

Hepatitis B and the healthcare worker

CDC answers frequently asked questions about how to protect healthcare workers

The Immunization Action Coalition thanks Eric E. Mast, MD, MPH, chief, Prevention Branch, Division of Viral Hepatitis, National Center for HIV/AIDS, Hepatitis, STD, and TB Prevention; William L. Atkinson, MD, MPH, medical epidemiologist, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention; and Linda A. Moyer, RN, consultant to the Immunization Action Coalition, for reviewing and updating the following questions and answers.

Healthcare workers need more vaccinations than just hepatitis B!

For information about additional vaccines you may need, see the references at the bottom of page 3.

Which workers in the healthcare setting need hepatitis B vaccine?

The Occupational Safety and Health Administration (OSHA) requires that hepatitis B vaccine be offered to healthcare workers (HCWs) who have a reasonable expectation of being exposed to blood on the job. This requirement does not include HCWs who would not be expected to have occupational risk, such as receptionists, billing staff, and general office workers.

At what anatomic site should hepatitis B vaccine be administered to adults? What needle size should be used?

The deltoid muscle is recommended for routine intramuscular (IM) vaccination among adults. The gluteus muscle should not be used as a site for administering hepatitis B vaccine. The suggested needle size is 1"–2" depending on the recipient's gender and weight (1" for females weighing less than 70 kg; 1½" for females weighing 70–100 kg; 1"–1½" for males weighing less than 120 kg; and 2" for males weighing 120 kg or more and females more than 100 kg). A 22- to 25-gauge needle should be used. For optimal protection, it is crucial that the vaccine be administered IM, not subcutaneously.

If a HCW had one dose only of hepatitis B vaccine 4 months ago, should the series be restarted?

No. The hepatitis B vaccine series should not be restarted when doses are delayed; rather, the series should be continued from where it stopped. The HCW should receive the second dose of vaccine now and the third dose at least 8 weeks later. There needs to be at least 16 weeks between the first and the third doses and at least 8 weeks between the second and third doses of vaccine.

Is it safe for HCWs to be vaccinated during pregnancy?

Yes. Limited data indicate no apparent risk for adverse events to developing fetuses. Current hepatitis B vaccines contain noninfectious hepatitis B surface antigen (HBsAg) and should pose no risk to the fetus. If the mother is being vaccinated be-

cause she is at risk for hepatitis B virus (HBV) infection (e.g., a HCW, a person with a sexually transmitted disease, an injection drug user, multiple sex partners), vaccination should be initiated as soon as her risk factor is identified during the pregnancy. If not vaccinated, a pregnant woman may contract an HBV infection, which might result in severe disease for the mother and chronic infection for the newborn. In addition, giving hepatitis B vaccine to the mother is not a contraindication to breastfeeding.

Which HCWs need serologic testing after receiving 3 doses of hepatitis B vaccine?

All HCWs who have a reasonable risk of exposure to blood or body fluids containing blood (e.g., HCWs with direct patient contact, HCWs who have the risk of needlestick or sharps injury, laboratory workers who draw or test blood) should have postvaccination testing for antibody to hepatitis B surface antigen (anti-HBs). Postvaccination testing should be done 1–2 months after the last dose of vaccine.

What should be done if a HCW's postvaccination anti-HBs test is negative 1–2 months after the last dose of vaccine?

Repeat the 3-dose series and test for anti-HBs 1–2 months after the last dose of vaccine. If the HCW is still negative after a second vaccine series, the HCW is considered a non-responder to hepatitis B vaccination. HCWs who do not respond to vaccination should be tested for HBsAg to determine if they have chronic HBV infection. If the HBsAg test is positive, the person should receive appropriate counseling and medical management. Persons who test negative for HBsAg should be considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain hepatitis B immune globulin (HBIG) prophylaxis for any known or likely exposure to HBsAg-positive blood.

How often should I test HCWs after they've received the hepatitis B vaccine series to make sure they're protected?

