SUPPLEMENTARY APPENDIX 1. Background on hepatitis B virus, including virus description, transmission, clinical features, natural history, and vaccination seroprotection and coverage

Virus Description and Transmission

Hepatitis B virus (HBV) is a partially double-stranded DNA virus in the *Hepadnaviridae* family. HBV DNA is enclosed in a nucleocapsid protein, called the hepatitis B core antigen (HBcAg), which is further surrounded by surface antigen (HBsAg) envelope protein (*1,2*). HBV replicates by reverse transcription of an RNA intermediate (*3*). During viral replication, a circulating protein, hepatitis B e antigen (HBeAg), can also be produced (*2*). The liver is the primary site of HBV replication, and the virus can integrate into the host hepatocyte genome and lead to oncogenic mutations (*4*). HBV can evade clearance by the immune system and form covalently closed circular DNA, which can persist in the nuclei of host hepatocytes (*1,5*). There are 10 HBV genotypes (A through J), which are associated with different geographic areas, disease severity, and responses to antiviral therapy (*6*).

While persons who test positive for HBsAg, HBV DNA, or both are considered infectious, the level of infectiousness is positively correlated with viral load. Outside the liver HBV is concentrated most highly in blood, but semen and vaginal secretions are also considered infectious (*7,8*). Although HBV has been detected in other body fluids, including urine, saliva, tears, cerebrospinal fluid, and feces, lower concentration of virus or lower epidemiologic plausibility make them less likely vehicles of transmission (*9,10*). HBV has also been found in breast milk, but breastfeeding by persons with HBV infection does not appear to increase risk for infection among infants who received recommended immunoprophylaxis (*11*). Therefore, HBV infection is not a contraindication to breastfeeding (*12*).

HBV is transmitted by direct contact through percutaneous, mucosal, or nonintact skin exposure to infectious blood or body fluids. Transmission can occur from a person infected with HBV during pregnancy or delivery; during sex; by sharing or exposure to contaminated needles, syringes, drug preparation equipment, or items that can break the skin or mucous membranes, potentially resulting in exposure to blood (e.g., razors, toothbrushes, glucose monitoring equipment); through contact with blood from or open sores; and through poor infection control practices in health care settings (e.g., dialysis units, diabetes clinics). HBV is not spread by kissing, hugging, coughing, ingesting food or water, sharing eating utensils or drinking glasses, or casual touching (*8,9,13*).

Outside the body, HBV can survive and remain infectious in the environment for at least 7 days and is still transmissible (*14–16*).

Clinical Features and Natural History

The incubation period from exposure to a positive HBsAg test has been shown to be as short as 6 days (*17*). Serial serum specimens from four patients prospectively followed showed abnormal serum ALT levels occurred on average 2 months after exposure, with a range of 41–77 days (*17*).

Infants, children aged <5 years, and immunosuppressed adults with acute HBV infection are typically asymptomatic, and persons aged <30 years are less likely to be symptomatic compared with persons aged ≥30 years (*18*). Signs and symptoms of acute hepatitis B are like those of other types of acute viral hepatitis and can include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, clay-colored stool, joint pain, and jaundice. Fulminant hepatitis occurs in approximately 1% of persons who are acutely infected and develop jaundice and might result in liver failure necessitating liver transplantation or death (*19,20*).

Risk for progression to chronic infection is inversely related to age at time of infection; approximately 90% of neonates develop chronic infection compared with less than 5% of immunocompetent adults (*18,21–23*). However, adults who are immunosuppressed are at higher risk for developing chronic infection (*21*). Approximately 0.5%–2% of chronic infections spontaneously resolve per year of infection without treatment (marked by loss of HBsAg), although not at a steady rate over time (*24–26*).

The American Association for the Study of Liver Diseases (AASLD) categorizes chronic HBV infection into four phases: immune tolerant, immune active, immune inactive, and reactivation (*27*). Phases are based on test results, primarily HBeAg and HBV DNA levels, as well as liver enzymes (transaminases), and are characterized by varying levels of liver inflammation and fibrosis. Disease progression is often dynamic, rather than a linear progression in severity. Symptoms during the chronic infection period are not an accurate predictor of disease severity; patients with chronic HBV infection might be asymptomatic until they present with severe or progressive liver injury (*28*).

Patients with chronic HBV infection are at increased risk for cirrhosis and liver cancer and are 70%–85% more likely to die prematurely than the general population (*29–32*). Therefore, routine monitoring of patients with HBV infection is necessary to identify those at higher risk for progression to hepatocellular carcinoma (HCC), cirrhosis, or liver failure (*27,33*).

Reactivation, the rapid increase or reappearance of HBV activity,* is associated with use of anti-rejection therapy for solid organ or bone marrow transplant, immunosuppressive therapy (e.g., B-cell depleting agents, chemotherapy), and direct-acting antiviral (DAA) therapy for treatment of hepatitis C in persons with a history of HBV infection (*27,34–36*). Reactivation is more likely to occur among persons who are HBsAg positive or HBV DNA positive but can also occur in persons with a history of HBV infection (anti-HBc positive) who are HBsAg negative. If the person becomes symptomatic, the clinical presentation of reactivation can range from mild disease to severe hepatitis resulting in death.

Hepatitis D virus (HDV) is a satellite virus that only infects persons who are also infected with HBV. Coinfection with HDV can impact the clinical course and management of HBV infection and can lead to more rapid progression of HBV infection and severe disease (*37*). Hepatitis D prevalence is highest among persons from Mongolia, the Republic of Moldova, and regions in Western and Central Africa, and among persons who inject drugs, sex workers, and men who have sex with men (*38*). Lack of systematic surveillance makes it difficult to estimate the true prevalence of hepatitis D in the United States. No U.S. Food and Drug Administration (FDA)-approved treatment is currently available in the United States for HDV infection.

Hepatitis B Vaccination Seroprotection and Coverage

Vaccination is highly effective in preventing the transmission of HBV infection (*39*). The 2-dose HepB vaccine series, prepared with a novel adjuvant, produces a protective antibody response in 90%–100% of adults, and the 3-dose series produces a response in 70%–90% of adults (*40*). Among healthy infants receiving the 3-dose HepB vaccine series, approximately 95% are protected (*40,41*).

HepB vaccination has been recommended by the Advisory Committee on Immunization Practices (ACIP) for all U.S. infants since 1991 and all children aged 0–18 years since 1999. The HepB birth dose was recommended by ACIP in 2005 and, along with vaccine series completion, is critical to protecting infants from perinatal transmission. HepB vaccination (≥3 doses) coverage by age 24 months among children born during 2017–2018 was 91.9% (*42*). Coverage with ≥3 doses of HepB vaccine among children aged 13–17 years (born during 2002–2008) was 92.6% (*43*).

HepB vaccination has been recommended by ACIP for groups at increased risk since 1982; adults with diabetes were added as a risk group in 2011. Vaccine coverage (≥3 doses) is lower among adults than adolescents and children (30% among adults aged ≥19 years, 40.3% for adults aged 19–49 years, and 19.1% for adults aged ≥50 years in 2018) (*44*). Coverage data are not available for the 2-dose HepB vaccine recommended by ACIP in 2018. In 2022, ACIP recommended universal HepB vaccination for everyone through age 59 years, regardless of risk, to increase vaccination coverage among all adults, including those at highest risk (*45*).

* HBV reactivation is the loss of HBV immune control in anti-HBc-positive patients (regardless of HBsAg status) receiving immunosuppressive therapy for a concomitant medical condition; an increase in HBV DNA compared with baseline (or an absolute level of HBV DNA when a baseline is unavailable); and reverse seroconversion (seroreversion) from HBsAg negative to HBsAg positive for HBsAg-negative, anti-HBc-positive patients (*27).*

References

1. Gish RG, Given BD, Lai CL, et al. Chronic hepatitis B: virology, natural history, current management and a glimpse at future opportunities. Antiviral Res. 2015;121:47–58.

2. Ganem D, Prince AM. Hepatitis B virus infection--natural history and clinical consequences. N Engl J Med. 2004;350:1118–29.
3. Seeger C, Ganem D, Varmus HE. Biochemical and genetic evidence for the hepatitis B virus replication strategy. Science. 1986;232:477–84.
4. Peneau C, Imbeaud S, La Bella T, et al. Hepatitis B virus integrations promote local and distant oncogenic driver alterations in hepatocellular carcinoma. Gut. 2022;71:616–26.
5. Kuipery A, Gehring AJ, Isogawa M. Mechanisms of HBV immune evasion. Antiviral Res. 2020;179:104816.
6. Kramvis A. Genotypes and genetic variability of hepatitis B virus. Intervirology. 2014;57:141–50.
7. Inaba N, Ohkawa R, Matsuura A, Kudoh J, Takamizawa H. Sexual transmission of hepatitis B surface antigen. Infection of husbands by HBsAg carrier-state wives. Br J Vener Dis. 1979;55:366–8.
8. Scott RM, Snitbhan R, Bancroft WH, Alter HJ, Tingpalapong M. Experimental transmission of hepatitis B virus by semen and saliva. J Infect Dis. 1980;142:67–71.
9. Zimmerman FH, Wormser GP. Exposure to hepatitis B: review of current concepts. Bull N Y Acad Med. 1989;65:741–56.
10. Komatsu H, Inui A, Fujisawa TJE. The role of body fluids in the horizontal transmission of hepatitis B virus via household/close contact. Eur Med J Heptol. 2016;1:68–75.
11. Shi Z, Yang Y, Wang H, et al. Breastfeeding of newborns by mothers carrying hepatitis B virus: a meta-analysis and systematic review. Arch Pediatr Adolesc Med. 2011;165:837–46.
12. 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.
13. Cancio-Bello TP, De Medina M, Shorey J, Valledor MD, Schiff ER. An institutional outbreak of hepatitis B related to a human biting carrier. J Infect Dis. 1982;146:652–6.
14. Bond WW, Favero MS, Petersen NJ, Gravelle CR, Ebert JW, Maynard JE. Survival of hepatitis B virus after drying and storage for one week. The Lancet. 1981;1:550–1.
15. Lauer JL, VanDrunen NA, Washburn JW, Balfour HH, Jr. Transmission of hepatitis B virus in clinical laboratory areas. J Infect Dis. 1979;140:513–6.
16. Francis DP, Favero MS, Maynard JE. Transmission of hepatitis B virus. Semin Liver Dis. 1981;1:27–32.
17. Krugman S, Overby LR, Mushahwar IK, Ling CM, Frosner GG, Deinhardt F. Viral hepatitis, type B. Studies on natural history and prevention re-examined. N Engl J Med. 1979;300:101–6.
18. McMahon BJ, Alward WL, Hall DB, et al. Acute hepatitis B virus infection: relation of age to the clinical expression of disease and subsequent development of the carrier state. J Infect Dis. 1985;151:599–603.
19. Liang TJ. Hepatitis B: the virus and disease. Hepatology. 2009;49:S13–21.
20. Berk P, Popper H. Fulminant hepatic failure. Am J Gastroenterol. 1978;69:349–400.
21. Hyams KC. Risks of chronicity following acute hepatitis B virus infection: a review. Clin Infect Dis. 1995;20:992–1000.
22. Beasley RP, Hwang LY, Lee GC, et al. Prevention of perinatally transmitted hepatitis B virus infections with hepatitis B immune globulin and hepatitis B vaccine. The Lancet. 1983;2:1099–102.

23. Coursaget P, Yvonnet B, Chotard J, et al. Age- and sex-related study of hepatitis B virus chronic carrier state in infants from an endemic area (Senegal). J Med Virol. 1987;22:1–5.
24. Liaw YF, Sheen IS, Chen TJ, Chu CM, Pao CC. Incidence, determinants and significance of delayed clearance of serum HBsAg in chronic hepatitis B virus infection: a prospective study. Hepatology. 1991;13:627–31.
25. Chu CM, Liaw YF. HBsAg seroclearance in asymptomatic carriers of high endemic areas: appreciably high rates during a long-term follow-up. Hepatology. 2007;45:1187–92.
26. McMahon BJ, Holck P, Bulkow L, Snowball M. Serologic and clinical outcomes of 1536 Alaska Natives chronically infected with hepatitis B virus. Ann Intern Med. 2001;135:759–68.
27. Terrault NA, Lok ASF, McMahon BJ, et al. Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance. Hepatology. 2018;67:1560–99.
28. Hoofnagle JH, Shafritz DA, Popper H. Chronic type B hepatitis and the "healthy" HBsAg carrier state. Hepatology. 1987;7:758–63.
29. Bixler D, Zhong Y, Ly KN, et al. Mortality among patients with chronic hepatitis B infection: the Chronic Hepatitis Cohort Study (CHeCS). Clin Infect Dis. 2019;68:956–63.
30. Montuclard C, Hamza S, Rollot F, et al. Causes of death in people with chronic HBV infection: a population-based cohort study. J Hepatol. 2015;62:1265–71.
31. Beasley RP, Hwang LY, Lin CC, Chien CS. Hepatocellular carcinoma and hepatitis B virus. A prospective study of 22,707 men in Taiwan. The Lancet. 1981;2:1129–33.
32. McMahon BJ, Alberts SR, Wainwright RB, Bulkow L, Lanier AP. Hepatitis B-related sequelae. Prospective study in 1400 hepatitis B surface antigen-positive Alaska native carriers. Arch Intern Med. 1990;150:1051–4.
33. Fattovich G, Bortolotti F, Donato F. Natural history of chronic hepatitis B: special emphasis on disease progression and prognostic factors. J Hepatol. 2008;48:335–52.
34. Mücke MM, Backus LI, Mücke VT, et al. Hepatitis B virus reactivation during direct-acting antiviral therapy for hepatitis C: a systematic review and meta-analysis. Lancet Gastroenterol Hepatol. 2018;3:172–80.
35. Hoofnagle JH. Reactivation of hepatitis B. Hepatology. 2009;49:S156–65.
36. Loomba R, Liang TJ. Hepatitis B reactivation associated with immune suppressive and biological modifier therapies: current concepts, management strategies, and future directions. Gastroenterology. 2017;152:1297–309.
37. Sureau C, Negro F. The hepatitis delta virus: replication and pathogenesis. J Hepatol. 2016;64:S102–S16.
38. Stockdale AJ, Kreuels B, Henrion MYR, et al. The global prevalence of hepatitis D virus infection: systematic review and meta-analysis. J Hepatol. 2020;73:523–32.
39. Weng M. Universal hepatitis B vaccination in adults aged 19–59 years: updated recommendations of the Advisory Committee on Immunization Practices — United States, 2022. MMWR Morb Mortal Wkly Rep. 2022;71:477–83.
40. Schillie S, Harris A, Link-Gelles R, Romero J, Ward J, Nelson N. Recommendations of the Advisory Committee on Immunization Practices for use of a hepatitis B vaccine with a novel adjuvant. MMWR Morb Mortal Wkly Rep. 2018;67:455–8.
41. Schillie SF, Murphy TV. Seroprotection after recombinant hepatitis B vaccination among newborn infants: a review. Vaccine. 2013;31:2506–16.

42. Hill HA. Vaccination coverage by age 24 months among children born in 2017 and 2018 —National Immunization Survey-Child, United States, 2018–2020. MMWR Morb Mortal Wkly Rep. 2021;70.
43. Pingali C, Yankey D, Elam-Evans LD, et al. National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years—United States, 2020. MMWR Morb Mortal Wkly Rep. 2021;70:1183.
44. Lu P-J, Hung M-C, Srivastav A, et al. Surveillance of vaccination coverage among adult populations—United States, 2018. MMWR CDC Surveill Summ. 2021;70:1.
45. Wang S, Cohen C, Tang AS, Graham CS. Hepatitis B virus elimination in the U.S.: time to dismantle barriers and implement solutions. Curr Hepatol Rep. 2021;34–42.

SUPPLEMENTARY APPENDIX 2. Guideline development staff and conflicts of interest

The role of the Steering Committee was to oversee recommendation development, review, and approval of recommendations. The role of the Work Group was to plan, search for, select, review, summarize, and report on the evidence. Members of either group who substantially contributed to the writing of the guidelines were included as authors.

All internal CDC staff and external peer reviewers involved in developing or reviewing the guidelines submitted a written financial disclosure statement reporting any perceived or actual conflicts of interest in relation to any components of the guidelines. The Steering Committee reviewed submissions and disqualified any participants with a conflict of interest. No CDC staff or external peer reviewers were deemed to have a conflict of interest.

Steering Committee
Noele Nelson, PhD, MD (lead); Amy Sandul, DHSc; Erin E. Conners, PhD; Karina Rapposelli, MPH; Carolyn Wester, MD

Work Group
Erin E. Conners, PhD (lead); Noele Nelson, PhD MD; Jessica Rogers-Brown, PhD; Liesl Hagan, MPH; Megan Hofmeister, MD; Philip Spradling, MD; Aaron Harris, MD; Lakshmi Panagiotakopoulos, MD

External Peer Reviewers

- **Elisa Choi, MD, FACP, FIDSA**, Harvard Vanguard Medical Associates Somerville and American College of Physicians, Sommerville, Massachusetts
- **Carla Coffin, MD, MSc, FRCPC**, Calvin, Phoebe and Joan Snyder Institute for Chronic Diseases, Cumming School of Medicine, University of Calgary and Calgary Liver Unit, Calgary Division of Gastroenterology and Hepatology, Alberta Health Services Calgary, Alberta, Canada
- **Kristen Marks, MD,** Division of Infectious Disease, Weill Cornell Medical College, New York, New York
- **David L. Thomas, MD, MPH** Johns Hopkins School of Medicine and Bloomberg School of Public Health, Baltimore, Maryland
- **Su H. Wang, MD, MPH** Cooperman Barnabas Medical Center, Livingston, New Jersey, and RWJ Barnabas-Rutgers Medical Group, West Orange, New Jersey

SUPPLEMENTARY APPENDIX 3. Peer review comments and responses

Responses from peer reviewer survey

Five peer reviewers were provided a full draft of the CDC guidelines and were asked to:

- evaluate the clarity of the recommendations and the likelihood that these implemented recommendations will reduce the burden of hepatitis B in the United States;
- evaluate the appropriateness of the methods used to develop these recommendations and the links between the recommendation language with the strength of the evidence of the effectiveness and economic value;
- point out any omissions from the body of evidence collected from the scientific literature;
- identify any residual biases, errors of omission, or inconsistencies in the interpretations, findings, and conclusions;
- assess the reasonableness of expert judgements made in the absence of empirical scientific evidence;
- ensure that scientific uncertainties are clearly identified and characterized, and that potential implications of any uncertainties for the proposed recommendations are clear; and
- assess whether the authors sufficiently acknowledge limitations in the evidence used to develop the recommendations and any limitations of the recommendations themselves for the intended purpose of screening U.S. adults for HBV infection.

CDC also invited other comments, including improving recommendation implementation or uptake and other suggestions about the use of terminology.

