provided through the PHBPP for contacts > 24 months of age. These contacts should be referred to a provider for health care evaluation. Documentation of the referral should be made on the mother's case management form.

Serologic Testing of the Mother with unknown HBsAg status

Prenatal HBsAg Status	Delivery HBsAg Status	Action
Unknown	Unknown	Test for HBsAg immediately.
Positive	Unknown	
Unknown	Positive	In six months patient should be referred for the following tests: HBsAg, anti-HBs, and anti-HBc.

Should the patient not have health insurance or their health insurance is refusing to pay, serology testing for HBsAg, anti-HBs, and anti-HBc is provided by DSHS at no cost to the client.

If the mother’s HBsAg status is unknown at delivery, the mother, her infant, and contacts ≤ 24 months of age must receive appropriate case management until the mother’s status is determined. If determined to be positive, case management services shall be continued until completion of the program. Contacts > 24 months of age should be referred to a health care provider for testing and vaccination if susceptible.

Discrepant HBsAg Results

Discrepant results occur when the mother’s HBsAg test during the current pregnancy yields conflicting results.

HBsAg Test Results	Prenatally	At Delivery	Hospitals
	Positive (+)	Negative (-)	<ul style="list-style-type: none"> ➤ Administer HBIG and hepatitis B vaccine birth dose within 12 hours of birth. ➤ Report case to DSHS HSR or LHD.
	Negative (-)	Positive (+)	

All infants born to mothers with discrepant HBsAg test results should receive appropriate PEP. It is the role of the delivery hospital to administer appropriate PEP within 12 hours of birth to all infants born to mothers with discrepant HBsAg results and to report results to the DSHS HSR or LHD. Please refer to Chapter 4 for further guidelines on PEP.

The Role of the DSHS Health Service Region (HSR) and Local Health Department (LHD)

- The LHDs must report the mother’s discrepant HBsAg results directly to their DSHS PHBPP Coordinator using the *Mother Case Management Report* form **within 15 days** of notification.
- The *Mother Case Management Report* form must contain the following information:
 - Name
 - Date of birth (DOB)
 - the types of tests
 - the laboratories that performed the tests
 - the hepatitis B vaccination dates (if applicable)
 - the types of vaccines (if applicable)
 - other pertinent health information

Case Management of Discrepant Hepatitis B Serology Results

- Case managers should ensure that six months have passed between HBsAg-positive results to determine the mother’s status.
- Please note that all cases should remain open and follow-up of the infant and contacts ≤ 24 months of age should be continued until the mother’s status can be determined.

This page intentionally left blank.