For immune competent HCWs, periodic testing or

periodic boosting is not needed. Postvaccination testing (anti-HBs) should be done 1–2 months after the last dose of hepatitis B vaccine. If adequate anti-HBs (at least 10 mIU/mL) is present, nothing more needs to be done. If postvaccination testing is less than 10 mIU/mL, the vaccine series should be repeated and anti-HBs testing done, 1–2 months after the last dose of the second series. This information should be recorded in the HCW's employee health record.

Should a HCW who performs invasive procedures and who once had a positive anti-HBs result be revaccinated if the anti-HBs titer is rechecked and is less than 10 mIU/mL?

No. Immune competent persons known to have responded to hepatitis B vaccination do not require additional passive or active immunization. Postvaccination testing should be done 1–2 months after the original vaccine series is completed. In this scenario, the initial postvaccination testing showed that the HCW was protected. Substantial evidence suggests that adults who respond to hepatitis B vaccination (anti-HBs of at least 10 mIU/mL) are protected from chronic HBV infection for as long as 23 years, even if there is no detectable anti-HBs currently. Only immunocompromised persons (e.g., hemodialysis patients, some HIV-positive persons) need to have anti-HBs testing and booster doses of vaccine to maintain their protective anti-HBs concentrations of at least 10 mIU/mL.

Before reading the recommendations of CDC's Advisory Committee on Immunization Practices (ACIP) that say not to do this, we tested our employees for anti-HBs several years after they were vaccinated and some people had inadequate results, even though they had all completed a 3-dose series. What should we do now?

ACIP does not recommend periodic testing of vaccinated HCWs because anti-HBs concentrations decline over time, and HCWs remain protected even if their anti-HBs concentration declines to below

(page 1 of 3)

www.immunize.org/catg.d/2109hcw.pdf • Item #P2109 (8/06)

10 mIU/mL. For HCWs who have been vaccinated in the past and who do not have a documented response to vaccination of at least 10 mIU/mL, ACIP recommends testing for anti-HBs at the time of an exposure and providing appropriate management based on the results of testing. (See postexposure guidelines in Table 1.) If cost is not a great concern or if an employee or employer wants documented assurance of immunity, a revaccination series can be undertaken followed by testing 1–2 months after the 3rd dose of hepatitis B vaccine.

How often should anti-HBs testing be done on HCWs who perform invasive procedures?

For persons whose immune status is normal, periodic serologic testing to assess anti-HBs concentrations is not necessary. Persons who perform invasive procedures should be treated no differently from other HCWs with respect to anti-HBs testing. If a HCW has an exposure (e.g., needlestick), s/he should be evaluated for their need for immunoprophylaxis according to postexposure guidelines in Table 1.

If HCWs received hepatitis B vaccination in the past and were not tested for immunity, should

they be tested now?

No. In this scenario, a HCW does not need to be tested unless s/he has an exposure. If an exposure occurs, refer to the postexposure guidelines in Table 1.

How should a vaccinated HCW with an unknown anti-HBs response be managed if they have a percutaneous or mucosal exposure to blood or body fluids from an HBsAg-positive source?

This person should be tested for anti-HBs as soon as possible after exposure. If the anti-HBs concentration is at least 10 mIU/mL, no further treatment is needed. If the anti-HBs concentration is less than 10 mIU/mL, HBIG and one dose of hepatitis B vaccine should be administered. Prior to administering the HBIG and vaccine, blood should be drawn for a baseline HBsAg test. Subsequently, in 3–6 months, an additional anti-HBs and an HBsAg test should be performed. If the HBsAg is positive, the person is infected and should be referred for medical evaluation. If the anti-HBs result is at least 10 mIU/mL, the person is seroprotected. It is necessary to do postvaccination testing later than the usual recommended time frame because anti-HBs from HBIG

might be detected if testing is done any earlier. The postvaccination test result should be recorded in the person’s health record.

For a pre-employment physical, a HCW states she received all three hepatitis B vaccine doses as an adolescent. Would you test for anti-HBs?