CDC reviewed all peer reviewer comments in their entirety. Presented below is a summary of substantive peer reviewer comments, grouped by guideline section. Individual comments are not attributed to specific reviewers, but all peer reviewers are listed in the main document in acknowledgement of their contributions. Minor editorial suggestions made by peer reviewers are not reflected and some comments have been edited for clarity (e.g., to correct typos, remove extraneous commentary).

Methodology

- One reviewer did not believe the report included all relevant studies and suggested an additional article. (*See comments below*)
- One reviewer did not agree with how some of the included studies and overall evidence have been interpreted. (*See comments below*)
- Three reviewers offered suggestions regarding how the findings of the report could be made clearer. (*See comments below*)
- Two reviewers offered revisions to the scientific uncertainties and limitations. (*See comments below*)

Recommendations

- Four reviewers believed CDC came to the right conclusions based on the evidence presented.

- One reviewer believed CDC came to the right conclusions in some ways but not in others. (*See comments below*)

What could be done to make the recommendations clearer?

- Three reviewers made suggestions regarding how the recommendations statement could be made clearer. (*See comments below*)

Potential impact and implementation

- All five reviewers agreed that if implemented as written, they believed these recommendations would result in a reduction of the burden of hepatitis B in the United States.

CDC responded to reviewer comments after all peer reviewer comments were reviewed and feedback from CDC clearance reviewers on the revision was received.

Specific comments, by section of the recommendation

Introduction

- [Reviewers 1 and 2] made suggestions to expand transmission mechanisms and infection routes and emphasize that the main transmission route leading to chronic infection is vertical or horizonal transmission in infancy.
  - The list of transmission routes was reordered, and additional language was added regarding the risk of infection during infancy. A full list of transmission routes is listed in the *Virus Description and Transmission* section.
- [Reviewer 2] "Would cite WHO GHSS as reference for viral hepatitis elimination goals https://www.who.int/publications/i/item/WHO-HIV-2016.06"
  - An updated citation was added.

Hepatitis B Screening and Testing Recommendations

- [Reviewer 1] disagreed with the use of the universal triple panel as the "vast majority of people with resolved HBV infection and natural immunity are not at risk for HBV reactivation. This is only in exceptional circumstances (i.e., potent immunosuppression). This test is most useful in that context." They believed that identifying persons who are anti-HBc positive might have unintended consequences, including impact on health insurance coverage, being mislabeled as having active infection, stigma, and confusion with anti-HCV positive tests.
  - In consideration of the potential consequences, the Work Group concluded the benefits of using the triple panel outweigh the harms. As with any change in practice, provider education will be needed; this is outside the scope of the current guidelines, but it should not limit the recommendation of best practices for public health. Additional language to support this decision was added:
    - Additional possible harms were added to the section on harms of HBV screening.
    - A call to action for laboratories to provide a triple panel summary result to aid providers in correctly interpreting results was added to *Future Directions*.
    - Results of a new cost-effectiveness analysis were added; the analysis demonstrated the triple panel test can be cost saving by avoiding unnecessary vaccine doses.
    - Additional information on the anti-HBc assay test performance was included.

- [Reviewer 3] requested clarification regarding what is meant by screening versus testing.
    - The definitions were added.
- [Reviewer 3] inquired whether the language regarding screening pregnant adults with the triple panel during pregnancy was "add[ing] to the burden on pregnant women without improving health." "I can also see an argument for operational simplicity for just HBsAg testing during pregnancy since the principal goal is [mother to infant] transmission prevention, not general care of the woman, whose complete testing would be done under the above rec."
    - Because the results of the anti-HBc and anti-HBs tests are not directly informative to the prenatal visit, the language regarding triple panel screening during pregnancy has been moved to the *Clinical Considerations* section.
- [Reviewer 3] posed the suggestion, "What if the universal screen were the 3-test panel and the risk-based rec was for HBsAg?" and the edit, "In addition to universal screening, additional testing is indicated for persons who are initially anti-HBs negative, remained unvaccinated, and had risk beyond the initial screening."
    - The following language was added to the *Clinical Considerations* section to clarify: "For periodic testing, consider using the triple panel test or the American Association for the Study of Liver Diseases' (AASLD) testing strategies (e.g., anti-HBc followed by HBsAg and anti-HBs, if positive)."
    - The guidelines do not rely on the absence of anti-HBs as an indicator of susceptibility because anti-HBs can wane years after vaccination while persistence of immune memory to HBsAg remains, thus providing the person with protection from disease.
    - The one-time triple panel screen applies to adults aged ≥18 years, whereas the risk-based recommendations are for persons of any age.
- [Reviewer 1] felt screening of HBsAg during each pregnancy was "not cost effective if clearly documented records of HBsAg negative and immunity" exist and did not agree with screening in each pregnancy.
    - The recommendation to screen for HBsAg during each pregnancy was set by past screening guidelines and the Advisory Committee on Immunization Practices (ACIP). This practice is already widely implemented in the United States and is an important safety net for perinatal hepatitis B prevention.
- [Reviewer 4] "The risk-based testing recommendations feel unnecessarily complicated because of the inclusion of the timing of the risk and the susceptibility status into the text of the recommendation. Would consider running this by a focus group of providers to see if they can easily follow what is meant. It might be more straightforward to state who should be screened with a footnote of who would be exempt. E.g., Change recommendation to: Testing for all susceptible[*] individuals with a history of increased risk[#] for hepatitis B virus (HBV) infection (Box 2), regardless of age. (With footnote defining [*]susceptibility and another stating something like [#]those with no new risk activity since last testing do not require additional testing.) I prefer this since it seems self-evident that if the risk occurred before the testing or [*after*] vaccine that you would not continue testing the person. But if in doubt the footnote would confirm it."
    - The *Screening and Testing Recommendations* section was reorganized to simplify the information. Much of the detailed information has been moved to footnotes or sub-bullets.

    - Conducting a focus group is not part of the methodology of these guidelines. In the future, CDC hopes to conduct focus groups with providers to develop additional tools (e.g., factsheets, algorithms, toolkits, handouts) that clearly communicate the guidelines. It is expected that these tools will have even more simplified language.
- [Reviewer 2] suggested adding universal vaccine recommendation for persons who are susceptible.
    - Additional language on vaccination was added.
- [Reviewer 2] had multiple comments regarding the risk-based testing susceptibility language. "The majority of people will have no idea if they were 'susceptible' [during a period of increased risk] unless they had been screened and they happened to know their test results." The reviewer suggested changing the wording to "were or might have been susceptible" and adding a footnote that susceptible means anti-HBc negative. [Reviewer 2] also suggested changing the definition of susceptible persons to those "never exposed" rather than "never infected." Finally, they stated, "did not receive a U.S. license hepatitis vaccine series [would] be confusing for people to know—do they just assume if they did it in the US that it was US licensed. And is there a chance that someone outside the US had something US licensed?"
    - The language was changed to "might have been susceptible."
    - Anti-HBc negative was added to the footnote. The classification of "susceptible" is based on vaccination records, along with no evidence of HBV infection during past tests. Use of "exposure" would be too broad.
    - The language regarding U.S.-licensed vaccine was removed, and a footnote was added regarding who is considered susceptible.
- Reviewers suggested adding other persons at increased risk, including veterans with combat exposure before the era of universal vaccination [Reviewer 1]; persons employed in high-risk settings and persons in high-risk occupations before broad or universal vaccination was implemented (e.g., laboratory, health care) [Reviewer 1]; groups who are going to be immunocompromised [because they are initiating immunosuppressive therapy] [Reviewer 3].
    - Veterans and persons in high-risk occupations in the era before universal childhood vaccination would be screened as part of the universal recommendation. Since these exposures were in the past and are not ongoing risks, these persons would not need periodic testing.
    - Recommendations for immunocompromised individuals are covered in other professional guidelines. In addition, Boxed Warnings on immunosuppressive therapy indicate risk for immunosuppression and increased susceptibility to infection, specifically reactivation of HBV infection. Immunosuppression is mentioned in the last paragraph of this section; however, the paragraph was moved up and expanded to: "The current recommendation to include a total anti-HBc test during universal adult screening will support identification of individuals with past HBV infection who should be aware of their risk for reactivation in the context of immunosuppression."
- [Reviewer 2] advocated for changing "Anyone who requests hepatitis B testing may receive it" to a stronger "should receive it."
    - The language was changed to align with CDC HCV screening recommendations.
- There were three reviewer comments regarding the justification for screening, including to add management of chronic infection to prevent transmission to others [Reviewer 3];

separate vaccination and reactivation because they are two different groups of people [Reviewer 2]; and add prevention of perinatal transmission [Reviewer 4].
    - All three changes were incorporated.
- [Reviewer 2] recommended adding language regarding screening of immunosuppressed individuals because these guidelines reach a broader non-specialty provider audience, which might not be aware of AASLD and American Society of Clinical Oncology (ASCO) guidelines for screening persons prior to immunosuppressive therapy.
    - The discussion of screening immunosuppressed individuals was expanded and the ASCO provisional clinical update was added as a reference.
- [Reviewer 4] suggested removing "not vaccinated as infants" from "Persons born in the United States not vaccinated as infants whose parents were born in regions with prevalence of HBV infection >8%." The reviewer based the suggestion on with the following: "What is the current uptake of HBV vaccine in infants born to women from HBV endemic areas? If it is substantially lower than other populations, might consider modifying the criteria."
    - The risk criteria in the 2008 guidelines were not reassessed. Persons who were appropriately vaccinated as infants in the United States should be protected from infection. While persons aged <18 years who were not vaccinated as infants would not receive screening if their parents were born in areas of HBV prevalence <8% (but ≥2%), they would eventually be recommended for screening as adults. Therefore, regardless of the uptake of vaccine, all individuals would eventually receive screening.
- [Reviewer 3] highlighted that the term "MSM" [men who have sex with men] does not capture all risk behaviors (e.g., multiple partners), and they prefer "men who have multiple male sexual partners or men who have high risk sexual partners."
    - Studies have found MSM as an independent risk factor for HBV infection, separate from increased number of partners. In evaluating the evidence, the Work Group conducted an informal review of the literature to see if there was sufficient evidence to tease out behaviors (e.g., receptive anal sex, number of partners) to add more precision. Unfortunately, there was insufficient evidence on the behaviors and most studies use "MSM" as the predictor variable for the analyses. MSM is a broad risk factor and its use favors the cost of misclassifying some low-risk individuals over missing persons at increased risk.
- [Reviewer 5] recommend changing the following recommendation: "Persons born in the United States not vaccinated as infants whose parents were born in regions with prevalence of HBV infection >8%" to "Persons born in the United States not vaccinated as infants whose parents were born in regions with prevalence of HBV infection >=2%. This population is at increased risk for infection because the higher underlying prevalence in the population increases the likelihood of perinatal or close contact exposures." The reviewer expressed that they have diagnosed hepatitis B in patients who were born in the United States but whose parents were born in low-intermediate, intermediate, and high prevalence regions.
    - In this update to the guidelines, CDC did not specifically assess the evidence related to the cutoff for persons whose parents were born in regions with higher HBV prevalence. However, with a universal adult recommendation, all adults with parents who were born in areas with higher HBV prevalence (regardless of the level) would be recommended for screening. Establishing where a person's parents were born and the corresponding HBV prevalence is cumbersome for providers and thus a strength

of using a simplified universal recommendation. While persons aged <18 years who were not vaccinated as infants would not receive screening if their parents were born in areas of HBV prevalence <8% (but ≥2%), they would eventually be recommended for screening as adults.

- [Reviewer 5] recommended, "There should be acknowledgement that more efforts to acquire data, particularly in those countries or territories where there is no data regarding hepatitis B prevalence, would be important goals to achieve in the future, to better improve the recommendations about screening for hepatitis B, related to country of origin of the patient or patient's parents."
    - While those are important goals, making surveillance recommendations for outside the United States is beyond the scope of these guidelines. In this update, CDC did not specifically assess the evidence related to the cutoff for persons whose parents were born in regions with higher HBV prevalence. The current recommendation for universal screening among adults reduces the importance of knowing a person's country of origin and prevalence of HBV in that country.

Virus Description and Transmission

- [Reviewer 2] recommended inserting "and lead to oncogenic mutations" after "The liver is the primary site of HBV replication, and the virus can integrate into the host hepatocyte genome." The reviewer based the recommendation on the following: "Hepatitis B virus is able to evade clearance by the immune system and there is evidence of immune cell depletion from chronic infection. https://pubmed.ncbi.nlm.nih.gov/33563643/; https://www.sciencedirect.com/science/article/abs/pii/S0166354220302308?via%3Dihub."
    - The Péneau et al. (2022) reference and additional text were added.
- [Reviewer 2] asked, "Can we restate to clarify that the burden of virus [is] correlated with infectiousness. This is an important scientific concept to convey also to prevent stigma/discrimination. Similar to HIV where undetectable=untransmissible, we should be relaying the concept that infectiousness is correlated with viral load. There are many people who are HBsAg+ but with undetectable (for example if under treatment) or very low viral loads and are not infectious. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6103a1.htm."
    - Additional language was added.
- [Reviewer 2] noted, "birth to an infected person is not an easily understood phrase [and] this could be confused with infants who have HBsAg positive fathers."
    - The phrase was changed to "during pregnancy or delivery."

Interpretation of Screening Tests

- [Reviewer 1] stated, "Would add footnote that IgM anti-HBc can also be positive in chronic infection with severe HBV flares or reactivation [Table 1]."
    - A footnote was added.
- [Reviewers 1 and 3] noted that loss of HBeAg is not a correlation with loss of replicating virus. "The virus can remain replication competent in those who acquire a pre-core or basal core promoter mutation that abolishes HBeAg expression, and viral replication is lower compared to the wild-type virus. Additionally, even after loss of HBsAg (i.e,

people with resolved infection) low-level replication can continue, which is consistent with occult HBV infection."
    - The statement was corrected per the comments.
- [Reviewer 2] noted that the sentence "presence of anti-HBs at concentrations ≥10 mIU/mL indicates immunity or resolved infection after completion of vaccine series" should be separated into resolved infection by itself and immunity after vaccination. They also suggested to "remove completion of vaccine series [because] some people may have [anti-HBs ≥10 mIU/mL] even without completing of the [vaccine] series."
    - This section was extensively reorganized for clarity.
    - The following statement was added: "While some individuals might have anti-HBs ≥10 mIU/mL after partial vaccination, it is unknown whether that confers long-term protection."
- [Reviewer 2] said in response to "Testing for IgM anti-HBc alone is not sufficient to assess chronic HBV infection" that IgM anti-HBc is also not clinically necessary to define chronic infection.
    - The section on interpreting screening tests was extensively reorganized for clarity.
    - A sentence was added to state, "IgM anti-HBc should only be ordered when there is concern for acute HBV infection."

Clinical Features and Natural History

- [Reviewer 1] requested to add the reference Seef et al. (1987) because "Natural history studies indicate that risk of chronic infection in healthy immunocompetent adults is likely a lot lower (<1%). This data based on the 1942 contamination of Yellow Fever Vaccine with hepatitis B showed [lower] rates of chronicity (only 0.26%) and HCC [hepatocellular carcinoma]."
    - A literature review by Hyams (1994) was already cited; the Hyams literature review includes the Seef et al. (1987) paper. This review found that among 10 studies of adults, risk for chronic infection was >10% in two studies, 5% in one study, and <5% in seven studies. (Min = 0.2%, Max = 12.1%).
    - The text was changed to "less than 5%."
- [Reviewer 1] suggested changing reference to the four phases of chronic HBV infection because "There is movement away from this phase nomenclature and preferred simply to HBeAg positive vs. negative with or without hepatitis (i.e., elevated ALT)."
    - This nomenclature is still used in the current AASLD guidelines, which is what is specifically referenced in this document. Other professional societies might use different terminology.
- [Reviewer 1] noted, "Reactivation occurs with rapid increase in HBV DNA or viral load, associated with anti-rejection therapy for solid organ transplant and bone marrow transplant, and those [with] chronic hepatitis C with HBV co-infection (or resolution of prior HBV infection) receiving DAA [direct-acting antiviral] therapy. Persons receiving B cell depleting therapies (i.e., rituximab) are especially at risk, even those with resolved infection. The FDA has issued a black box warning about B cell depleting therapies in persons with hepatitis B virus. (https://www.pharmacytimes.com/view/fda-issues-a-new-black-box-warning-for-cd20-directed-monoclonal-antibodies)."

- Language about use of DAA therapy among people with a history of HBV infection was added as was a parenthetical indicating that B-cell depleting agents and chemotherapy are examples of immunosuppressive therapy. The section on HBV reactivation during DAA therapy already referenced the FDA Boxed Warning on the risk for reactivation. The *Persons with resolved (past) HBV infection* section now includes references and a discussion of B-cell depleting therapies.

- [Reviewer 1] highlighted some facts around hepatitis delta.
  - Some additional details about hepatitis D have been added; however, the overview is brief because the focus of these guidelines is on HBV. CDC is considering the need for separate guidance on hepatitis D screening.

Epidemiology and Risk Factors

- [Reviewer 2] noted that there are not inherent geographic differences in HBV, but that the difference is due to the opioid epidemic.
  - An additional paper regarding the possible link between the opioid epidemic and geographical differences was added.
- [Reviewer 2] requested moving the Wong et al. (2021) estimate of chronic HBV to the first sentence because there are limitations with the National Health and Nutrition Examination Survey (NHANES) data.
  - This section includes a more in-depth discussion of strengths and weaknesses of NHANES data and the modeled data; therefore, the section was not modified.
  - The introduction highlights both citations.
- [Reviewer 2] suggested adding mother-to-child transmission epidemiology.
  - Data on the topic were added.
- [Reviewer 1] stated, "A 3-dose trivalent HBV vaccine was also found to have increased seroprotection response in adults age >45 years compared to individuals who received the standard monovalent HBV vaccine; (Vesikari T et al., Immunogenicity and safety of a tri-antigenic vs. a mono-antigenic hepatitis B vaccine in adults (PROTECT)…Lancet Infect Dis. 21, 1271 (2021)."
  - Because the focus of these guidelines is on testing, the Work Group prefers not to discuss specific strengths of one vaccine versus another; this would require a lengthy discussion and is outside of the purview of these recommendations.

Summary of the Universal Screening Systematic Review and Review of Evidence

- [Reviewer 3] requested references for the statement that the diagnostic accuracy of HBV testing has previously been well described. There was concern that there was not enough evidence that the anti-HBc test is beneficial overall given the low prevalence of HBV infection in the United States.
  - Results from the systematic review found the prevalence of resolved HBV infection (i.e., HBsAg-, anti-HBc+) in the general population ranged from 4.8% to 14% (median = 6.2%).
  - A list of FDA-approved HBV serologic assays, including links to detailed information on their performance characteristics, was added as a supplementary table.

