



CLINICAL GUIDELINES PROGRAM

NEW YORK STATE DEPARTMENT OF HEALTH AIDS INSTITUTE | HIV • HCV • STIs • SUBSTANCE USE • LGBTQ+ HEALTH

Prevention and Management of Hepatitis B Virus Infection in Adults With HIV

Updates, Authorship, and Related Resources

Date of current publication	March 12, 2026
Highlights of changes, additions, and updates in the March 12, 2026 edition	<ul style="list-style-type: none">• HBV Screening and Diagnosis section: Anti-HBs testing added to the recommendation: “If acute HBV infection is confirmed and the patient is asymptomatic, the clinician should repeat ALT testing within 2 to 4 weeks to assess for symptoms of liver disease progression (B3) and repeat HBsAg, HBeAg, anti-HBe, anti-HBs and HBV DNA testing 6 months later to determine whether infection has cleared. (A3)”• HBV Vaccination section:<ul style="list-style-type: none">– Recommended anti-HBs testing interval changed to “1 to 6 months” throughout– Rating for the preferred HBV vaccine, 2-dose Heplisav-B, changed to “(A1)”– Updated recommendation: “In a patient with negative HBsAg, negative anti-HBs, and positive anti-HBc test results (isolated anti-HBc positive), the clinician should offer a single dose of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after vaccination OR vaccination with 2 doses of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after the last dose. (A2) For patients who received only 1 dose of Heplisav-B, if the anti-HBs titer is <100 mIU/mL, complete the HBV vaccine series and repeat anti-HBs testing 1 to 6 months after the last vaccine. (A2)”– Updated recommendation for individuals with nonresponse to HBV vaccine: “If the Heplisav-B vaccine series was administered as the initial HBV vaccination, revaccinate with 1 dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)”– Updated recommendation for individuals with nonresponse to HBV vaccine: “If the Heplisav-B vaccine series was not administered as the initial HBV vaccination, revaccinate with a 2-dose series of Heplisav-B and repeat anti-HBs titer testing 1 to 6 months after the last dose. If the patient is still not immune, give an additional dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)”– Text and Table 3 revised to state that the HBV vaccine Twinrix is not recommended for individuals with HIV– Discussion added regarding waning immunity after HBV vaccination, including the option to test anti-HBs titers annually in patients with ongoing HBV risk and give a booster dose of Heplisav-B
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Contents

Purpose of This Guideline	3
HBV Screening and Diagnosis.....	4
Screening Tests	5
Diagnosis.....	6
Transmission Prevention	7
HBV Vaccination.....	8
Primary Vaccination Strategies.....	10
Follow-up Testing	12
Revaccination.....	12
Waning Immunity	12
Assessment Before HBV Treatment.....	13
Liver Disease Assessment	13
Alcohol Use Screening and Education	14
HAV, HCV, and HDV Status	14
HBV Treatment and Monitoring.....	15
Treatment.....	16
Monitoring.....	18
Ongoing Screening for Hepatocellular Carcinoma.....	19
All Recommendations	20
References	22
Supplement: Guideline Development and Recommendation Ratings	28

Purpose of This Guideline

Purpose: This guideline on prevention and management of hepatitis B virus (HBV) infection in adults with HIV was developed by the New York State Department of Health AIDS Institute (NYSDOH AI) to guide clinicians who provide medical care for adults (aged ≥18 years) with HIV.

The goals of this guideline are to:

- Raise awareness among clinicians about the prevalence and associated risks of chronic HBV in individuals with HIV.
- Encourage clinicians to offer HBV screening and vaccination to adults with HIV.
- Provide up-to-date, evidence-based recommendations on diagnosis, assessment, treatment, and monitoring of chronic HBV infection in patients with HIV, with emphasis on antiretroviral therapy regimens to treat coinfection.

HBV transmission: Chronic HBV infection is defined as having circulating hepatitis B surface antigen (HBsAg) in the blood for 6 months or longer [Terrault, et al. 2018]. An estimated 880,000 to 1.89 million people in the United States have chronic HBV [DHHS 2023], and thousands of deaths occur annually from HBV-related complications, including cirrhosis and hepatocellular carcinoma (HCC) [CDC(a) 2025]. The primary routes of HBV transmission are perinatal, blood, and sexual exposures. HBV DNA has been detected in various bodily secretions, including tears, urine, and saliva, but there is no firm evidence of HBV transmission via body fluids other than blood, semen, or vaginal secretions [StatPearls 2023; Komatsu, et al. 2012].

Approximately 95% of individuals who acquire HBV in adulthood mount an immune response, resulting in spontaneous recovery and production of protective HBV antibodies (anti-HBs) [Pattyn, et al. 2021]. However, some individuals develop persistent HBV after the initial immune response fails to clear the virus, resulting in chronic HBV infection [Blaser, et al. 2025].

HIV/HBV coinfection: HIV and HBV share similar transmission routes and are often diagnosed in the same patients. In the United States, HBV is most commonly acquired through sexual contact and injection drug use [DHHS 2023]. In contrast, in HBV-endemic regions, HBV is most commonly acquired at birth or in early childhood [Alter 2006].

In a large U.S. cohort study of individuals with HIV, from 1996 to 2007, 8.4% overall tested positive for HBsAg or detectable HBV DNA, and prevalence was higher (10.3%) among men who have sex with men than among individuals who inject drugs (8.5%) and heterosexual individuals with risk factors (5.2%) [Spradling, et al. 2010].

HIV/HBV coinfection can significantly influence the natural history, progression, management, morbidity, and mortality associated with both infections. HBV viremia and the risk of chronic HBV are increased in people with HIV, and HIV infection is associated with decreased clearance of HBV e antigen [Thio 2009]. Individuals with HIV who acquire protective anti-HBs through HBV infection remain at risk of developing low antibody levels and subsequent reactivation of HBV (reverse seroconversion). Individuals with HIV/HBV coinfection also tend to have a decreased inflammatory response to chronic HBV, indicated by decreased serum alanine transaminase levels, an increased risk of progression to cirrhosis and HCC, and increased mortality compared with individuals with HBV mono-infection [Sun, et al. 2021; Pinato, et al. 2019; Singh, et al. 2017; Thio 2009].

HBV post-exposure prophylaxis (PEP): For recommendations on HBV PEP, see the NYSDOH AI guideline [PEP to Prevent HIV Infection > Management of Potential Exposure to Hepatitis B Virus](#).

HBV Screening and Diagnosis

RECOMMENDATIONS

Screening Tests

- Clinicians should determine the HBV vaccination and immune status of patients with HIV by performing laboratory testing for HBsAg, anti-HBs, and anti-HBc (total). (A*) See [Table 1: Interpretation of HBV Screening Test Results](#).
- Clinicians should repeat laboratory screening annually in patients who are not immune to HBV, choose not to be vaccinated, and are at ongoing risk of acquiring HBV. (A3)

Diagnosis

- In patients with positive baseline (screening) HBsAg test results, clinicians should perform HBeAg, anti-HBe, and HBV DNA testing to diagnose the phase of HBV infection. (B2†) See [Table 2: Serologic and Virologic Responses to HBV Infection](#).
- If a patient with HIV and unknown HBsAg status has signs or symptoms of acute hepatitis (i.e., elevated ALT), the clinician should perform HBsAg, anti-HBc IgM, HBeAg, anti-HBe (A*), and HBV DNA (A3) testing along with other diagnostic testing for acute hepatitis.

Acute HBV Infection

- If acute HBV infection is confirmed and the patient is asymptomatic, the clinician should repeat ALT testing within 2 to 4 weeks to assess for symptoms of liver disease progression (B3) and repeat HBsAg, HBeAg, anti-HBe, anti-HBs and HBV DNA testing 6 months later to determine whether infection has cleared. (A3)
- If a patient with HIV and acute HBV is not taking ART, the clinician should [recommend ART initiation](#) with a regimen active against HBV. (A1)

RECOMMENDATIONS

Transmission Prevention

- Clinicians should advise patients who have a positive HBsAg test result that they can transmit HBV (A*) and encourage sexually active patients to use effective barrier protection to reduce the risk of HBV transmission. (A2+)
- Clinicians should inform patients with acute or chronic active HBV that their household contacts should be vaccinated and counsel the patients to avoid sharing items such as razors or toothbrushes that could expose others to HBV-contaminated blood. (A2+)
- For individuals who inject drugs, clinicians should offer or refer for substance use treatment, ensure access to clean needles and syringes, and provide [harm reduction counseling](#). (A2+)
– See NYSDOH [Drug Use Resources](#).

Abbreviations: ALT, alanine transaminase; anti-HBc, hepatitis B core antibody; anti-HBe, antibody to HBeAg; anti-HBs, hepatitis B surface antibody; ART, antiretroviral therapy; HBeAg, hepatitis B e antigen; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; IgM, immunoglobulin M.

★ NEW YORK STATE LAW: REPORTING HBV INFECTION

- Clinicians must report all suspected or confirmed HBV infections, and specify acute or chronic, to the local health department of the area where the individual resides according to [NYSDOH Communicable Diseases Reporting Requirements](#).

Screening Tests

Clinicians should screen all patients with HIV for HBV risk, vaccination history, and infection upon entry into medical care and perform baseline testing to determine HBV immune status. Initial laboratory testing includes serologic testing for HBsAg, anti-HBc total, and anti-HBs, with results interpreted as detailed in Table 1, below. Patients with anti-HBs levels of ≥ 10 IU/mL are considered immune to HBV [DHHS 2024]. If a patient with HIV decides against HBV vaccination and remains at risk, annual laboratory screening is recommended (see guideline section [HBV Vaccination](#)) [Terrault, et al. 2018].

Table 1: Interpretation of HBV Screening Test Results

HBsAg	Anti-HBs	Anti-HBc		Interpretations
		IgG	IgM	
Negative	Negative	Negative	Negative	Susceptible to HBV infection
Negative	Positive	Negative	Negative	Immune due to HBV vaccination
Negative	Positive	Positive	Negative	Immune due to natural HBV infection
Positive	Negative	Positive	Positive	Acute HBV infection
Positive	Negative	Positive	Negative/Positive	Chronic HBV infection [a]
Negative	Negative	Positive	Negative/Positive	Isolated anti-HBc positivity. Possible interpretations: <ul style="list-style-type: none"> • Resolved HBV infection with waning anti-HBs titers • False-positive result • Occult HBV infection • Resolving acute HBV infection

Abbreviations: anti-HBc, hepatitis B core antibody; anti-HBs, hepatitis B surface antibody; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; IgG, immunoglobulin G; IgM, immunoglobulin M.

Note:

- a. HBsAg+ for >6 months.

Diagnosis

For patients with positive HBsAg screening test results, follow-up laboratory testing should be performed to confirm HBV status (see Table 2, below). If a patient with HIV and unknown HBsAg status presents with signs or symptoms of acute hepatitis (i.e., elevated ALT), the clinician should perform HBsAg, anti-HBs, anti-HBc IgM, HBeAg, anti-HBe, and HBV DNA testing to confirm a diagnosis.

Stage of Infection	HBsAg	Anti-HBs	Anti-HBc IgG	Anti-HBc IgM	HBeAg	Anti-HBe	HBV DNA Level
Incubation	+	-	-	-	+ or -	-	Low
Acute HBV infection	+	-	+	+	+	-	High
HBsAg-negative acute HBV	-	-	+	+	+ or -	-	High
Inactive HBsAg carrier	+	-	+++	+ or -	-	+	Low
Precore mutant	+	-	+ or -	+ or -	-	+	High
Occult infection	-	-	+	+ or -	-	-	High or low
Chronic HBV infection [a]	+	-	+++	+ or -	+ or -	-	High or low

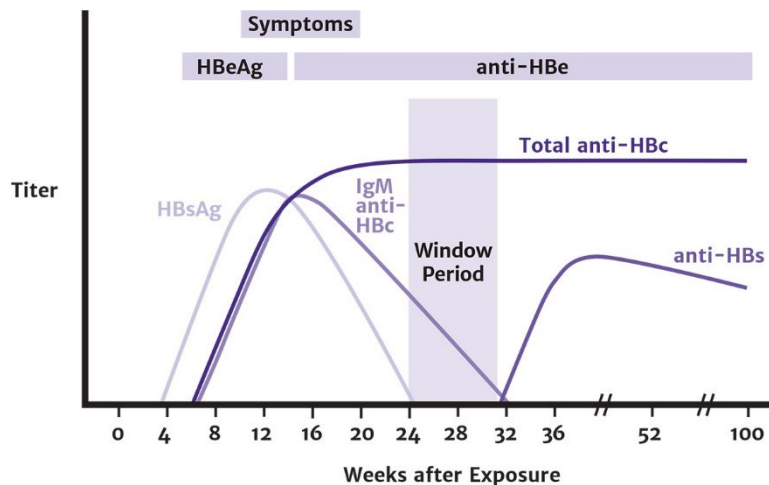
Abbreviations: anti-HBc, hepatitis B core antibody (IgG or IgM); anti-HBe, antibody to HBeAg; anti-HBs, hepatitis B surface antibody; HBeAg, hepatitis B e antigen; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; IgG, immunoglobulin G; IgM, immunoglobulin M.

Note:
a. HBsAg+ for >6 months.

Acute HBV infection: Following exposure, HBV enters the bloodstream and circulates to the liver. The time to the onset of abnormal liver enzymes after exposure averages 60 days (range, 40 to 90 days), and the onset of jaundice averages 90 days (range, 60 to 150 days). Acute HBV infection is asymptomatic in approximately 70% of patients, and <1% of patients develop fulminant hepatic failure. Symptoms may include anorexia, malaise, nausea, vomiting, arthralgias, and right upper quadrant abdominal pain and generally resolve within 4 weeks, with normalization of transaminase levels in 2 to 8 weeks.

