

HEPATITIS B CLINICAL TRAINING SERIES

Hepatitis B: Epidemiology, Prevention & Screening

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Services

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- No Disclosures

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The Empire Liver Foundation is an association of NYS liver specialists dedicated to increasing community awareness of liver disease, providing education on liver disease to health care providers and patients and providing guidance to those who make policy decisions influencing the practice and science of liver disease.

- **CME Grand Rounds**
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www.empireliverfoundation.org



The New York City Health Department Viral Hepatitis Program conducts surveillance and develops and implements programs to build capacity to prevent, manage and treat hepatitis B and C in New York City.

- **Surveillance**
- **Community Coalitions**
- **Navigation Programs**
- **Clinical Practice Facilitation**
- **Training**

www.nyc.gov/health/hepatitisb

Overarching Learning Objectives

By the end of this presentation, participants will be able to:

1. Describe the importance of interprofessional collaboration in effectively meeting the healthcare, educational, and psychosocial needs of patients living with hepatitis B or C infection.
2. Describe the epidemiology and natural history of hepatitis B and hepatitis C infection.
3. Use updated guidelines to identify patients at risk for hepatitis B and/or hepatitis C infection and provide screening according to these guidelines.
4. Select appropriate antiviral treatments for people living with hepatitis B or hepatitis C, including special populations such as people with advanced liver disease or HIV co-infection.
5. Explain the efficacy and safety of current and emerging therapies for hepatitis B and C, including use in special populations such as people who use drugs or alcohol or have substance use disorders.
6. Illustrate how to counsel patients diagnosed with hepatitis B or C regarding risks and benefits of therapies and involve them in shared treatment decisions.

Learning Objectives

By the end of this presentation, participants will be able to:

- Describe the epidemiology of the hepatitis B virus (HBV)
- Understand the natural history of HBV infection
- Identify candidates for HBV vaccination
- Identify patients who should be screened for HBV and interpret HBV serology
- Educate patients on preventing HBV transmission
- Recall the role of the primary care provider (PCP) in HBV care

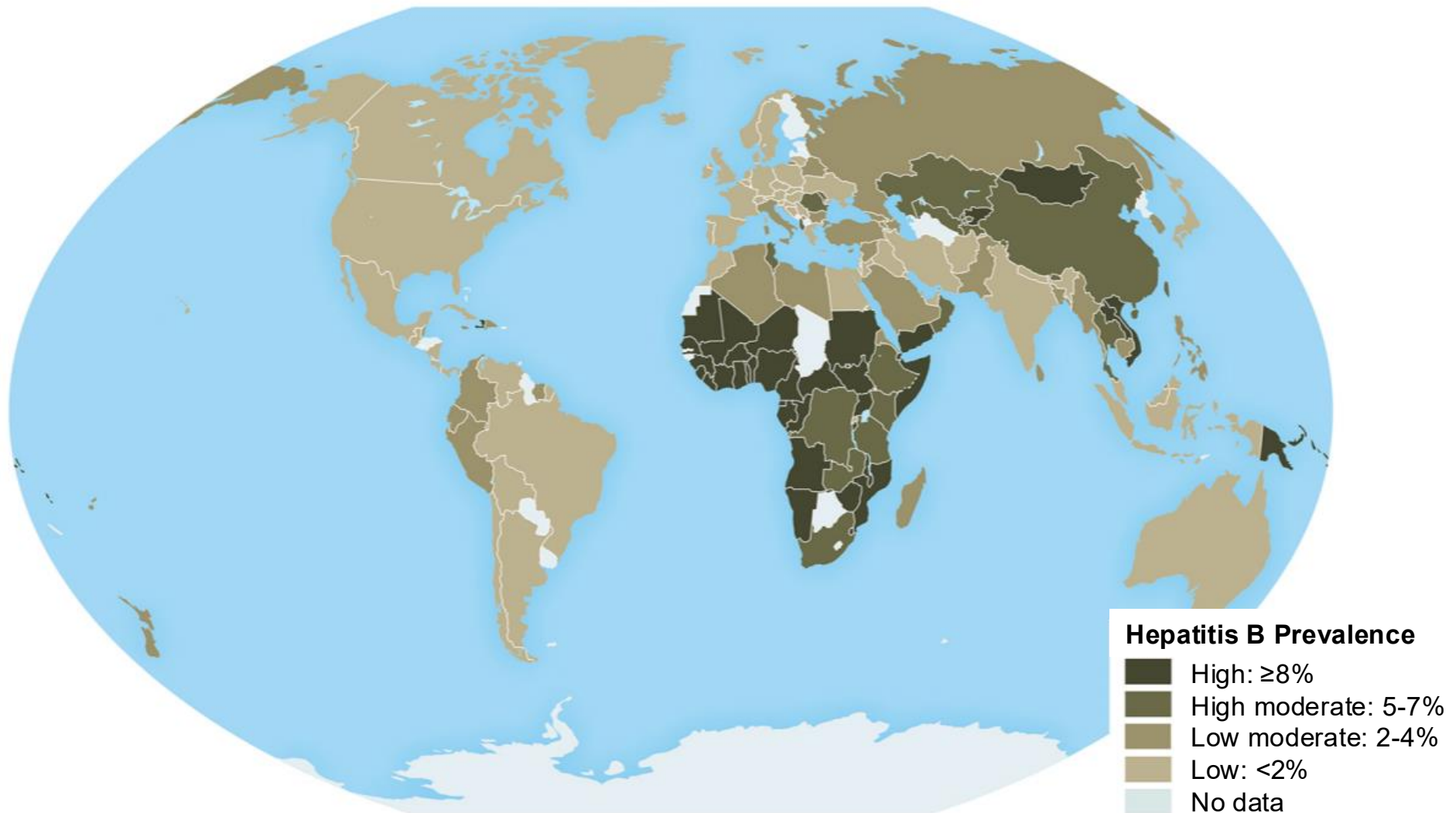
Epidemiology

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Chronic HBV in the U.S.

