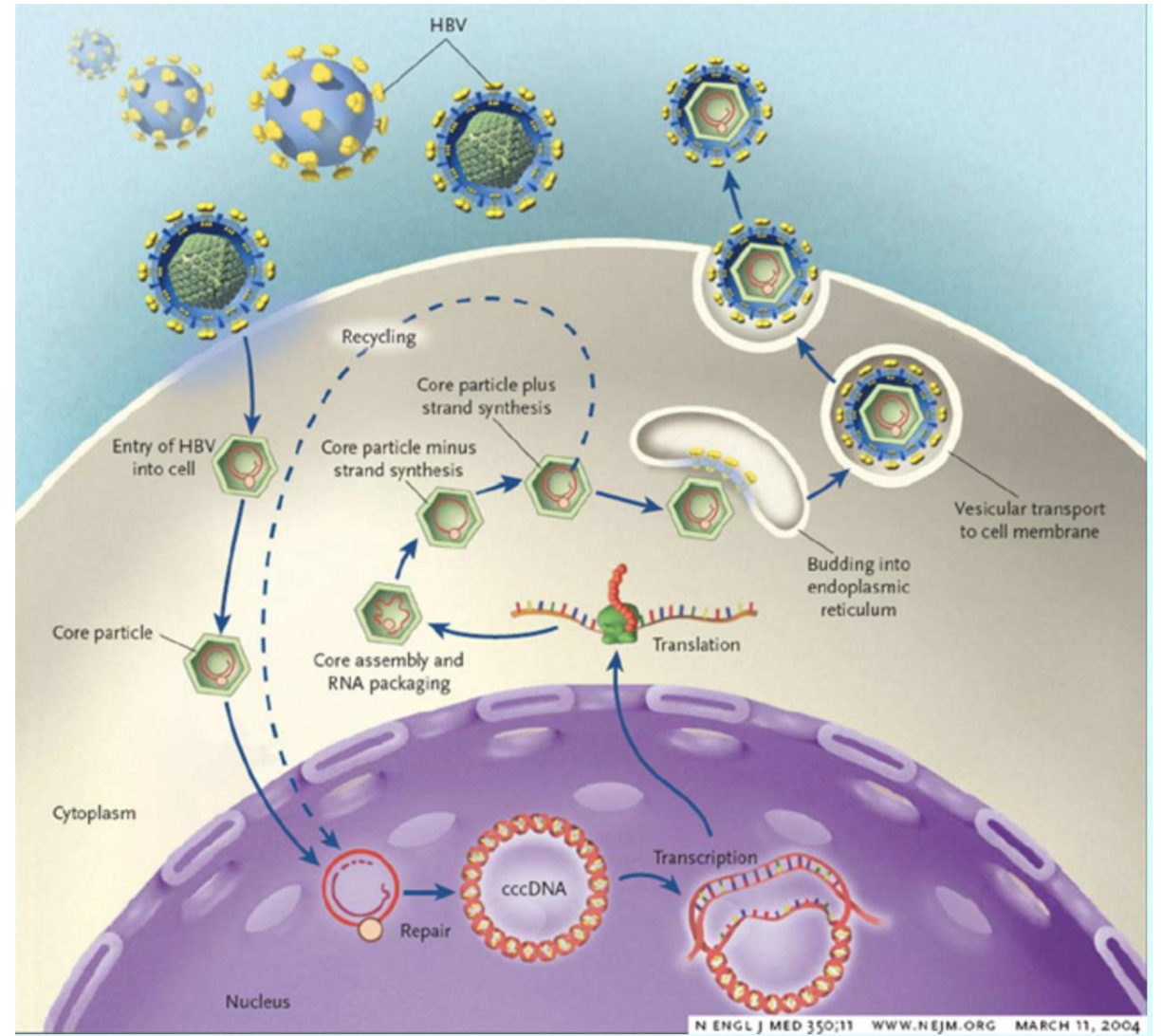
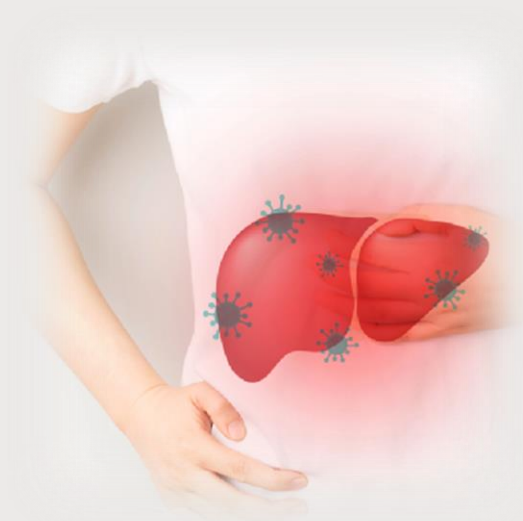