Acute HBV infection is diagnosed through the detection of HBsAg and anti-HBc IgM. During the initial phase of infection, HBeAg and HBV DNA are also present (see Figure 1, below). Recovery is marked by the disappearance of HBV DNA and seroconversion of HBeAg to anti-HBe and of HBsAg to anti-HBs [Shiffman 2010].

Figure 1: Typical Serologic Course of Acute Hepatitis B Virus Infection With Recovery [a]



Abbreviations: anti-HBc, hepatitis B core antibody; anti-HBe, antibody to HBeAg; anti-HBs, hepatitis B surface antibody; HBeAg, hepatitis B e antigen; HBsAg, hepatitis B surface antigen; IgM, immunoglobulin M.

Note:

- a. Reprinted from Centers for Disease Control and Prevention [Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis B Virus Infection](#).

Individuals newly diagnosed with HIV and acute HBV should initiate a fully suppressive ART regimen that includes 2 drugs active against HBV. In some individuals with newly diagnosed HIV and acute HBV who initiate ART, acute liver disease may be worsened by [immune reconstitution inflammatory syndrome](#), and ALT, bilirubin level, and international normalized ratio (INR) should be closely monitored. Individuals already taking a fully active ART regimen that includes tenofovir alafenamide (TAF) or tenofovir disoproxil fumarate (TDF) should continue with the regimen, and those not taking a tenofovir-based regimen should have their regimen modified accordingly. Treatment with entecavir (ETV), TAF, or TDF outside of a fully active ART regimen could lead to HIV resistance. See guideline section [HBV Treatment and Monitoring](#) for more information.

If acute HBV infection is confirmed in an asymptomatic patient, the clinician should repeat ALT testing within 2 to 4 weeks to assess for symptoms of liver disease progression and should repeat HBsAg, HBeAg, anti-HBe, and HBV DNA testing in 6 months to determine whether infection has cleared. Patients with symptomatic acute HBV require more frequent monitoring tailored to the patient's condition.

Chronic HBV infection: HBV infection is a dynamic disease, and individuals can transition through the defined clinical phases with variable levels of serum ALT activity, HBV DNA, and HBV antigens. See the guideline sections [Assessment Before HBV Treatment](#) and [HBV Treatment and Monitoring](#) for recommendations on the management of chronic HBV infection in patients with HIV.

Reactivation: Chronic HBV can resolve in some patients, and tests will indicate a sustained loss of HBsAg, undetectable serum HBV DNA levels, and absence of clinical or histologic evidence of active viral infection. However, reactivation of HBV replication, characterized by the reappearance of HBeAg and HBsAg and a rise in serum HBV DNA, can occur. Reactivation is usually seen in patients taking immunosuppressive therapy for a concurrent medical condition; in rare instances, patients with prior resolved HBV infection who are anti-HBs-positive can have reactivation of HBV during subsequent immunosuppressive therapy. For a list of medications associated with increased risk for HBV reactivation, see [Medscape > Hepatitis B Treatment & Management](#). Reactivation of HBV can also occur in individuals with HIV, including those who experience immune reconstitution after ART initiation. HBV reactivation may result in severe hepatitis and should be considered a potential cause of hepatitis in patients with previously resolved HBV infection. During reactivation, serum ALT levels will be elevated, and patients who were HBeAg- or HBsAg-negative may become both HBeAg- and HBsAg-positive. HBV reactivation can vary from mild and asymptomatic to severe with possible fulminant hepatic failure.

Occult HBV infection is defined as detectable HBV DNA in HBsAg-negative individuals. Most patients with occult HBV have very low or undetectable serum levels, but HBV DNA is often detected in the liver. Patients with occult infection are at risk of HBV reactivation if they receive potent immunosuppressive therapy or chemotherapy. Occult HBV infection has been associated with chronic liver disease and increased risk of hepatocellular carcinoma [Raimondo, et al. 2007].

Transmission Prevention

HBV is significantly more transmissible through exposure to blood and body fluid than HIV and requires more frequent assessment for behaviors that increase HIV/HBV transmission risk. Barrier protection, including latex or polyurethane condoms, should be recommended to decrease the risk of sexual transmission [Smith, et al. 2015; Weller and Davis 2002], and sexual partners should be vaccinated if possible. Advise patients that household contacts be vaccinated against HBV and that they avoid sharing any objects that may be contaminated with blood, such as razors or toothbrushes. Patients with chronic HBV should also be advised that risk of transmission is significantly reduced but it is still possible if their HBV viral load is low or undetectable.

Patients who actively use injection drugs should be prescribed clean syringes and needles and offered referrals to [substance use treatment](#), such as opioid substitution. Referral to needle-exchange programs should also be offered (see NYSDOH [Drug Use Resources](#)), along with information about safe disposal and storage of needles/syringes and safer injection techniques.

HBV Vaccination

RECOMMENDATIONS

Primary Vaccination

- Clinicians should offer an HBV vaccine to patients with negative test results for HBsAg, anti-HBs, and anti-HBc:
 - Preferred: 2-dose Heplisav-B vaccine series (A1)
 - Alternative: 3-dose Engerix-B or Recombivax HB vaccine series (A1)
- Clinicians should not defer initial HBV vaccination in patients with a CD4 count <200 cells/mm³ who are at risk of HBV infection. (A2)
- Clinicians should repeat anti-HBs testing at 1 to 6 months, based on the patient's visit schedule, after completion of the vaccination series to ensure immunity (anti-HBs ≥10 mIU/mL). (A3)
- In a patient with negative HBsAg, negative anti-HBs, and positive anti-HBc test results (isolated anti-HBc positive), the clinician should offer a single dose of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after vaccination OR vaccination with 2 doses of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after the last dose. (A2)
 - For patients who received only 1 dose of Heplisav-B, if the anti-HBs titer is <100 mIU/mL, complete the HBV vaccine series and repeat anti-HBs testing 1 to 6 months after the last vaccine. (A2)
 - If vaccination is refused or if follow-up anti-HBs titer testing cannot be assured, perform HBV DNA testing to evaluate for occult HBV infection. (A2)
- Clinicians should not defer initial vaccination or revaccination in pregnant patients with HIV who do not have immunity to HBV. (A3)

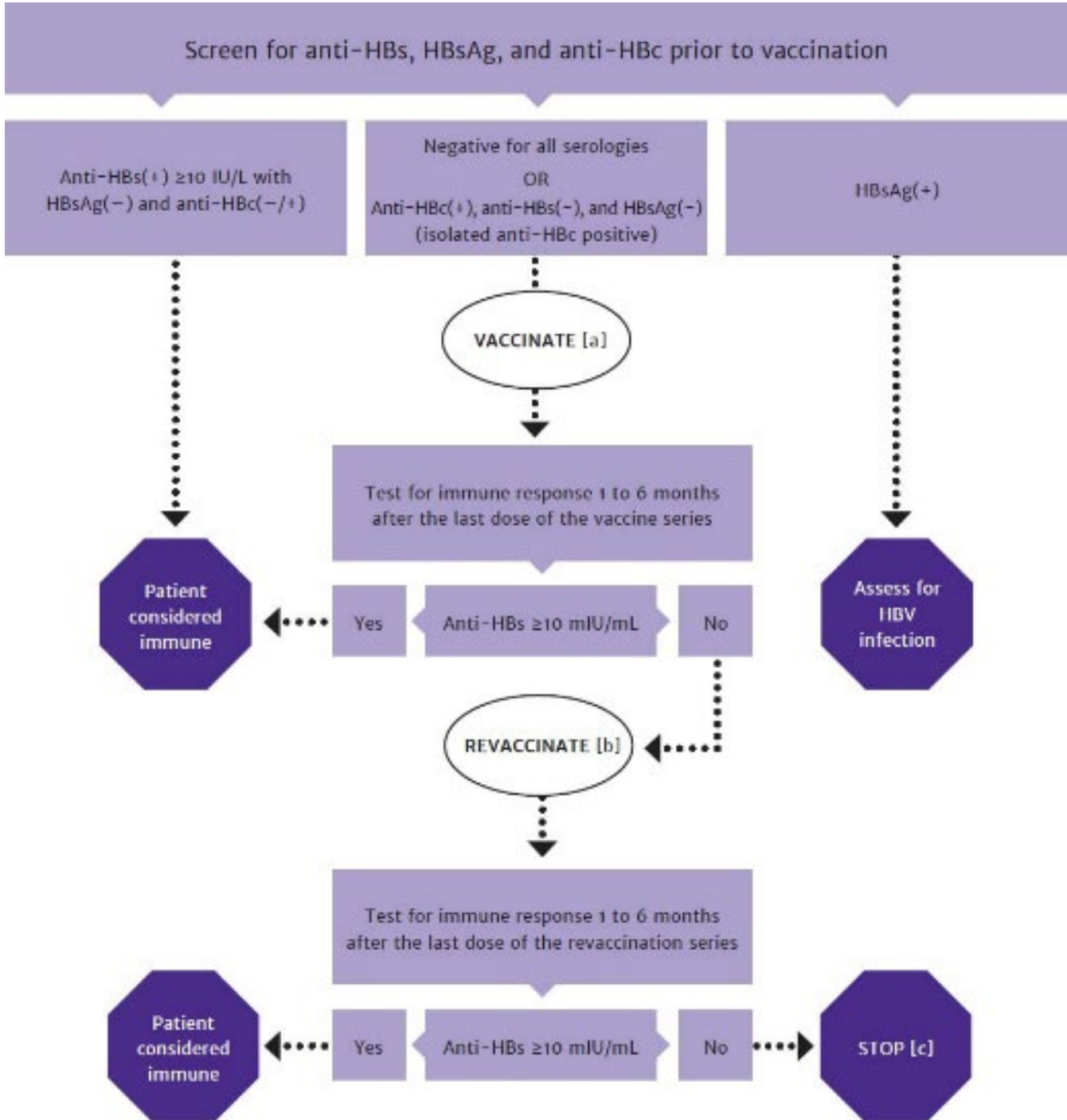
Revaccination

- In previously vaccinated patients with anti-HBs levels <10 mIU/mL (vaccine nonresponse), clinicians should recommend revaccination. (A2)
 - If the Heplisav-B vaccine series was administered as the initial HBV vaccination, revaccinate with 1 dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)
 - If the Heplisav-B vaccine series was not administered as the initial HBV vaccination, revaccinate with a 2-dose series of Heplisav-B and repeat anti-HBs titer testing 1 to 6 months after the last dose. If the patient is still not immune, give an additional dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)
 - If patients have contraindications to Heplisav-B, revaccinate with a double dose of Engerix-B or Recombivax HB. (A2)

Abbreviations: anti-HBc, hepatitis B core antibody; anti-HBs, hepatitis B surface antibody; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus.

Vaccination effectively prevents HBV infection. Patients with HIV with negative anti-HBs, anti-HBc, and HBsAg test results have no evidence of immunity and should be offered vaccination against HBV [DHHS 2024]; see Figure 2, below and [Table 1: Interpretation of HBV Screening Test Results](#). Conversely, patients with positive anti-HBc and anti-HBs test results have resolved HBV infection and do not require vaccination.

Figure 2: Algorithm for HBV Screening and Vaccination in Patients With HIV



Abbreviations: anti-HBc, hepatitis B core antibody; anti-HBs, hepatitis B surface antibody; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus.

Notes:

- a. In patients with negative HBsAg, negative anti-HBs, and positive anti-HBc test results (isolated anti-HBc positive), offer a single dose of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after vaccination OR vaccination with 2 doses of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after the last dose. For patients who received only 1 dose of Heplisav-B, if the anti-HBs titer is <100 mIU/mL, complete the HBV vaccine series and repeat anti-HBs testing 1 to 6 months after the last vaccine.
- b. In patients with anti-HBs levels <10 mIU/mL (vaccine nonresponse), revaccination is recommended. If the Heplisav-B vaccine series was not administered as the initial HBV vaccination, revaccinate with a 2-dose series of Heplisav-B.
- c. A patient who is negative for all serologies and who does not respond to revaccination may have a primary nonresponse or chronic infection. HBV DNA testing may be used to detect chronic HBV infection.

Primary Vaccination Strategies

The single-antigen HBV vaccines currently approved by the U.S. Food and Drug Administration (FDA) for individuals aged 18 years and older are Heplisav-B, Engerix-B, and Recombivax HB. Prehevbrio, a 3-antigen recombinant HBV vaccine, was approved by the FDA in 2021 but is no longer available as of November 2024 [FDA(b) 2024].

Immune response to HBV vaccination in individuals with HIV can be lower than in those without HIV [Mast, et al. 2006; Rey, et al. 2000; Tayal and Sankar 1994; Loke, et al. 1990]. Studies have shown that having detectable HIV RNA [Overton, et al. 2005; Tedaldi, et al. 2004] and low CD4 cell counts [Veiga, et al. 2006; Fonseca, et al. 2005; Tedaldi, et al. 2004; Keet, et al. 1992] correlates with a poor immune response to vaccination. The HBV vaccine should ideally be administered before a patient’s CD4 count declines to <350 cells/mm³ to improve immunogenicity; however, vaccination should not be deferred in patients who have CD4 counts <350 cells/mm³.

The recommended initial option for HBV vaccination is Heplisav-B, approved by the FDA as a 2-dose (4 weeks apart) recombinant HBsAg vaccine with a novel adjuvant, available for individuals aged 18 years and older [FDA(a) 2024]. In 3 randomized controlled trials (RCTs) among individuals without HIV, 2 doses of Heplisav-B was associated with a higher seroprotection rate than 3 doses of Engerix-B [FDA(a) 2024]. In primary analysis of the multicenter, open-label ACTG A5379 study, all 68 participants with HIV who were not previously vaccinated against HBV achieved seroprotective titers with 3 doses of Heplisav-B (at 0, 4, and 24 weeks), 94.4% before administration of the third dose and 98.5% at week 24 [Marks, et al. 2023]; in a secondary analysis, 74 participants (97.3%) had seroprotective titers at week 72 [Marks, et al. 2025].