- Up to 2.4 million people in the U.S. live with HBV
- People born in regions with 2% HBV prevalence are often infected at birth and account for **95%** of newly reported chronic infections in the U.S.
- Remaining 5% of newly reported cases:
 - People who inject drugs
 - Men who have sex with men
 - Persons with HIV infection
 - Contacts of people with HBV (household, sexual, needle sharing)

HBV Prevalence by Country

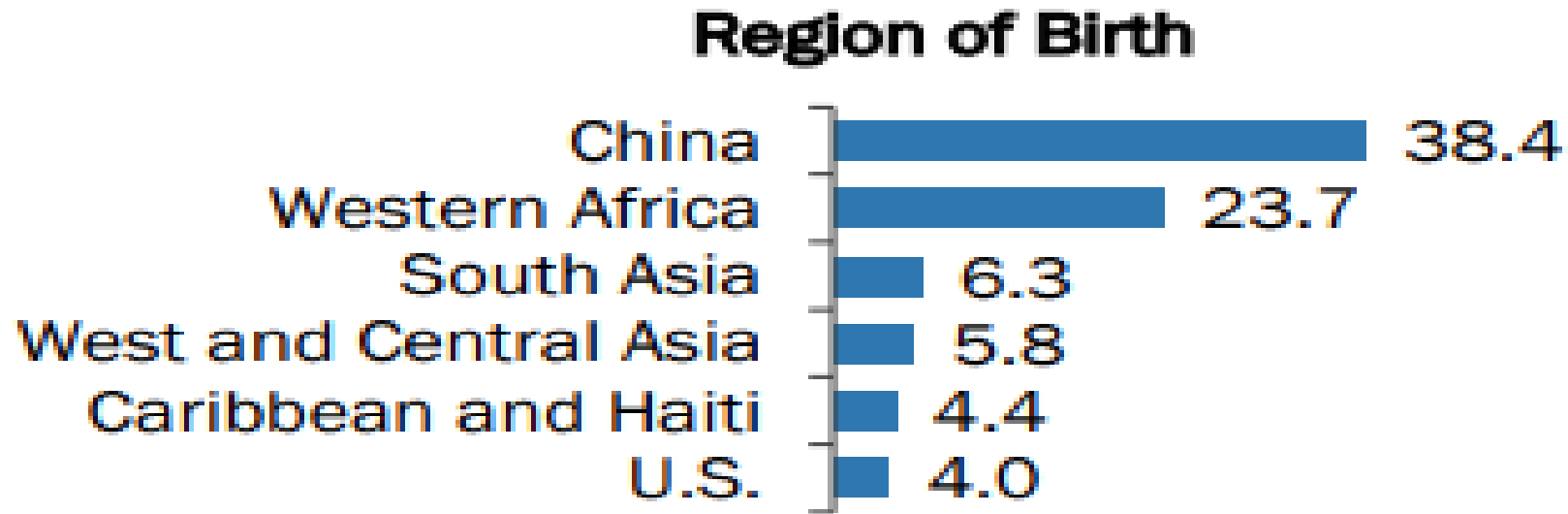


Foreign-Born Population and Chronic HBV in NYC vs. US

	US	NYC
Foreign-born population	11%	36%