- [Reviewer 3] felt the harms of hepatitis B screening were underemphasized, especially interpretation of positive anti-HBc results.
    - This has been added as a possible harm.
- [Reviewer 2] noted that there were studies of community-based screening programs reporting linkage to care that were not cited.
    - The main search terms of the systematic review were used to look at universal/routine screening. There were only two studies included in the review that reported linkage to care. As mentioned, the Work Group also considered evidence from other studies. The section has been edited to clarify that the only studies included were those among the general population. There are many studies concerning linkage to care among subsets of the population at increased risk (i.e., Asian American persons) and community-based programs, but those were outside the scope of this research question.
- [Reviewer 3] noted that the section on proportion of close contacts at risk for infection did not include infants, where testing of pregnant persons and birth dose hepatitis B vaccine are preventing new chronic hepatitis B.
    - This section sought to answer the question "How many additional persons would be linked to care [with adult universal screening for hepatitis B]?" Because there is already a universal screening recommendation among persons who are pregnant, this review did not include transmission to infants during birth. A parenthetical has been added to make that clear.

Follow-up After Hepatitis B Virus Testing

- [Reviewer 2] emphasized the importance of stating persons living with hepatitis B have rights protected under the ADA [Americans with Disabilities Act] and suggested adding the following citations: https://journals.sagepub.com/doi/full/10.1177/0033354920921252#:~:text=Hepatitis%20B%20is%20a%20protected%20condition%20under%20the%20ADA.&text=According%20to%20the%20DOJ%2C%20no,HBV%20status%20contradicts%20CDC%20recommendations and https://www.hhs.gov/sites/default/files/hep-b-letter.pdf
    - A sentence was added along with the Moraras et al. (2020) article. The hepatitis B letter was already referenced.

Table 2

- [Reviewer 1] highlighted differing opinions on whether to recommend alpha-fetoprotein (AFP) together with ultrasound, citing the Singal et al. Journal of Hepatology 2020 article.
    - The current guidelines reference AASLD recommendations because the Work Group did not assess clinical management as part of guideline development. AASLD currently states that AFP is optional.

Figure 1

- [Reviewer 4] noted that, "Figure 1 focuses more on vaccination status than susceptibility. For the "Age ≥18" flow sheet suggest the following: For the flow of patients with history of vaccine: Change wording to: Had an activity, exposure or condition associated with increased risk (since last testing)? and Offer testing if the exposure occurred while susceptible to infection (then add the footnote with definition of susceptible)."

    - The decision to begin the flowchart with vaccination came after extensive discussion and various attempts to simplify vaccination and screening into one chart. While these guidelines are about screening, in practice, providers will need to integrate screening and vaccination considerations.
    - The Work Group discussed the proposed modification and determined the previously proposed format was clearer.
- [Reviewer 3] suggested that the first step in the flowchart [Figure 1] be "Previous testing shows anti-HBs" with a "yes" requiring no further action and a "no/unknown" requiring an offer of screening. If there was no prior testing, then subsequent questions ask about risk and vaccine.
    - Relying on anti-HBs is insufficient because people might be fully vaccinated but no longer anti-HBs positive because of waning antibody (but still protected with the presence of vaccine-induced immunologic memory). "Completed vaccine series" is a more encompassing category.

General Comments

- [Reviewer 1] recommended greater emphasis on universal birth dose HBV vaccination.
    - This is well covered in the Schillie et al. (2018) ACIP guidance. Because this is a screening guideline, details on the birth dose are beyond the scope of this document. A brief sentence on this topic was added to the *Hepatitis B Vaccination Seroprotection and Coverage* section.

- [Reviewer 3] suggested CDC work with commercial laboratories to add reflex testing and better interpretation of tests.
    - A comment about the need for collaboration with laboratories has been added to the *Future Directions* section.

SUPPLEMENTARY APPENDIX 4. Public review comments and responses: summary

During April 4–June 3, 2022, CDC announced in the Federal Register the availability of draft CDC recommendations for hepatitis B screening and testing and invited public comment. Overall, 28 comments were received by nonprofit/advocacy groups, providers, industry groups, medical professional organizations, the public, academia, and a consulting group; multiple signatories endorsed some comments. The comment themes and how CDC adjudicated those comments are described below.

- **Universal screening recommendation:** There were 22 comments specifically supportive of the universal screening recommendation for adults and an additional two comments that were generally supportive of the updated recommendations. One comment opposing the universal screening recommendation was received from an industry group voicing concerns that the proposed CDC recommendations are discordant from current U.S. Preventive Services Task Force (USPSTF) recommendations and are not supported by the evidence because there is not curative treatment currently available.
    - While there is not curative treatment currently available, antiviral treatment, monitoring, and liver cancer surveillance can reduce morbidity and mortality from hepatitis B virus (HBV) infection. Risk-based screening has fallen short in identifying persons with chronic HBV infection. Universal screening is cost effective with currently available antiviral treatment and can detect chronic infection prior to development of severe liver disease. CDC developed these guidelines independently of USPSTF, with consideration of new evidence beyond the scope of what was considered in the 2020 USPSTF recommendations.
- **Recommending triple panel test for screening:** Twenty comments supported testing for hepatitis B surface antigen (HBsAg), antibody to hepatitis B surface antigen (anti-HBs), and total antibody to hepatitis B core antigen (anti-HBc) for screening adults, and one comment did not support use of total anti-HBc testing as part of screening. The comment against total anti-HBc testing noted universal total anti-HBc screening will lead to unnecessary anxiety and result in many false positives.
    - The additional harm of false positives or misinterpretation of results was considered and added to the section on harms. Any assay that receives FDA approval for clinical use must meet very high standards of diagnostic accuracy. A list of FDA-approved HBV serologic assays, including links to detailed information on their performance characteristics, was added as a supplementary table. Ultimately the Work Group determined that the harms did not outweigh the benefits.
- **Adding additional persons at increased risk indicated for periodic testing:** Seventeen comments supported adding a history of incarceration, HCV coinfection, and STIs or multiple sex partners to the list of exposures warranting periodic risk-based testing.
- **Hepatitis D:** Fifteen comments were received requesting a statement regarding hepatitis D virus (HDV) and two proposed adding once-in-a-lifetime HDV screening among patients with HBV infection and periodic testing of persons who are HBsAg positive and at increased risk for exposure to HDV.

- Additional details regarding hepatitis D have been added. Making recommendations regarding HDV screening is beyond the scope of these guidelines; however, CDC is considering the need for separate guidance on HDV screening.

- **Introduction edits:** Eleven comments suggested edits to the introduction.
  - Ten suggested updating the number of persons living with hepatitis B infection in the United States to "up to 2.4 million persons."
    - The introduction was changed to "An estimated 580,000 to 2.4 million persons are living with HBV infection in the United States." This reflects the two main data sources for estimates of persons with hepatitis B virus infection (NHANES 2013–2018; Wong et al., 2021) and the lower and upper bounds of the confidence intervals.
  - Ten suggested adding additional examples of transmission routes and reordering the current list to emphasize the most common transmission pathways and deemphasize stigmatized behaviors.
    - The list of transmission routes was reordered, and additional language was added regarding the greater risk of chronic infection from perinatal transmission. A full list of transmission routes is listed in the Virus Description and Transmission section of the guidelines.
  - One suggested adding more detail on the World Health Organization (WHO) viral hepatitis elimination goals.
    - A reference to WHO's elimination goals was added.
- **Patients requesting testing:** Ten comments recommended changing the language that "Anyone who requests hepatitis B testing may receive it" to "should receive."
  - The language was changed to align with CDC hepatitis C virus (HCV) screening recommendations.

- **Vaccination language:** CDC received several different comments regarding modifying or adding language about HepB vaccination.
  - Ten requested to add "offer screening and vaccine" to Figure 1.
    - The change was incorporated.
  - Seven requested to replace language that screening is not a requirement for HepB vaccination because it might take away from the universal screening message.
    - The language was changed from "screening is not a requirement for HepB vaccination" to "screening should not be a barrier to hepatitis B (HepB) vaccination, especially in populations that have decreased engagement with or access to health care." This recognizes the complementary nature of the HepB vaccine recommendations from the Advisory Committee on Immunization Practices.
  - In response to the statement "screening is not a requirement for HepB vaccination," 10 requested more specific guidance to avoid conflicting with the expanded recommendation to offer a one-time test for all adults.
    - Additional language regarding timing of screening and vaccination was added.

- Three requested to add that the first dose of HepB should be administered after collection of blood.
  - This language was added to clarify timing.
- One comment recommended adding language that [susceptible] persons who have not already initiated the series should be offered vaccine, and if they have received a first dose of vaccine, the second dose should be administered if feasible or an appointment should be made for future vaccination.
  - Additional language regarding susceptible persons who have initiated but not completed the HepB vaccine series was added.

- **Additional references**
  - To increase awareness among health care providers and the public that hepatitis B is a protected condition under the Americans with Disabilities Act, 11 comments recommended expanding and elevating the statement regarding avoiding exclusion of people with HBV infection from any setting because of their infection.
    - A sentence was added along with reference to the Moraras et al., 2020 article.
  - Ten comments suggested adding the following reference: Gish RG, Basit SA, Ryan J, Dawood A, Protzer U. Hepatitis B core antibody: role in clinical practice in 2020. Curr Hepatol Rep 2020;19:254–65.
    - The reference was added along with a supplementary table of performance characteristics of all FDA approved anti-HBc tests.
- **General language suggestions**
  - Eight comments recommended changing "3-test panel" to "3-part panel" or "triple panel" because the use of "3-test panel" might be confusing to providers.
    - The recommendations now use "triple panel."
  - Ten comments requested changing terminology regarding perinatal transmission to "from an infected person to their baby during labor and delivery (mother-to-child transmission)."
    - The phrase was changed to "during pregnancy or delivery."
  - Nine comments recommended replacing "augment" with "supersede" or "replace" in the following statement: "The following recommendations for hepatitis B screen augment those issued by CDC in 2008."
    - "Augment" was changed to "update and expand." The new guidelines do not fully replace the 2008 guidelines because not all aspects of the 2008 guidelines were re-reviewed (i.e., persons at increased risk recommended for testing).
  - One comment recommended replacing "infected" with "living with."
    - CDC utilizes person-first language to describe persons as having a condition or circumstance and to humanize people being referred to. "Persons infected with HBV" aligns with this principle.
  - Two comments recommended use of gender-inclusive, person-first language throughout.
    - CDC aimed to use gender-inclusive and person-first language throughout the guidelines.

- **Suggestions for improving implementation:** Several comments recommended additional actions to aid in guideline implementation or rollout, including the following:
    - Host joint educational events with medical specialty organizations
    - Work with USPSTF, insurers, and the Centers for Medicare and Medicaid Services to ensure testing is covered for patients under preventative services (n = 2)
    - Work with electronic medical records (EMR) companies to develop and disseminate best practices
    - Work with the Office of the National Coordinator for Health Information Technology to ensure interoperability and interfaces across EMRs
    - Sponsor a National Quality Forum hepatitis B screening measure
    - Work with national laboratory companies to develop correct HBV triple panel screening profiles and result interpretation
    - Address cost and resources for hepatitis B testing and vaccination for patients
    - Provide educational resources for providers and patients in multiple languages
    - Coordinate a screening and vaccination campaign (n = 2)
    - Start a high-level interagency initiative to rapidly develop next-generation diagnostic tools, including making HBV rapid testing available in the United States
        - While important, conducting these actions was out of the scope of the screening guidelines. Several key items are mentioned in the Future Directions section of the guidelines.

SUPPLEMENTARY TABLE 1. Chain of indirect evidence and key questions for universal screening systematic review

How would adult universal screening for hepatitis B affect the number (and composition) of persons who screen positive for HBV infection?	**How many additional persons would be linked to care?**	**How many new infections of HBV would be prevented?**	**Do desirable management and treatment effects outweigh undesirable effects?**
Q1a. What is the prevalence of chronic HBV infection in the United States? In the general population, by age groups?	Q2a. What is the diagnostic accuracy of HBV testing?*	Q3a. What proportion of close contacts are at risk for infection?	Q4a. What is the effect of treatment on HBV viral load?*
Q1b. What is the yield (number of new diagnoses per tests performed) and sensitivity of alternative HBV screening strategies (e.g., universal versus targeted screening or screening strategies based on alternative risk factors)?*	Q2b. What are the harms of hepatitis B screening?		Q4b. What is the effect of treatment on morbidity (including cirrhosis and hepatocellular carcinoma)?*
	Q2c. What proportion of persons who screen positive for HBV infection are linked to care?		Q4c. What is the effect of treatment on mortality (HBV-specific and all-cause)?*
	Q2d. What proportion of persons who screen positive for HBV infection are treatment eligible?		Q4d. What are the adverse effects of treatment?*
	Q2e. What proportion of eligible persons who screen positive for HBV infection are treated?		

Abbreviations: HBV = hepatitis B virus; Q = question.

*Previously well described and therefore not included in this review

SUPPLEMENTARY TABLE 2. Search strategy for universal screening systematic review

Database	Strategy	Run date: 02/08/2021
Medline (OVID) 1946–	(((Exp Hepatitis B/di AND *mass screening/) OR (*hepatitis B/ AND *mass screening/)) AND (routine* OR universal)) OR ((hepatitis B OR HBV OR hepb).ti,ab. AND (Exp "Diagnostic Techniques and Procedures"/ OR *mass screening/) AND (universal OR routine*).ti,ab.) OR (((hepatitis B OR HBV OR hepb) ADJ5 (HBsAg OR anti-HBc OR anti-HBs OR DNA OR serolog* OR antigen* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)) AND (universal OR routine*)).ti,ab. English; 2008–	1,441
Embase (OVID) 1974–	(((Exp Hepatitis B/di AND *mass screening/) OR (*hepatitis B/ AND *mass screening/)) AND ((routine* OR universal) ADJ5 (test* OR screen*)).ti,ab.) OR ((hepatitis B OR HBV OR hepb).ti,ab. AND (Exp "Diagnostic Procedures"/ OR *mass screening/) AND ((routine* OR universal) ADJ5 (test* OR screen*)).ti,ab.) OR (((hepatitis B OR HBV OR hepb) ADJ5 (HBsAg OR anti-HBc OR anti-HBs OR DNA OR serolog* OR antigen* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)) AND ((universal OR routine*) ADJ5 (test* OR screen*))).ti,ab.	1,409 – 458 duplicates = 951 unique items
Cochrane Library	English; 2008–; NOT pubmed/medline (([mh "Hepatitis B"] AND ([mh "Mass Screening"] OR [mh "Diagnostic Techniques and Procedures"])) OR (("hepatitis B" OR HBV OR hepb) NEAR/5 (HBsAg OR DNA OR serolog* OR antigen* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*))) AND (universal OR routine*):ti,ab	187 – 69 duplicates = 118 unique items
CINAHL (EbscoHost)	English; 2008– ((((MH “Hepatitis B”/DI) AND (MJ "mass screening")) OR ((MJ “Hepatitis B”) AND (MJ "mass screening")) AND (universal OR routine*)) OR ((“hepatitis B” OR HBV OR hepb) AND ((MH “Diagnostic Techniques and Procedures”+) OR (MJ "mass screening")) AND (universal OR routine*)) OR (((“hepatitis B” OR HBV OR hepb) N5 (HBsAg OR DNA OR serolog* OR antigen* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)) AND (universal OR routine*))	169 – 75 duplicates = 94 unique items

	English; 2008–; exclude Medline records; remove duplicates	
Distiller and manual deduplication		– 24
Total articles		**2,580**

SUPPLEMENTARY TABLE 3. Inclusion and exclusion criteria for universal screening systematic review

Universal title review tool
Exclude if ▪ Outside the United States ▪ Reports only data from studies not conducted in humans, environmental studies, or technology assessments (studies on laboratory or diagnostic methods) ▪ Opinion paper, editorial, perspective, or correspondence article ▪ Case report ▪ Specifies outcome and population does not include HBV
Universal abstract screening tool
1. Is this reference on populations in the United States (including territories)? ▪ Yes (Continue) ▪ No (Can end review and submit) ▪ Unsure (Continue) 2. Does this reference report on the prevalence or incidence of HBV in adults aged 18 years and older *or* linkage-to-care data? ▪ Yes, reports on HBV prevalence/incidence or linkage to care (Continue) ▪ No (Can end review and submit) ▪ Unsure (Continue) 3. Is this reference a review article (systematic or not) with no original data? ▪ Yes (Can end review and submit) ▪ No (Continue) ▪ Unsure (Continue) 4. Does the reference meet any of the following exclusion criteria? (Select ALL that apply) ▪ Only among persons aged <18 years ▪ Studies not conducted in humans, environmental studies, or technology assessments (studies on laboratory or diagnostic methods) ▪ Editorial or commentary (e.g., position paper, perspective, opinion, letter to the editor, correspondence) ▪ Guidelines ▪ Non-peer reviewed source (e.g., newsletter, legislative update, abstract) ▪ Reports modeled data only ▪ Self-reported (i.e., unconfirmed) HBV prevalence ▪ Case report or case series ▪ None of the above or Unsure (Include)

Abbreviation: HBV = hepatitis B virus.