A retrospective cohort study among individuals with HIV found seroprotection rates were higher with Heplisav-B than other previously used HBV vaccines [Schnittman, et al. 2021]. A modeling study determined that use of Heplisav-B among individuals with HIV results in lower costs and increased benefits compared with Engerix-B [Rosenthal, et al. 2020]. No data are available to support use of other recombinant vaccines for the second dose if Heplisav-B is used for the initial dose.

Other options include vaccination with conventional HBV vaccines (Engerix-B, Recombivax HB) that are typically administered intramuscularly as 3 standard doses at 0, 4, and 24 weeks (see Table 3, below). Whether patients with HIV should receive a standard or double dose of these vaccines is still being debated. This committee and the DHHS [Guidelines for the Prevention and Treatment of Opportunistic Infections in Adults and Adolescents With HIV](#) recommend administering the standard 3-dose regimen.

Combined HBV and hepatitis A virus (HAV) vaccine: Twinrix is a combination vaccine that includes recombinant HBV and HAV vaccines and is approved by the FDA for use in individuals aged 18 years and older. This committee prefers separate vaccination for HBV and HAV given the data for better immunogenicity with Heplisav-B in individuals with HIV and does not recommend vaccination with Twinrix for such individuals.

Table 3: HBV Vaccine Dosing Schedule		
Vaccine	Dosing	Notes
Heplisav-B [a]	<p>Single dose: 20 µg as one 0.5 mL dose containing 20 µg/mL vaccine administered as follows:</p> <ul style="list-style-type: none"> • 2 IM injections at weeks 0 and 4 	Patients with ESRD: No dosage adjustments [Awad, et al. 2021]
Engerix-B	<p>Single dose: 20 µg as one 1 mL dose containing 20 µg/mL vaccine administered as follows:</p> <ul style="list-style-type: none"> • 3 IM injections at weeks 0, 4, and 24 OR • 4 IM injections at weeks 0, 4, 8, and 24 <p>Double dose: 40 µg as two 1 mL doses of 20 µg/mL vaccine administered as follows:</p> <ul style="list-style-type: none"> • 3 IM injections at weeks 0, 4, and 24 OR • 4 IM injections at weeks 0, 4, 8, and 24 	Patients with ESRD or other immunocompromising conditions [b]: 40 µg/mL as two 1 mL doses of 20 µg/mL vaccine administered in 3 IM injections at weeks 0, 4, 8, and 24

Table 3: HBV Vaccine Dosing Schedule		
Vaccine	Dosing	Notes
Recombivax HB	<p>Single dose: 10 µg as one 1 mL dose containing 10 µg/mL vaccine administered as follows:</p> <ul style="list-style-type: none"> • 3 IM injections at weeks 0, 4, and 24 OR • 4 IM injections at weeks 0, 4, 8, and 24 <p>Double dose [c]: 20 µg as two 1 mL doses containing 10 µg/mL vaccine administered as follows:</p> <ul style="list-style-type: none"> • 3 IM injections at weeks 0, 4, and 24 OR • 4 IM injections at weeks 0, 4, 8, and 24 	<p>Patients with ESRD or other immunocompromising conditions [b]: 40 µg/mL as 1 mL of higher-strength vaccine administered in 4 IM injections at weeks 0, 4, and 24</p>
Twinrix	N/A	Not recommended for individuals with HIV
<p>Abbreviations: ESRD, end-stage renal disease; HAV, hepatitis A virus; HBV, hepatitis B virus; IM, intramuscular; N/A, not applicable.</p> <p>Notes:</p> <p>a. Double dosing and an accelerated schedule with Heplisav-B have not been well studied.</p> <p>b. Higher-strength regimens of both Engerix-B and Recombivax HB are approved by the U.S. Food and Drug Administration for use in patients with ESRD; these higher-strength regimens may also be considered for patients with other immunocompromising conditions.</p> <p>c. Double dosing with Recombivax HB has not been as well studied as double dosing with Engerix-B. However, Recombivax HB may be the only formulation available at some institutions.</p>		

Double-dose and 4-dose strategies: Other vaccination approaches are to administer a double dose of vaccine on a standard 3-dose schedule or to add a fourth dose at 2 months to a 3-dose vaccine series. Several studies have shown improved immune response to double-dose vaccinations given in a 3-dose schedule [Pseudos, et al. 2010; de Vries-Sluijs, et al. 2008; Fonseca, et al. 2005]. A 2013 meta-analysis (5 studies, n=883) found that increasing the vaccine dosage may significantly improve immune responses in participants with HIV [Ni, et al. 2013].

An RCT conducted in 2013 compared the immunogenicity and safety of 4 standard doses and 4 double doses with 3 standard doses of HBV vaccination in adults with HIV [Chaiklang, et al. 2013]. Response rates were higher in the 4-dose group than in the standard 3-dose group, but the difference was not statistically significant. Local adverse effects were more common with increased frequency and dosage of vaccine, but systemic and serious adverse effects were extremely rare [Chaiklang, et al. 2013]. Based on these data, an HBV vaccination approach with a 3- or 4-injection double-dose vaccine series in patients with HIV can be considered. There are no trial studies comparing Heplisav-B to a 3- or 4-injection double-dose vaccine series, and this committee recommends vaccination with Heplisav-B over double-dose vaccine series.

Accelerated vaccination: An RCT using the standard-dose HBV vaccine compared an accelerated schedule (0, 1, and 3 weeks) with the standard schedule (0, 4, and 24 weeks) and demonstrated a noninferior response rate for participants with CD4 counts >500 cells/mm³; this schedule may increase patient adherence to the full vaccine series [de Vries-Sluijs, et al. 2011]. However, the accelerated schedule was inferior in patients with CD4 counts of 200 to 500 cells/mm³. Because of the low number of participants with CD4 counts <200 cells/mm³, the results were inconclusive for this population.

Based on these findings, the accelerated schedule may be considered for patients with CD4 counts ≥500 cells/mm³ but is not recommended for patients with CD4 counts <500 cells/mm³ [de Vries-Sluijs, et al. 2011]. If an accelerated HBV vaccination schedule is used, the patient should also receive a fourth-dose booster at least 6 months after initiation of the vaccine series.

Pregnancy: Clinicians should not defer initial vaccination or revaccination in pregnant patients with HIV who do not have immunity to HBV. There are no well-controlled studies designed to evaluate the recommended anti-HBV vaccines during pregnancy. However, available data do not suggest an increased risk of miscarriage or major congenital disabilities in individuals who received Engerix-B, Twinrix, Recombivax HB, or Heplisav-B vaccines during pregnancy compared with individuals in the general U.S. population who were not vaccinated during pregnancy [FDA(a) 2024; Sandul, et al. 2024; FDA(a) 2023; FDA(b) 2023; FDA 2018].

Isolated anti-HBc positivity: Defined as having negative HBsAg, negative anti-HBs, and positive anti-HBc test results, isolated anti-HBc positivity has been reported in 0.4% to 1.7% of blood donors in low prevalence areas and 10% to 20% of the population in endemic countries [Lok, et al. 1988]. It has been estimated that 17% to 41% of patients with HIV have isolated anti-HBc positivity [Bhattacharya, et al. 2016; Witt, et al. 2013; Neau, et al. 2005]. As shown in [Table 1: Interpretation of HBV](#)

[Screening Test Results](#), there are 4 possible interpretations of this result: resolved HBV infection with waning anti-HBs titers, false-positive result, occult HBV infection, or resolving acute HBV infection [Mast, et al. 2006].

Most patients with HIV and isolated anti-HBc positivity are HBV DNA-negative, not immune to HBV [Gandhi, et al. 2005], and routinely checking HBV DNA is no longer recommended. Clinicians should offer patients with HIV and isolated anti-HBc a single standard dose of Heplisav-B [DHHS 2024]. Anti-HBs testing should be performed 1 to 6 months after the first dose. If the anti-HBs titer is <100 mIU/mL, the remaining vaccine in the series should be administered, and anti-HBs testing should be repeated 1 to 6 months after the vaccine series is complete [DHHS 2024; Piroth, et al. 2016]. Alternatively, clinicians may choose to vaccinate with 2 doses of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after the last dose. In a prospective study of 54 patients with HIV and isolated anti-HBc, 46% responded to a single dose of vaccine. Of those who did not respond to a single dose, 89% developed immunity after a 3-dose series of double-dose vaccine [Piroth, et al. 2016]. For patients with an anti-HBs titer ≥100 mIU/mL, clinicians may opt to discontinue the vaccine series. There are few data to guide the optimal number of vaccine doses for these patients but no evidence of harm in completing the full vaccination series.

However, if patients with HIV and isolated anti-HBc refuse vaccination or if post-vaccination anti-HBs testing cannot be assured, then a reasonable approach is to perform HBV DNA testing [Chang, et al. 2018]. HBV DNA testing may also be performed in patients with isolated anti-HBc who do not respond to the full vaccine series. A positive HBV DNA test result in a patient with isolated anti-HBc test results indicates occult HBV infection (see guideline section [HBV Screening and Diagnosis > Diagnosis > Reactivation](#)).

Follow-up Testing

Clinicians should repeat anti-HBs testing in 1 to 6 months, based on the patient’s visit schedule, after vaccination to ensure immunity [Rubin, et al. 2014]. If the anti-HBs titer is ≥10 mIU/mL, the patient is considered immune to HBV. If the anti-HBs titer is <10 mIU/mL, the patient may have primary nonresponse to the vaccine and require revaccination, or the patient may have chronic HBV infection. HBV DNA testing may be used to detect chronic HBV.

→ KEY POINT

- Patient education regarding HBV vaccination is important to ensure awareness of the continued risk of acquiring and subsequently transmitting HBV until adequate anti-HBs response is confirmed.

Revaccination

Individuals with HIV who do not respond (anti-HBs <10 mIU/mL) to the primary HBV vaccine series should be revaccinated. If Heplisav-B was not administered as the initial HBV vaccination series, clinicians should revaccinate with a 2-dose series of Heplisav-B. In a retrospective, cross-sectional study among individuals with HIV who did not seroconvert after vaccination (HBsAg- and anti-HBs-negative) with Engerix-B or Recombivax HB, revaccination with Heplisav-B was highly effective in achieving seroprotection [Khaimova, et al. 2021]. If patients have contraindications to Heplisav-B, revaccination with a double dose of Engerix-B or Recombivax HB, given as a 4-dose series, is recommended.

Revaccination can be deferred for patients initiating ART until their CD4 count is ≥200 cells/mm³; response rates to vaccination may be higher in individuals with CD4 counts ≥200 cells/mm³ than those with lower CD4 cell counts [Gandhi, et al. 2005].

Waning Immunity

Waning immunity has been observed in individuals with HIV who initially developed an immune response after HBV vaccination, is typically seen in those with low CD4 cell counts (<350 cells/mm³), and may be in part due to the level of the initial antibody response after immunization. In a study of individuals with HIV who had antibody titers measured 4 weeks after completing the 3-dose hepatitis B vaccine series, those who had a titer <100 mIU/mL were more likely to have waning immunity over the next 5 years compared with those who had higher titers after vaccination [Lopes, et al. 2013]. There are no data or guidance regarding which individuals should be screened for waning immunity or at what intervals. It is reasonable to test anti-HBs titers annually in patients with HIV who have ongoing risk for acquiring HBV, and if the titer is <10 mIU/mL, giving a booster dose of Heplisav-B. Anti-HBs titers should be tested 1 to 6 months after the booster dose, and if the titer is <10 mIU/mL, the complete 2-dose series of Heplisav-B should be administered.

Assessment Before HBV Treatment

RECOMMENDATIONS

Liver Disease Assessment

- Before initiating HBV treatment in patients with HIV, clinicians should obtain a complete physical examination and medical history, including the use of hepatotoxic medications (A*); noninvasive fibrosis evaluation (A2+); baseline ultrasonography for HCC [a] (A2+); and the following laboratory testing: CBC, albumin, bilirubin, alkaline phosphatase, PT/INR, ALT, AST, and a basic metabolic panel. (A*)
- Clinicians should refer patients with HIV/HBV coinfection and cirrhosis to a gastroenterologist or hepatologist to assess and manage complications of portal hypertension. (A3)
- In patients with HIV/HBV coinfection and cirrhosis, clinicians should screen for HCC with ultrasound every 6 months. (A2+)
 - See guideline section [HBV Treatment and Monitoring > Ongoing Screening for Hepatocellular Carcinoma](#) regarding screening for patients without cirrhosis.

Alcohol Use Screening and Education

- Clinicians should perform alcohol use screening in patients with HIV/HBV coinfection at baseline and at least annually and refer patients for treatment as needed. (A3)
 - See NYSDOH AI guidelines [Substance Use Screening, Risk Assessment, and Use Disorder in Adults](#) and [Treatment of Alcohol Use Disorder](#).
- Clinicians should educate patients about the detrimental effects of alcohol use on the course of HBV infection and counsel patients with underlying liver disease to abstain from or minimize alcohol use. (A*)

HAV, HCV, and HDV Status

- Clinicians should perform anti-HAV IgG or total (IgM and IgG) serum testing and administer the full HAV vaccine series in patients [who are not immune to HAV](#). (A3)
- Clinicians should determine patients' HCV status by medical history and serum testing and recommend treatment with DAA therapy if chronic HCV infection is diagnosed. (A1)
 - See NYSDOH AI guidelines [Hepatitis C Virus Screening, Testing, and Diagnosis in Adults](#) and [Treatment of Chronic Hepatitis C Virus Infection in Adults](#).
- Clinicians should perform anti-HDV total (IgM and IgG) serum testing to screen for HDV in all patients with HIV/HBV coinfection. (B2)

Abbreviations: ALT, alanine transaminase; AST, aspartate transaminase; CBC, complete blood count; DAA, direct-acting antiviral; HAV, hepatitis A virus; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; HDV, hepatitis D virus; IgG, immunoglobulin G; IgM, immunoglobulin M; PT/INR, prothrombin time/international normalized ratio.