Prevalence of HBV	0.3-0.5%	1.2%

HBV-Infected Pregnant Women in NYC: Region of Birth

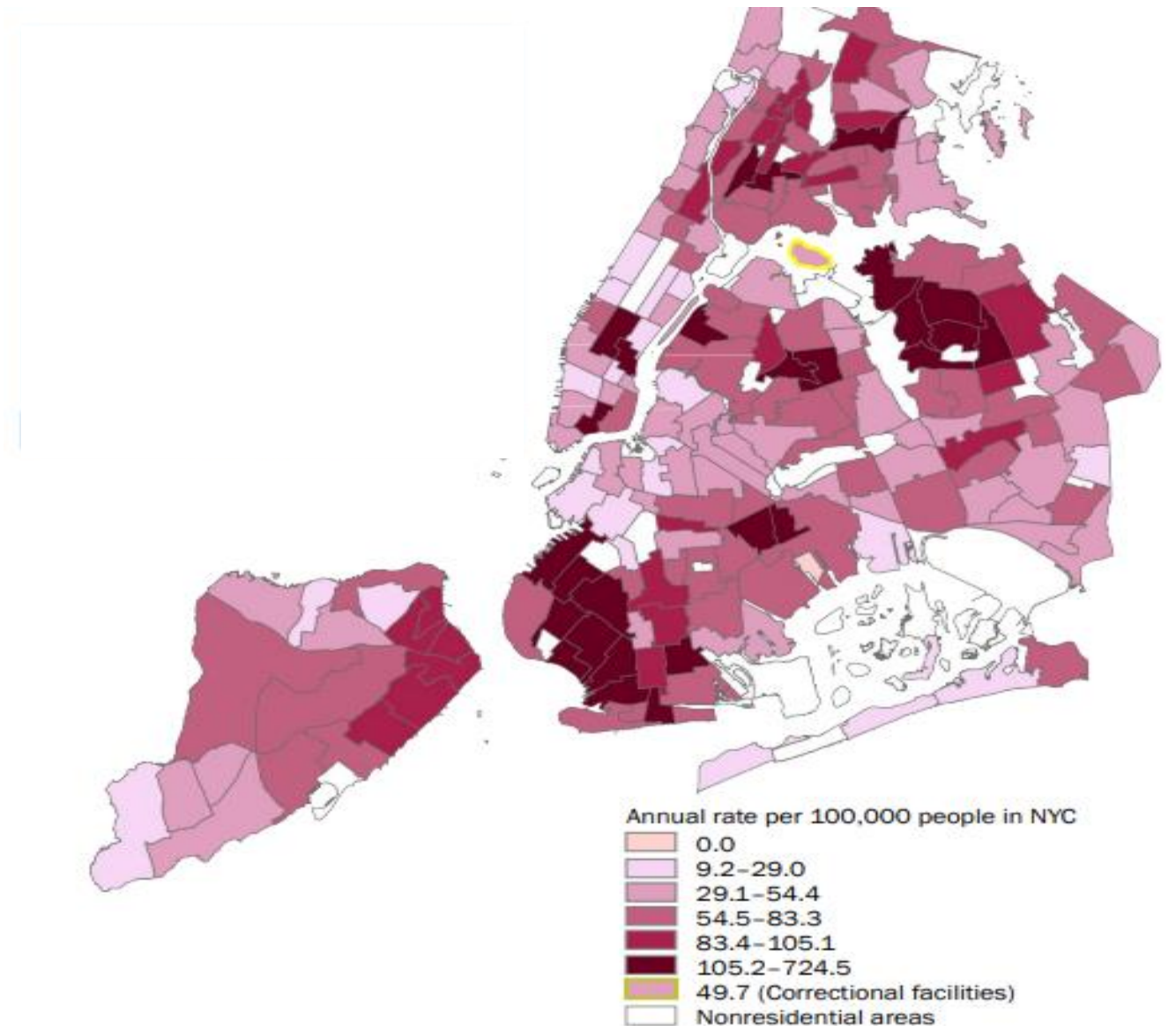
Percentage of people with hepatitis B who delivered a live birth in New York City by region of birth, 2023



HBV in NYC, 2023

In 2023:

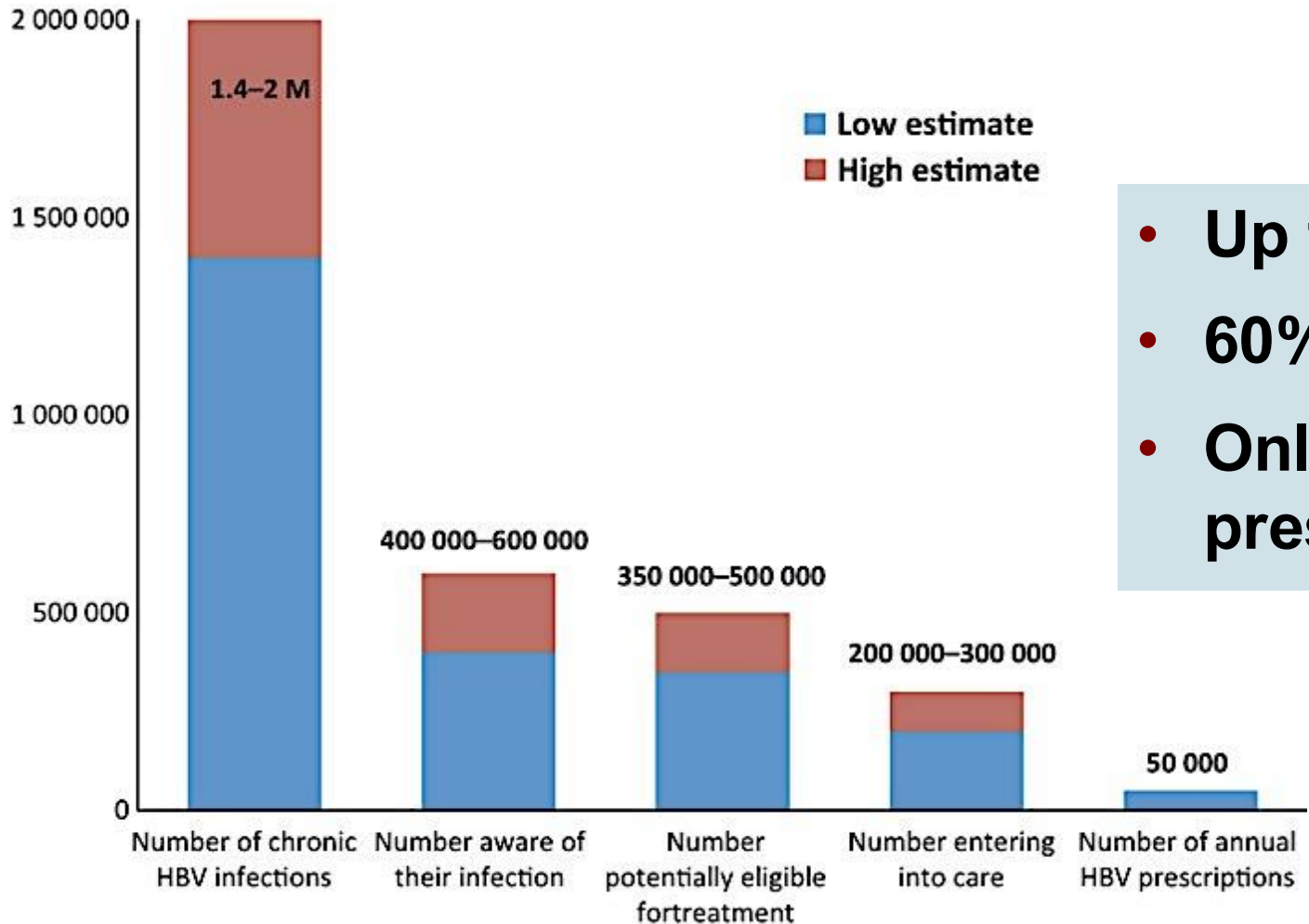
- 6,947 newly reported chronic HBV cases
- Neighborhoods with highest rates were:
 - Sunset Park East, Brooklyn
 - Flushing, Queens
- More than half of residents of both neighborhoods are foreign-born (largely from China, Korea and Mexico)