SUPPLEMENTARY TABLE 4. Chain of indirect evidence for persons with hepatitis C and B coinfection

- Population: hepatitis C-infected adults (aged ≥18 years)
- Intervention: testing for hepatitis B
- Comparison: hepatitis B testing versus no hepatitis B testing
- Outcome: prevention of morbidity (decompensated cirrhosis or hepatocellular carcinoma or liver transplant) or hepatitis B reactivation or mortality

SUPPLEMENTARY TABLE 5. Search strategy for persons with hepatitis C and B coinfection systematic review

Database	Strategy	Run date 10/27/2017	Run date 05/16/2018	Run date 09/22/2020
Medline (OVID) 1946–	Exp Hepatitis B/di OR ((hepatitis B OR HBV).ti,ab. AND Exp "Diagnostic Techniques and Procedures"/) OR ((hepatitis B OR HBV) ADJ5 (HBsAg OR anti-HCV OR RNA OR serolog* OR antigen* OR assessment* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)) AND Exp Hepatitis C/ OR (hepatitis C OR HCV).ti,ab. English; 2005–; remove duplicates	4,386	105	756
Embase (OVID) 1947–	Exp Hepatitis B/di OR ((hepatitis B OR HBV).ti,ab. AND Exp Diagnostic Procedure/) OR ((hepatitis B OR HBV) ADJ5 (HBsAg OR anti-HCV OR RNA OR serolog* OR antigen* OR assessment* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)).ti,ab. AND Exp Hepatitis C/ OR (hepatitis C OR HCV).ti,ab.	2,258 – 215 duplicates = 2,043 unique items	195 – 5 duplicates = 190 unique items	621 – 62 duplicates = 559 unique items
CINAHL (Ebsco)	English; 2005–; exclude Medline journals; remove duplicates (MH "Hepatitis B"/DI) OR (("hepatitis B" OR HBV) AND (MH "Diagnostic Techniques and Procedures"+)) OR (("hepatitis B" OR HBV) N5 (HBsAg OR anti-HCV OR RNA OR serolog* OR antigen* OR assessment* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)) AND (MH "Hepatitis C") OR (TI ("hepatitis C" OR HCV)) OR (AB ("hepatitis C" OR HCV))	52 – 31 duplicates = 21 unique items	11 – 3 duplicates = 8 unique items	193 – 72 duplicates = 121 unique items

	English; 2005–; exclude Medline records; remove duplicates			
Cochrane Library	(MeSH descriptor: [Hepatitis B] explode all trees and with qualifier(s): [Diagnosis - DI]) OR ((“hepatitis B” OR HBV) AND [mh^ “Diagnostic Techniques and Procedures”]) OR ((“hepatitis B” OR HBV) NEAR/5 (HBsAg OR anti-HCV OR RNA OR serolog* OR antigen* OR assessment* OR antibod* OR test* OR screen* OR assay* OR immunoassay* OR diagnos*)):ti,ab AND [mh “Hepatitis C”] OR (“hepatitis C” OR HCV):ti,ab	127 – 84 duplicates = 43 unique items	0	234 – 161 duplicates = 73 unique items
Distiller and manual deduplication		—	– 1	– 9
Total articles		**6,493**	**302**	**1,500**

SUPPLEMENTARY TABLE 6. Inclusion and exclusion criteria for hepatitis C and B coinfection systematic review

HCV title review tool
Exclude if ▪ Outside the United States ▪ Reports only data from a study not conducted in humans, environmental studies, or technology assessments (studies on laboratory or diagnostic methods) ▪ Opinion paper, editorial, guidelines or recommendations, perspective, correspondence article, systematic review, or meta-analysis ▪ Case report ▪ Specifies outcome and population that does not include HBV or HCV
HCV abstract screening tool
1. Does this reference report on the prevalence or outcomes of HBV/HCV coinfection? ▪ Yes, reports on HBV/HCV coinfection prevalence *or* outcomes (Continue) ▪ No (Can end review and submit) ▪ Unsure (Continue) 2. Does the reference meet any of the following exclusion criteria? (Select ALL that apply) ▪ Populations outside the United States ▪ Specific subpopulations with a given medical condition (e.g., hepatocellular carcinoma, solid organ recipient, end-stage renal disease, compromised immune system) or for whom screening recommendations already exist (e.g., persons who inject drugs) rather than the general population ▪ Studies not conducted in humans, environmental studies, or technology assessments (studies on laboratory or diagnostic methods) ▪ Opinion paper, editorial, guidelines or recommendations, perspective, correspondence article, systematic review, or meta-analysis ▪ Sample size <100 in countries with population >5 million or sample size <50 in countries with population <5 million ▪ Reports modeled data only ▪ Self-reported (i.e., unconfirmed) HBsAg/anti-HCV prevalence ▪ Only among persons aged <18 years ▪ None of the above or Unsure (Include)

Abbreviations: HBsAg = hepatitis B surface antigen; HBV = hepatitis B virus; HCV = hepatitis C virus; anti-HCV = antibody to hepatitis C virus.

SUPPLEMENTARY TABLE 7. Chain of indirect evidence for persons with a history of incarceration systematic review

Does screening for HBV reduce morbidity and mortality among adults who are currently incarcerated or have a history of incarceration? • What is the prevalence of HBV infection in persons in the United States who are currently incarcerated or have a history of incarceration? • What is the incidence of HBV infection in correctional populations in the United States? • What is the risk for HBV infection among current or formerly incarcerated adults compared with those never incarcerated?

Abbreviation: HBV = hepatitis B virus.

SUPPLEMENTARY TABLE 8. Search strategy for persons with a history of incarceration screening systematic review

Database	Strategy	Run date 10/16/2019	Run date 03/03/2021
Medline (OVID) 1946–	Prisons/ OR Prisoners/ OR (inmate* OR incarcerat* OR (detention ADJ2 center*) OR (detention ADJ2 camp*) OR (detention ADJ2 facilit*) OR jail* OR prison* OR (correction* ADJ2 facilit*) OR (correction* ADJ2 institution*) OR penitentiar* OR (penal ADJ2 institution*) OR (penal ADJ2 facility) OR halfway house OR detainee OR offender* OR parole* OR probation OR work camp*).ti,ab. AND (hepatitis B OR HBV OR hepatitis C OR HCV) English; Abstracts; 2000–: Update (201910* OR 201911* OR 201912* OR 2020* OR 2021*).dt	974	147
Embase (OVID) 1996–	Prison/ OR Prisoner/ OR (inmate* OR incarcerat* OR (detention ADJ2 center*) OR (detention ADJ2 camp*) OR (detention ADJ2 facilit*) OR jail* OR prison* OR (correction* ADJ2 facilit*) OR (correction* ADJ2 institution*) OR penitentiar* OR (penal ADJ2 institution*) OR (penal ADJ2 facility) OR halfway house OR detainee OR offender* OR parole* OR probation OR work camp*).ti,ab. AND (hepatitis B OR HBV OR hepatitis C OR HCV) English; Abstracts; not PubMed/Medline; 2000–; Update (201910* OR 201911* OR 201912* OR 2020* OR 2021*).dc	1,528 – 692 duplicates = 836 unique items	287 – 133 duplicates = 154 unique items
PsycInfo (OVID) 2002–	Prison/ OR Prisoner/ OR (inmate* OR incarcerat* OR (detention ADJ2 center*) OR (detention ADJ2 camp*) OR (detention ADJ2 facilit*) OR jail* OR prison* OR (correction* ADJ2 facilit*) OR (correction* ADJ2 institution*) OR penitentiar* OR (penal ADJ2 institution*) OR (penal ADJ2 facility) OR halfway house OR detainee OR offender* OR parole* OR probation OR work camp*).ti,ab. AND (hepatitis B OR HBV OR hepatitis C OR HCV) English; Abstracts; 2000– Update (201910* OR 201911* OR 201912* OR 2020* OR 2021*).up	229 – 170 duplicates = 59 unique items	26 – 17 duplicates = 9 unique items
CINAHL (Ebsco)	(inmate* OR incarcerat* OR (detention N2 center*) OR (detention N2 camp*) OR (detention N2 facilit*) OR jail* OR prison* OR (correction* N2 facilit*) OR (correction* N2 institution*) OR penitentiar* OR (penal N2	130 – 86 duplicates	72 – 52 duplicates

	institution*) OR (penal N2 facility) OR "halfway house*" OR detainee OR offender* OR parole* OR probation OR "work camp*") AND ("hepatitis B" OR HBV OR "hepatitis C" OR HCV) English; Abstracts; exclude Medline records; 2000–	= 44 unique items	= 20 unique items
Scopus	TITLE-ABS-KEY(inmate* OR incarcerat* OR (detention W/2 center*) OR (detention W/2 camp*) OR (detention W/2 facilit*) OR jail* OR prison* OR (correction* W/2 facilit*) OR (correction* W/2 institution*) OR penitentiar* OR (penal W/2 institution*) OR (penal W/2 facility) OR "halfway house*" OR detainee OR offender* OR parole* OR probation OR "work camp*") AND TITLE-ABS-KEY(("hepatitis B" OR HBV OR "hepatitis C" OR HCV)) AND NOT INDEX(medline) AND NOT INDEX(embase) AND PUBYEAR > 1999 English; Abstracts; exclude Medline records; 2000–	105 – 57 duplicates = 48 unique items	27 – 9 duplicates = 18 unique items
Criminal Justice Database	TI,AB(inmate* OR incarcerat* OR (detention NEAR/2 center*) OR (detention NEAR/2 camp*) OR (detention NEAR/2 facilit*) OR jail* OR prison* OR (correction* NEAR/2 facilit*) OR (correction* NEAR/2 institution*) OR penitentiar* OR (penal NEAR/2 institution*) OR (penal NEAR/2 facility) OR "halfway house*" OR detainee OR offender* OR parole* OR probation OR "work camp*") AND TI,AB("hepatitis B" OR HBV OR "hepatitis C" OR HCV) English; Abstracts; exclude Medline records; 2000–	256 – 103 duplicates = 153 unique items	23 – 11 duplicates = 12 unique items
Sociological Abstracts	TI,AB(inmate* OR incarcerat* OR (detention NEAR/2 center*) OR (detention NEAR/2 camp*) OR (detention NEAR/2 facilit*) OR jail* OR prison* OR (correction* NEAR/2 facilit*) OR (correction* NEAR/2 institution*) OR penitentiar* OR (penal NEAR/2 institution*) OR (penal NEAR/2 facility) OR "halfway house*" OR detainee OR offender* OR parole* OR probation OR "work camp*") AND TI,AB("hepatitis B" OR HBV OR "hepatitis C" OR HCV) English; Abstracts; exclude Medline records; 2000–	57 – 51 duplicates = 6 unique items	1 – 1 duplicates = 0 unique items
Distiller and manual deduplication		—	– 85
Total articles		**2,120**	**275**

SUPPLEMENTARY TABLE 9. Inclusion and exclusion criteria for corrections systematic review

Review 1: Hepatitis C or hepatitis B in correctional settings
Include if the reference addresses any of the following: • HBV testing or screening (in corrections) • HBV vaccination (in corrections) • HBV incidence, transmission, or outbreaks (in corrections) • HBV prevalence (in corrections) • HBV treatment (in corrections) • Linkage to HBV care (from corrections to community) • Incarceration as an HBV risk factor • HCV testing or screening (in corrections) • HCV incidence, transmission, outbreaks, or reinfection (in corrections) • HCV prevalence (in corrections) • HCV treatment (in corrections) • Linkage to HCV care (from corrections to community) • Incarceration as an HCV risk factor • Exclude if article does not contain data on correctional settings or correctional populations in the United States Include • Journal articles describing primary research • Systematic reviews • Review articles (not systematic) • Abstracts, posters, or conference presentations • Dissertations or theses • Institutional guidelines Exclude • Books, book chapters, or book reviews • Editorials or commentaries (e.g., position papers, perspectives, opinions, letters to the editor) • Newsletters or newspaper articles • Legislative updates, documents, or reports • Reports modeled data only
Review 2: Hepatitis B only
Include if the reference addresses any of the following: • HBV testing or screening (in corrections) • HBV incidence, transmission, or outbreaks (in corrections) • HBV prevalence (in corrections) • Incarceration as an HBV risk factor Exclude if • Not among adults (aged ≥18 years) • Dissertation or thesis • Data all prior to 2000 • Met any other exclusion criteria from Review 1

Abbreviations: HBV = hepatitis B virus; HCV = hepatitis C virus.

SUPPLEMENTARY TABLE 10. Summary of findings from the Steering Committee for universal screening recommendation

Key question	Evidence considered by Steering Committee	Summary of conclusions	Limitations
Q1a. What is the prevalence of chronic HBV infection in the United States? In the general population, by age groups?	• Universal screening systematic review • NHANES data • Modeled prevalence data (Wong et al., 2021) • Cost-effectiveness (Toy et al., 2022) • Vaccination rates and efficacy • Surveillance data • Feasibility of implementation • Acceptability	• With a cost effectiveness of $50,000 per QALY, triple panel screening remains cost effective if HBV prevalence is above 0.15%. • The median HBV prevalence from the systematic review was 0.4%, similar to the NHANES estimate of 0.36%. Both estimates are higher than the cost-effectiveness threshold determined from the study. There were four studies that were below the cost-effectiveness threshold: three in organ and blood donors and one of a study of insured patients born between 1945–1960. • Modeled estimates using a meta-analysis of prevalence by Wong et al. (2021) found a higher prevalence than the systematic review or NHANES because it tried to assess more accurate estimates among individuals born outside the United States. • New acute HBV infections are primarily in adults; the lowest rates of infections are in those born in 2000 or later. • Reporting of risk, especially potentially stigmatizing	• No studies directly assessed universal screening. The Committee had to rely on prevalence studies among people not known to be at increased risk for HBV, which may not be generalizable. • NHANES does not include institutionalized populations and might underestimate the prevalence among those populations and ethnic minority groups that are not well represented in the survey. • Modeled data are limited to the underlying quality of the inputs, which might vary by country setting. • Surveillance data are limited by the resources available for investigating and reporting hepatitis B, which varies greatly by jurisdiction. • There was only one universal screening cost-effectiveness study. • Costs of treatment might increase over time. However, the cost of treatment would need to increase above $9,000 for screening to no longer be cost effective.

		conditions (e.g., immigration status, IDU) is low among acute cases, hampering a risk-based approach. • The epidemiology of cases varies by transmission route (which is correlated with age of infection). Onset of chronic symptoms vary by age at first infection. • An "all adults" recommendation was considered more feasible to implement (e.g., for integrating into EMR alerts) and acceptable by peer reviewers and most public comments.	
Q1b. What is the yield (number of new diagnoses per tests performed) and sensitivity of alternative HBV screening strategies (e.g., universal versus targeted screening or screening strategies based on alternative risk factors)?	• USPSTF systematic review • Prospective cohort study in United States • Ease of implementation	• In the absence of direct data, the Steering Committee considered indirect data. • Universal screening was considered more efficient for providers than risk-based testing.	• No studies directly assessed universal screening. • Universal screening could represent a greater burden to laboratories (but also represent greater income).
Q2a. What is the diagnostic accuracy of HBV testing?	• FDA	• The diagnostic accuracy of HBV tests has been evaluated by FDA and was not included as part of the systematic review.	• Not assessed as part of the review.
Q2b. What are the harms of hepatitis B screening?	• Systematic review • Prior HCV systematic review	• Benefits of reducing morbidity and mortality outweigh harms. • Universal screening might reduce harms compared with risk-based screening by not requiring individuals to disclose	• Many harms (e.g., distress at finding results) are theoretical and were not directly measured.

		potentially stigmatizing risk conditions.	
Q2c. What proportion of persons who screen positive for HBV infection are linked to care? Q2d. What proportion of persons who screen positive for HBV infection are treatment eligible? Q2e. What proportion of eligible persons who screen positive for HBV infection are treated?	• Universal screening systematic review • U.S.-based research in general population	• Overall, the CDC Steering Committee found linkage-to-care rates ranged from 36% to 78%, and 18%–32% of patients with chronic HBV infection are prescribed treatment. • The linkage and treatment rates were considered sufficient to warrant recommending screening. CDC is supporting efforts to improve these rates further.	• Linkage-to-care data are limited.
Q3: How many new infections of HBV would be prevented? Q3a. What proportion of close contacts are at risk for infection?	• Universal screening systematic review • Studies and surveillance data on rates of HBV among close contacts of known hepatitis B cases	• While this could not be directly estimated, treatment of patients with chronic HBV can bring their viral load to levels that are no longer transmissible to others. While the Steering Committee couldn't estimate the magnitude of the effect, any decrease in transmission was considered as a benefit to screening.	• No studies.
Q4: Do desirable management and treatment effects outweigh undesirable effects? Q4a. What is the effect of treatment on HBV viral load? Q4b. What is the effect of treatment on morbidity (including cirrhosis and hepatocellular carcinoma)? Q4c. What is the effect of treatment on	• USPSTF systematic review • AASLD systematic review	• This question was not assessed by the systematic review because it has been reported elsewhere. • Based on the USPSTF and AASLD reviews, the Steering Committee considered that treatment reduces morbidity and mortality of HBV infection.	• Not assessed as part of the review.

mortality (HBV-specific and all-cause)? Q4d. What are the adverse effects of treatment?			

Abbreviations: AASLD = American Association for the Study of Liver Diseases; EMR =electronic medical record; FDA = U.S. Food and Drug Administration; HBV = hepatitis B virus; HCV = hepatitis C virus; IDU = injection drug use; NHANES = National Health and Nutrition Examination Survey; Q = question; QALY = quality-adjusted life year; USPSTF = United States Preventive Services Task Force.