Note:

- a. Baseline ultrasound for HCC is performed in all patients with HIV/HBV coinfection. In patients with HIV/HCV coinfection, an ultrasound is performed only in patients with cirrhosis.

Liver Disease Assessment

Initial assessment of patients with chronic HBV should include a detailed history and physical examination to evaluate for any signs of advanced liver disease, including bruising, jaundice, dark urine, light stools, history of gastrointestinal bleeding, and pruritus. A prior treatment history, including medication history, should be obtained to determine whether the patient has previously taken hepatotoxic medications or lamivudine or emtricitabine, which have been associated with HBV resistance when taken as monotherapy. On examination, identify any stigmata of advanced liver disease, such as spider angiomas, splenomegaly, palmar erythema, and asterixis. The presence of ascites or encephalopathy indicates decompensated liver disease. Baseline laboratory tests include CBC, albumin, bilirubin, alkaline phosphatase, prothrombin time, ALT, and AST. Low albumin levels or elevated prothrombin time may suggest advanced liver disease with hepatic decompensation. Leukopenia and thrombocytopenia may indicate the presence of portal hypertension.

All individuals should be evaluated for liver fibrosis using noninvasive methods, such as transient elastography (FibroScan), serum testing for biomarkers (FibroSure), or AST to platelet ratio index (APRI) calculation. Liver biopsy is no longer preferred because of the risk of complications (e.g., bleeding, infection) and the possibility of a sampling error when only a small portion of the liver is evaluated. All patients with HIV/HBV coinfection should have a baseline ultrasound to screen for HCC [Terrault, et al. 2018], and those with cirrhosis should be referred to a hepatologist to screen for esophageal varices [Garcia-Tsao, et al. 2017; de Franchis 2015].

Results of the liver disease assessment determine the phase of chronic HBV infection. Although liver biopsy is rarely indicated in patients with HIV/HBV, the procedure can be considered in patients who have persistently elevated ALT but persistently low HBV DNA to exclude other causes of liver disease. The phases of chronic HBV infection (with associated liver biopsy results) are:

- **Immune tolerance:** Characterized by hepatitis B e antigen (HBeAg) positivity with elevated HBV DNA levels but normal or minimally elevated ALT levels. Liver biopsies are generally benign, without signs of necroinflammation or fibrosis [Tran 2011].
- **Immune active:** Subdivided into HBeAg-positive and HBeAg-negative. In HBeAg-positive individuals, HBV DNA levels are typically >20,000 IU/mL, and serum ALT levels are elevated. In HBeAg-negative individuals, HBV DNA levels tend to be lower (2,000 to 20,000 IU/mL) with low to normal serum ALT levels. Liver biopsy often reveals chronic hepatitis with variable signs of necroinflammation or fibrosis [Terrault, et al. 2018].
- **Inactive chronic HBV:** These individuals are HBeAg-negative and antibody to HBeAg-positive. Serum HBV DNA is usually <2,000 IU/mL or undetectable, and ALT levels are normal. Liver biopsy indicates an absence of significant necroinflammation and variable levels of fibrosis [Terrault, et al. 2018].

Alcohol Use Screening and Education

In 2023, there were an estimated 28,632 deaths from alcoholic liver disease and 52,222 deaths from chronic liver disease and cirrhosis in the general U.S. population [CDC(b) 2025; CDC(c) 2025]. Chronic alcohol use in individuals with HBV infection results in increased oxidative stress and liver inflammation, which can progress to cirrhosis and lead to the development of HCC [Donato, et al. 1997; Nakanuma and Ohta 1983]. These effects are even more pronounced in patients with HIV/HBV coinfection in whom increased levels of liver inflammation, liver fibrosis, drug-induced hepatotoxicity, liver cirrhosis, and death from liver disease and HCC have been observed [Marcellin, et al. 2008; Poynard, et al. 2003; Núñez, et al. 2001]. Educating patients about the effects of alcohol use on the course of HBV infection and counseling those with underlying liver disease are essential to helping them make informed decisions regarding alcohol use or abstinence. Studies have shown that individual counseling and peer group education and support can effectively reduce alcohol use in individuals with HIV [Knox, et al. 2013; Velasquez, et al. 2009].

HAV, HCV, and HDV Status

HAV: For information on HAV/HIV coinfection, see NYSDOH AI guideline [Prevention and Management of Hepatitis A Virus Infection in Adults With HIV > Management of HAV/HIV Coinfection](#).

HCV: HBV/HCV coinfection is associated with higher rates of cirrhosis, increased severity of liver disease, and increased risk of HCC compared with HBV or HCV mono-infection [Mavilia and Wu 2018]. This is of particular concern in individuals with HIV/HBV coinfection; individuals with HIV have more severe liver disease and higher rates of liver complications than those without HIV [Bräu, et al. 2007; Thio, et al. 2002]. For information on screening, diagnosis, and treatment of HCV in patients with HIV, see NYSDOH AI guidelines [Hepatitis C Virus Screening, Testing, and Diagnosis in Adults](#) and [Treatment of Chronic Hepatitis C Virus Infection in Adults](#).

HDV: Formerly known as hepatitis delta virus, HDV is a defective satellite RNA virus that requires active HBV infection to replicate. HIV/HBV/HDV tri-infection is associated with faster liver disease progression and higher rates of decompensated cirrhosis, HCC, and mortality than HIV/HBV coinfection [Béguelin, et al. 2017; Fernández-Montero, et al. 2014; Castellares, et al. 2008; Sheng, et al. 2007]. HDV infection is uncommon in the United States; it is not a reportable disease, and the prevalence is unknown [Patel, et al. 2019]. The majority of cases occur among people who migrate or travel to the United States from countries with high HDV endemicity (i.e., Eastern Europe, Southern Europe, the Mediterranean region, the Middle East, West and Central Africa, East Asia, and the Amazon River Basin in South America) [CDC 2024].

Existing data indicate pegylated interferon (PEG-IFN) is the only effective anti-HDV treatment [EASL 2012]. However, fewer than 30% of people without HIV who have HDV achieve sustained HDV suppression when treated with PEG-IFN [Wedemeyer, et al. 2011]. No data are available regarding the efficacy of PEG-IFN therapy in individuals with HIV/HBV/HDV tri-infection.

Investigational trials of the newer agent bulevirtide have shown promising results. Bulevirtide, an HDV entry inhibitor, is approved in Europe for treatment of HDV in individuals with compensated liver cirrhosis but is not currently available in the United States [Wedemeyer, et al. 2023]. In an analysis of 38 individuals with HIV/HBV/HDV tri-infection treated with bulevirtide plus PEG-IFN- α in France, 50% achieved virologic response [de Ledinghen, et al. 2024]. Similarly, in a small compassionate use trial in Italy among individuals with HBV/HDV-related cirrhosis who were treated with bulevirtide, 66% with HIV and 60% without HIV achieved virologic response and normalization of ALT [Visco Comandini, et al. 2023]. A list of investigational studies of HDV treatment in the United States is available at [ClinicalTrials.gov](https://www.clinicaltrials.gov).

Because HDV depends on HBV to replicate, HBsAg seroconversion should be the primary goal for patients with HIV/HBV/HDV tri-infection. In patients with tri-infection, prompt initiation of anti-HBV and anti-HIV therapy should be strongly encouraged. Little guidance is available on optimal monitoring strategies for patients with HIV/HBV coinfection and positive serum anti-HDV total (IgM and IgG) test results. For such patients, it is reasonable to perform baseline HDV RNA testing and consult with an experienced care provider about ongoing HDV RNA and DNA testing [Farci and Niro 2018].

HBV Treatment and Monitoring

RECOMMENDATIONS

Treatment

- Clinicians should recommend [immediate ART initiation](#) for any patient with HIV/HBV coinfection who is not taking ART. (A1)
- **Preferred:** In patients with HIV and chronic HBV, clinicians should recommend an ART regimen that includes 2 agents active against HBV (see [Table 4: Available Medications for HBV Treatment in Adults With HIV](#)). Preferred regimens include a backbone of either TAF/FTC, TDF/FTC, or TDF/3TC. (A2)
- Clinicians should not prescribe a 2-drug regimen of TAF/FTC, TDF/FTC, or TDF/3TC alone to treat patients with HIV/HBV coinfection; a fully suppressive ART regimen is required. (A1)
- Nonadherence with or discontinuation of anti-HBV treatment may result in transaminase flares and hepatic damage. Clinicians should educate patients about the treatment adherence requirements (A*), and if treatment must be interrupted or discontinued, consult with a care provider experienced in HIV/HBV coinfection. (A3)
- **Alternative:** If a patient cannot or chooses not to take TDF or TAF, the clinician should initiate treatment with ETV and a fully suppressive ART regimen for HIV. (A3)
- **Pregnant patients:** Clinicians should offer pregnant patients treatment with an ART regimen that includes 2 agents active against both HIV and HBV; 3TC, FTC, TAF, and TDF can be used safely during pregnancy at standard doses. (A2⁺)

Monitoring

- After HBV treatment initiation, clinicians should perform the laboratory testing listed in [Table 6: Recommended Monitoring After HBV Treatment Initiation in Adults With HIV](#). (A3)
- If a patient being treated for chronic HBV develops signs or symptoms of acute hepatitis (nausea, vomiting, elevated ALT or bilirubin levels), the clinician should rule out HBV IRIS and HDV flare and consult with an HIV-experienced hepatologist. (A3)
 - See NYSDOH AI guideline [Management of IRIS](#).

Abbreviations: 3TC, lamivudine; ALT, alanine transaminase; ART, antiretroviral therapy; ETV, entecavir; FTC, emtricitabine; HBV, hepatitis B virus; HDV, hepatitis D virus; IRIS, immune reconstitution inflammatory syndrome; TAF, tenofovir alafenamide; TDF, tenofovir disoproxil fumarate.

Treatment

Goals: The goals of treatment for chronic HBV infection in adults with HIV are to reduce liver inflammation (as indicated by normalization of ALT), obtain seroconversion of hepatitis B e antigen (HBeAg) to antibody to HBeAg, and suppress HBV viral replication. These changes will help reduce the risk of hepatic decompensation, halt or reverse liver fibrosis, prevent the development of hepatocellular carcinoma (HCC), and decrease HBV-related mortality [Kim, et al. 2021; Terrault, et al. 2018; Soriano, et al. 2008].

As indicated in NYSDOH AI guideline [Rapid ART Initiation](#), clinicians should recommend ART to all patients diagnosed with HIV infection. For patients with HIV/HBV coinfection, the regimen should include medications that suppress both HIV and HBV (see Table 4, below). Optimal treatment for both viruses should be taken simultaneously to prevent HIV and HBV drug resistance from developing. Optimal treatment of both infections may also help reduce the risk of IRIS, which is increased in patients with high levels of HBV viremia (see guideline section Monitoring, below) [Avihingsanon, et al. 2012; Crane, et al. 2009].

Table 4: Available Medications for HBV Treatment in Adults With HIV	
Medication	Clinical Comment
Tenofovir disoproxil fumarate (TDF)	<ul style="list-style-type: none"> • A prodrug of the NRTI tenofovir active against HIV and HBV, including 3TC-resistant HBV • A preferred agent for chronic HBV treatment because of its high virologic efficacy and low risk of HBV resistance [Terrault, et al. 2018] • Potential association with renal impairment and loss of bone density [McComsey, et al. 2011; Gupta 2008] • Initiate only in patients with CrCl \geq50 mL/min.
Tenofovir alafenamide (TAF)	<ul style="list-style-type: none"> • A prodrug of the NRTI tenofovir active against HIV and HBV that achieves higher intracellular concentrations in peripheral blood mononuclear cells and hepatocytes than TDF [Agarwal, et al. 2018] • Improved biomarkers for renal and bone safety compared with TDF while maintaining high rates of HIV and HBV viral suppression [Lampertico, et al. 2020; Gallant, et al. 2016; Callebaut, et al. 2015] • In HIV/HBV coinfection, switching from a TDF- to a TAF-containing regimen demonstrated similarly high levels of HBV virologic control [Gallant, et al. 2016]. • Initiate only in patients with CrCl \geq30 mL/min.
Lamivudine (3TC)	<ul style="list-style-type: none"> • An HBV reverse transcriptase inhibitor and HIV NRTI active against HIV and HBV • Has a low genetic barrier to HIV and HBV resistance and should not be used as the sole anti-HBV drug in an ART regimen. Studies found the rate of HBV resistance reached 90% after 4 years of 3TC monotherapy [Benhamou, et al. 1999]. Avoid 3TC monotherapy.
Emtricitabine (FTC)	<ul style="list-style-type: none"> • An NRTI similar to 3TC and active against HIV and HBV • 3TC-resistant isolates are also cross-resistant to FTC [Gallant 2006]. • Do not use as the sole anti-HBV drug in an ART regimen.
Entecavir (ETV)	<ul style="list-style-type: none"> • An NRTI active against HIV and HBV • May select for 3TC- and FTC-resistant HIV • ETV monotherapy for HBV is not recommended in patients with HIV unless combined with a fully active ART regimen to treat HIV.
Interferon (IFN)	<ul style="list-style-type: none"> • IFN alfa-2a or -2b or PEG-IFN alfa-2a is used as HBV treatment in patients with HBV mono-infection. • Contraindicated in patients with decompensated liver disease (Child-Turcotte-Pugh class B or C) • PEG-IFN alfa-2a monotherapy for up to 48 weeks may be considered for HBV treatment in patients with HIV/HBV coinfection if concurrent ART active against HIV and HBV is not possible. • PEG-IFN alfa-2a is not associated with HBV drug resistance [DHHS 2024].
<p>Abbreviations: ART, antiretroviral therapy; CrCl, creatinine clearance; HBV, hepatitis B virus; NRTI, nucleoside/nucleotide reverse transcriptase inhibitor; PEG-IFN, pegylated interferon.</p>	

Preferred regimen: Because FTC, 3TC, TDF, and TAF all have activity against HIV and HBV, an ART regimen for a patient with HIV/HBV coinfection should include a nucleoside/nucleotide reverse transcriptase inhibitor backbone of either TAF/FTC, TDF/FTC, or TDF/3TC as part of a fully suppressive regimen. TDF or TAF should not be used alone in the absence of a fully suppressive ART regimen because resistance mutations may develop [DHHS 2025; DHHS 2024]. For the use of TDF or TAF in patients with reduced renal function, see NYSDOH AI guideline [Selecting an Initial ART Regimen > ARV Dose Adjustments for Hepatic or Renal Impairment](#).