HBV Care Cascade



HBV Care Cascade in the U.S.



- **Up to 2.4 million infected**
- **60% unaware of infection**
- **Only 50,000 HBV prescriptions a year**

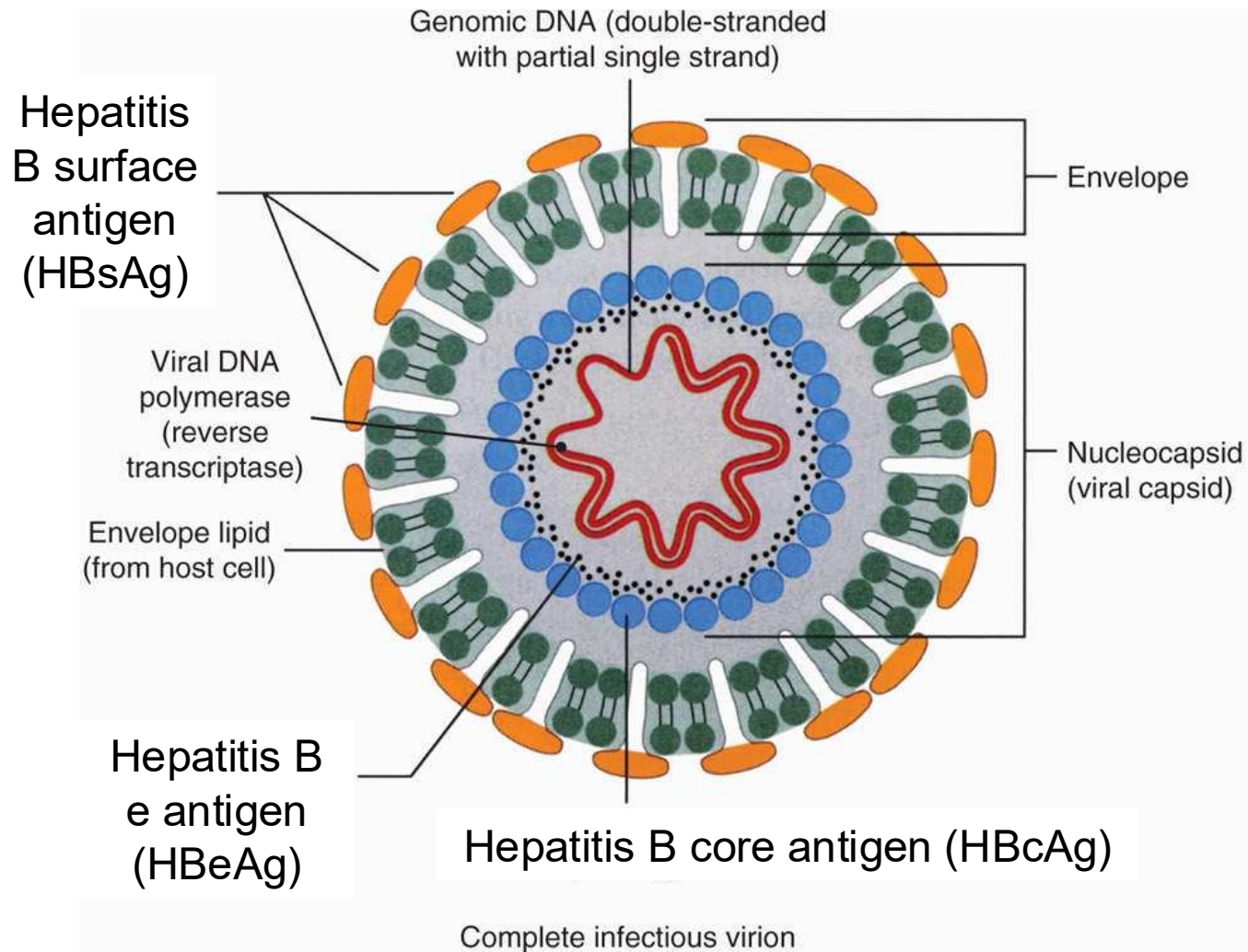
Gaps in HBV Care in the U.S.