If the HCW has written documentation of a full hepatitis B vaccine series, testing for anti-HBs at this point is not necessary. If the HCW has a subsequent exposure to HBV, hepatitis B immunoprophylaxis should be administered following guidelines for a person who has been vaccinated, but the immune response is not known (Table 1). This information should be documented in the HCW’s employee health record. This approach should be sufficient to meet the needs of the employer and the requirements of OSHA. If there is no written documentation of hepatitis B vaccination, see the next question.

(continued on next page)

Table 1: Recommendations for postexposure prophylaxis after percutaneous or mucosal exposure to HBV in an occupational setting

Vaccination and antibody response status of exposed persons ¹	Treatment			
	Source is HBsAg positive	Source is HBsAg negative	Source is unknown or not tested	
			High risk	Low risk
Unvaccinated	HBIG ² (1 dose) and begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series	Begin a hepatitis B vaccine series
Known responder ³	No treatment	No treatment	No treatment	No treatment
Nonresponder ³				
Not revaccinated ⁴	HBIG (1 dose) and begin a revaccination series	Begin a revaccination series	HBIG (1 dose) and begin a revaccination series	Begin a revaccination series
After revaccination ⁴	HBIG (2 doses) ⁵	No treatment	HBIG (2 doses) ⁵	No treatment
Antibody response unknown	Test for anti-HBs ⁶ If adequate ³ , no treatment If inadequate, HBIG x 1 and vaccine booster	No treatment	Test for anti-HBs ⁶ If adequate, ³ no treatment If inadequate, give vaccine booster and check anti-HBs in 1–2 months	

1. Persons known to have had HBV infection in the past or who are chronically infected do not require HBIG or vaccine.
 2. Hepatitis B immune globulin (0.06 mL/kg) administered IM.
 3. Adequate response is anti-HBs of at least 10 mIU/mL after vaccination.
 4. Revaccination = additional 3-dose series of hepatitis B vaccine administered after the primary series.
 5. First dose as soon as possible after exposure and the second dose 1 month later.
 6. Testing should be done as soon as possible after exposure.

Source: This table was adapted from “Updated U.S. PHS Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis,” MMWR, 6/29/01, Vol. 50 (RR-11)

Several physicians in our group have no documentation showing they received hepatitis B vaccine. They are relatively sure, however, that they received the doses many years ago. What do we do now?

Because there is no documentation of vaccination, the 3-dose vaccination series should be administered and postvaccination testing should be performed 1–2 months after the third dose of vaccine. There is no harm in receiving extra doses of vaccine. Care should always be taken to document vaccine lot, date, manufacturer, route, and vaccine dosages. Postvaccination testing results should also be documented, including the date testing was performed. All organizations (e.g., hospitals, clinics) should develop policies or guidelines to assure valid hepatitis B immunization.

A healthcare worker (HCW) thinks she had 3 doses of hepatitis B vaccine in the past but has no documentation of receiving those doses. Before reading the recommendations to revaccinate her, we obtained an anti-HBs titer and the result was greater than 10 mIU/mL. With this lab result, can't we assume she is immune?

A positive anti-HBs indicates that the vaccinated person is immune at the time the HCW was tested, but does not necessarily assure that the HCW has long-term immunity. Long-term immunity has been shown only for persons attaining an adequate anti-HBs result of at least 10 mIU/mL after a 3-dose vaccination series. The most direct way to deal with this is to vaccinate the HCW with the 3-dose series of hepatitis B vaccine; test for anti-HBs in 1–2 months and document the result in the HCW's employee health record. An adequate anti-HBs result from a documented 3-dose vaccine series would assure not only seroprotection, but long-term protection, as well.

Of course, it is possible that the HCW has an anti-HBs result of greater than 10 mIU/mL because of an HBV infection in the past. If this is of concern, a total anti-HBc test could be performed to discern this (a positive result indicates a history of HBV infection at some undefined period in time).

I'm a nurse who received the hepatitis B vaccine series more than 10 years ago and had a positive follow-up titer (at least 10 mIU/mL). At present, my titer is negative (less than 10 mIU/mL). What should I do now?