Alternative regimen: If patients cannot or choose not to take TDF or TAF, the alternative recommended regimen is ETV in addition to a fully suppressive HIV ART regimen [DHHS 2025; DHHS 2024]. ETV should not be considered part of the HIV ART regimen. The ETV dose should be increased from 0.5 mg per day to 1.0 mg per day in patients with known or suspected 3TC-resistant HBV infection. However, ETV resistance may emerge rapidly in patients with 3TC-resistant HBV infection [Terrault, et al. 2018]. Therefore, ETV should be used with caution in patients with HIV/HBV coinfection who do not take TAF or TDF, and frequent monitoring (every 3 months) of HBV DNA levels should be performed to detect viral breakthrough (see guideline section Monitoring, below).

The anti-HBV activity of 3TC, FTC, TDF, and TAF warrants their continued use whenever possible, even when HIV resistance indicates that they should be discontinued as part of the ART regimen. These agents should be continued after an anti-HBV therapy response has been achieved, even if the ART regimen has to be changed. Patients should be advised against discontinuing HIV or HBV treatment because ceasing therapy has been associated with HBV reactivation leading to exacerbations of hepatitis and hepatic failure [DHHS 2024]. Hepatitis flares can occur in patients with HBV mono-infection and those with HIV/HBV coinfection, but the risk of hepatic injury and fulminant hepatic failure is greater in patients with HIV/HBV coinfection [Moreno-Cubero, et al. 2018; Boyd, et al. 2017; Dore, et al. 2010].

Two-drug regimens for HIV: For patients with HIV/HBV coinfection, a 2-drug ART regimen should not be used as initial ART unless combined with an additional agent(s) with activity against HBV (see Table 5, below, for recommended additions). The same is true for patients with controlled HIV/HBV coinfection who switch to a 2-drug regimen for HIV ART—an agent with anti-HBV activity is required. Patients switching to a 2-drug regimen for HIV plus the additional agent(s) to treat HBV should be closely monitored for potential HBV flare (see guideline section Monitoring, below).

Table 5: Recommended Additions to 2-Drug HIV ART Regimens for Patients With Chronic HBV	
2-Drug HIV ART Regimen	Addition for HBV Treatment
DTG/3TC	TAF, TDF, or ETV
DTG/RPV	TAF/FTC, TDF/FTC, TDF/3TC, or ETV
CAB/RPV	TAF/FTC, TDF/FTC, TDF/3TC, or ETV
Abbreviations: 3TC, lamivudine; ART, antiretroviral therapy; CAB, cabotegravir; DTG, dolutegravir; ETV, entecavir; FTC, emtricitabine; HBV, hepatitis B virus; RPV, rilpivirine; TAF, tenofovir alafenamide; TDF, tenofovir disoproxil fumarate.	

HBV treatment during pregnancy: Clinicians should offer pregnant patients with HIV/HBV coinfection ART that includes agents active against HIV and HBV. 3TC, FTC, TAF, and TDF can be safely used during pregnancy [DHHS 2024; Terrault, et al. 2018]. The preferred regimen is DTG plus TDF or TAF in combination with either FTC or 3TC. An alternative regimen is ritonavir-boosted darunavir (DRV/r) plus TDF or TAF with FTC or 3TC [DHHS 2024].

Monitoring

Table 6, below, lists recommended laboratory monitoring.

Table 6: Recommended Monitoring After HBV Treatment Initiation in Adults With HIV			
Laboratory Test	Every 3 Months	Every 6 Months	Every 12 Months
HBV DNA	Until HBV DNA is undetectable [a]	After HBV DNA is undetectable	
HBeAg			Check for HBeAg-negative result [b]
HBsAg			X
Anti-HBs			X
Electrolyte panel		X	
Serum creatinine		X	
Urinalysis [c]			X
Liver function panel [c]	Until HBV DNA is undetectable [a]	After HBV DNA is undetectable	

Abbreviations: HBeAg, hepatitis B e antigen; HBV, hepatitis B virus.

Notes:

- Undetectable is defined as <10 IU/mL.
- Patients who have been taking anti-HBV treatment for several years may not convert to HBeAg-negative [Singh, et al. 2017].
- See NYSDOH AI guideline [Laboratory Monitoring for Adverse Effects of ART](#).

Response to treatment: HBV viral load levels generally decline more slowly after treatment initiation than HIV viral load levels. Anti-HBV treatment responses are defined as follows [DHHS 2024]:

- Primary nonresponse: HBV DNA <1 log₁₀ decline at 12 weeks
- Complete virologic response: Undetectable HBV DNA by polymerase chain reaction assay at 24 to 48 weeks
- Partial virologic response: ≥1 log₁₀ decline but still detectable HBV DNA at 24 weeks
- Maintained virologic response: A response that continues while on therapy
- Sustained virologic response: A virologic response that is still present 6 months after cessation of therapy

Renal toxicity: Renal toxicity with increased creatinine or renal tubular dysfunction has been associated with tenofovir use, and the association is stronger with TDF than TAF [Gupta, et al. 2019]. This renal toxicity may be reversible with dose adjustments of TDF or switching to TAF. Clinicians should evaluate electrolytes, serum creatinine levels, and urinalysis every 6 months [DHHS 2024].

Cirrhosis: Patients with HIV/HBV coinfection and cirrhosis should be referred to a gastroenterologist or hepatologist to assess and manage complications of portal hypertension such as gastroesophageal varices and ascites. Patients with HIV/HBV coinfection and cirrhosis should undergo esophagogastroduodenoscopy at the time of chronic HBV diagnosis and every 1 to 2 years thereafter [DHHS 2024; Terrault, et al. 2018].

Acute flare: If a patient being treated for chronic HBV develops signs or symptoms of acute hepatitis (nausea, vomiting, elevated ALT or bilirubin levels), clinicians should evaluate the patient, rule out HBV IRIS and HDV flare among other potential causes, and consult with an HIV-experienced hepatologist. Hepatic flares are usually mild and self-limited but can result in decompensation in individuals with preexisting cirrhosis [Anderson, et al. 2010; Crane, et al. 2009; Perrella, et al. 2006; Konopnicki, et al. 2005; Drake, et al. 2004].

In patients with HIV, initiation of or a change in ART introduces the potential for IRIS, which may manifest as a worsening of previously diagnosed disease or the appearance of a previously undiagnosed disease. In patients with HIV/HBV coinfection, [IRIS](#) can present as an acute flare of HBV disease. It can often be difficult to distinguish HBV IRIS from other causes of an acute HBV flare, such as drug or alcohol hepatotoxicity or other viral infection (hepatitis A, C, D, or E virus, Epstein-Barr virus,

herpes simplex virus, or cytomegalovirus). Reviewing medication history and testing for serum HBV DNA, HBeAg, HIV viral load, and CD4 cell count can help distinguish between these possibilities [DHHS 2024].

HBV IRIS is usually detected within the first 6 to 12 weeks after ART is initiated, based on a noticeable rise in ALT levels that coincides with rising CD4 cell counts (immune reconstitution) and signs and symptoms characteristic of acute hepatitis and with no other cause for the flare [DHHS 2024]. Risk factors for HBV IRIS include high HBV viral load, elevated ALT level, and low CD4 cell count at baseline [Singh, et al. 2017].

Ongoing Screening for Hepatocellular Carcinoma

Compared with HBV monoinfection, HIV/HBV coinfection is associated with an increased risk of developing HCC and increased mortality rates [Sun, et al. 2021; Pinato, et al. 2019; Singh, et al. 2017]. Patients with HIV/HBV coinfection and cirrhosis should be screened for HCC with an ultrasound and alpha-fetoprotein (AFP) every 6 months [Singal, et al. 2023; Terrault, et al. 2018].

There is no consensus on how frequently to screen for HCC in patients with HIV/HBV coinfection who do not have cirrhosis. In patients with HBV monoinfection, screening is recommended every 6 months for groups at increased risk for developing HCC, including Asian men older than 40 years, Asian women older than 50 years, Black men older than 40 years old, individuals with a first-degree family member with a history of HCC, individuals with HDV [Terrault, et al. 2018; Sarin, et al. 2016; Zhang, et al. 2004].

All Recommendations

✓ ALL RECOMMENDATIONS: PREVENTION AND MANAGEMENT OF HEPATITIS B VIRUS IN ADULTS WITH HIV

Screening Tests

- Clinicians should determine the HBV vaccination and immune status of patients with HIV by performing laboratory testing for HBsAg, anti-HBs, and anti-HBc (total). (A*) See [Table 1: Interpretation of HBV Screening Test Results](#).
- Clinicians should repeat laboratory screening annually in patients who are not immune to HBV, choose not to be vaccinated, and are at ongoing risk of acquiring HBV. (A3)

Diagnosis

- In patients with positive baseline (screening) HBsAg test results, clinicians should perform HBeAg, anti-HBe, and HBV DNA testing to diagnose the phase of HBV infection. (B2†) See [Table 2: Serologic and Virologic Responses to HBV Infection](#).
- If a patient with HIV and unknown HBsAg status has signs or symptoms of acute hepatitis (i.e., elevated ALT), the clinician should perform HBsAg, anti-HBc IgM, HBeAg, anti-HBe (A*), and HBV DNA (A3) testing along with other diagnostic testing for acute hepatitis.

Acute HBV Infection

- If acute HBV infection is confirmed and the patient is asymptomatic, the clinician should repeat ALT testing within 2 to 4 weeks to assess for symptoms of liver disease progression (B3) and repeat HBsAg, HBeAg, anti-HBe, anti-HBs and HBV DNA testing 6 months later to determine whether infection has cleared. (A3)
- If a patient with HIV and acute HBV is not taking ART, the clinician should [recommend ART initiation](#) with a regimen active against HBV. (A1)

Transmission Prevention

- Clinicians should advise patients who have a positive HBsAg test result that they can transmit HBV (A*) and encourage sexually active patients to use effective barrier protection to reduce the risk of HBV transmission. (A2†)
- Clinicians should inform patients with acute or chronic active HBV that their household contacts should be vaccinated and counsel the patients to avoid sharing items such as razors or toothbrushes that could expose others to HBV-contaminated blood. (A2†)
- For individuals who inject drugs, clinicians should offer or refer for substance use treatment, ensure access to clean needles and syringes, and provide [harm reduction counseling](#). (A2†)
 - See NYSDOH [Drug Use Resources](#).

Primary Vaccination

- Clinicians should offer an HBV vaccine to patients with negative test results for HBsAg, anti-HBs, and anti-HBc:
 - Preferred: 2-dose Heplisav-B vaccine series (A1)
 - Alternative: 3-dose Engerix-B or Recombivax HB vaccine series (A1)
- Clinicians should not defer initial HBV vaccination in patients with a CD4 count <200 cells/mm³ who are at risk of HBV infection. (A2)
- Clinicians should repeat anti-HBs testing at 1 to 6 months, based on the patient’s visit schedule, after completion of the vaccination series to ensure immunity (anti-HBs ≥10 mIU/mL). (A3)
- In a patient with negative HBsAg, negative anti-HBs, and positive anti-HBc test results (isolated anti-HBc positive), the clinician should offer a single dose of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after vaccination OR vaccination with 2 doses of Heplisav-B followed by anti-HBs titer testing 1 to 6 months after the last dose. (A2)
 - For patients who received only 1 dose of Heplisav-B, if the anti-HBs titer is <100 mIU/mL, complete the HBV vaccine series and repeat anti-HBs testing 1 to 6 months after the last vaccine. (A2)
 - If vaccination is refused or if follow-up anti-HBs titer testing cannot be assured, perform HBV DNA testing to evaluate for occult HBV infection. (A2)
- Clinicians should not defer initial vaccination or revaccination in pregnant patients with HIV who do not have immunity to HBV. (A3)

ALL RECOMMENDATIONS: PREVENTION AND MANAGEMENT OF HEPATITIS B VIRUS IN ADULTS WITH HIV

Revaccination

- In previously vaccinated patients with anti-HBs levels <10 mIU/mL (vaccine nonresponse), clinicians should recommend revaccination. (A2)
 - If the Heplisav-B vaccine series was administered as the initial HBV vaccination, revaccinate with 1 dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)
 - If the Heplisav-B vaccine series was not administered as the initial HBV vaccination, revaccinate with a 2-dose series of Heplisav-B and repeat anti-HBs titer testing 1 to 6 months after the last dose. If the patient is still not immune, give an additional dose of Heplisav-B and repeat the anti-HBs titer test in 1 to 6 months. (A1)
 - If patients have contraindications to Heplisav-B, revaccinate with a double dose of Engerix-B or Recombivax HB. (A2)

Liver Disease Assessment

- Before initiating HBV treatment in patients with HIV, clinicians should obtain a complete physical examination and medical history, including the use of hepatotoxic medications (A*); noninvasive fibrosis evaluation (A2+); baseline ultrasonography for HCC [a] (A2+); and the following laboratory testing: CBC, albumin, bilirubin, alkaline phosphatase, PT/INR, ALT, AST, and a basic metabolic panel. (A*)
- Clinicians should refer patients with HIV/HBV coinfection and cirrhosis to a gastroenterologist or hepatologist to assess and manage complications of portal hypertension. (A3)
- In patients with HIV/HBV coinfection and cirrhosis, clinicians should screen for HCC with ultrasound every 6 months. (A2+)
 - See guideline section [HBV Treatment and Monitoring > Ongoing Screening for Hepatocellular Carcinoma](#) regarding screening for patients without cirrhosis.