- Up to 40% of HBV-infected persons develop cirrhosis, HCC, or liver failure
 - 25% die prematurely
 - Indirect/direct health care costs: \$1 billion
- Vaccination and screening can reduce this burden
 - Only 25% of U.S. adults have been completely vaccinated
 - 60% of infected persons are unaware of their infection
 - Only 10-15% of eligible patients have been treated

Natural History

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HBV Structure

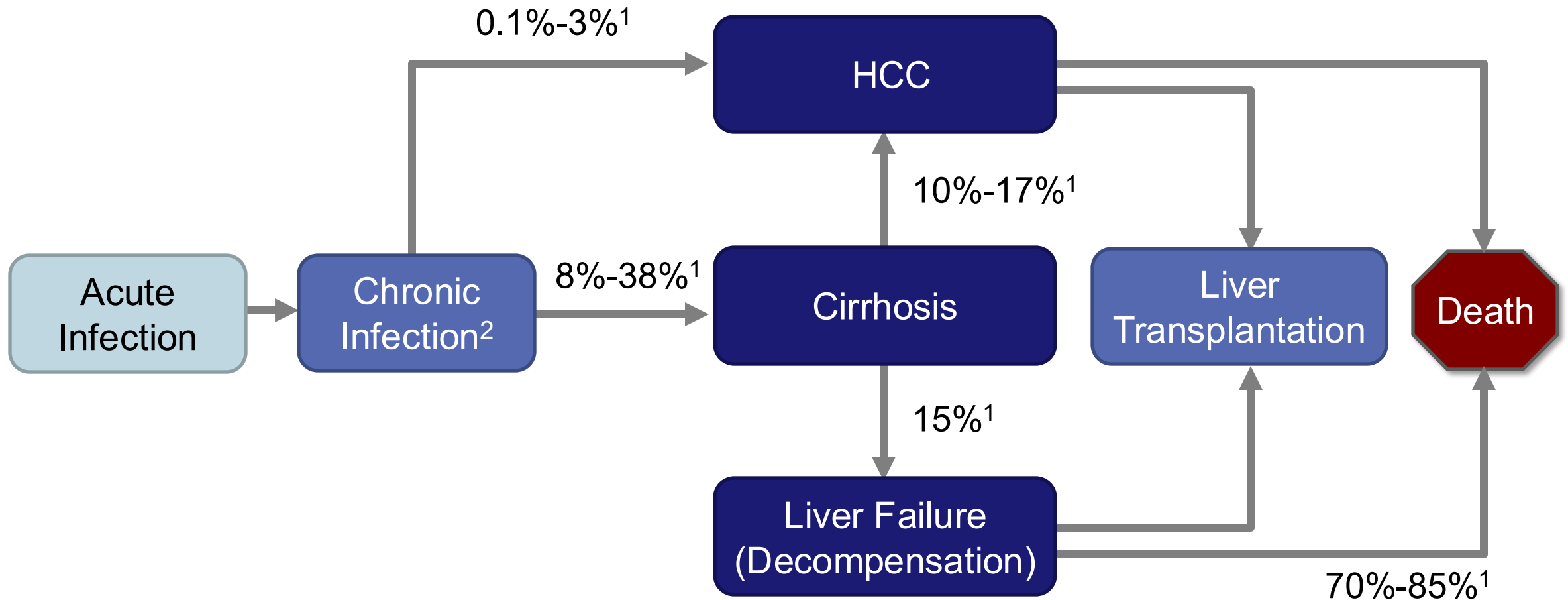


- DNA virus
- Ten genotypes, A to J
- HBV replicates through an RNA intermediate and can integrate into the host genome
- Virological and serological assays have been developed for diagnosis of various forms of HBV-associated disease

AASLD Guidelines: Diagnostic Criteria and Definitions for Chronic HBV

	Immune-Tolerant CHB	Immune-Active CHB	Inactive CHB
HBV test results	<ul style="list-style-type: none"> • HBsAg present for 6 months • HBeAg positive • HBV-DNA levels are very high (typically >1 million IU/mL) 	<ul style="list-style-type: none"> • HBsAg present for 6 months • Serum HBV DNA >20,000 IU/mL in HBeAg-positive CHB • >2,000 IU/mL in HBeAg-negative CHB 	<ul style="list-style-type: none"> • HBsAg present for 6 months • HBeAg negative, anti-HBe positive • Serum HBV DNA <2,000 IU/mL
ALT/AST levels	Normal or minimally elevated	Intermittently or persistently elevated	Persistently normal
Liver biopsy or noninvasive test results	no fibrosis and minimal inflammation	chronic hepatitis with moderate or severe necroinflammation and with or without fibrosis	absence of significant necroinflammation (biopsy); variable levels of fibrosis

Disease Burden from HBV Infection: 5-Year Cumulative Incidence Rates of Development of Chronic HBV Complications