SUPPLEMENTARY TABLE 11. HBV infection prevalence and linkage to care, universal screening systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years among *sample*	Age, years among *HBV+*	Race/ethnicity among *sample*	Race/ethnicity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI) (HBsAg+ unless otherwise defined)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other test results
General Population Prevalence												
Abara WE, Collier MG, Moorman A, et al. Characteristics of deceased solid organ donors and screening results for hepatitis B, C, and human immunodeficiency viruses—United States, 2010–2017. MMWR Morb Mortal Wkly Rep 2019;68(3):61–6.	Cross-sectional analytic	Nonprobability sampling	U.S. Organ Procurement and Transplantation Network	2010–2017	Deceased solid organ donors	Mean: 39.9 (range: 0–65)		(N = 70,414) White: 46,636 (66.2%) Black: 11,348 (16.1%) Hispanic: 9,375 (13.3%) Other: 3,055 (4.4%)		All donors: 61/70,349 (0.1%) Increased risk donors: 14/12,578 (0.1%)		Anti-HBc+, all donors: 3,390/67,011 (4.8%) Anti-HBc+, increased risk donors: 866/11,705 (7.0%)
Abara WE, Cha S, Malik T, DeSimone MS, et al. Prenatal screening for and prevalence of hepatitis B surface antigen in pregnant women and prevention of transmission to infants born to infected mothers—Guam, 2014. J Pediatric Infect Dis Soc 2018;7(4):290–95.	Cross-sectional analytic	Probability sampling	Largest delivery hospital, Guam	2014	Pregnant women	Mean: 27.2 (SD: 6.2) Range: 15–45	(n = 18) ≤25 years: 2 (11%) >25 years: 16 (89%)	(N = 966) Pacific Islander: 752 (78.2%) Asian: 197 (20.5%) White: 11 (1.1%) Hispanic: 2 (0.2%)		18/899 (2%)		
Beste LA, Ioannou GN, Chang MF, et al. Prevalence of hepatitis B virus exposure in the Veterans Health Administration and association with military-related risk factors. Clin Gastroenterol Hepatol 2020;18(4):954–62.	Cross-sectional analytic	Probability sampling	20 Veterans Health Administration medical centers	2002–2003	Veterans	Mean: 62.1 (SD: 13.7)		(N = 1,146) White: 910 (79.4%) Black: 123 (10.7%) Asian/PI: 26 (2.3%) AI/AN: 9 (0.8%) Other: 63 (5.5%) Refused: 15 (1.3%)		7/1,146 (0.6%) *Includes 1 person who was anti-HBc+/DNA+/HBsAg-		Anti-HBc+ (regardless of HBsAg), unadjusted: 149/1146 (13%) HBsAg+; anti-HBc+; or anti-HBs+, anti-HBc-, HBsAg- (i.e., chronic, exposed, or immune; adjusted for nonparticipation bias): 0.7% (95% CI: 0.3–1.5)
Chao TT, Sheffield JS, Wendel GD Jr, Ansari MQ, McIntire DD, Roberts SW. Risk factors associated with false positive HIV test results in a low-risk urban obstetric population. J Pregnancy 2012;2012:841979.	Cross-sectional analytic	Nonprobability sampling	Hospital, Dallas, Texas	2005–2008	All women who delivered in hospital with an HIV test result	(N = 47,708) <18: 2,512 (5%) 18–35: 41,688 (87%) >35: 3,508 (7%)		(N = 47,708) Black: 4,557 (10%) White: 1,979 (4%) Other: 1,041 (2%) Hispanic: 40,131 (84%)		131/47,472 (0.3%)		
Delwart E, Slikas E, Stramer SL, et al.; NHLBI-REDS-II Study Group. Genetic diversity of recently acquired and prevalent HIV, hepatitis B virus, and hepatitis C virus infections in US blood donors. J Infect Dis 2012;205(6):875–85.	Cross-sectional analytic	Nonprobability sampling	Blood centers accounting for 70% of U.S. blood supply	2006–2009	Blood donations	(N = 5,968,986 all donations) <20: 4,782,307 (14%) 20–29: 4,547,134 (13%) 30–39: 4,367,417 (13%) 40–49: 7,080,519 (21%) 50–59: 7,730,474 (23%) 60–69: 3,927,177 (12%) ≥70: 1,482,979 (4%)	(n = 3,061 all donations) <20: 653 (21%) 20–29: 655 (21%) 30–39: 576 (19%) 40–49: 521 (17%) 50–59: 428 (14%) 60–69: 163 (5%) ≥70: 65 (2%)	(N = 33,947,146 all donations) White: 27,112,643 (80%) Black: 1,242,416 (4%) Asian: 510,633 (2%) Other: 628,302 (2%) Hispanic: 1,354,391 (4%)	(n = 3,061 all donations) Asian: 848 (28%) White: 651 (21%) Black: 543 (18%) Other: 189 (6%) Hispanic: 166 (5%)	All donations: 3,061/33,947,146 (0.01%) First-time donors: 2,561/5,968,986 (0.04%)		
Dodd RY, Crowder LA, Haynes JM, Notari EP, Stramer SL, Steele WR. Screening blood donors for HIV, HCV, and HBV at the American Red Cross: 10-year trends in prevalence, incidence, and residual risk, 2007 to 2016. Transfus Med Rev 2020;34(2):81–93.	Cross-sectional analytic	Nonprobability sampling	American Red Cross blood donation centers	2007–2016 *HBV data only available for 2009–2016	American Red Cross donors		(n = 2,892 first-time donors) 16–17: 274 (9%) 18–24: 518 (18%) 25–39: 888 (31%) 40–54: 780 (27%) ≥55: 432 (15%)		(n = 2,892 first-time donors) Asian: 979 (34%) Black: 585 (20%) White: 407 (14%) Other: 133 (5%) Hispanic: 67 (2%) Multiple: 42 (1%) American Indian: 8 (0%)	First-time donors: 2,892/4,866,315 (0.06%)		DNA+: 2,892/5,185,215 (0.06%)
Gebran SG, Wasicek PJ, Wu Y, et al. The prevalence of blood-borne pathogens in maxillofacial trauma patients. J Craniofac Surg 2020;31(8):2285–8.	Cross-sectional analytic	Nonprobability sampling	Level 1 trauma center, Baltimore, Maryland	2010–2015	Patients admitted with facial fracture	Mean: 42 (SD: 20)		(N = 4,608) White: 2,598 (56%) Black: 1,601 (35%) Hispanic: 46 (1%)				HBsAg+, anti-HBc+, or HBV DNA+: 35/4,608 (0.8%)
Hall MR, Ray D, Payne JA. Prevalence of hepatitis C, hepatitis B, and human immunodeficiency virus in a Grand Rapids, Michigan emergency department. J Emerg Med;38(3):401–5.	Incidence or prevalence study without a comparison group	Nonprobability sampling	Level 1 trauma center, Grand Rapids, Michigan	2005	Patients aged 15–50 years with blood draws	(N = 404) Mean: 36 (range: 17–49)				3/403 (0.7%; 95% CI: –0.1%–1.6%)		
Kushner T, Park C, Masand D, et al. Hepatitis C seroprevalence among consecutive labor and delivery admissions in two New York City hospitals. Open Forum Infect Dis 2020;7(11):ofaa514.	Cross-sectional analytic	Nonprobability sampling	2 labor and delivery hospitals, New York, New York	2018–2019	Patients admitted to labor and delivery	(N = 7,429) Mean: 32.4 (SD: 5.6)		(N = 7,429) White: 4,657 (63%) Black: 1,042 (14%) Other: 769 (10%) Asian: 899 (12%)		Chronic (no definition): 47/7,253 (0.65%; 95% CI: 0.48–0.86)		Chronic HBV and HCV coinfection: 1/56 (1.8%)

SUPPLEMENTARY TABLE 11. HBV infection prevalence and linkage to care, universal screening systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years among *sample*	Age, years among *HBV+*	Race/ethnicity among *sample*	Race/ethnicity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI) (HBsAg+ unless otherwise defined)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other test results
Mortensen E, Kamali A, Schirmer PL, et al. Are current screening protocols for chronic hepatitis B virus infection adequate? Diagn Microbiol Infect Dis 2016;85(2):159–67.	Incidence or prevalence study without a comparison group Literature review	Nonprobability sampling	2 Veterans Administration medical centers	1999–2012	Veterans attending dental appointments	Adults	Adults			HBsAg+: 4/1,891 (0.2%) HBsAg + or DNA+: 8/1,999 (0.4%)	273/1,891 (14%)	4/108 (3.7%) HBsAg- patients were tested for HBV DNA and found to be positive (from the general population cohort) Occult infection: 6/1,891 (0.3%)
Patel EU, Thio CL, Boon D, Thomas DL, Tobian AAR. Prevalence of hepatitis B and hepatitis D virus infections in the United States, 2011–2016. Clin Infect Dis 2019;69(4):709–12.	Cross-sectional analytic (NHANES)	Nonprobability sampling	United States	2011–2016	U.S. residents, NHANES participants with complete demographic and testing data	≥18	(n = 113) 18–49: 59 (52%) >50: 54 (48%)			113/16,143 (0.36%; 95% CI: 0.29–0.46)		
Roberts H, Kruszon-Moran D, Ly KN, et al. Prevalence of chronic hepatitis B virus (HBV) infection in U.S. households: National Health and Nutrition Examination Survey (NHANES), 1988–2012. Hepatology 2016;63(2):388–97.	Cross-sectional analytic (NHANES)	Nonprobability sampling	United States	1988–1994 1999–2008 2007–2012	U.S. residents, NHANES participants		(n = 228) 20–49: (range: 45%–60%) ≥50: (range: 27%–53%)		(N = 228) White, Non-Hispanic: (range: 11%–16%) Black, Non-Hispanic: (range 32%–54%) Mexican American: (range 3%–10%) Asian, Non-Hispanic: 28% (only available for 2007–2012) Not reported: (range: 22%–26%)	Adults aged ≥20 years, from 1988–1994 and 1999–2012: 228/49,419 (0.5%)		Anti-HBc+, anti-HBs + or -: 3,755/49,419 (7.6%)
Sarathy L, Cirillo C, Dehn C, Lerou PH, Prendergast M. Improving timeliness of hepatitis B vaccine birth dose administration. Hosp Pediatr 2021;11(5):446–53.	Quantitative descriptive: plan-do-study-act	Nonprobability sampling	Urban tertiary care facility	2019	Patients delivering babies	(N = 852) 15–19: 13 (1.5%) 20–24: 53 (6.2%) 25–29: 197 (23.1%) 30–34: 327 (38.4%) 35–39: 198 (23.2%) 40–44: 58 (6.7%) ≥45: 6 (0.7%)		(N = 852) White: 415 (49%) Black: 138 (16%) Asian: 95 (11%) Other: 17 (2%) American Indian: 2 (0.2%) Hispanic White: 92 (11%) Hispanic Other: 73 (9%) Hispanic Black: 27 (3%) Pacific Islander: 2 (0.2%) Not reported: 26 (3%)		(N = 852) (0.35%)		
Seamon MJ, Ginwalla R, Kulp H, et al. HIV and hepatitis in an urban penetrating trauma population: unrecognized and untreated. J Trauma 2011;71(2):306–10.	Cross-sectional analytic	Nonprobability sampling	Hospital, Pennsylvania	2008–2010	Patients admitted with penetrating injuries from interpersonal violence aged 18–85 years	(N = 341) Mean: 28.6 (SD: 9.9)		(N = 341) Black: 228 (67%) Latino: 84 (25%) White: 28 (8%) Other: 1 (<1%)		1/341 (0.3%)	20/341 (5.9%)	
Sears DM, Cohen DC, Ackerman K, Ma JE, Song J. Birth cohort screening for chronic hepatitis during colonoscopy appointments. Am J Gastroenterol 2013;108(6):981–9.	Cross-sectional analytic	Nonprobability sampling	Outpatient gastroenterology department, Temple, Texas	2010–2011	Insured patients scheduled for outpatient colonoscopy born 1945–1960 without prior HBV diagnosis	(N = 376) 50–55: 169 (47%) 56–60: 102 (28%) 61–65: 92 (25%)		(N = 376) White: 297 (80%) Black: 45 (12%) Hispanic: 26 (7%) Asian/PI: 3 (0.8%)		0/346 (0%)		
Levy V, Yuan J, Ruiz J, et al. Hepatitis B sero-prevalence and risk behaviors among immigrant men in a population-based household survey in low-income neighborhoods of northern California. J Immigr Minor Health 2010;12(6):828–33.	Cross-sectional analytic	Nonprobability sampling	5 California counties with median household income below 10th percentile	2001–2005	Men aged 18–35 years	(N = 1,502) Median: 24 (IQR: 21–29)		(N = 1,512) US-born (no race ethnicity listed): 811 (54%) Latin American (immigrant): 648 (43%) Asian (immigrant): 53 (3.5%)	(n = 9) Asian immigrant: 2 (22%) Latin American immigrant: 2 (22%) U.S.-born: 5 (56%)	9/1,512 (0.6%)		Occult infection: 62/1,512 (4.1%)
Ramsey SD, Unger JM, Baker LH, et al. Prevalence of hepatitis B virus, hepatitis C virus, and HIV infection among patients with newly diagnosed cancer from academic and community oncology practices. JAMA Oncol 2019;5(4):497–505.	Cohort (prospective)	Nonprobability sampling	Cancer clinics at 9 academic and 9 community oncology institutions	2013–2017	Adults patients with newly diagnosed cancer	(N = 3,051) Median: 60.6 (range: 18.2–93.7)		(N = 3,051) White: 2,281 (75%) Black: 553 (18%) Asian: 102 (3%) Other: 115 (4%) Non-Hispanic: 2,478 (81%) Hispanic: 558 (18%)		19/3,050 (0.6%; 95% CI: 0.4%–1.0%) Adjusted for cancer, age, race: 0.4%	Unadjusted: 197/3,050 (6.5%; 95% CI: 5.6%–7.4%) Adjusted for cancer, age, race: 5.3%	
Thompson LA, Heath LJ, Freml H, Delate T. Universal hepatitis B screening and management in patients with cancer who received immunosuppressive chemotherapy. J Oncol Pharm Pract 2020;26(5):1141–6.	Incidence or prevalence study without a comparison group	Nonprobability sampling	Gastroenterology and oncology departments, Kaiser Permanente, Colorado	2014–2016	Adult patients with cancer					5/2,409 (0.2%)		Anti-HBc+: 111/1,917 (5.8%)

SUPPLEMENTARY TABLE 11. HBV infection prevalence and linkage to care, universal screening systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years among *sample*	Age, years among *HBV+*	Race/ethnicity among *sample*	Race/ethnicity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI) (HBsAg+ unless otherwise defined)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other test results
Prevalence not representative												
Bailey MB, Shiau R, Zola J, et al. San Francisco Hep B Free: a grassroots community coalition to prevent hepatitis B and liver cancer. J Community Health 2011;36(4):538–51.	Quantitative: cross-sectional analytic study Qualitative: narrative research	Nonprobability sampling	7 free public hepatitis B testing and vaccination sites, San Francisco, California	2007–2009	All clients tested for hepatitis B	Median: 42 (range: 9–108)	(n = 238) Median: 45 (range: 18–84) <18: 0 (0%) 18–30: 58 (24%) 31–40: 36 (15%) 41–50: 48 (20%) 51–60: 62 (26%) ≥61: 33 (14%)	(N = 4,427) Asian/Pacific Islander: 3,467 (80%) White: 408 (9%) Hispanic: 265 (6%) Black: 71 (2%) Other/multiracial: 78 (2%) AI/AN: 31 (1%) Unknown: 26 (1%)	(N = 238) Asian/Pacific Islander: 224 (95%) White: 4 (2%) Black: 3 (1%) AI/AN: 2 (1%) Other/multiracial: 1 (1%) Hispanic: 0 (0%)	238/4,427 (5.4%)		
Ben Musa R, Gampa A, Basu S, et al. Hepatitis B vaccination in patients with inflammatory bowel disease. World J Gastroenterol 2014;20(41):15358–66.	Cross-sectional analytic Observational study (retrospective)	Nonprobability sampling	Rush University Medical Center Gastroenterology section, Chicago, Illinois	2008–2013	Consecutively treated patients with inflammatory bowel disease	Mean: 42.5 (SD: 16.5)	Median: 56 (range: 54–61)	(N = 500) White: 350 (70%) Black: 103 (21%) Asian: 5 (1%) Native American: 3 (1%) Missing: 39 (8%) Hispanic: 30 (6%) Non-Hispanic: 470 (94%)	(n = 4) White: 2 (50%) Black: 2 (50%)	4/220 (1.8%)	3/114 (2.6%)	
Bender TJ, Wise ME, Utah O, et al. Outbreak of hepatitis B virus infections associated with assisted monitoring of blood glucose in an assisted living facility—Virginia, 2010. PLoS One 2012;7(12):e50012.	Cohort (retrospective) Outbreak investigation	Nonprobability sampling	Assisted living facility, Virginia	2010	Residents of an assisted living facility, with and without neuropsychiatric disorders	(N = 139) Median: 59 (range: 28–93)		Black: 82/139 (59%)		Chronic (anti-HBc+, HBsAg+, anti-HBs-): 5/126 (4%)		
Centers for Disease Control and Prevention (CDC). Multiple outbreaks of hepatitis B virus infection related to assisted monitoring of blood glucose among residents of assisted living facilities—Virginia, 2009–2011. MMWR Morb Mortal Wkly Rep 2012;61(19):339–43.	Incidence or prevalence study without a comparison group Outbreak investigation	Nonprobability sampling	4 assisted living facilities, Virginia	2009–2011	Facility residents receiving blood glucose monitoring	(N = 536) 19–59: 177 (33%) ≥60: 360 (67%)				Chronic [CSTE definition]: 16/420 (3.8%)		
Chak E, Taefi A, Li CS, et al. Electronic medical alerts increase screening for chronic hepatitis B: a randomized, double-blind, controlled trial. Cancer Epidemiol Biomarkers Prev 2018;27(11):1352–7.	Cohort (prospective)	Nonprobability sampling	UC Davis health system, California	2016–2017	General: Patients within health system as of 2014 with prior HBsAg test Intervention and Control: Asian/PI patients with private insurance seen during 2016–2017			General: unknown race Intervention and control groups: Asian/PI (100%)	(N = 9) Asian/PI: 9 (100%)	General: 353/2,640 (13.4%) Asian/PI enrolled: 9/167 (5.4%)		
Christian WJ, Hopenhayn C, Christian A, McIntosh D, Koch A. Viral hepatitis and injection drug use in Appalachian Kentucky: a survey of rural health department clients. Public Health Rep 2010;125(1):121–8.	Cross-sectional analytic	Nonprobability sampling	4 rural health departments, Kentucky	2006–2007	Adults screened for HBV or HCV	(N = 92) Mean: 32.9 years <30: 41 (44%) 30–49: 40 (44%) ≥50: 5 (5%)				2/50 (4%)		
Fong TL, Lee BT, Chang M, et al. High prevalence of chronic viral hepatitis and liver fibrosis among Mongols in Southern California. Dig Dis Sci 2021;66(8):2833–9.	Cross-sectional analytic	Nonprobability sampling	Community center free screening events aimed at Mongols, Los Angeles, California	2018	Persons attending events	Mean: 38 (range: 4–69)	Mean: 38 (range: 4–69)	(N = 534) Asian: 534 (100%) Born in Mongolia: 531 (99%)	Born in Mongolia: 51/534 (96%)	53/534 (9.9%)		
Ganesan A, Krantz EM, Huppler Hullsiek K, et al.; Infectious Disease Clinical Research Program HIV/STI Working Group. Determinants of incident chronic kidney disease and progression in a cohort of HIV-infected persons with unrestricted access to health care. HIV Med 2013;14(2):65–76.	Cohort	Nonprobability sampling	U.S. military health system	1986–2010	Enrolled active duty members with HIV infection with at least 4 creatinine measures	(N = 3,360) Median: 28.8 (IQR = 24.5–34.1)		(N = 2,030) White: 955 (47%) Black: 840 (41%) Other: 235 (12%)	(n = 77) White: 35 (45%) Black: 33 (43%) Other: 9 (12%)	Chronic [HBsAg+ at least 2 times, 6 months apart]: 77/2,030 (3.8%)		
Haider M, Flocco G, Lopez R, Carey W. Retrospective observational study of temporal trends and outcomes of hepatitis B screening in patients receiving rituximab. BMJ Open 2020;10(12):e043672.	Incidence or prevalence study without a comparison group	Nonprobability sampling	Tertiary care center	2005–2017	Patients receiving rituximab	(N = 2,219) Mean: 58 (SD: 16)		(N = 1,765) White: 1,474 (84%) Black: 200 (11%) Asian: 13 (1%) Hispanic: 32 (2%) Other: 46 (3%)		3/1,584 (0.2%)		Anti-HBc+: 100/1,765 (5.7%)