Alcohol Use Screening and Education

- Clinicians should perform alcohol use screening in patients with HIV/HBV coinfection at baseline and at least annually and refer patients for treatment as needed. (A3)
 - See NYSDOH AI guidelines [Substance Use Screening, Risk Assessment, and Use Disorder in Adults](#) and [Treatment of Alcohol Use Disorder](#).
- Clinicians should educate patients about the detrimental effects of alcohol use on the course of HBV infection and counsel patients with underlying liver disease to abstain from or minimize alcohol use. (A*)

HAV, HCV, and HDV Status

- Clinicians should perform anti-HAV IgG or total (IgM and IgG) serum testing and administer the full HAV vaccine series in patients [who are not immune to HAV](#). (A3)
- Clinicians should determine patients' HCV status by medical history and serum testing and recommend treatment with DAA therapy if chronic HCV infection is diagnosed. (A1)
 - See NYSDOH AI guidelines [Hepatitis C Virus Screening, Testing, and Diagnosis in Adults](#) and [Treatment of Chronic Hepatitis C Virus Infection in Adults](#).
- Clinicians should perform anti-HDV total (IgM and IgG) serum testing to screen for HDV in all patients with HIV/HBV coinfection. (B2)

Treatment

- Clinicians should recommend [immediate ART initiation](#) for any patient with HIV/HBV coinfection who is not taking ART. (A1)
- **Preferred:** In patients with HIV and chronic HBV, clinicians should recommend an ART regimen that includes 2 agents active against HBV (see [Table 4: Available Medications for HBV Treatment in Adults With HIV](#)). Preferred regimens include a backbone of either TAF/FTC, TDF/FTC, or TDF/3TC. (A2)
- Clinicians should not prescribe a 2-drug regimen of TAF/FTC, TDF/FTC, or TDF/3TC alone to treat patients with HIV/HBV coinfection; a fully suppressive ART regimen is required. (A1)
- Nonadherence with or discontinuation of anti-HBV treatment may result in transaminase flares and hepatic damage. Clinicians should educate patients about the treatment adherence requirements (A*), and if treatment must be interrupted or discontinued, consult with a care provider experienced in HIV/HBV coinfection. (A3)

ALL RECOMMENDATIONS: PREVENTION AND MANAGEMENT OF HEPATITIS B VIRUS IN ADULTS WITH HIV

- **Alternative:** If a patient cannot or chooses not to take TDF or TAF, the clinician should initiate treatment with ETV and a fully suppressive ART regimen for HIV. (A3)
- **Pregnant patients:** Clinicians should offer pregnant patients treatment with an ART regimen that includes 2 agents active against both HIV and HBV; 3TC, FTC, TAF, and TDF can be used safely during pregnancy at standard doses. (A2⁺)

Monitoring

- After HBV treatment initiation, clinicians should perform the laboratory testing listed in [Table 6: Recommended Monitoring After HBV Treatment Initiation in Adults With HIV](#). (A3)
- If a patient being treated for chronic HBV develops signs or symptoms of acute hepatitis (nausea, vomiting, elevated ALT or bilirubin levels), the clinician should rule out HBV IRIS and HDV flare and consult with an HIV-experienced hepatologist. (A3)
 - See NYSDOH AI guideline [Management of IRIS](#).

Abbreviations: 3TC, lamivudine; ALT, alanine transaminase; anti-HBc, hepatitis B core antibody; anti-HBe, antibody to HBeAg; anti-HBs, hepatitis B surface antibody; ART, antiretroviral therapy; AST, aspartate transaminase; CBC, complete blood count; DAA, direct-acting antiviral; ETV, entecavir; FTC, emtricitabine; HAV, hepatitis A virus; HBeAg, hepatitis B e antigen; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; HDV, hepatitis D virus; IgG, immunoglobulin G; IgM, immunoglobulin M; IRIS, immune reconstitution inflammatory syndrome; PT/INR, prothrombin time/international normalized ratio; TAF, tenofovir alafenamide; TDF, tenofovir disoproxil fumarate.

Note:

- a. Baseline ultrasound for HCC is performed in all patients with HIV/HBV coinfection. In patients with HIV/HCV coinfection, an ultrasound is performed only in patients with cirrhosis.

References

Agarwal K, Brunetto M, Seto WK, et al. 96 weeks treatment of tenofovir alafenamide vs. tenofovir disoproxil fumarate for hepatitis B virus infection. *J Hepatol* 2018;68(4):672–81. [PMID: 29756595] <https://pubmed.ncbi.nlm.nih.gov/29756595>

Alter MJ. Epidemiology of viral hepatitis and HIV co-infection. *J Hepatol* 2006;44(1 Suppl):S6–9. [PMID: 16352363] <https://pubmed.ncbi.nlm.nih.gov/16352363>

Anderson AM, Mosunjac MB, Palmore MP, et al. Development of fatal acute liver failure in HIV-HBV coinfecting patients. *World J Gastroenterol* 2010;16(32):4107–11. [PMID: 20731028] <https://pubmed.ncbi.nlm.nih.gov/20731028>

Avihingsanon A, Matthews GV, Lewin SR, et al. Assessment of HBV flare in a randomized clinical trial in HIV/HBV coinfecting subjects initiating HBV-active antiretroviral therapy in Thailand. *AIDS Res Ther* 2012;9(1):6. [PMID: 22405335] <https://pubmed.ncbi.nlm.nih.gov/22405335>

Awad AM, Ntoso A, Connaire JJ, et al. An open-label, single-arm study evaluating the immunogenicity and safety of the hepatitis B vaccine HepB-CpG (HEPLISAV-B®) in adults receiving hemodialysis. *Vaccine* 2021;39(25):3346–52. [PMID: 34001345] <https://pubmed.ncbi.nlm.nih.gov/34001345>

Béguelin C, Moradpour D, Sahli R, et al. Hepatitis delta-associated mortality in HIV/HBV-coinfecting patients. *J Hepatol* 2017;66(2):297–303. [PMID: 27746337] <https://pubmed.ncbi.nlm.nih.gov/27746337>

Benhamou Y, Bochet M, Thibault V, et al. Long-term incidence of hepatitis B virus resistance to lamivudine in human immunodeficiency virus-infected patients. *Hepatology* 1999;30(5):1302–6. [PMID: 10534354] <https://pubmed.ncbi.nlm.nih.gov/10534354>

Bhattacharya D, Tseng CH, Tate JP, et al. Isolated hepatitis B core antibody is associated with advanced hepatic fibrosis in HIV/HCV infection but not in HIV infection alone. *J Acquir Immune Defic Syndr* 2016;72(1):e14–7. [PMID: 26829660] <https://pubmed.ncbi.nlm.nih.gov/26829660>

Blaser MJ, Cohen JI, Holland SM. Mandell, Douglas, and Bennett's principles and practice of infectious diseases. 2025 Jul 10. <https://www.elsevier.com/books/mandell-douglas-and-bennetts-principles-and-practice-of-infectious-diseases/bennett/978-0-323-48255-4>

Boyd A, Houghtaling L, Moh R, et al. Clinical outcomes during treatment interruptions in human immunodeficiency virus-hepatitis B virus co-infected patients from Sub-Saharan Africa. *Am J Trop Med Hyg* 2017;97(6):1936–42. [PMID: 29141712] <https://pubmed.ncbi.nlm.nih.gov/29141712>

- Bräu N, Fox RK, Xiao P, et al. Presentation and outcome of hepatocellular carcinoma in HIV-infected patients: a U.S.-Canadian multicenter study. *J Hepatol* 2007;47(4):527–37. [PMID: 17692986] <https://pubmed.ncbi.nlm.nih.gov/17692986>
- Callebaut C, Stepan G, Tian Y, et al. In vitro virology profile of tenofovir alafenamide, a novel oral prodrug of tenofovir with improved antiviral activity compared to that of tenofovir disoproxil fumarate. *Antimicrob Agents Chemother* 2015;59(10):5909–16. [PMID: 26149992] <https://pubmed.ncbi.nlm.nih.gov/26149992>
- Castellares C, Barreiro P, Martín-Carbonero L, et al. Liver cirrhosis in HIV-infected patients: prevalence, aetiology and clinical outcome. *J Viral Hepat* 2008;15(3):165–72. [PMID: 18233989] <https://pubmed.ncbi.nlm.nih.gov/18233989>
- CDC. Hepatitis D basics. 2024 Apr 24. <https://www.cdc.gov/hepatitis/hdv/index.htm> [accessed 2025 Dec 9]
- CDC(a). Hepatitis B surveillance. 2025 Apr 15. <https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-b/index.html> [accessed 2025 Jul 28]
- CDC(b). National Center for Health Statistics: alcohol use. 2025 Jan 17. <https://www.cdc.gov/nchs/fastats/alcohol.htm> [accessed 2025 Dec 9]
- CDC(c). National Center for Health Statistics: chronic liver disease and chirrrosis. 2025 Jan 15. <https://www.cdc.gov/nchs/fastats/liver-disease.htm> [accessed 2025 Dec 9]
- Chaiklang K, Wipasa J, Chaiwarith R, et al. Comparison of immunogenicity and safety of four doses and four double doses vs. standard doses of hepatitis B vaccination in HIV-infected adults: a randomized, controlled trial. *PLoS One* 2013;8(11):e80409. [PMID: 24265819] <https://pubmed.ncbi.nlm.nih.gov/24265819>
- Chang JJ, Mohtashemi N, Bhattacharya D. Significance and management of isolated hepatitis B core antibody (anti-HBc) in HIV and HCV: strategies in the DAA era. *Curr HIV/AIDS Rep* 2018;15(2):172–81. [PMID: 29572624] <https://pubmed.ncbi.nlm.nih.gov/29572624>
- Crane M, Oliver B, Matthews G, et al. Immunopathogenesis of hepatic flare in HIV/hepatitis B virus (HBV)-coinfected individuals after the initiation of HBV-active antiretroviral therapy. *J Infect Dis* 2009;199(7):974–81. [PMID: 19231993] <https://pubmed.ncbi.nlm.nih.gov/19231993>
- de Franchis R. Expanding consensus in portal hypertension: report of the Baveno VI Consensus Workshop: stratifying risk and individualizing care for portal hypertension. *J Hepatol* 2015;63(3):743–52. [PMID: 26047908] <https://pubmed.ncbi.nlm.nih.gov/26047908>
- de Ledingham V, Fougerou-Leurent C, Le Pabic E, et al. Treatment with bulevirtide in HIV-infected patients with chronic hepatitis D: ANRS HD EP01 BuleDelta and compassionate cohort. *JHEP Rep* 2024;6(8):101057. [PMID: 39045338] <https://pubmed.ncbi.nlm.nih.gov/39045338>
- de Vries-Sluijs TE, Hansen BE, van Doornum GJ, et al. A randomized controlled study of accelerated versus standard hepatitis B vaccination in HIV-positive patients. *J Infect Dis* 2011;203(7):984–91. [PMID: 21266513] <https://pubmed.ncbi.nlm.nih.gov/21266513>
- de Vries-Sluijs TE, Hansen BE, van Doornum GJ, et al. A prospective open study of the efficacy of high-dose recombinant hepatitis B rechallenge vaccination in HIV-infected patients. *J Infect Dis* 2008;197(2):292–94. [PMID: 18177248] <https://pubmed.ncbi.nlm.nih.gov/18177248>
- DHHS. Hepatitis B basic information. 2023 Mar 31. <https://www.hhs.gov/hepatitis/learn-about-viral-hepatitis/hepatitis-b-basics/index.html> [accessed 2025 Dec 9]
- DHHS. Guidelines for the prevention and treatment of opportunistic infections in adults and adolescents with HIV: hepatitis B virus infection. 2024 Dec 16. <https://clinicalinfo.hiv.gov/en/guidelines/adult-and-adolescent-opportunistic-infection/hepatitis-b-virus-infection?view=full> [accessed 2025 Dec 9]
- DHHS. Guidelines for the use of antiretroviral agents in adults and adolescents living with HIV: initiation of antiretroviral therapy. 2025 Sep 25. <https://clinicalinfo.hiv.gov/en/guidelines/adult-and-adolescent-arv/initiation-antiretroviral-therapy?view=full> [accessed 2025 Dec 9]
- Donato F, Tagger A, Chiesa R, et al. Hepatitis B and C virus infection, alcohol drinking, and hepatocellular carcinoma: a case-control study in Italy. Brescia HCC Study. *Hepatology* 1997;26(3):579–84. [PMID: 9303486] <https://pubmed.ncbi.nlm.nih.gov/9303486>
- Dore GJ, Soriano V, Rockstroh J, et al. Frequent hepatitis B virus rebound among HIV-hepatitis B virus-coinfected patients following antiretroviral therapy interruption. *AIDS* 2010;24(6):857–65. [PMID: 20216301] <https://pubmed.ncbi.nlm.nih.gov/20216301>
- Drake A, Mijch A, Sasadeusz J. Immune reconstitution hepatitis in HIV and hepatitis B coinfection, despite lamivudine therapy as part of HAART. *Clin Infect Dis* 2004;39(1):129–32. [PMID: 15206064] <https://pubmed.ncbi.nlm.nih.gov/15206064>
- EASL. EASL clinical practice guidelines: management of chronic hepatitis B virus infection. *J Hepatol* 2012;57(1):167–85. [PMID: 22436845] <https://pubmed.ncbi.nlm.nih.gov/22436845>