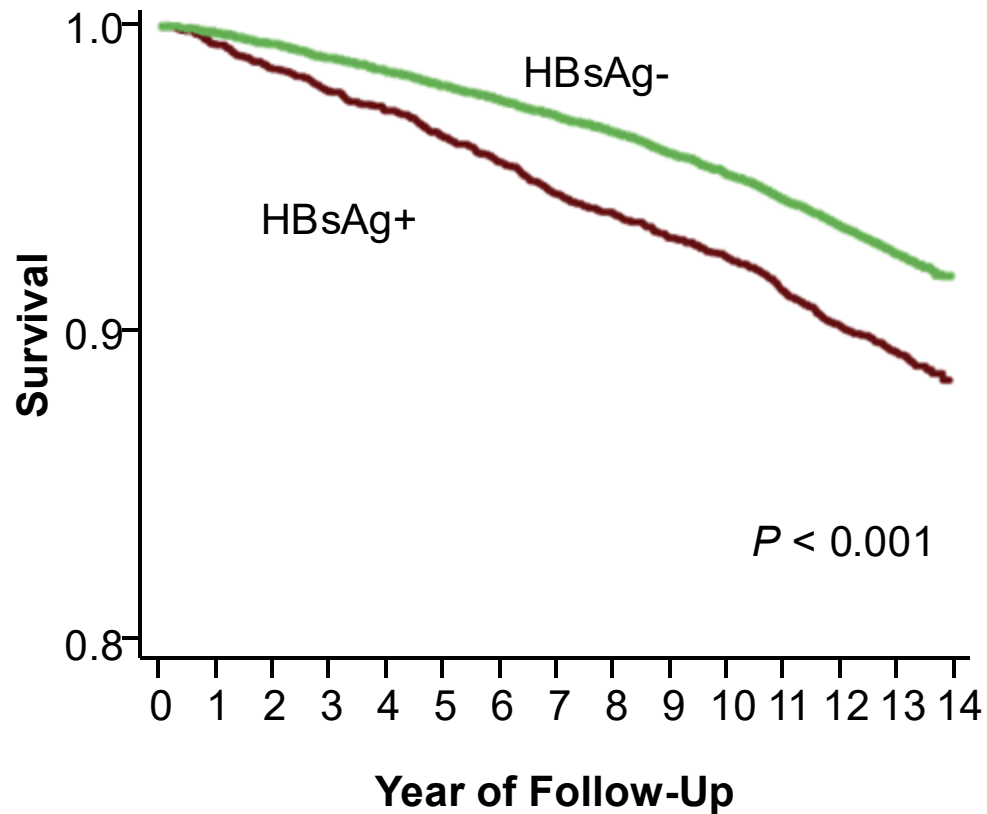


1. Fattovich G, et al. *J Hepatol.* 2008;48:335-352.

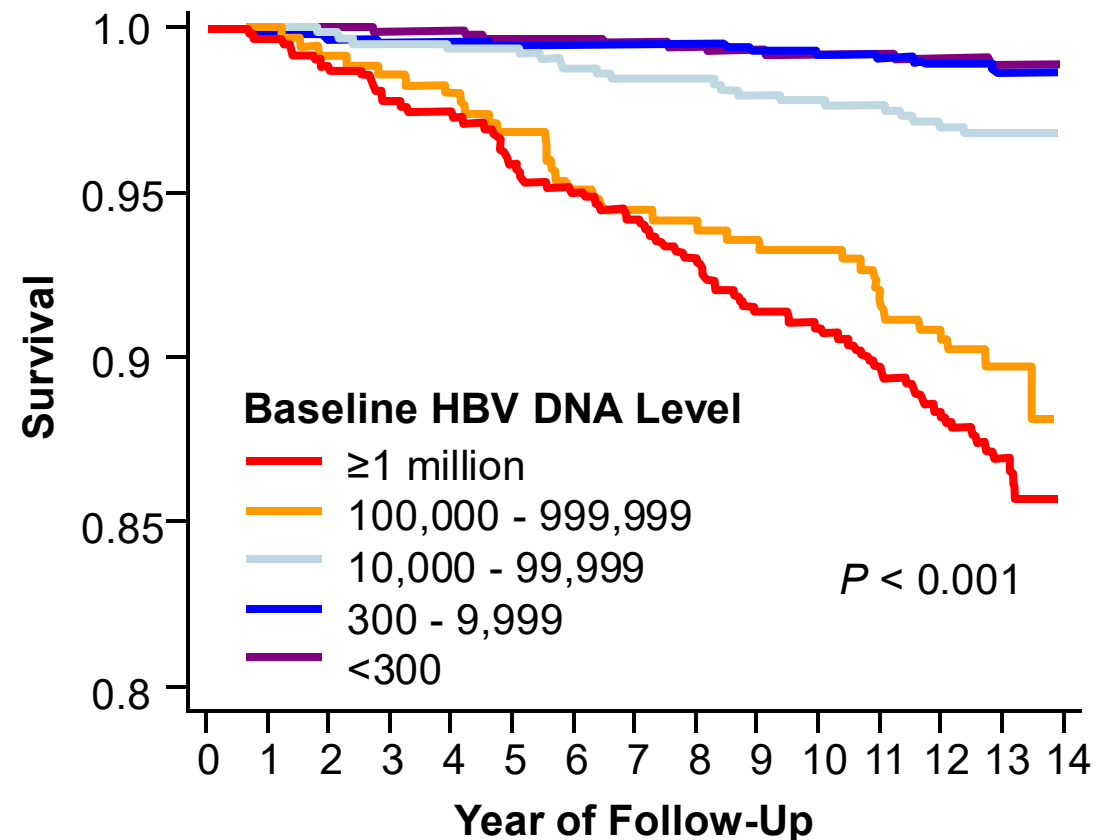
2. Lok ASF, McMahon BJ. *Hepatology.* 2009;50:1-36.