SUPPLEMENTARY TABLE 11. HBV infection prevalence and linkage to care, universal screening systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years among *sample*	Age, years among *HBV+*	Race/ethnicity among *sample*	Race/ethnicity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI) (HBsAg+ unless otherwise defined)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other test results
Hennessey KA, Kim AA, Griffin V, Collins NT, Weinbaum CM, Sabin K. Prevalence of infection with hepatitis B and C viruses and co-infection with HIV in three jails: a case for viral hepatitis prevention in jails in the United States. J Urban Health 2009;86(1):93–105.	Cross-sectional analytic	Probability sampling	Jails: Chicago, Illinois; Detroit, Michigan; and San Francisco, California	1999–2000	Incoming inmates with HIV infection		Weighted (n = 11,165) 15–19: 0.2% (95% CI: 0–0.4) 20–29: 1.1% (95% CI: 0.8–1.3) 30–39: 1.3% (95% CI: 0.9–1.7) ≥40: 0.6% (95% CI: 0.2–0.9)			Weighted: (n = 11,165) (0.9%; 95% CI: 0.1–1.1)		Weighted: (n = 11,166) Anti-HBc+: 19% (95% CI: 18–19)
Hwang JP, Lok AS, Fisch MJ, et al. Models to predict hepatitis B virus infection among patients with cancer undergoing systemic anticancer therapy: a prospective cohort study. J Clin Oncol 2018;36(10):959–67.	Cross-sectional analytic Modeling	Probability sampling	Cancer center, Houston, Texas	2013–2014	Adult patients with solid or hematologic malignancies who received systemic anti-cancer therapy and with no known history of HBV infection or current use of anti-HBV medications		Mean: 50 (SD: 10.5)	(N = 2,124) White: (11%) Black: (8%) Asian: (4%) Hispanic: (11%)	(n = 7) Asian: 4 (57%) White: 3 (43%)	7/2124 (0.3%)	128/2124 (6%)	HBsAg-, anti-HBs-, anti-HBc+: 27/2,124 (1.3%)
Jazwa A, Coleman MS, Gazmararian J, et al. Cost-benefit comparison of two proposed overseas programs for reducing chronic Hepatitis B infection among refugees: is screening essential? Vaccine 2015;33(11):1393–9.	Incidence or prevalence study without a comparison group Economic analysis	Nonprobability sampling	Minnesota and Georgia	2005–2010	Refugees from 82 countries of origin	(N = 21,409) Mean: 27.6 (SD: 16) ≥19: 13,995 (65%)				1,515/21,409 (7.1%)		
Kushner T, Chen Z, Tressler S, Kaufman H, Feinberg J, Terrault NA. Trends in hepatitis B infection and immunity among women of childbearing age in the United States. Clin Infect Dis 2020;71(3):586–92.	Cross-sectional analytic	Nonprobability sampling	Quest Diagnostics database, United States	2011–2017	Women aged 15–44	Range: 15–44	*Rates of chronic infection by age group Born after 1992: 1,896/1,518,136 (0.12%) Born 1980–1991: 16,869/4,506,979 (0.37%) Born before 1980: 18,990/2,009,550 (0.94%)			(HBsAg+, HBeAg+, or HBV DNA+ and anti-HBc IgM-): 37,755/8,034,665 (0.47%)		Exposed (anti-HBc IgM+ or anti-HBc total +): 60,114/2,332,979 (2.6%)
Ladenheim MR, Kim NG, Nguyen P, et al. Sex differences in disease presentation, treatment and clinical outcomes of patients with hepatocellular carcinoma: a single-centre cohort study. BMJ Open Gastroenterol 2016;3(1):e000107.	Cohort (retrospective)	Nonprobability sampling	Medical center, California	1998–2015	Patients with HCC	Mean: 60.8 (SD: 11.1)		(N = 1,886) Asian: 792 (42.4%) White: 726 (38.8%) Hispanic: 292 (15.6%) Black: 31 (1.7%) Other: 29 (1.6%)	(n = 446) Asian: 415 (93%) Non-Asian: 31 (7%)			HBsAg+, HBV DNA+, or documented history of HBV infection: 446/1,886 (23.7%)
Lederman E, Blackwell A, Tomkus G, et al. Opt-out testing pilot for sexually transmitted infections among immigrant detainees at 2 Immigration and Customs Enforcement Health Service Corps-staffed detention facilities, 2018. Public Health Rep 2020;135(1_suppl):82S–89S.	Cross-sectional analytic Economic analysis Qualitative survey	Nonprobability sampling	2 Immigration and Customs Enforcement Health Service Corps-staffed facilities, Texas and Arizona	2018	Immigrants being detained without known STI infection or who were symptomatic or pregnant	(N = 1,041) Median: 28 (range: 18–78)				3/497 (0.6%)		
Lee H, Kiang P, Watanabe P, Halon P, Shi L, Church DR. Hepatitis B virus infection and immunizations among Asian American college students: infection, exposure, and immunity rates. J Am Coll Health 2013;61(2):67–74.	Cross-sectional analytic	Nonprobability sampling	University, Massachussetts	2010	API college students	Mean: 23.4 (SD: 4.6; range: 18–42)		Asian: 208 (100%)	Born in Asia: 5 (100%)	5/208 (2.4%)	28/208 (13%)	
Lin SY, Chang ET, So SK. Stopping a silent killer in the underserved Asian and Pacific Islander community: a chronic hepatitis B and liver cancer prevention clinic by medical students. Asian Pac J Cancer Prev 2009;10(3):38–6.	Incidence or prevalence study without a comparison group	Nonprobability sampling	Free HBV Screening Clinic, San Jose, California	2007–2008	Clinic attendees, primarily API immigrants	(N = 510) Median: 54 (range: 16–86)	(n = 87) Median: 53 <30: 7 (8%) 30–39: 16 (18%) 40–49: 14 (16%) 50–59: 31 (36%) 60–69: 17 (20%) ≥70: 2 (2%)	(N = 510) Asian: 501 (98%) Non-Asian: 9 (2%)	(n = 87) Asian: 85 (98%) Non-Asian: 2 (2%)	87/510 (17%)		

SUPPLEMENTARY TABLE 11. HBV infection prevalence and linkage to care, universal screening systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years among *sample*	Age, years among *HBV+*	Race/ethnicity among *sample*	Race/ethnicity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI) (HBsAg+ unless otherwise defined)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other test results
Liu TC, Vachharajani N, Chapman WC, Brunt EM. SALL4 immunoreactivity predicts prognosis in Western hepatocellular carcinoma patients but is a rare event: a study of 236 cases. Am J Surg Pathol 2014;38(7):966–72.	Cross-sectional analytic	Nonprobability sampling	Washington University School of Medicine, Missouri	1990–2009	Patients with heptaocellular carcinoma and tissue available	Median: 59 (range: 19–83)		(N = 236) White: 185 (78%) Black: 37 (16%) Asian: 9 (4%) Hispanic: 4 (2%) Native American: 1 (0.4%)				Undefined HBV: 21/236 (8.9%)
Lu M, Zhou Y, Holmberg SD, et al.; Chronic Hepatitis Cohort Study Investigators. Trends in diagnosed chronic hepatitis B in a US health system population, 2006–2015. Open Forum Infect Dis 2019;6(7):ofz286.	Cross-sectional analytic	Nonprobability sampling	4 health care systems, Michigan, Pennsylvania, Oregon, Hawaii	2006–2015	Adult patients who received health care services	(N = 2,500,000) ≤40: (range: 34%–39%)	Rate per 100,000 ≤40: (range: 160.1–189.1) 41–50: (range: 256.9–365.4) 51–60: (range: 221.4–333.2) 61–70: (range: 152.5–287.7) >70: (range: 72.0–152.8)	White: (range: 64%–70%)		(n = 5,492) Range: rate 181.1–253.9 per 100,000 persons		
Lum PJ, Hahn JA, Shafer KP, et al. Hepatitis B virus infection and immunization status in a new generation of injection drug users in San Francisco. J Viral Hepat 2008;15(3):229–36.	Cross-sectional analytic	Nonprobability sampling	4 neighborhoods, San Francisco, California	2000–2002	Persons under 30 who injected drugs in the past 30 days	Median: 22 (IQR: 20–25)	(n = 177)*Among those with past or current HBV infection (any combination of HBsAg, anti-HBc, and anti-HBs+) 15–19: 12 (7%) 20–24: 79 (45%) 25–29: 86 (49%)	(N = 831) White: 665 (80%) Non-White: 166 (20%)		Overall: 19/831 (2%) Among persons with HIV: 2/32 (6%) Among peorsons with HCV: 9/315 (3%)	Overall: 158/831 (19%) Among persons with HIV: 17/32 (53%) Among persons with HCV: 112/315 (36%)	
Moore MS, Bocour A, Winters A. Surveillance-based estimate of the prevalence of chronic hepatitis B virus infection, New York City, 2016. Public Health Rep 2019;134(6):695–702.	Modeling Incidence or Prevalence (Surveillance)	Nonprobability sampling	New York, New York	2000–2016	City residents					Chronic (HBsAg+, HBeAg+, DNA+, or genotype result): 123,869/8,537,673 (1.5%)		
Park LS, Tate JP, Justice AC, et al. FIB-4 index is associated with hepatocellular carcinoma risk in HIV-infected patients. Cancer Epidemiol Biomarkers Prev 2011;20(12):2512–7.	Cohort (prospective)	Nonprobability sampling	Veterans Affairs medical centers	1996–2007	Male veterans with HIV infection	(N = 22,980) <35: 2,548 (11%) 35–39: 3,112 (14%) 40–44: 4,815 (21%) 45–49: 5,298 (23%) 50–54: 3,394 (15%) 55–59: 1,922 (8%) ≥60: 1,891 (8%)		(N = 22,980) Black: 11,773 (51%) White: 8,300 (36%) Hispanic: 1,761 (8%) Other/unknown: 1,146 (5%)				HBsAg+, HBeAg+, or DNA+: Overall: 1,442/19,742 (7.3%) With HCC: 30/104 (29%)
Sarkar S, Esserman DA, Skanderson M, Levin FL, Justice AC, Lim JK. Disparities in hepatitis C testing in U.S. veterans born 1945–1965. J Hepatol 2016;65(2):259–65.	Cross-sectional analytic	Nonprobability sampling	U.S. Veterans Administration facilities	2000–2013	Veterans born during 1945–1965 with at least 2 visits during the study period	(N = 4,221,135) 1945–1949: 1,683,073 (39.9%) 1950–1954: 1,002,366 (23.7%) 1955–1959: 794,945 (18.8%) 1960–1965: 740,751 (17.5%)		(N = 4,221,135) White: 2,310,386 (54.7%) Unknown: 1,141,956 (27.1%) Black: 666,983 (15.8%) Hawaiian/Pacific Islander: 45,957 (1.1%) AI/AN: 29,661 (0.7%) Asian: 26,192 (0.6%)		(HBsAg+, DNA+, or HBeAg+): 384,470/4,221,135 (9.1%)		
Scott KC, Taylor EM, Mamo B, et al.; Centers for Disease Control and Prevention (CDC). Hepatitis B screening and prevalence among resettled refugees—United States, 2006–2011. MMWR Morb Mortal Wkly Rep 2015;64(21):570–3.	Cross-sectional analytic	Nonprobability sampling	Minnesota Department of Health, the State University of New York-Upstate Medical University (SUNY-Upstate), Thomas Jefferson University, and Yale-New Haven Hospital	2006–2011	Refugees resettled in the United States	>18				267/3,661 (7.3%)	776/3,661 (21.2%)	
Wi CI, Loo NM, Larson JJ, et al. Low level of hepatitis B virus screening among patients receiving chemotherapy. Clin Gastroenterol Hepatol 2015;13(5):970–5.	Cross-sectional analytic	Non-probability sampling	Large academic medical center, Rochester, Minnesota	2006–2011	Patients undergoing chemotherapy who were screened for HBV	(N = 1,279) Mean: 58.8 (SD: 13.5)		(N = 1,279) White: 1,163 (90.9%) Other: 79 (6.2%) Black: 20 (1.6%) Asian: 17 (1.3%)		13/1,279 (1%)		

SUPPLEMENTARY TABLE 12. Hepatitis C and B coinfection systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Chronic HBV prevalence among persons with HCV infection n/N (%; 95% CI)	Serology used to determine coinfection prevalence	Anti-HBc+, anti-HBs+ or -, and HBsAg-	Anti-HBc+/anti-HBs+	Anti-HBc + (regardless of HBsAg or anti-HBs) n/N (%; 95% CI)	Anti-HBc+ only (isolated core) n/N (denominator is anti-HBc+) (%; 95% CI)	Other results
Abutaleb A, Almario JA, Alghsoon S, et al. Higher levels of fibrosis in a cohort of veterans with chronic viral hepatitis are associated with extrahepatic cancers. J Clin Exp Hepatol 2021;11(2):195–200.	Cross-sectional analytic study	Nonprobability sample	Veterans Affairs hepatitis clinic, Maryland	2014–2018	Patients with advanced liver disease undergoing ransient elastography	17/1,318 (1.3%)	Not specified					
Armed Forces Health Surveillance Center (AFHSC). Surveillance snapshot: service members with hepatitis B, hepatitis C, and HIV-1, active component, U.S. Armed Forces. MSMR 2011;18(8):23.	Incidence or prevalence study without a comparison group	Nonprobability sample	United States	2000–2010	Active component service members	86/3,185 (2.7%)	ICD codes, tests not specified					
Belperio PS, Shahoumian TA, Mole LA, Backus LI. Evaluation of hepatitis B reactivation among 62,920 veterans treated with oral hepatitis C antivirals. Hepatology 2017;66(1):27–36.	Incidence or prevalence study without a comparison group	Nonprobability sample	U.S. Veterans Affairs health care system	2014–2016	Veterans with HCV on DAA	377/53,784 (0.7%)	HCV: serology not specified HBV: HBsAg			18,462/40,383 (45.7%)	7,295/18,462 (39.5%)	42.2% anti-HBs+ of those who were HBsAg+ (22,479/53,237)
Bini EJ, Perumalswami PV. Hepatitis B virus infection among American patients with chronic hepatitis C virus infection: prevalence, racial/ethnic differences, and viral interactions. Hepatology 2010;51(3):759–66.	Cross-sectional analytic study	Nonprobability sample	VA New York Harbor Healthcare System and Bellevue Hospital Center, New York, New York	1998–2004	Outpatient gastroenterology, primary care, and infectious diseases clinic adult patients with HCV	73/1,257 (5.8%; 95% CI: 4.5%–7.1%)	HCV: HCV ab, HCV RNA HBV: HBsAg, anti-HBs, anti-HBc	773/1,257 (61.5%; 95% CI: 58.8%–64.2%)				
Butt AA, Yan P, Aslam S, et al. Hepatitis C virologic response in hepatitis B and C coinfected persons treated with directly acting antiviral agents: results from ERCHIVES. Int J Infect Dis 2020;92:184–8.	Cross-sectional analytic study	Nonprobability sample	National Veterans Affairs HCV Clinical Case Registry (ERCHIVES)	Not specified	HCV patients who initiated treatment with new DAAs	115/51,781 (0.22%)	HCV: HCV ab and HCV RNA HBV: HBsAg or HBV DNA	13,096/51,781 (25.3%)				
Davison J, O'Shea A, Waterbury N, Villalvazo Y. Examining hepatitis, A and B vaccination, and HBV reactivation monitoring during direct-acting antiviral therapy for hepatitis C. J Community Health 2018;43(6):1124–7.	Incidence or prevalence study without a comparison group	Nonprobability sample	VA Healthcare System, Iowa City, Iowa	2014–2016	Veterans with HCV infection treated with DAA		HCV: HCV ab, HCV RNA HBV: anti-HBc			101/409 (25%)		
Harris AM, Millman AJ, Lora M, Osinubi A, Lom J, Miller LS. Hepatitis B testing, care linkage, and vaccination coverage within a registry of hepatitis C infected patients. Vaccine 2019;37(16):2188–93.	Incidence or prevalence study without a comparison group	Nonprobability sample	Large, urban safety-net health system, Atlanta, Georgia	2004–2016	Patients with HCV infection	43/3,629 (1.2%)	HCV: anti-HCV, HCV RNA, or HCV genotype HBV: HBsAg, total anti-HBc, anti-HBs, HBV DNA, HBeAg		678/2,342 (29%)		789/1,467 (54%)	
Hom JK, Kuncio D, Johnson CC, Viner K. Increased health and social vulnerability among hepatitis C infected individuals coinfected with hepatitis B. J Health Care Poor Underserved 2018;29(4):1269–80.	Cross-sectional analytic study	Nonprobability sample	Philadelphia, Pennsylvania	2010–2014	Residents with positive HCV or HBV lab results	133/29,940 (0.44%)	HBV: HBsAg, HBeAg, or HBV DNA HCV: anti-HCV or HCV RNA					

SUPPLEMENTARY TABLE 12. Hepatitis C and B coinfection systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Chronic HBV prevalence among persons with HCV infection n/N (%; 95% CI)	Serology used to determine coinfection prevalence	Anti-HBc+, anti-HBs+ or -, and HBsAg-	Anti-HBc+/anti-HBs+	Anti-HBc + (regardless of HBsAg or anti-HBs) n/N (%; 95% CI)	Anti-HBc+ only (isolated core) n/N (denominator is anti-HBc+) (%; 95% CI)	Other results
Kruse RL, Kramer JR, Tyson GL, et al. Clinical outcomes of hepatitis B virus coinfection in a United States cohort of hepatitis C virus-infected patients. Hepatology 2014;60(6):1871–8.	Cohort (retrospective)	Nonprobability sample	128 U.S. Veterans Affairs facilities	1997–2009	Veterans with HCV	1,370/99,548 (1.4%)	HBV: HBsAg, DNA, or HBeAg HCV: antibody or ICD-9 code					
Lok AS, Everhart JE, Di Bisceglie AM, Kim HY, Hussain M, Morgan TR; HALT-C Trial Group. Occult and previous hepatitis B virus infection are not associated with hepatocellular carcinoma in United States patients with chronic hepatitis C. Hepatology 2011;54(2):434–42.	Nested case-control	Nonprobability sample	10 study centers in the United States (HALT-C study)	Not specified	HCC cases and matched controls		HCV: Not defined Previous HBV: HBsAg-, anti-HBc without anti-HBs; or HBV DNA in serum Occult: HBsAg-, HBV DNA in the liver					
Moorman AC, Xing J, Rupp LB, et al.; Chronic Hepatitis Cohort Study Investigators. Hepatitis B virus infection and hepatitis C virus treatment in a large cohort of hepatitis C-infected patients in the United States. Gastroenterology 2018;154(3):754–8.	Incidence or prevalence study without a comparison group	Nonprobability sample	4 U.S. integrated health care systems in Detroit, Michigan; Honolulu, Hawaii; Portland, Oregon; Danville, Pennsylvania	2014–2016	Patients 18 years or older with confirmed chronic HCV infection	115/10,551 (1.1%)	HBV: HBsAg or HBV DNA HCV: not defined		1,348/5,298 (25.4%) Primarily among patients with negative HBsAg and DNA, but also includes unknowns	2,136/5,298 (40.3%) Primarily among patients with negative HBsAg and DNA, but also includes unknowns	788/2,136 (36.9%)	
Nguyen LH, Ko S, Wong SS, et al. Ethnic differences in viral dominance patterns in patients with hepatitis B virus and hepatitis C virus dual infection. Hepatology 2011;53(6):1839–45.	Case-control study	Nonprobability sample and probability sample	Medical center and community gastroenterology clinic, San Francisco, California	1994–2009	Patients with chronic HBV (n = 115, coinfected HBV and HCV)		HBV: HBsAg or DNA HCV: anti-HCV or RNA					
Reddy A, May E, Ehrinpreis M, Mutchnick M. Latent hepatitis B is a risk factor for hepatocellular carcinoma in patients with chronic hepatitis C. World J Gastroenterol 2013;19(48):9328–33.	Case-control study	Nonprobability sample	Detroit Medical Center, Detroit, Michigan	1999–2008	Patients with HCC and HCV, HBsAg- and controls with HCV and HBsAg-		HCV: anti-HCV or HCV RNA HBV: anti-HBc+, anti-HBs + or -					
Serper M, Forde KA, Kaplan DE. Rare clinically significant hepatic events and hepatitis B reactivation occur more frequently following rather than during direct-acting antiviral therapy for chronic hepatitis C: data from a national US cohort. J Viral Hepat 2018;25(2):187–97.	Cohort (retrospective)	Nonprobability sample	U.S. Veterans Affairs health care system	2014–2016	Veterans who are anti-HBc+ who initiated oral DAAs (N = 17,266)							
Tong MJ, Theodoro CF, Salvo RT. Late development of hepatocellular carcinoma after viral clearance in patients with chronic hepatitis C: a need for continual surveillance. J Dig Dis 2018;19(7):411–20.	Case-control study	Nonprobability sample	Academic medical center, Pasadena, California	1996–2016	Cases: patients with HCC who achieved SVR for HCV infection (n = 22) Controls: patients without HCC who achieved SVR for HCV infection (n = 164)							