- Farci P, Niro GA. Current and future management of chronic hepatitis D. *Gastroenterol Hepatol (N Y)* 2018;14(6):342–51. [PMID: 30166948] <https://pubmed.ncbi.nlm.nih.gov/30166948>
- FDA. Recombivax HB hepatitis B vaccine (recombinant) suspension for intramuscular injection. 2018 Dec. <https://www.fda.gov/media/74274/download> [accessed 2025 Dec 9]
- FDA(a). Engerix-B [hepatitis B vaccine (recombinant)] injectable suspension, for intramuscular use. 2023 Oct 30. <https://www.fda.gov/media/119403/download?attachment> [accessed 2025 Dec 9]
- FDA(a). Heplisav-B [hepatitis B vaccine (recombinant), adjuvanted] injection, for intramuscular use. 2024 Sep. <https://www.fda.gov/media/108745/download> [accessed 2025 Dec 9]
- FDA(b). Twinrix [hepatitis A & hepatitis B (recombinant) vaccine] injectable suspension, for intramuscular use. 2023 Apr. <https://www.fda.gov/media/119351/download> [accessed 2025 Dec 9]
- FDA(b). Prehevbrio 2024 Nov 29. <https://www.fda.gov/vaccines-blood-biologics/prehevbrio> [accessed 2025 Dec 9]
- Fernández-Montero JV, Vispo E, Barreiro P, et al. Hepatitis delta is a major determinant of liver decompensation events and death in HIV-infected patients. *Clin Infect Dis* 2014;58(11):1549–53. [PMID: 24633686] <https://pubmed.ncbi.nlm.nih.gov/24633686>
- Fonseca MO, Pang LW, de Paula Cavalheiro N, et al. Randomized trial of recombinant hepatitis B vaccine in HIV-infected adult patients comparing a standard dose to a double dose. *Vaccine* 2005;23(22):2902–8. [PMID: 15780739] <https://pubmed.ncbi.nlm.nih.gov/15780739>
- Gallant J. The M184V mutation: what it does, how to prevent it, and what to do with it when it's there. *AIDS Read* 2006;16(10):556–59. [PMID: 17096474] <https://pubmed.ncbi.nlm.nih.gov/17096474>
- Gallant J, Brunetta J, Crofoot G, et al. Brief report: efficacy and safety of switching to a single-tablet regimen of elvitegravir/cobicistat/emtricitabine/tenofovir alafenamide in HIV-1/hepatitis B-coinfected adults. *J Acquir Immune Defic Syndr* 2016;73(3):294–98. [PMID: 27171740] <https://pubmed.ncbi.nlm.nih.gov/27171740>
- Gandhi RT, Wurcel A, Lee H, et al. Response to hepatitis B vaccine in HIV-1-positive subjects who test positive for isolated antibody to hepatitis B core antigen: implications for hepatitis B vaccine strategies. *J Infect Dis* 2005;191(9):1435–41. [PMID: 15809901] <https://pubmed.ncbi.nlm.nih.gov/15809901>
- Garcia-Tsao G, Abraldes JG, Berzigotti A, et al. Portal hypertensive bleeding in cirrhosis: risk stratification, diagnosis, and management: 2016 practice guidance by the American Association for the Study of Liver Diseases. *Hepatology* 2017;65(1):310–35. [PMID: 27786365] <https://pubmed.ncbi.nlm.nih.gov/27786365>
- Gupta SK. Tenofovir-associated Fanconi syndrome: review of the FDA adverse event reporting system. *AIDS Patient Care STDS* 2008;22(2):99–103. [PMID: 18260800] <https://pubmed.ncbi.nlm.nih.gov/18260800>
- Gupta SK, Post FA, Arribas JR, et al. Renal safety of tenofovir alafenamide vs. tenofovir disoproxil fumarate: a pooled analysis of 26 clinical trials. *AIDS* 2019;33(9):1455–65. [PMID: 30932951] <https://pubmed.ncbi.nlm.nih.gov/30932951>
- Keet IP, van Doornum G, Safary A, et al. Insufficient response to hepatitis B vaccination in HIV-positive homosexual men. *AIDS* 1992;6(5):509–10. [PMID: 1535502] <https://pubmed.ncbi.nlm.nih.gov/1535502>
- Khaimova R, Fischetti B, Cope R, et al. Serological response with Heplisav-B® in prior hepatitis B vaccine non-responders living with HIV. *Vaccine* 2021;39(44):6529–34. [PMID: 34600748] <https://pubmed.ncbi.nlm.nih.gov/34600748>
- Kim HN, Newcomb CW, Carbonari DM, et al. Risk of HCC with hepatitis B viremia among HIV/HBV-coinfected persons in North America. *Hepatology* 2021;74(3):1190–1202. [PMID: 33780007] <https://pubmed.ncbi.nlm.nih.gov/33780007>
- Knox TA, Jerger L, Tang AM. Alcohol, nutrition, and health consequences: alcohol, HIV/AIDS, and liver disease. 2013. https://link.springer.com/chapter/10.1007/978-1-62703-047-2_23
- Komatsu H, Inui A, Sogo T, et al. Tears from children with chronic hepatitis B virus (HBV) infection are infectious vehicles of HBV transmission: experimental transmission of HBV by tears, using mice with chimeric human livers. *J Infect Dis* 2012;206(4):478–85. [PMID: 22508939] <https://pubmed.ncbi.nlm.nih.gov/22508939>
- Konopnicki D, Mocroft A, de Wit S, et al. Hepatitis B and HIV: prevalence, AIDS progression, response to highly active antiretroviral therapy and increased mortality in the EuroSIDA cohort. *AIDS* 2005;19(6):593–601. [PMID: 15802978] <https://pubmed.ncbi.nlm.nih.gov/15802978>
- Lampertico P, Buti M, Fung S, et al. Switching from tenofovir disoproxil fumarate to tenofovir alafenamide in virologically suppressed patients with chronic hepatitis B: a randomised, double-blind, phase 3, multicentre non-inferiority study. *Lancet Gastroenterol Hepatol* 2020;5(5):441–53. [PMID: 32087795] <https://pubmed.ncbi.nlm.nih.gov/32087795>
- Lok AS, Lai CL, Wu PC. Prevalence of isolated antibody to hepatitis B core antigen in an area endemic for hepatitis B virus infection: implications in hepatitis B vaccination programs. *Hepatology* 1988;8(4):766–70. [PMID: 2968945] <https://pubmed.ncbi.nlm.nih.gov/2968945>

- Loke RH, Murray-Lyon IM, Coleman JC, et al. Diminished response to recombinant hepatitis B vaccine in homosexual men with HIV antibody: an indicator of poor prognosis. *J Med Virol* 1990;31(2):109–11. [PMID: 2143776] <https://pubmed.ncbi.nlm.nih.gov/2143776>
- Lopes VB, Hassing RJ, de Vries-Sluijs TE, et al. Long-term response rates of successful hepatitis B vaccination in HIV-infected patients. *Vaccine* 2013;31(7):1040–44. [PMID: 23273969] <https://pubmed.ncbi.nlm.nih.gov/23273969>
- Marcellin P, Pequignot F, Delarocque-Astagneau E, et al. Mortality related to chronic hepatitis B and chronic hepatitis C in France: evidence for the role of HIV coinfection and alcohol consumption. *J Hepatol* 2008;48(2):200–207. [PMID: 18086507] <https://pubmed.ncbi.nlm.nih.gov/18086507>
- Marks K, Kang M, Umbleja T, et al. Highly durable seroprotection with HepB-CpG vaccine in people with HIV (PWH): ACTG A5379 (BEeHIVe). Abstract 112. CROI; 2025 Mar 9–12; San Francisco, CA. https://www.natap.org/2025/CROI/croi_152.htm
- Marks KM, Kang M, Umbleja T, et al. Immunogenicity and safety of hepatitis B virus (HBV) vaccine with a toll-like receptor 9 agonist adjuvant in HBV vaccine-naïve people with human immunodeficiency virus. *Clin Infect Dis* 2023;77(3):414–18. [PMID: 37017075] <https://pubmed.ncbi.nlm.nih.gov/37017075>
- Mast EE, Weinbaum CM, Fiore AE, et al. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) part II: immunization of adults. *MMWR Recomm Rep* 2006;55(Rr-16):1–33. [PMID: 17159833] <https://pubmed.ncbi.nlm.nih.gov/17159833>
- Mavilia MG, Wu GY. HBV-HCV coinfection: viral interactions, management, and viral reactivation. *J Clin Transl Hepatol* 2018;6(3):296–305. [PMID: 30271742] <https://pubmed.ncbi.nlm.nih.gov/30271742>
- McComsey GA, Kitch D, Daar ES, et al. Bone mineral density and fractures in antiretroviral-naïve persons randomized to receive abacavir-lamivudine or tenofovir disoproxil fumarate-emtricitabine along with efavirenz or atazanavir-ritonavir: AIDS Clinical Trials Group A5224s, a substudy of ACTG A5202. *J Infect Dis* 2011;203(12):1791–1801. [PMID: 21606537] <https://pubmed.ncbi.nlm.nih.gov/21606537>
- Moreno-Cubero E, Del Arco RT, Peña-Asensio J, et al. Is it possible to stop nucleos(t)ide analogue treatment in chronic hepatitis B patients? *World J Gastroenterol* 2018;24(17):1825–38. [PMID: 29740199] <https://pubmed.ncbi.nlm.nih.gov/29740199>
- Nakanuma Y, Ohta G. Morphology of cirrhosis and occurrence of hepatocellular carcinoma in alcoholics with and without HBsAg and in non-alcoholic HBsAg-positive patients. A comparative autopsy study. *Liver* 1983;3(4):231–37. [PMID: 6323910] <https://pubmed.ncbi.nlm.nih.gov/6323910>
- Neau D, Winnock M, Jouvencel AC, et al. Occult hepatitis B virus infection in HIV-infected patients with isolated antibodies to hepatitis B core antigen: Aquitaine cohort, 2002-2003. *Clin Infect Dis* 2005;40(5):750–53. [PMID: 15714424] <https://pubmed.ncbi.nlm.nih.gov/15714424>
- Ni JD, Xiong YZ, Wang XJ, et al. Does increased hepatitis B vaccination dose lead to a better immune response in HIV-infected patients than standard dose vaccination: a meta-analysis? *Int J STD AIDS* 2013;24(2):117–22. [PMID: 23467291] <https://pubmed.ncbi.nlm.nih.gov/23467291>
- Núñez M, Lana R, Mendoza JL, et al. Risk factors for severe hepatic injury after introduction of highly active antiretroviral therapy. *J Acquir Immune Defic Syndr* 2001;27(5):426–31. [PMID: 11511818] <https://pubmed.ncbi.nlm.nih.gov/11511818>
- Overton ET, Sungkanuparph S, Powderly WG, et al. Undetectable plasma HIV RNA load predicts success after hepatitis B vaccination in HIV-infected persons. *Clin Infect Dis* 2005;41(7):1045–48. [PMID: 16142673] <https://pubmed.ncbi.nlm.nih.gov/16142673>
- Patel EU, Thio CL, Boon D, et al. Prevalence of hepatitis B and hepatitis D virus infections in the United States, 2011-2016. *Clin Infect Dis* 2019;69(4):709–12. [PMID: 30605508] <https://pubmed.ncbi.nlm.nih.gov/30605508>
- Pattyn J, Hendrickx G, Vorsters A, et al. Hepatitis B vaccines. *J Infect Dis* 2021;224(12 Suppl 2):S343–51. [PMID: 34590138] <https://pubmed.ncbi.nlm.nih.gov/34590138>
- Perrella O, Sbriglia C, De Sena R, et al. Immune reconstitution: bad or good factor in hepatitis B virus and HIV co-infection? *AIDS* 2006;20(5):790–91. [PMID: 16514319] <https://pubmed.ncbi.nlm.nih.gov/16514319>
- Pinato DJ, Allara E, Chen TY, et al. Influence of HIV infection on the natural history of hepatocellular carcinoma: results from a global multicohort study. *J Clin Oncol* 2019;37(4):296–304. [PMID: 30562130] <https://pubmed.ncbi.nlm.nih.gov/30562130>
- Piroth L, Launay O, Michel ML, et al. Vaccination against hepatitis B virus (HBV) in HIV-1-infected patients with isolated anti-HBV core antibody: the ANRS HB EP03 CISOVAC prospective study. *J Infect Dis* 2016;213(11):1735–42. [PMID: 26768256] <https://pubmed.ncbi.nlm.nih.gov/26768256>