REVEAL Study: All-Cause and Liver-Related Mortality in Patients with HBV

Total mortality according to HBsAg status (n=22,472)

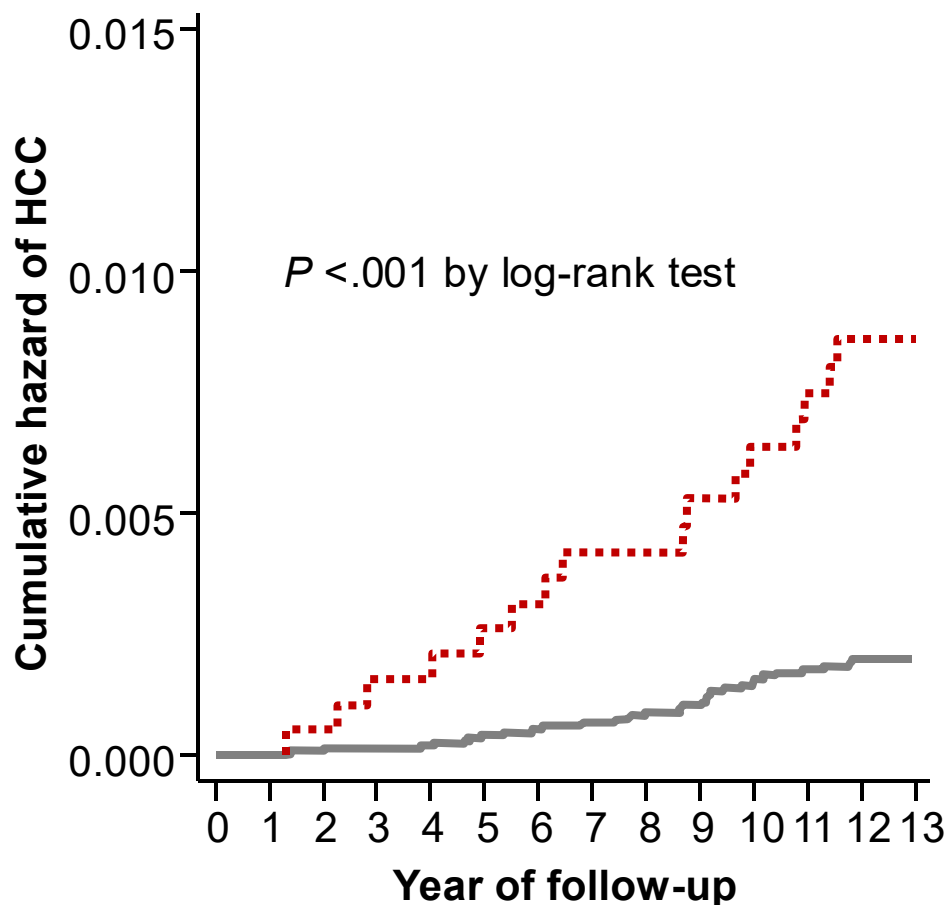


Liver-related mortality by baseline HBV DNA in HBsAg+ subjects without evidence of HCV infection (n=3,653)

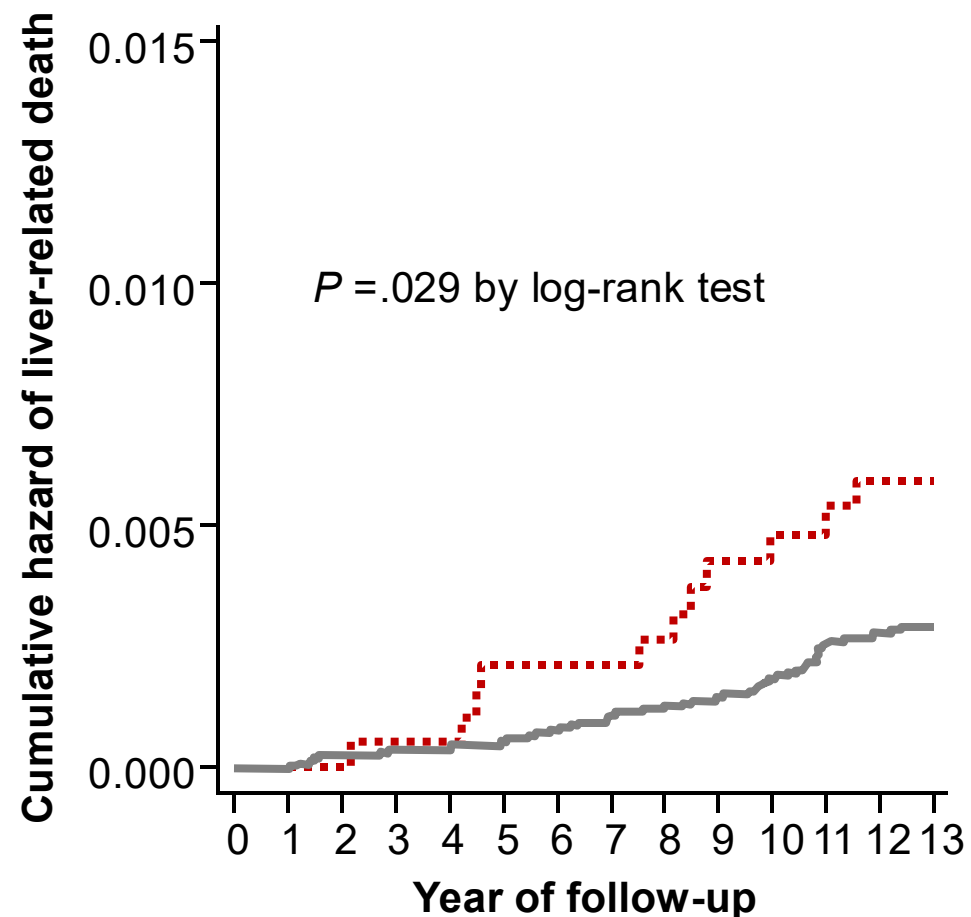


REVEAL Study: Progression to HCC and Liver-Related Death in HBeAg Negative Chronic Infection