HBV care and prevention for adults

4/1/26

Hepatitis B



<https://www.bio.davidson.edu/people/sosarfova/assets/bio307/chbrough/page01.html>;

<https://www.niddk.nih.gov/health-information/liver-disease/viral-hepatitis>

Hepatitis B (HBV)

Risk factors for acquisition & environmental survival

ROUTES OF TRANSMISSION

Blood contact

Shared needles/syringes
Needlestick injuries
Blood transfusions (unscreened)

Sexual contact

Unprotected intercourse
Multiple sexual partners
Men who have sex with men

Perinatal

Mother-to-child at birth
HBsAg+ mother: high risk
of chronic infection in infant

ENVIRONMENTAL VIABILITY

Bond et al., Lancet 1981

≥ 7 days

on surfaces at room temp
in dried blood / bodily fluids

50–100x more infectious than HIV

Pfaender et al., JID 2019
(cell culture model)

Half-life >22 days at 37°C

Barely reduced at 4°C

for up to 9 months

Stable at pH 3–8; stable in serum

Most resistant virus tested

Common fomites

Razors · Nail clippers

Toothbrushes · Earrings

Shared medical equipment

Surfaces with dried blood

Disinfect: 1:10 bleach solution

Alcohol hand sanitizers effective

NOT TRANSMITTED BY

Casual contact · Kissing · Coughing or sneezing · Sharing utensils or food · Breastfeeding
Hugging · Insect bites · Contaminated water or food

Hepatitis B (HBV) acute vs chronic infection

- Acute HBV infection

- Largely asymptomatic, can develop self-limited acute viral hepatitis syndrome
 - Subjective: N/V/D, fatigue, dark urine, jaundice
 - Objective: elevated liver function tests (ALT, AST, bilirubin), rarely acute hepatic failure
 - Hepatitis B surface antigen HBSAg +
- ~6 months

- Chronic HBV infection

- Persistent HBSAg+ > 6 months
- Variable risk of developing chronic HBV
 - Perinatal transmission confers the greatest likelihood of developing chronic infection
 - If exposed in the first year of life, 80-90% risk of developing chronic infection
 - 800-1,000 cases/yr in the United States
 - 30-50% risk of developing chronic infection among children <6 yo
 - <5% of healthy adults who acquire HBV will develop chronic infection

Chronic HBV in the US

- Approximately 1.8 million in the US living with chronic hepatitis B
 - ~50% are unaware of their diagnosis

Chronic hepatitis B and hepatitis B-related deaths in 2023

17,650	There were 17,650 cases of newly reported chronic hepatitis B during 2023.
1,769	There were 1,769 hepatitis B-related deaths reported during 2023.

During 2023, 17,650 cases of chronic hepatitis B were newly reported by 44 states and the District of Columbia, corresponding to a rate of 6.1 cases per 100,000 people.

The rate of newly reported chronic hepatitis B cases among non-Hispanic Asian/Pacific Islander (A/PI) persons (18.9 cases per 100,000 population) was 9.9 times as high as the rate among non-Hispanic White persons (1.9 cases per 100,000 population).

Fast facts about chronic hepatitis B in 2023

Case rates by age

46%

The rate of newly reported chronic hepatitis B cases was highest among persons aged **30–39** and **40–49**; these two age groups combined accounted for **46%** of all newly reported chronic hepatitis B cases.