- Poynard T, Mathurin P, Lai CL, et al. A comparison of fibrosis progression in chronic liver diseases. *J Hepatol* 2003;38(3):257–65. [PMID: 12586290] <https://pubmed.ncbi.nlm.nih.gov/12586290>
- Pseudos G, Kim JH, Groce V, et al. Efficacy of double-dose hepatitis B rescue vaccination in HIV-infected patients. *AIDS Patient Care STDS* 2010;24(7):403–7. [PMID: 20586648] <https://pubmed.ncbi.nlm.nih.gov/20586648>
- Raimondo G, Pollicino T, Cacciola I, et al. Occult hepatitis B virus infection. *J Hepatol* 2007;46(1):160–70. [PMID: 17112622] <https://pubmed.ncbi.nlm.nih.gov/17112622>
- Rey D, Krantz V, Partisani M, et al. Increasing the number of hepatitis B vaccine injections augments anti-HBs response rate in HIV-infected patients. Effects on HIV-1 viral load. *Vaccine* 2000;18(13):1161–65. [PMID: 10649616] <https://pubmed.ncbi.nlm.nih.gov/10649616>
- Rosenthal EM, Hall EW, Rosenberg ES, et al. Assessing the cost-utility of preferentially administering HepHisav-B vaccine to certain populations. *Vaccine* 2020;38(51):8206–15. [PMID: 33160756] <https://pubmed.ncbi.nlm.nih.gov/33160756>
- Rubin LG, Levin MJ, Ljungman P, et al. 2013 IDSA clinical practice guideline for vaccination of the immunocompromised host. *Clin Infect Dis* 2014;58(3):e44–100. [PMID: 24311479] <https://pubmed.ncbi.nlm.nih.gov/24311479>
- Sandul AL, Rapposelli K, Nyendak M, et al. Updated recommendation for universal hepatitis b vaccination in adults aged 19-59 years - United States, 2024. *MMWR Morb Mortal Wkly Rep* 2024;73(48):1106. [PMID: 39636783] <https://pubmed.ncbi.nlm.nih.gov/39636783>
- Sarin SK, Kumar M, Lau GK, et al. Asian-Pacific clinical practice guidelines on the management of hepatitis B: a 2015 update. *Hepatol Int* 2016;10(1):1–98. [PMID: 26563120] <https://pubmed.ncbi.nlm.nih.gov/26563120>
- Schnittman SR, Zepf R, Cocohoba J, et al. Brief report: HepHisav-B seroprotection in people with HIV: a single-center experience. *J Acquir Immune Defic Syndr* 2021;86(4):445–49. [PMID: 33196553] <https://pubmed.ncbi.nlm.nih.gov/33196553>
- Sheng WH, Hung CC, Kao JH, et al. Impact of hepatitis D virus infection on the long-term outcomes of patients with hepatitis B virus and HIV coinfection in the era of highly active antiretroviral therapy: a matched cohort study. *Clin Infect Dis* 2007;44(7):988–95. [PMID: 17342655] <https://pubmed.ncbi.nlm.nih.gov/17342655>
- Shiffman ML. Management of acute hepatitis B. *Clin Liver Dis* 2010;14(1):75–91. [PMID: 20123442] <https://pubmed.ncbi.nlm.nih.gov/20123442>
- Singal AG, Llovet JM, Yarchoan M, et al. AASLD Practice Guidance on prevention, diagnosis, and treatment of hepatocellular carcinoma. *Hepatology* 2023;78(6):1922–65. [PMID: 37199193] <https://pubmed.ncbi.nlm.nih.gov/37199193>
- Singh KP, Crane M, Audsley J, et al. HIV-hepatitis B virus coinfection: epidemiology, pathogenesis, and treatment. *AIDS* 2017;31(15):2035–52. [PMID: 28692539] <https://pubmed.ncbi.nlm.nih.gov/28692539>
- Smith DK, Herbst JH, Zhang X, et al. Condom effectiveness for HIV prevention by consistency of use among men who have sex with men in the United States. *J Acquir Immune Defic Syndr* 2015;68(3):337–44. [PMID: 25469526] <https://pubmed.ncbi.nlm.nih.gov/25469526>
- Soriano V, Puoti M, Peters M, et al. Care of HIV patients with chronic hepatitis B: updated recommendations from the HIV-Hepatitis B Virus International Panel. *AIDS* 2008;22(12):1399–1410. [PMID: 18614862] <https://pubmed.ncbi.nlm.nih.gov/18614862>
- Spradling PR, Richardson JT, Buchacz K, et al. Prevalence of chronic hepatitis B virus infection among patients in the HIV Outpatient Study, 1996–2007. *J Viral Hepat* 2010;17(12):879–86. [PMID: 20158604] <https://pubmed.ncbi.nlm.nih.gov/20158604>
- StatPearls. Hepatitis B. 2023 Jul 9. <https://www.ncbi.nlm.nih.gov/books/NBK555945/> [accessed 2025 Dec 9]
- Sun J, Althoff KN, Jing Y, et al. Trends in hepatocellular carcinoma incidence and risk among persons with HIV in the US and Canada, 1996–2015. *JAMA Netw Open* 2021;4(2):e2037512. [PMID: 33595662] <https://pubmed.ncbi.nlm.nih.gov/33595662>
- Tayal SC, Sankar KN. Impaired response to recombinant hepatitis B vaccine in asymptomatic HIV-infected individuals. *AIDS* 1994;8(4):558–59. [PMID: 7912087] <https://pubmed.ncbi.nlm.nih.gov/7912087>
- Tedaldi EM, Baker RK, Moorman AC, et al. Hepatitis A and B vaccination practices for ambulatory patients infected with HIV. *Clin Infect Dis* 2004;38(10):1478–84. [PMID: 15156488] <https://pubmed.ncbi.nlm.nih.gov/15156488>
- Terrault NA, Lok AS, McMahon BJ, et al. Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance. *Hepatology* 2018;67(4):1560–99. [PMID: 29405329] <https://pubmed.ncbi.nlm.nih.gov/29405329>
- Thio CL. Hepatitis B and human immunodeficiency virus coinfection. *Hepatology* 2009;49(5 Suppl):S138–45. [PMID: 19399813] <https://pubmed.ncbi.nlm.nih.gov/19399813>
- Thio CL, Seaberg EC, Skolasky R, Jr., et al. HIV-1, hepatitis B virus, and risk of liver-related mortality in the Multicenter Cohort Study (MACS). *Lancet* 2002;360(9349):1921–26. [PMID: 12493258] <https://pubmed.ncbi.nlm.nih.gov/12493258>

- Tran TT. Immune tolerant hepatitis B: a clinical dilemma. *Gastroenterol Hepatol (N Y)* 2011;7(8):511–16. [PMID: 22298987] <https://pubmed.ncbi.nlm.nih.gov/22298987>
- Veiga AP, Casseb J, Duarte AJ. Humoral response to hepatitis B vaccination and its relationship with T CD45RA+ (naïve) and CD45RO+ (memory) subsets in HIV-1-infected subjects. *Vaccine* 2006;24(49-50):7124–28. [PMID: 16884833] <https://pubmed.ncbi.nlm.nih.gov/16884833>
- Velasquez MM, von Sternberg K, Johnson DH, et al. Reducing sexual risk behaviors and alcohol use among HIV-positive men who have sex with men: a randomized clinical trial. *J Consult Clin Psychol* 2009;77(4):657–67. [PMID: 19634959] <https://pubmed.ncbi.nlm.nih.gov/19634959>
- Visco Comandini U, De Santis E, De Maria F, et al. "Real world" efficacy of bulevirtide in HBV/HDV-related cirrhosis including people living with HIV: results from the compassionate use programme at INMI Spallanzani in Rome, Italy. *HIV Med* 2023;24(10):1075–82. [PMID: 37287427] <https://pubmed.ncbi.nlm.nih.gov/37287427>
- Wedemeyer H, Aleman S, Brunetto MR, et al. A phase 3, randomized trial of bulevirtide in chronic hepatitis D. *N Engl J Med* 2023;389(1):22–32. [PMID: 37345876] <https://pubmed.ncbi.nlm.nih.gov/37345876>
- Wedemeyer H, Yurdaydin C, Dalekos GN, et al. Peginterferon plus adefovir versus either drug alone for hepatitis delta. *N Engl J Med* 2011;364(4):322–31. [PMID: 21268724] <https://pubmed.ncbi.nlm.nih.gov/21268724>
- Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database Syst Rev* 2002;(1):CD003255. [PMID: 11869658] <https://pubmed.ncbi.nlm.nih.gov/11869658>
- Witt MD, Lewis RJ, Rieg G, et al. Predictors of the isolated hepatitis B core antibody pattern in HIV-infected and -uninfected men in the Multicenter AIDS Cohort Study. *Clin Infect Dis* 2013;56(4):606–12. [PMID: 23090927] <https://pubmed.ncbi.nlm.nih.gov/23090927>
- Zhang BH, Yang BH, Tang ZY. Randomized controlled trial of screening for hepatocellular carcinoma. *J Cancer Res Clin Oncol* 2004;130(7):417–22. [PMID: 15042359] <https://pubmed.ncbi.nlm.nih.gov/15042359>

Supplement: Guideline Development and Recommendation Ratings

Table S1: Guideline Development: New York State Department of Health AIDS Institute Clinical Guidelines Program

Developer	New York State Department of Health AIDS Institute (NYSDOH AI) Clinical Guidelines Program
Funding source	NYSDOH AI
Program manager	Clinical Guidelines Program, Johns Hopkins University School of Medicine, Division of Infectious Diseases. See Program Leadership and Staff .
Mission	To produce and disseminate evidence-based, state-of-the-art clinical practice guidelines that establish uniform standards of care for practitioners who provide prevention or treatment of HIV, viral hepatitis, other sexually transmitted infections, and substance use disorders for adults throughout New York State in the wide array of settings in which those services are delivered.
Expert committees	The NYSDOH AI Medical Director invites and appoints committees of clinical and public health experts from throughout New York State to ensure that the guidelines are practical, immediately applicable, and meet the needs of care providers and stakeholders in all major regions of New York State, all relevant clinical practice settings, key New York State agencies, and community service organizations.
Committee structure	<ul style="list-style-type: none"> • Leadership: AI-appointed chair, vice chair(s), chair emeritus, clinical specialist(s), JHU Guidelines Program Director, AI Medical Director, AI Clinical Consultant, AVAC community advisor • Contributing members • Guideline writing groups: Lead author, coauthors if applicable, and all committee leaders
Disclosure and management of conflicts of interest	<ul style="list-style-type: none"> • Annual disclosure of financial relationships with commercial entities for the 12 months prior and upcoming is required of all individuals who work with the guidelines program, and includes disclosure for partners or spouses and primary professional affiliation. • The NYSDOH AI assesses all reported financial relationships to determine the potential for undue influence on guideline recommendations and, when indicated, denies participation in the program or formulates a plan to manage potential conflicts. Disclosures are listed for each committee member.
Evidence collection and review	<ul style="list-style-type: none"> • Literature search and review strategy is defined by the guideline lead author based on the defined scope of a new guideline or update. • A comprehensive literature search and review is conducted for a new guideline or an extensive update using PubMed, other pertinent databases of peer-reviewed literature, and relevant conference abstracts to establish the evidence base for guideline recommendations. • A targeted search and review to identify recently published evidence is conducted for guidelines published within the previous 3 years. • Title, abstract, and article reviews are performed by the lead author. The JHU editorial team collates evidence and creates and maintains an evidence table for each guideline.
Recommendation development	<ul style="list-style-type: none"> • The lead author drafts recommendations to address the defined scope of the guideline based on available published data. • Writing group members review the draft recommendations and evidence and deliberate to revise, refine, and reach consensus on all recommendations. • When published data are not available, support for a recommendation may be based on the committee’s expert opinion. • The writing group assigns a 2-part rating to each recommendation to indicate the strength of the recommendation and quality of the supporting evidence. The group reviews the evidence, deliberates, and may revise recommendations when required to reach consensus.

Table S1: Guideline Development: New York State Department of Health AIDS Institute Clinical Guidelines Program

Review and approval process	<ul style="list-style-type: none"> • Following writing group approval, draft guidelines are reviewed by all contributors, program liaisons, and a volunteer reviewer from the AI Community Advisory Committee. • Recommendations must be approved by two-thirds of the full committee. If necessary to achieve consensus, the full committee is invited to deliberate, review the evidence, and revise recommendations. • Final approval by the committee chair and the NYSDOH AI Medical Director is required for publication.
External reviews	<ul style="list-style-type: none"> • External review of each guideline is invited at the developer’s discretion. • External reviewers recognized for their experience and expertise review guidelines for accuracy, balance, clarity, and practicality and provide feedback.
Update process	<ul style="list-style-type: none"> • JHU editorial staff ensure that each guideline is reviewed and determined to be current upon the 3-year anniversary of publication; guidelines that provide clinical recommendations in rapidly changing areas of practice may be reviewed annually. Published literature is surveilled to identify new evidence that may prompt changes to existing recommendations or development of new recommendations. • If changes in the standard of care, newly published studies, new drug approval, new drug-related warning, or a public health emergency indicate the need for immediate change to published guidelines, committee leadership will make recommendations and immediate updates and will invite full committee review as indicated.

Table S2: Recommendation Ratings and Definitions

Strength	Quality of Evidence
A: Strong B: Moderate C: Optional	1 Based on published results of at least 1 randomized clinical trial with clinical outcomes or validated laboratory endpoints.
	* Based on either a self-evident conclusion; conclusive, published, in vitro data; or well-established practice that cannot be tested because ethics would preclude a clinical trial.
	2 Based on published results of at least 1 well-designed, nonrandomized clinical trial or observational cohort study with long-term clinical outcomes.
	2 [†] Extrapolated from published results of well-designed studies (including nonrandomized clinical trials) conducted in populations other than those specifically addressed by a recommendation. The source(s) of the extrapolated evidence and the rationale for the extrapolation are provided in the guideline text. One example would be results of studies conducted predominantly in a subpopulation (e.g., one gender) that the committee determines to be generalizable to the population under consideration in the guideline.
	3 Based on committee expert opinion, with rationale provided in the guideline text.