Nothing. Data show that vaccine-induced anti-HBs levels might decline over time; however, immune memory (anamnestic anti-HBs response) remains

intact indefinitely following immunization. Persons with anti-HBs concentrations that decline to less than 10 mIU/mL are still protected against HBV infection. For HCWs with normal immune status who have demonstrated adequate anti-HBs (at least 10 mIU/mL) following vaccination, booster doses of vaccine or periodic anti-HBs testing is not recommended.

A person who is a known non-responder to hepatitis B vaccine has a percutaneous exposure to HBsAg-positive blood. According to older ACIP recommendations, I have the option to give HBIG x 2 or HBIG x 1 and initiate revaccination. How do I decide which to do?

Current recommendations have been revised. The recommended postexposure prophylaxis for persons who are non-responders to hepatitis B vaccine (i.e., have not responded to an initial 3-dose series and revaccination with a 3-dose series) is to give HBIG as soon as possible after exposure and a second dose of HBIG one month later (see Table 1). Exposed persons, who are known not to have responded to a primary vaccine series, but have not been revaccinated with a second 3-dose series, should receive a single dose of HBIG and reinstate the hepatitis B vaccine series with the first dose of hepatitis B vaccine as soon as possible after exposure.

If an employee does not respond to hepatitis B vaccination (employee has had two full series of hepatitis B vaccine), does s/he need to be removed from activities that expose her/him to bloodborne pathogens? Does the employer have a responsibility in this area beyond providing the vaccine?

There are no regulations that require removal from job situations where exposure to bloodborne pathogens could occur; this is an individual policy decision within the organization. OSHA regulations require that employees in jobs where there is a reasonable risk of exposure to blood be offered hepatitis B vaccine. In addition, the regulation states that adequate personal protective equipment be provided and that standard precautions be followed. Check your state OSHA regulations regarding additional requirements. If there are no state OSHA regulations, federal OSHA regulations should be followed. Adequate documentation should be placed in the employee record regarding non-response to vaccination. HCWs who do not respond to vaccination should be tested for HBsAg to determine if they have chronic HBV infection.

If the HBsAg test is positive, the person should receive appropriate counseling and medical management. Persons who test negative for HBsAg should be considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known or likely exposure to HBsAg-positive blood (see Table 1).

Can a person with chronic HBV infection become a HCW?

Yes. All HCWs should practice standard precautions, which are designed to prevent HBV transmission, both from patients to HCW and from HCW to patient. There is, however, one caveat concerning HBV-infected HCWs. Those who are HBsAg positive and HBeAg (hepatitis B e antigen) positive should not perform exposure-prone procedures (e.g., gynecologic, cardiothoracic surgery) unless they have sought counsel from an expert review panel and been advised under what circumstances, if any, they may continue to perform these procedures. Such circumstances might include notifying prospective patients of the HCW's seropositivity before they undergo exposure-prone invasive procedures. For more information on this issue, see the *Mortality and Morbidity Weekly Report*, "Recommendations for Preventing Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Patients During Exposure-Prone Invasive Procedures," *MMWR*, 7/12/91, Vol. 40(RR-8);1–9. This document is available at www.cdc.gov/mmwr/preview/mmwrhtml/00014845.htm.

Keep your own vaccination history!

Record the dates you received hepatitis B vaccine, as well as the results of your postvaccination serologic testing (anti-HBs).

Remember to save records of any vaccinations you receive so you don't have to repeat them.

To order adult immunization record cards, visit www.immunize.org/adultizcards.

For more information on vaccination recommendations for healthcare workers, see the following:

1. "Immunization of Health-Care Workers," *MMWR*, 12/26/97, Vol. 46 (RR-18), www.cdc.gov/mmwr/PDF/rr/rr4618.pdf
2. "Influenza Vaccination of Health-Care Personnel," *MMWR*, 2/24/06, Vol. 55 (RR-2), www.cdc.gov/mmwr/PDF/rr/rr5502.pdf
3. "Healthcare Worker Vaccination Recommendations," Immunization Action Coalition, www.immunize.org/catg.d/p2017.pdf