Case rates by demographics

9.9x

The rate of newly reported chronic hepatitis B cases among non-Hispanic A/PI persons was **9.9 times** as high as among non-Hispanic White persons.

Acute vs. chronic rates

Although the rate of reported acute hepatitis B cases was the lowest among non-Hispanic A/PI persons, the rate of newly reported **chronic hepatitis B cases was highest** among this group.

HBV screening

Update: All adults should be tested at least once for hepatitis B. Have you been tested?

- Hepatitis B infection can cause liver cancer and early death
- Most people with the virus don't know they have it
- Treatment is available — **schedule your screening today**



bit.ly/rr7201a1
MARCH 10, 2023

MMWR

BOX 1. Hepatitis B virus screening and testing recommendations — CDC, 2023



Universal hepatitis B virus (HBV) screening

- HBV screening at least once during a lifetime for adults aged ≥ 18 years (new recommendation)
- During screening, test for hepatitis B surface antigen (HBsAg), antibody to HBsAg, and total antibody to HBcAg (total anti-HBc) (new recommendation)

Screening pregnant persons

- HBV screening for all pregnant persons during each pregnancy, preferably in the first trimester, regardless of vaccination status or history of testing*
- Pregnant persons with a history of appropriately timed triple panel screening and without subsequent risk for exposure to HBV (i.e., no new HBV exposures since triple panel screening) only need HBsAg screening

Risk-based testing

- Testing for all persons with a history of increased risk for HBV infection, regardless of age, if they might have been susceptible during the period of increased risk[†]
- Periodic testing for susceptible persons, regardless of age, with ongoing risk for exposures, while risk for exposures persists[†]

* **Source:** Schillie S, Vellozzi C, Reingold A, et al. Prevention of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices. *MMWR Recomm Rep* 2018;67(No. RR-1):1–31.

[†] Susceptible persons include those who have never been infected with HBV (i.e., total anti-HBc negative) and either did not complete a HepB vaccine series per Advisory Committee on Immunization Practices recommendations or who are known to be vaccine nonresponders.

BOX 4. Persons and activities, exposures, or conditions associated with an increased risk for hepatitis B virus infection — CDC testing recommendations, 2023

- Infants born to pregnant persons who are hepatitis B surface antigen positive
- Persons born in regions with hepatitis B virus (HBV) infection prevalence of $\geq 2\%$
- U.S.-born persons not vaccinated as infants whose parents were born in regions with HBV infection prevalence of $\geq 8\%$
- Injection drug use
- Incarceration in a jail, prison, or other detention setting (new recommendation)
- HIV infection
- Hepatitis C virus infection (new recommendation)
- Men who have sex with men
- Sexually transmitted infections or multiple sex partners (new recommendation)
- Household contacts of persons with known HBV infection
- Needle-sharing or sexual contacts of persons with known HBV infection
- Maintenance dialysis, including in-center or home hemodialysis and peritoneal dialysis
- Elevated alanine aminotransferase or aspartate aminotransferase levels of unknown origin
- Persons who request HBV testing (new recommendation)

HBV Screening

- Screening should include all 3 titers:
 - HBsAg
 - Anti-HBc
 - Anti-HBs

Test outcome	Interpretation	Action
HBsAg — Positive Total anti-HBc — Positive IgM anti-HBc — Positive* Anti-HBs — Negative	Acute infection	Link to hepatitis B care
HBsAg — Positive Total anti-HBc — Positive IgM anti-HBc — Negative Anti-HBs — Negative	Chronic infection	Link to hepatitis B care
HBsAg — Negative Total anti-HBc — Positive Anti-HBs — Positive	Resolved infection	Counsel about HBV infection reactivation risk
HBsAg — Negative Total anti-HBc — Negative Anti-HBs — Positive†	Immune from receipt of prior vaccination (if documented complete series)	If not vaccinated, then complete vaccine series
HBsAg — Negative Total anti-HBc — Positive Anti-HBs — Negative	<i>Only core antibody is positive. See possible interpretations and corresponding actions.</i>	
	Resolved infection where anti-HBs levels have waned	Counsel about HBV infection reactivation risk
	Occult infection	Link to hepatitis B care
	Passive transfer of anti-HBc to an infant born to an HBsAg-positive gestational parent	No action
	False positive, thus patient is susceptible	Offer HepB vaccine per ACIP
	A mutant HBsAg strain that is not detectable by laboratory assay	Link to hepatitis B care
HBsAg — Negative Total anti-HBc — Negative Anti-HBs — Negative‡	Susceptible, never infected (if no documentation of HepB vaccine series completion)	Offer HepB vaccine per ACIP recommendations