SUPPLEMENTARY TABLE 12. Hepatitis C and B coinfection systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Chronic HBV prevalence among persons with HCV infection n/N (%; 95% CI)	Serology used to determine coinfection prevalence	Anti-HBc+, anti-HBs+ or -, and HBsAg-	Anti-HBc+/anti-HBs+	Anti-HBc + (regardless of HBsAg or anti-HBs) n/N (%; 95% CI)	Anti-HBc+ only (isolated core) n/N (denominator is anti-HBc+) (%; 95% CI)	Other results
Tyson GL, Kramer JR, Duan Z, Davila JA, Richardson PA, El-Serag HB. Prevalence and predictors of hepatitis B virus coinfection in a United States cohort of hepatitis C virus-infected patients. Hepatology 2013;58(2):538–45.	Cross-sectional analytic study	Nonprobability sample	National Veterans Affairs HCV Clinical Case Registry	1997–2005	Veterans with positive HCV testing	1,431/102,971 (1.4%)	HCV exposure (2 of the following): anti-HCV, HCV RNA, or genotype positive; or one test and ICD-9 code for HCV HCV infection: HCV RNA or genotype positive HBV exposure: anti-HBc, HBsAg, HBV DNA, HBeAg, or anti-HBe positive HBV infection: HBsAg, DNA, or HBeAg within 1 year of HCV index date					HBV/HCV coinfection: 1,431/102,971 (1.4%) HCV exposure and HBV exposure ("history of HCV and HBV"): 58,415/168,239 (34.7%)
Yanny BT, Latt NL, Saab S, et al. Risk of hepatitis B virus reactivation among patients treated with ledipasvir-sofosbuvir for hepatitis C virus infection. J Clin Gastroenterol 2018;52(10):908–12.	Incidence or prevalence study without a comparison group	Nonprobability sample	Kaiser Permanente, Southern California	2015–2016	Patients with current or prior HBV infection treated with ledipasvir-sofosbuvir (N = 283)							Among patients with HBV exposure, 127/283 (45%) anti-HBc+/HBsAg-, 156/283 (55%) HBsAg+

SUPPLEMENTARY TABLE 13. HBV infection prevalence, corrections systematic review

Citation	Study design	Sampling strategy	Setting	Timeframe	Study population	Age, years (%) among *sample*	Age, years (%) among *HBV+*	Race/ethnicity among *sample*	Race/ethnitity among *HBV+*	Chronic HBV prevalence n/N (%; 95% CI)	HBsAg+ incidence or acute HBV infection n/N (%; 95% CI)	Past infection [HBsAg-, anti-HBc+] n/N (%; 95% CI)	Other results (specify n/N [%; 95% CI] and tests)
Centers for Disease Control and Prevention (CDC). Transmission of hepatitis B virus in correctional facilities—Georgia, January 1999–June 2002. MMWR Morb Mortal Wkly Rep 2004;53(30):678–81.	Incidence or prevalence study without a comparison group	Nonprobability sample	4 Georgia prison intake centers (3 for men, 1 for women)	2003	People consenting to testing at intake					Chronic infection, undefined: 4/489 (0.8%)			
Centers for Disease Control and Prevention (CDC). Hepatitis B outbreak in a state correctional facility, 2000. MMWR Morb Mortal Wkly Rep 2001;50(25):529–32.	Cross-sectional analytic	Nonprobability sample	High-security state correctional facility	2000	People residing in the facility who consented to screening					HBsAg+, anti-HBc IgM- : 11/1,123 (1%)	(N = 1,123) IgM anti-HBc+: 11 (1%)	194/1,123 (17%)	Total anti-HBc prevalence: 860/4269 (20.2%) (95% CI 18.95–21.35)
Custer B. Behavioral factors associated with HIV, HBV, HCV, and HTLV infections in US blood donors. Conference abstract 2014.	Case-control	Nonprobability sample	Blood centers collecting 50% of U.S. supply	2011–2013	Blood donors with history of incarceration								
Hennessey KA, Kim AA, Griffin V, Collins NT, Weinbaum CM, Sabin K. Prevalence of infection with hepatitis B and C viruses and co-infection with HIV in three jails: a case for viral hepatitis prevention in jails in the United States. J Urban Health 2009;86(1):93–105.	Cross-sectional analytic	Probability sample	Jails: Chicago, Illinois; Detroit, Michigan; San Francisco, California	1999–2000	Incoming inmates with HIV infection		15–19: 0.2% (95% CI: 0–0.4) 20–29: 1.1% (95% CI: 0.8–1.3) 30–39: 1.3% (95% CI: 0.9–1.7) ≥40: 0.6% (95% CI: 0.2–0.9)			Weighted: (N = 11,165) (0.9%; 95% CI: 0.8–1.1)			Weighted: (N = 11,166) Anti-HBc+: 19%; 95% CI: 18–19)
Khan AJ, Simard EP, Bower WA, et al. Ongoing transmission of hepatitis B virus infection among inmates at a state correctional facility. Am J Public Health 2005;95(10):1793–9.	Cross-sectional analytic	Nonprobability sample	High-security state correctional facility, Georgia	2000–2001	Men	Baseline (N = 1,124): Median 32.5 (range: 18–71) Endline (N = 366): Median 32 (range: 19–58)		(N = 1,488) Black: 970 (65%)		HBsAg+, total anti-HBc+, IgM anti-HBc+: 15/1,490 (1%)	Acute infection: 13/1,490 (0.9%) (defined as IgM+ with or without HBsAg+) Annual incidence: 3,579 per 100,000; 18/503 (3.6%) of susceptible inmates became	Baseline: 208/1,124 (18.5%) Repeat testing of susceptible persons at endline: 14/503 (2.8%)	
Kittikraisak W, Davidson PJ, Hahn JA, et al. Incarceration among young injectors in San Francisco: associations with risk for hepatitis C virus infection. J Subst Use 2006;11(4):271–81.	Cross-sectional analytic	Nonprobability sample	San Francisco, California	2000–2002	Persons under 30 who self-reported recently injecting drugs	(N = 716) 15–19: 131 (18%) 20–24: 357 (50%) 25–29: 228 (32%)		(N = 716) White: 570 (80%) Non-White: 146 (20%)					HBsAg+ or anti-HBc+ and anti-HBs+ among those with history of incarceration: 160/707 (22.6%)
Lederman E, Blackwell A, Tomkus G, et al. Opt-out testing pilot for sexually transmitted infections among immigrant detainees at 2 Immigration and Customs Enforcement Health Service Corps-staffed detention facilities, 2018. Public Health Rep 2020;135(1_suppl):82S–89S.	Cross-sectional analytic Economic analysis Qualitative survey	Nonprobability sample	2 Immigration and Customs Enforcement Health Service Corps-staffed facilities, Texas and Arizona	2018	Immigrants being detained without known STI infection or who were symptomatic or pregnant	(N = 1,041) Median: 28 (range: 18–78)				3/497 (0.6%)			
Macalino GE, Vlahov D, Sanford-Colby S, et al. Prevalence and incidence of HIV, hepatitis B virus, and hepatitis C virus infections among males in Rhode Island prisons. Am J Public Health 2004;94(7):1218–23.	Cross-sectional analytic	Nonprobability sample	Rhode Island Department of Corrections facility	1998–2000	Women with multiple instances of incarceration	(N = 4,269) <30: 2,058 (48.2%) 30–39: 1,463 (34.3%) 40–49: 600 (14.1%) ≥50: 148 (3.5%)		(N = 4,269) White: 2,449 (57.5%) Black: 1,093 (25.6%) Hispanic: 693 (16.2%) Other: 32 (0.7%)	(n = 860) White: 476 (55.3%) Black: 210 (24.4%) Hispanic: 160 (18.6%) Other: 14 (1.6%)	134/4,269 (3.1%)	Seroincidence 2.7 per 100 person-years (95% CI: 1.57–3.58)		Total anti-HBc prevalence: 860/4269 (20.2%; 95% CI 18.95–21.35)
Solomon L, Flynn C, Muck K, Vertefeuille J. Prevalence of HIV, syphilis, hepatitis B, and hepatitis C among entrants to Maryland correctional facilities. J Urban Health 2004;81(1):25–37.	Cross-sectional analytic	Nonprobability sample	Intake facilities, Maryland	2002	New entrants	(N = 3,914) 18–25: 1,043 (26.6%) 26–30: 529 (13.5%) 31–35: 750 (19.2%) 36–40: 672 (17.2%) 41–50: 772 (19.7%) 51–60: 128 (3.3%) >60: 20 (0.5%)		(N = 3,914) Black: 3,146 (80%) White: 738 (19%) Other: 27 (1%)		286/3,286 (8.7%) 2.9% among incarcerated persons and 11.4% among detained persons		460/2,910 (15.8%)	
Sosman J, Macgowan R, Margolis A, et al; Project START Biologics Study Group. Sexually transmitted infections and hepatitis in men with a history of incarceration. Sex Transm Dis 2011;38(7):634–9.	Cross-sectional analytic	Nonprobability sample	Prisons: Mississippi, Rhode Island, Wisconsin	Not reported	Men aged 18–29 years, recently released from prison, and who had been incarcerated for at least 90 days	(N = 178) Mean: 22.5 (SD: 2.7)		(N = 178) Black: 82 (46%) White: 55 (31%) Other: 21 (12%) Hispanic: 20 (11%)		Chronic (HBsAg+ and anti-HBc+): 2/166 (1%)		11/166 (7%)	

SUPPLEMENTARY TABLE 14. Universal screening systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or exposure occurred) as intended?**
Abara WE, Collier MG, Moorman A, et al. Characteristics of deceased solid organ donors and screening results for hepatitis B, C, and human immunodeficiency viruses—United States, 2010–2017. MMWR Morb Mortal Wkly Rep 2019;68:61–6.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Abara WE, Cha S, Malik T, et al. Prenatal screening for and prevalence of hepatitis B surface antigen in pregnant women and prevention of transmission to infants born to infected mothers—Guam, 2014. J Pediatric Infect Dis Soc 2018;7:290–5.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Beste LA, Ioannou GN, Chang MF, et al. Prevalence of hepatitis B virus exposure in the Veterans Health Administration and association with military-related risk factors. J Clin Gastroenterol Hepatol 2020;18:954–62.e6.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Chao TT, Sheffield JS, Wendel GD Jr, Ansari MQ, McIntire D, Roberts SW. Risk factors associated with false positive HIV test results in a low-risk urban obstetric population. J Pregnancy 2012:841979.	Cross-sectional analytic	No	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 14. Universal screening systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or exposure occurred) as intended?**
Delwart E, Slikas E, Stramer SL, et al.; NHLBI-REDS-II Study Group. Genetic diversity of recently acquired and prevalent HIV, hepatitis B virus, and hepatitis C virus infections in US blood donors. J Infect Dis 2012;205:875–85.	Cross-sectional analytic	Yes	Yes	Can't tell	No	Can't tell
Dodd RY, Crowder LA, Haynes JM, Notari E, Stramer SL, Steele WR. Screening blood donors for HIV, HCV, and HBV at the American Red Cross: 10-year trends in prevalence, incidence, and residual risk, 2007 to 2016. Transfus Med Rev 2020;34:81–93.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Yes
Gebran SG, Wasicek PJ, Wu Y, et al. The prevalence of blood-borne pathogens in maxillofacial trauma patients. J Craniofac Surg 2020;31:2285–8.	Cross-sectional analytic	Yes	Yes	Yes	Can't tell	Can't tell
Kushner T, Park C, Masand D, et al. Hepatitis C seroprevalence among consecutive labor and delivery admissions in two New York City hospitals. Open Forum Infect Dis 2020;7:ofaa514.	Cross-sectional analytic	Yes	Can't tell	Yes	Can't tell	Can't tell

SUPPLEMENTARY TABLE 14. Universal screening systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or exposure occurred) as intended?**
Levy V, Yuan J, Ruiz J, et al. Hepatitis B sero-prevalence and risk behaviors among immigrant men in a population-based household survey in low-income neighborhoods of northern California. J Immigr Minor Health 2010;12:828–33.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Patel EU, Thio CL, Boon D, Thomas DL, Tobian AAR. Prevalence of hepatitis B and hepatitis D virus infections in the United States, 2011–2016. Clin Infect Dis 2019;69:709–12.	Cross-sectional analytic (NHANES)	Yes	Yes	Yes	Yes	Can't tell
Ramsey SD, Unger JM, Baker LH, et al. Prevalence of hepatitis B virus, hepatitis C virus, and HIV infection among patients with newly diagnosed cancer from academic and community oncology practices. JAMA Oncol 2019;5:497–505.	Cohort (prospective)	Yes	Yes	Yes	Yes	Can't tell
Roberts H, Kruszon-Moran D, Ly KN, et al. Prevalence of chronic hepatitis B virus (HBV) infection in U.S. households: National Health and Nutrition Examination Survey (NHANES), 1988–2012. Hepatology 2016;63:388–97.	Cross-sectional analytic (NHANES)	Yes	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 14. Universal screening systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or exposure occurred) as intended?**
Seamon MJ, Ginwalla R, Kulp H, et al. HIV and hepatitis in an urban penetrating trauma population: unrecognized and untreated. J Trauma 2011;71:306–10.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Sears DM, Cohen DC, Ackerman K, Ma JE, Song J. Birth cohort screening for chronic hepatitis during colonoscopy appointments. Am J Gastroenterol 2013;108:981–9.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Yes

SUPPLEMENTARY TABLE 15. Universal screening systematic review quality appraisal, quantitative descriptive studies						
Citation	**MMAT study design**	**4.1. Is the sampling strategy relevant to address the research question?**	**4.2. Is the sample representative of the target population?**	**4.3. Are the measurements appropriate?**	**4.4. Is the risk of nonresponse bias low?**	**4.5. Is the statistical analysis appropriate to answer the research question?**
Hall MR, Ray D, Payne JA. Prevalence of hepatitis C, hepatitis B, and human immunodeficiency virus in a Grand Rapids, Michigan emergency department. J Emerg Med 2010;38(3):401–5.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes
Mortensen E, Kamali A, Schirmer PL, et al. Are current screening protocols for chronic hepatitis B virus infection adequate? Diagn Microbiol Infect Dis 2016;85(2):159–67.	Incidence or prevalence study without a comparison group Literature review	Yes	Yes	Yes	Yes	Yes
Thompson LA, Heath LJ, Freml H, Delate T. Universal hepatitis B screening and management in patients with cancer who received immunosuppressive chemotherapy. J Oncol Pharm Pract 2020;26(5):1141–6.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes
Sarathy L, Cirillo C, Dehn C, Lerou PH, Prendergast M. Improving timeliness of hepatitis B vaccine birth dose administration. Hosp Pediatr 2021;11(5):446–53.	Quantitative descriptive: plan-do-study-act	Yes	Yes	Yes	Yes	Yes

SUPPLEMENTARY TABLE 16. Corrections systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or has exposure occurred) as intended?**
Centers for Disease Control and Prevention (CDC). Hepatitis B outbreak in a state correctional facility, 2000. MMWR Morb Mortal Wkly Rep 2001;50(25):529–32.	Cross-sectional analytic	Yes	Yes	Yes	Can't tell	Can't tell
Custer B. Behavioral factors associated with HIV, HBV, HCV, and HTLV infections in US blood donors. Transfusion 2014;54S:209A-210A.	Case-control	Yes	Yes	Yes	Yes	Can't tell
Hennessey KA, Kim AA, Griffin V, Collins NT, Weinbaum CM, Sabin K. Prevalence of infection with hepatitis B and C viruses and co-infection with HIV in three jails: a case for viral hepatitis prevention in jails in the United States. J Urban Health 2009;86(1):93–105.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Khan AJ, Simard EP, Bower WA, et al. Ongoing transmission of hepatitis B virus infection among inmates at a state correctional facility. Am J Public Health 2005;95(10):1793–9.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Kittikraisak W, Davidson PJ, Hahn JA, et al. Incarceration among young injectors in San Francisco: associations with risk for hepatitis C virus infection. J Subst Use 2006;11(4):271–81.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 16. Corrections systematic review quality appraisal, quantitative nonrandomized studies						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or has exposure occurred) as intended?**
Lederman E, Blackwell A, Tomkus G, et al. Opt-out testing pilot for sexually transmitted infections among immigrant detainees at 2 Immigration and Customs Enforcement Health Service Corps-staffed detention facilities, 2018. Public Health Rep 2020;135(1_suppl):82S–89S.	Cross-sectional analytic Economic analysis Qualitative survey	Can't tell	Yes	Yes	Yes	Can't tell
Macalino GE, Vlahov D, Sanford-Colby S, et al. Prevalence and incidence of HIV, hepatitis B virus, and hepatitis C virus infections among males in Rhode Island prisons. Am J Public Health 2004;94(7):1218–23.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Solomon L, Flynn C, Muck K, Vertefeuille J. Prevalence of HIV, syphilis, hepatitis B, and hepatitis C among entrants to Maryland correctional facilities. J Urban Health 2004;81(1):25–37.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Sosman J, Macgowan R, Margolis A, et al.; Project START Biologics Study Group. Sexually transmitted infections and hepatitis in men with a history of incarceration. Sex Transm Dis 2011;38(7):634–9.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 17. Corrections systematic review quality appraisal, quantitative descriptive						
Citation	**MMAT study design**	**4.1. Is the sampling strategy relevant to address the research question?**	**4.2. Is the sample representative of the target population?**	**4.3. Are the measurements appropriate?**	**4.4. Is the risk of nonresponse bias low?**	**4.5. Is the statistical analysis appropriate to answer the research question?**
Centers for Disease Control and Prevention (CDC). Transmission of hepatitis B virus in correctional facilities—Georgia, January 1999–June 2002. MMWR Morb Mortal Wkly Rep 2004;53(30):678–81.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes

SUPPLEMENTARY TABLE 18. HCV systematic review quality appraisal, quantitative nonrandomized						
Citation	MMAT study design	3.1. Are the participants representative of the target population?	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	3.3. Are there complete outcome data?	3.4. Are the confounders accounted for in the design and analysis?	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?
Abutaleb A, Almario JA, Alghsoon S, et al. Higher levels of fibrosis in a cohort of veterans with chronic viral hepatitis are associated with extrahepatic cancers. J Clin Exp Hepatol 2021;11(2):195–200.	Cross-sectional analytic	Yes	Can't tell	Yes	Yes	Can't tell
Bini EJ, Perumalswami PV. Hepatitis B virus infection among American patients with chronic hepatitis C virus infection: prevalence, racial/ethnic differences, and viral interactions. Hepatology 2010;51(3):759–66.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Butt AA, Yan P, Aslam S, et al. Hepatitis C virologic response in hepatitis B and C coinfected persons treated with directly acting antiviral agents: results from ERCHIVES. Int J Infect Dis 2020;92:184–8.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell
Hom JK, Kuncio D, Johnson CC, Viner K. Increased health and social vulnerability among hepatitis C infected individuals coinfected with hepatitis B. J Health Care Poor Underserved 2018;29(4):1269–80.	Cross-sectional analytic	Yes	Yes	Yes	Can't tell	Can't tell
Kruse RL, Kramer JR, Tyson GL, et al. Clinical outcomes of hepatitis B virus coinfection in a United States cohort of hepatitis C virus-infected patients. Hepatology 2014;60(6):1871–8.	Cohort (retrospective)	Yes	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 18. HCV systematic review quality appraisal, quantitative nonrandomized						
Citation	MMAT study design	3.1. Are the participants representative of the target population?	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	3.3. Are there complete outcome data?	3.4. Are the confounders accounted for in the design and analysis?	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?
Lok AS, Everhart JE, Di Bisceglie AM, Kim HY, Hussain M, Morgan TR; HALT-C Trial Group. Occult and previous hepatitis B virus infection are not associated with hepatocellular carcinoma in United States patients with chronic hepatitis C. Hepatology 2011;54(2):434–42.	Nested case-control	Yes	Yes	Yes	Yes	Can't tell
Nguyen LH, Ko S, Wong SS, et al. Ethnic differences in viral dominance patterns in patients with hepatitis B virus and hepatitis C virus dual infection. Hepatology 2011;53(6):1839–45.	Case-control	Yes	Yes	Yes	Yes	Can't tell
Reddy A, May E, Ehrinpreis M, Mutchnick M. Latent hepatitis B is a risk factor for hepatocellular carcinoma in patients with chronic hepatitis C. World J Gastroenterol 2013;19(48):9328–33.	Case-control	Yes	Yes	Yes	Yes	Can't tell
Serper M, Forde KA, Kaplan DE. Rare clinically significant hepatic events and hepatitis B reactivation occur more frequently following rather than during direct-acting antiviral therapy for chronic hepatitis C: data from a national US cohort. J Viral Hepat 2018;25(2):187–97.	Cohort (retrospective)	Yes	Yes	Yes	Can't tell	Can't tell

SUPPLEMENTARY TABLE 18. HCV systematic review quality appraisal, quantitative nonrandomized						
Citation	**MMAT study design**	**3.1. Are the participants representative of the target population?**	**3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?**	**3.3. Are there complete outcome data?**	**3.4. Are the confounders accounted for in the design and analysis?**	**3.5. During the study period, is the intervention administered (or exposure occurred) as intended?**
Tong MJ, Theodoro CF, Salvo RT. Late development of hepatocellular carcinoma after viral clearance in patients with chronic hepatitis C: a need for continual surveillance. J Dig Dis 2018;19(7):411–20.	Case-control	Yes	Yes	Yes	Yes	Yes
Tyson GL, Kramer JR, Duan Z, Davila JA, Richardson PA, El-Serag HB. Prevalence and predictors of hepatitis B virus coinfection in a United States cohort of hepatitis C virus-infected patients. Hepatology 2013;58(2):538–45.	Cross-sectional analytic	Yes	Yes	Yes	Yes	Can't tell

SUPPLEMENTARY TABLE 19. HCV systematic review quality appraisal, quantitative descriptive						
Citation	**MMAT study design**	**4.1. Is the sampling strategy relevant to address the research question?**	**4.2. Is the sample representative of the target population?**	**4.3. Are the measurements appropriate?**	**4.4. Is the risk of nonresponse bias low?**	**4.5. Is the statistical analysis appropriate to answer the research question?**
Armed Forces Health Surveillance Center (AFHSC). Surveillance snapshot: service members with hepatitis B, hepatitis C, and HIV-1, active component, U.S. Armed Forces. MSMR 2011;18(8):23.	Incidence or prevalence study without a comparison group	Can't tell	Can't tell	Can't tell	Can't tell	Yes
Belperio PS, Shahoumian TA, Mole LA, Backus LI. Evaluation of hepatitis B reactivation among 62,920 veterans treated with oral hepatitis C antivirals. Hepatology 2017;66(1):27–36.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes
Davison J, O'Shea A, Waterbury N, Villalvazo Y. Examining hepatitis, A and B vaccination, and HBV reactivation monitoring during direct-acting antiviral therapy for hepatitis C. J Community Health 2018;43(6):1124–7.	Incidence or prevalence study without a comparison group	Yes	No	Yes	Yes	Yes
Harris AM, Millman AJ, Lora M, Osinubi A, Lom J, Miller LS. Hepatitis B testing, care linkage, and vaccination coverage within a registry of hepatitis C infected patients. Vaccine 2019;37(16):2188–93.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes
Moorman AC, Xing J, Rupp LB, et al.; Chronic Hepatitis Cohort Study Investigators. Hepatitis B virus infection and hepatitis C virus treatment in a large cohort of hepatitis C-infected patients in the United States. Gastroenterology 2018;154(3):754–8.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes

SUPPLEMENTARY TABLE 19. HCV systematic review quality appraisal, quantitative descriptive						
Citation	**MMAT study design**	**4.1. Is the sampling strategy relevant to address the research question?**	**4.2. Is the sample representative of the target population?**	**4.3. Are the measurements appropriate?**	**4.4. Is the risk of nonresponse bias low?**	**4.5. Is the statistical analysis appropriate to answer the research question?**
Yanny BT, Latt NL, Saab S, et al. Risk of hepatitis B virus reactivation among patients treated with ledipasvir-sofosbuvir for hepatitis C virus infection. J Clin Gastroenterol 2018;52(10):908–12.	Incidence or prevalence study without a comparison group	Yes	Yes	Yes	Yes	Yes

SUPPLEMENTARY TABLE 20. Consolidated Health Economic Evaluation Reporting Standards Checklist				
Citation				
Toy M, Hutton D, Harris AM, Nelson N, Salomon JA, So S. Cost-effectiveness of 1-time universal screening for chronic hepatitis B infection in adults in the United States. Clin Infect Dis 2022;74(2):210–7.				
Section/item	**Item #**	**Recommendation**	**Reported on page #**	**Comments**
Title and abstract				
Title	1	Identify the study as an economic evaluation or use more specific terms such as “cost-effectiveness analysis”, and describe the interventions compared.	1	Doesn't list comparator group
Abstract	2	Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses), and conclusions.	1	Did not provide the perspective in abstract
Introduction				
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	1,2	
Methods				
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	2	
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	2	
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	2,7	Health systems costs; assumption occur as part of regular visits, did not include other programmatic costs. Did conduct a sensitivity analysis on increased screening costs.
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	2	
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	2	Lifetime
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	3	Didn't state why 3% per year was appropriate

Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	4	
Measurement of effectiveness	11a	Single study-based estimates: Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	N/A	
	11b	Synthesis-based estimates: Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	2	Derived from recent cohort studies and meta-analyses; did not have extensive methodology on how those were identified.
Measurement and valuation of preference-based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	N/A	
Estimating resources and costs	13a	Single study-based economic evaluation: Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	N/A	
	13b	Model-based economic evaluation: Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	1,2,3,4,S	
Currency, price date, and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	2,3	2020 Medicare reimbursement rates; some costs from studies, year not clearly specified. All costs reported in U.S. dollars.

Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	2,S	
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	2,3,7	
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	S	Validation and sensitivity analyses reported but methods used not described in detail
Results				
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	3,S	
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	4	ICERs
Characterizing uncertainty	20a	Single study-based economic evaluation: Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).	N/A	
	20b	Model-based economic evaluation: Describe the effects on the results of uncertainty for all input parameters and uncertainty related to the structure of the model and assumptions.	4,S	

Characterizing heterogeneity	21	If applicable, report differences in costs, outcomes, or cost effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	N/A	
Discussion				
Study findings, limitations, generalizability, and current knowledge	22	Summarize key study findings and describe how they support the conclusions reached. Discuss limitations and the generalizability of the findings and how the findings fit with current knowledge.	4,5,6,7	
Other				
Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	7	
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	7	

Abbreviations: N/A = not applicable; S = supplementary data.

SUPPLEMENTARY TABLE 21. FDA-approved HBV serological assays (as of July 2022)			
Web address	**Applicant**	**Decision date**	**Device**
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P000014	Ortho-Clinical Diagnostics, Inc.	9/29/2000	VITROS IMMUNODIAGNOSTIC PRODUCTS:ANTI-HBS REAGENT PACK/ANTI-HBS CALIBRATORS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P000044	Ortho-Clinical Diagnostics, Inc.	4/27/2001	VITROS IMMUNODIAGNOSTIC PRODUCTS/HBSAG REAGENT PACK,VITROS IMMUNODIAGNOSTIC PRODUCTS CONFIRMATORY KIT, AND VITROS IMMUNR
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P010050	Siemens Healthcare Diagnostics Products, LTD	7/26/2002	IMMULITE 2000 XPI HBSAG
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P010051	Siemens Healthcare Diagnostics Products, LTD	7/24/2002	IMMULITE 2000 XPI ANTI-HBC
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P010052	Siemens Healthcare Diagnostics Products, LTD	7/22/2002	IMMULITE 2000 XPI ANTI-HBS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P010053	Siemens Healthcare Diagnostics Products, LTD	7/26/2002	IMMULITE 2000 XPI ANTI-HBC IMG
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P010054	ROCHE DIAGNOSTICS CORP.	2/28/2002	ELECSYS ANTI-HBS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P030024	ORTHO-CLINICAL DIAGNOSTICS	3/4/2004	VITROS IMMUNODIAGNOSTIC PRODUCTS ANTI-HBC REAGENT PACK/CALIBRATOR
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P030026	Ortho-Clinical Diagnostics, Inc.	3/4/2004	VITROS IMMUNODIAGNOSTIC PRODUCTS ANTI-HBC IGM REAGENT PAK/CALIBRATOR
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P030029	SIEMENS HEALTHCARE DIAGNOSTICS	5/14/2004	ADVIA CENTAUR ANTI-HBS READYPACK REAGENTS AND CALIBRATORS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P030040	SIEMENS HEALTHCARE DIAGNOSTICS	8/6/2004	ADVIA CENTAUR HBC IGM READYPACK REAGENTS, ADVIA CENTAUR HBC IGM QUALITY CONTROL MATERIALS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P030049	SIEMENS HEALTHCARE DIAGNOSTICS	5/26/2005	ADVIA CENTAUR HBSAG READY PACK REAGENTS/CONFIRMATORY READY PACK REAGENTS/QUALITY CONTROL MATERIAL
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P040004	SIEMENS HEALTHCARE DIAGNOSTICS	12/22/2004	ADVIA CENTAUR HBC TOTAL READYPACK REAGENTS/ADVIA CENTAUR HBC TOTAL QUALITY CONTROL MATERIALS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P050048	BIO-RAD LABORATORIES	8/25/2006	MONOLISA ANTI-HBS EIA
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P050049	ABBOTT LABORATORIES INC	6/1/2006	AXSYM HBSAG, HBSAG CONFIRMATORY, AND AXSYM HBSAG CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P050051	ABBOTT LABORATORIES INC	6/1/2006	ABBOTT ARCHITECT AUSAB
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060003	ABBOTT LABORATORIES INC	8/7/2006	AXSYM, AUSAB
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060007	Abbott Laboratories	9/7/2006	ARCHITECT HBSAG REAGENT KIT, CALIBRATORS, CONTROLS, CONFIRMATORY REAGENT KIT, CONFIRMATORY MANUAL DILUENT
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060009	ABBOTT LABORATORIES INC	8/25/2006	AXSYM CORE-M 2.0 AND AXSYM CORE-M 2.0 CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060012	ABBOTT LABORATORIES INC	9/8/2006	AXSYM CORE 2.0 AND AXSYM CORE 2.0 CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060031	Bio-Rad Laboratories, Inc.	4/27/2007	BIO-RAD MONOLISA ANTI-HBC EIA
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060034	Bio-Rad Laboratories, Inc.	5/31/2007	BIO RAD MONOLISA ANTI-HBC IGM EIA
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P060035	Abbott Laboratories	11/6/2007	ARCHITECT CORE-M REAGENT KIT/CALIBRATORS/CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P080023	Abbott Laboratories	4/10/2009	ARCHITECT CORE REAGENT KIT, ARCHITECT CORE CALIBRATOR AND ARCHITECT CORE CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P090024	SIEMENS HEALTHCARE DIAGNOSTICS	10/11/2011	ADVIA CENTAUR HBEAG ASSAY AND QUALITY CONTROL MATERIAL
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P090028	Ortho-Clinical Diagnostics, Inc.	5/11/2011	VITROS IMMUNODIAGNOSTIC PRODUCTS HBEAG REAGENT PACK/PRODUCTS HBEAG CALIBRATOR/PRODUCTS HBE CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P100001	ORTHO-CLINICAL DIAGNOSTICS	7/20/2011	VITROS IMMUNODIAGNOSTIC PRODUCTS ANTI-HBE REAGENT PACK/ANTI-HBE CALIBRATOR/ANTI HBE CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P100031	ROCHE DIAGNOSTICS CORP.	6/22/2011	ELECSYS ANTI-HBC IMMUNOASSAY & ELECSYS PRECICONTROL ANTI-HBC

https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P100032	ROCHE DIAGNOSTICS CORP.	6/27/2011	ELECSYS ANTI-HBC IMMUNOASSAY, ELECSYS PRECICONTROL ANTI-HBC FOR USE ON THE ELECSYS 2010 IMMUNOASSAY ANALYZER
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P100039	SIEMENS HEALTHCARE DIAGNOSTICS INC.	1/20/2012	ADVIA CENTAUR ANTI-HBS2 (AHBS2) ASSAY AND QAULITY CONTROL MATERIAL
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P110022	ROCHE DIAGNOSTICS CORP.	10/26/2011	ELECSYS ANTI-HBC IGM IMMUNOASSAY AND ELECSYS PRECICONTROL ANTI-HBC IGM
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P110025	ROCHE DIAGNOSTICS CORP.	12/14/2011	ELECSYS ANTI-HBC IGM IMMUNOASSAY & ELECSYS PREICONTROL ANTI-HBC IGM FOR USE ON THE MODULAR ANAYTICS E170 IMMUNOASSAY ANA
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P110029	Abbott Laboratories	4/12/2012	ARCHITECT HBSAG QUALITATIVE, QUALITATIVE CONFIRMATORY, CONFIRMATORY MANUAL DILUENT, CALIBRATORS, AND CONTROLS
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P110031	ROCHE DIAGNOSTICS CORP.	1/3/2012	ELECSYS ANTI-HBC IGM IMMUNOASSAY AND ELECSYS PRECICONTROL ANTI-HBC IGM
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P110041	SIEMENS CORP.	5/16/2014	ADVIA CENTAUR HBSAGII
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P130015	ROCHE DIAGNOSTICS OPERATIONS INC	3/14/2014	ELECSYS® HBEAG IMMUNOASSAY AND ELECSYS® PRECICONTROL HBEAG
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P160019	ROCHE DIAGNOSTICS, INC.	12/23/2016	Elecsys HBsAg II/Elecsys HBsAg Confirmatory Test/ PreciControl HBsAg II
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P180038	DiaSorin Inc.	1/2/2020	LIAISON XL MUREX Anti-HBc, LIAISON MUREX Control Anti-HBc
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P180039	DiaSorin Inc.	2/21/2020	LIAISON® XL MUREX Anti-HBs, LIAISON® XL MUREX Control Anti-HBs and LIAISON® XL MUREX Anti-HBs Verifiers
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P180045	DiaSorin Inc.	8/29/2020	LIAISON® XL MUREX HBc IgM, LIAISON® XL MUREX Control HBc IgM
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P180048	DiaSorin Inc.	8/29/2020	LIAISON® XL MUREX HBeAg, LIAISON® XL MUREX Control HBeAg
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P180049	DiaSorin Inc.	8/29/2020	LIAISON® XL MUREX anti-HBe, LIAISON® XL MUREX Control anti-HBe
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P190005	Roche Diagnostics	2/3/2021	Elecsys Anti-HBe, PreciControl Anti-HBe
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P190017	DiaSorin Inc	8/29/2020	LIAISON® XL MUREX HBsAg Qual, LIAISON® MUREX Control HBsAg, and LIAISON® XL MUREX HBsAg Confirmatory Test
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P190034	Roche Diagnostics	2/23/2021	Elecsys Anti-HBs II, PreciControl Anti-HBs, Anti-HBs CalCheck
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P200017	Siemens Healthcare Diagnostics, Inc.	7/14/2021	ADVIA Centaur Anti-HBe2 (aHBe2) assay
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P790025	Abbott Laboratories	7/15/1980	ABBOTT HBE DIAGNOSTIC KIT
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P840070	ORGANON TEKNIKA CORP.	5/14/1986	HEPANOSTIKA(TM) HBEAG/ANTI HBE MICROELISA(TM) SYST
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P870048	DIASORIN	7/13/1990	EBK
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P990012	ROCHE DIAGNOSTICS CORP.	6/1/2001	ELECSYS HBSAG IMMUNOASSAY, ELECSYS HBSAG CONFIRMATORY, AND PRECICONTROL HBSAG
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P990038	DIASORIN, INC.	3/30/2001	DIASORIN ETI MAK-2 PLUS ASSAY
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P990042	DIASORIN, INC.	3/30/2001	DIASORIN ETI-AB-AUK PLUS ASSAY
https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpma/pma.cfm?ID=P990043	DIASORIN, INC.	2/8/2001	DIASORIN ETI-EBK PLUS ASSAY