HBV vaccination for adults



Table 2.
Recommended Doses of Hepatitis B Vaccine in Children, Adolescents, and Adults[†]

Age group (years)	Single-Antigen Vaccines				Combination Vaccines					
	Recombivax-HB		Engerix-B		Heplisav-B [^]		Pediatrix [*]		Twinrix [†]	
	Dose (µg)	Vol (mL)	Dose (µg)	Vol (mL)	Dose (µg)	Vol (mL)	Dose (µg)	Vol (mL)	Dose (µg)	Volume (mL)
Standard Dosing										
Birth through 10	5	0.5	10	0.5	N/A	N/A	10 [*]	0.5	N/A	N/A
11 through 15	10 [§]	1.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11 through 19	5	0.5	10	0.5	N/A	N/A	N/A	N/A	N/A	N/A
≥20	10	1.0	20	1.0	20	0.5	N/A	N/A	20 [†]	1.0
Dosing in Hemodialysis Patients and Other Immunocompromised Persons										
<20	5	0.5	10	0.5	N/A	N/A	N/A	N/A	N/A	N/A
≥20	40 [#]	1.0 [#]	40	2.0	N/A	N/A	N/A	N/A	N/A	N/A

[†]**Note:** this table is modified from original to include information on Heplisav-B

Abbreviation: N/A = not applicable (not approved for use).

[^] Heplisav-B is approved for use in persons aged ≥18; each dose also includes 3,000 µg of CpG 1018 adjuvant

^{*} Pediatrix is approved for use in persons aged 6 weeks through 6 years (prior to the 7th birthday).

[†] Twinrix is approved for use in persons aged ≥18 years.

[§] The adult formulation approved for ages 11 through 15 and is administered on a 2-dose schedule.

[#] The Recombivax-HB Dialysis Formulation has 40 µg of HBsAg per 1 mL

Single-Antigen Vaccines

- **Engerix-B:** This single-antigen hepatitis B vaccine contains yeast-derived (recombinant) HBsAg combined with an aluminum adjuvant. It is FDA-approved for use in individuals of all ages.
- **Heplisav-B:** This single-antigen hepatitis B recombinant vaccine consists of recombinant HBsAg combined with the synthetic immunostimulatory cytidine-phosphate-guanosine (CpG) oligodeoxynucleotide 1018 adjuvant; the CpG adjuvant binds to Toll-like receptor 9, signaling an innate immune system pathway in response to the HBsAg antigen. This vaccine is FDA-approved as a 2-dose series for use in persons 18 years of age and older.
- **Recombivax-HB:** This single-antigen hepatitis B vaccine contains recombinant HBsAg that is also produced in yeast cells and is combined with an aluminum adjuvant; this vaccine is FDA-approved for use in individuals of all ages.

Combination Vaccines

- **Twinrix:** This bivalent vaccine contains inactivated hepatitis A virus and recombinant HBsAg. Each 1 mL dose contains a lower quantity (720 ELISA units) of hepatitis A vaccine than the standard 1 mL single-antigen hepatitis A vaccine (1440 ELISA units). This vaccine is FDA-approved for use only in persons 18 years of age and older.
- **Pediatrix:** This combination vaccine contains diphtheria toxoid, tetanus toxoid, acellular pertussis antigens, recombinant HBsAg, and inactivated poliovirus. Pediatrix is FDA-approved as a 3-dose series in infants born to HBsAg-negative mothers; this vaccine may be given as early as 6 weeks of age and through 6 years of age (prior to the seventh birthday). It is not approved for children younger than 6 weeks of life and thus should not be given for the birth-dose vaccination.
- **Vaxelis:** This combination vaccine contains diphtheria toxoid, tetanus toxoid, acellular pertussis antigens, inactivated poliovirus, recombinant HBsAg, and *Haemophilus influenzae* type b. Vaxelis is FDA-approved as a 3-dose series in children 6 weeks through 4 years of age (prior to the fifth birthday). Although this vaccine is FDA-approved, it is not widely available. Accordingly, it will not be discussed further.

Vaccination Schedule, by Month

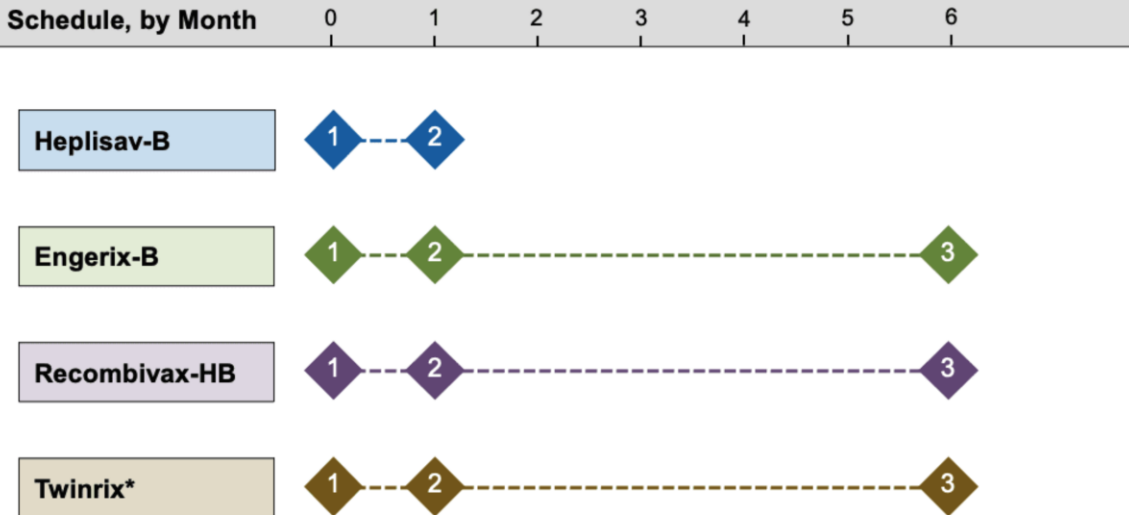


Figure 5. Recommended Hepatitis B Vaccine Schedule in Adults

^{*}Before a potential exposure, such as travel, Twinrix can be administered as an accelerated series at days 1, 7, 21-30, followed by a fourth dose at 12 months.

Modified from: Schillie S, Vellozzi C, Reingold A, et al. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2018;67:1-31.

Vaccine efficacy

Figure 9. Serologic Response to Hepelisav-B Vaccine

9A 9B

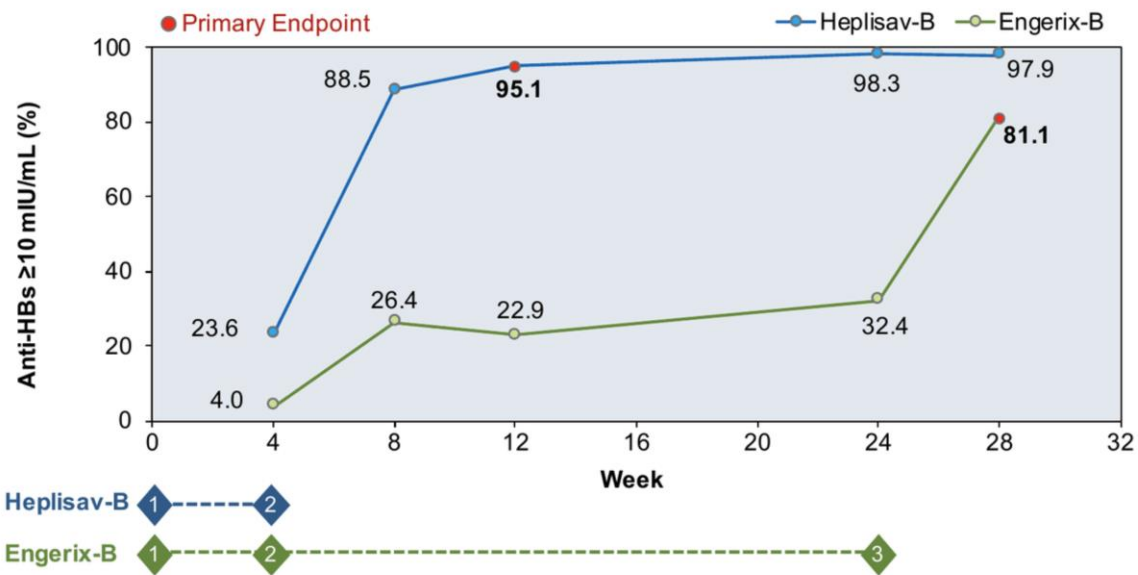


Figure 9A. Hepelisav-B Vaccine versus Engerix-B Vaccine in Healthy Adults 18-55 Years of Age

In this trial, the primary endpoint was the percentage of persons who achieved seroprotection 8 weeks after the final dose of the Hepelisav-B vaccine series or 4 weeks after completing the Engerix-B vaccine series. Seroprotection was defined as an anti-HBs titer of at least 10 mIU/mL.

Source: Halperin SA, Ward B, Cooper C, et al. Comparison of safety and immunogenicity of two doses of investigational hepatitis B virus surface antigen co-administered with an immunostimulatory phosphorothioate oligodeoxyribonucleotide and three doses of a licensed hepatitis B vaccine in healthy adults 18-55 years of age. *Vaccine*. 2012;30:2556-63.

Table 4.

Conditions Associated with Decreased Response to HBV Vaccine

- Age older than 40 years
- Alcohol use disorder
- Male sex
- Chronic kidney disease
- Obesity
- HIV infection
- Diabetes mellitus
- Celiac disease
- Tobacco smoking
- Other immune compromising conditions
- Chronic hepatitis C infection

Table 1.
Indications for Hepatitis B Vaccination

Groups with Indication for Hepatitis B Vaccination

**Indicated for all,
ages 0-59**

All infants

Unvaccinated Children Younger than 19 Years of Age

Adults 19 to 59 Years of Age

Adults 60 Years of Age and Older with Risk Factors for Hepatitis B

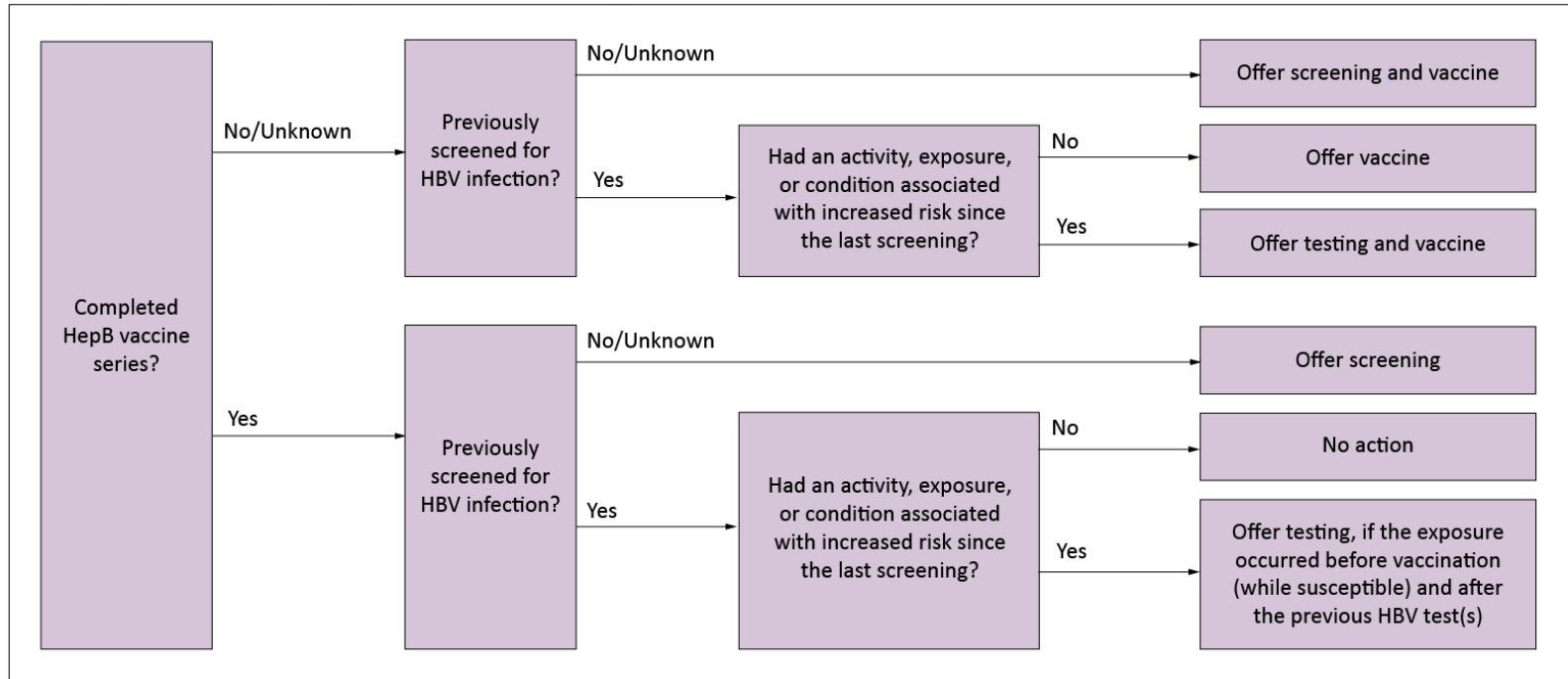
- Persons at Risk for HBV Infection by Sexual Exposure
 - Sex partners of HBsAg-positive persons
 - Sexually active persons who are not in a long-term, mutually monogamous relationship (e.g. persons with more than one sex partner during the previous 6 months)
 - Persons seeking evaluation or treatment for a sexually transmitted infection
 - Men who have sex with men
- Persons at Risk for Infection by Percutaneous Exposure
 - Persons who currently or recently injected drugs
 - Household contacts of HBsAg-positive persons
 - Residents and staff of facilities for persons with developmental disabilities
 - Health care and public safety personnel with reasonably anticipated risk of exposure to blood or blood-contaminated body fluids
 - Persons receiving hemodialysis, peritoneal dialysis, or home dialysis, and persons who are predialysis
 - Persons with diabetes who are 19–59 years of age
 - Persons with diabetes 60 years of age and older at the discretion of the treating clinician
- Others at Increased Risk of Acquiring HBV Infection
 - International travelers to countries with low-intermediate to high levels of endemic HBV infection (HBsAg prevalence of 2% or greater)
 - Persons with hepatitis C virus infection
 - Persons with chronic liver disease (including, but not limited to, persons with cirrhosis, fatty liver disease, alcohol-related liver disease, autoimmune hepatitis, and an ALT or AST level greater than twice the upper limit of normal)
 - Persons with HIV infection
 - Persons who are incarcerated

**Indicated for those
≥ 60 with risk, or
anyone who
wishes vaccination**

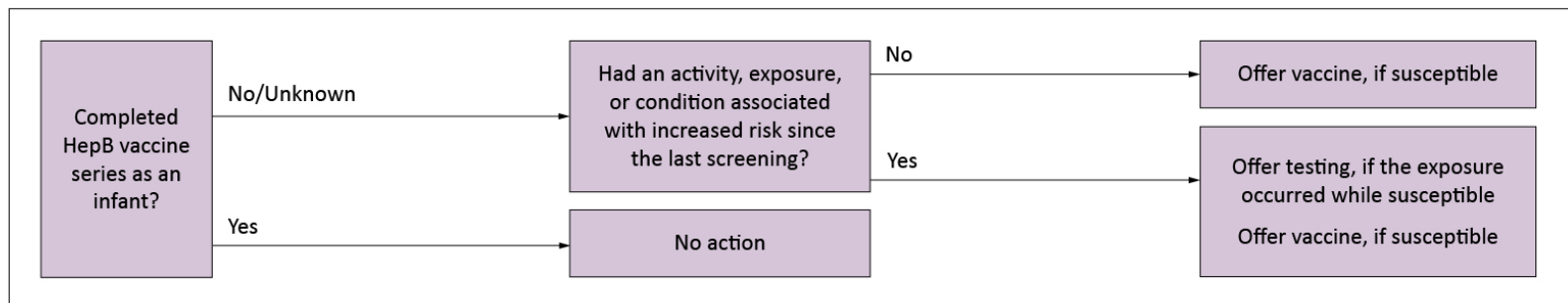
Adults 60 years of age and older without known risk factors may receive hepatitis B immunization.

HBV screening workflow

A. Nonpregnant adults aged ≥ 18 years without a known history of HBV infection



B. Children and adolescents aged 1-17 years without a known history of HBV infection



What to do about an isolated anti-HBc+

Hepatitis B Virus (HBV) Serology Interpretation and Management

HbsAg	Anti-HBc (Total or IgG)	Anti-HBs	Interpretation	Management
+	+	-/+	Current infection	<ul style="list-style-type: none"> > See Evaluation, Counseling, Management, Treatment, and HCC Surveillance (pages 5, 6, 7, 8) > Refer household and sexual contacts for HBV screening; if susceptible, vaccinate
-	+	+	History of infection with immune control	<ul style="list-style-type: none"> > No transmission risk; HBV dormant in liver > Reactivation risk if on select immunosuppressive medications¹
-	+	-	History of infection or occult infection ²	<ul style="list-style-type: none"> > If immunocompromised, check HBV DNA for occult infection² > If immunocompetent, counsel as history of infection above > Reactivation risk if on select immunosuppressive medications¹
-	-	+	Immune from prior vaccination	Protected. No need for booster vaccine
-	-	-	Susceptible	VACCINATE ^{3,4}

- In high-prevalence populations, isolated anti-HBc+ likely indicates prior infection with loss of anti-HBs

- PWIDs:
 - 3.5%-20% with chronic HBV
 - 22% with evidence of past infection
- Household contacts of someone with HBV
 - 16% with chronic HBV
 - 45% evidence of past infection

Do you vaccinate people with isolated anti-HBc+?

- Approach to vaccination in this group requires further study
 - CDC: vaccination of individuals with prior exposure holds no benefit, but causes no harm
 - More recently, hepatology experts have discussed potential benefit for certain individuals, including stratification based on risk of reactivation
- Special populations
 - HIV+
 - Most patients with HIV infection with isolated anti-HBc are HBV DNA-negative and not immune to HBV infection,³⁶ therefore, routinely checking HBV DNA is not recommended. However, such patients should be vaccinated with one standard dose of HBV vaccine and anti-HBs titers should be checked 1 to 2 months after vaccination. If the anti-HBs titer is >100 mIU/mL, no further vaccination is needed, but if the titer is <100 mIU/mL, a complete series of HBV vaccine should be completed followed by anti-HBs testing (**BII**).⁵⁵

HBV Pearls

- Hepatitis B is a **preventable virus that can cause cancer** and liver disease, contributing to significant morbidity and mortality
- As of 2023, it is recommended that all adults be screened for HBV once in their lifetime with all three titers (HBsAg, anti-HBc, anti-HBs)
- Vaccination is indicated for all 0-59, as well as anyone 60 or older, with risk factors, or who desires vaccination
 - The 2-dose CpG vaccine demonstrates superior efficacy in adults
 - Prescreening does not need to preclude vaccination, especially for hard-to-reach individuals
 - Give the first dose and check screening labs concurrently
 - If labs are not feasible, still vaccinate

Thank you!

- Questions?
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