Cumulative hazard of progression to HCC



Cumulative hazard of progression to liver-related death



Prevention

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HBV Vaccination: Infants, Children, Adults

- Infants:
 - First dose of HBV vaccine at birth
 - Complete the series by 6 months of age
 - HBIG at time of birth if mother is HBV DNA +
- Unvaccinated children <19 years
- As of March 2022:
 - CDC recommends universal HBV vaccination for all adults 19-59
 - Adults 60 years and older with [risk factors](#) for hepatitis B

HBV Vaccination: At Risk Adults

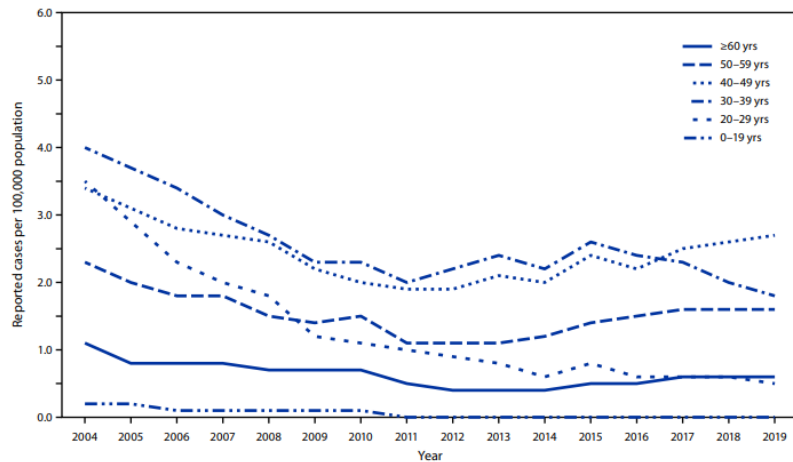
- Adults at risk by **sexual exposure**
 - sex partners of HBsAg+ persons
 - persons with multiple sex partners
 - persons seeking STI treatment
 - men who have sex with men (MSM)
- Adults at risk by **percutaneous or mucosal exposure**
 - persons who, or have, inject(ed) drugs
 - household contacts of HBsAg+ persons
 - persons who are, or have been, incarcerated
 - health care and public safety workers
- Adults with chronic liver disease, end-stage renal disease (including hemodialysis patients), or HIV infection
- Pregnant women at risk for infection
- Travelers to HBV endemic regions
- Adults seeking protection from HBV infection

Gaps in HBV Vaccination

- Adult HBV vaccine coverage is low.
- Only 31% of primary care physicians reported routinely assessing for and vaccinating adults with HBV risk factors.
- Similarly, among men who have sex with men (MSM) surveyed in the Young Men's Health Study, only 17% had received hepatitis B vaccine.

HBV Vaccination: Adults

Rates of reported acute hepatitis B virus infection, by age group
— United States, 2004–2019



Source: <https://www.cdc.gov/hepatitis/statistics/2019surveillance/Figure2.4.htm>

- Approximately one half of acute hepatitis B cases reported in 2019 occurred among persons aged 30–49 years
- Increased # of cases in those aged 40–49
- HBV vaccination coverage (≥ 3 doses) was 40.3% for adults aged 19–49 years and 19.1% for adults aged ≥ 50 years
- Universal recommendation for HBV vaccine will increase the number of persons who receive vaccination before the onset of chronic liver disease and other comorbidities (that may affect efficacy of vaccine)
 - Eliminates the need for risk assessment before vaccination
 - Improves racial and ethnic disparities exist among those who become infected with HBV

Centers for Disease Control and Prevention

MMWR

Weekly / Vol. 71 / No. 13

Morbidity and Mortality Weekly Report

April 1, 2022

Universal Hepatitis B Vaccination in Adults Aged 19–59 Years: Updated
Recommendations of the Advisory Committee on Immunization Practices —
United States, 2022

Screening & Diagnosis

CDC HBV Screening Recommendation, 2023

Screen **all adults aged 18 years and older** at least once in their lifetime using a triple panel test

Screen pregnant people for hepatitis B surface antigen (HBsAg) during each pregnancy regardless of vaccination status and history of testing

Expand periodic testing in **high-risk groups**

Test anyone who requests HBV testing regardless of disclosure of risk

High-Risk Groups for HBV Screening

- Persons requiring immunosuppressive therapy and chemotherapy
- Persons with end-stage renal disease (including hemodialysis patients)
- HCV infected persons
- Persons with elevated ALT (≥ 19 IU/L for women and ≥ 30 IU/L for men)
- Persons who have been incarcerated
- Pregnant women*
- Infants born to HBV infected people

*The 1990 NYS Public Health Law Article 25, Section 2500-e (Appendix A) mandates HBsAg testing of all pregnant women.

Additional High-Risk Groups for HBV Screening

Important risk groups for HBV infection with a prevalence of $\geq 2\%$ that should be screened include

- Persons born in countries and regions with a high prevalence of HBV infection ($\geq 2\%$), such as Asia, Africa, the Pacific Islands, and parts of South America
- US-born persons not vaccinated as infants whose parents were born in regions with a very high prevalence of HBV infection ($\geq 8\%$)
- HIV-positive persons and people taking PrEP to prevent HIV infection
- Persons who inject drug use or have a history of injection drug use
- Men who have sex with men
- Household contacts or sexual partners of persons with HBV infection

HBV Tests:

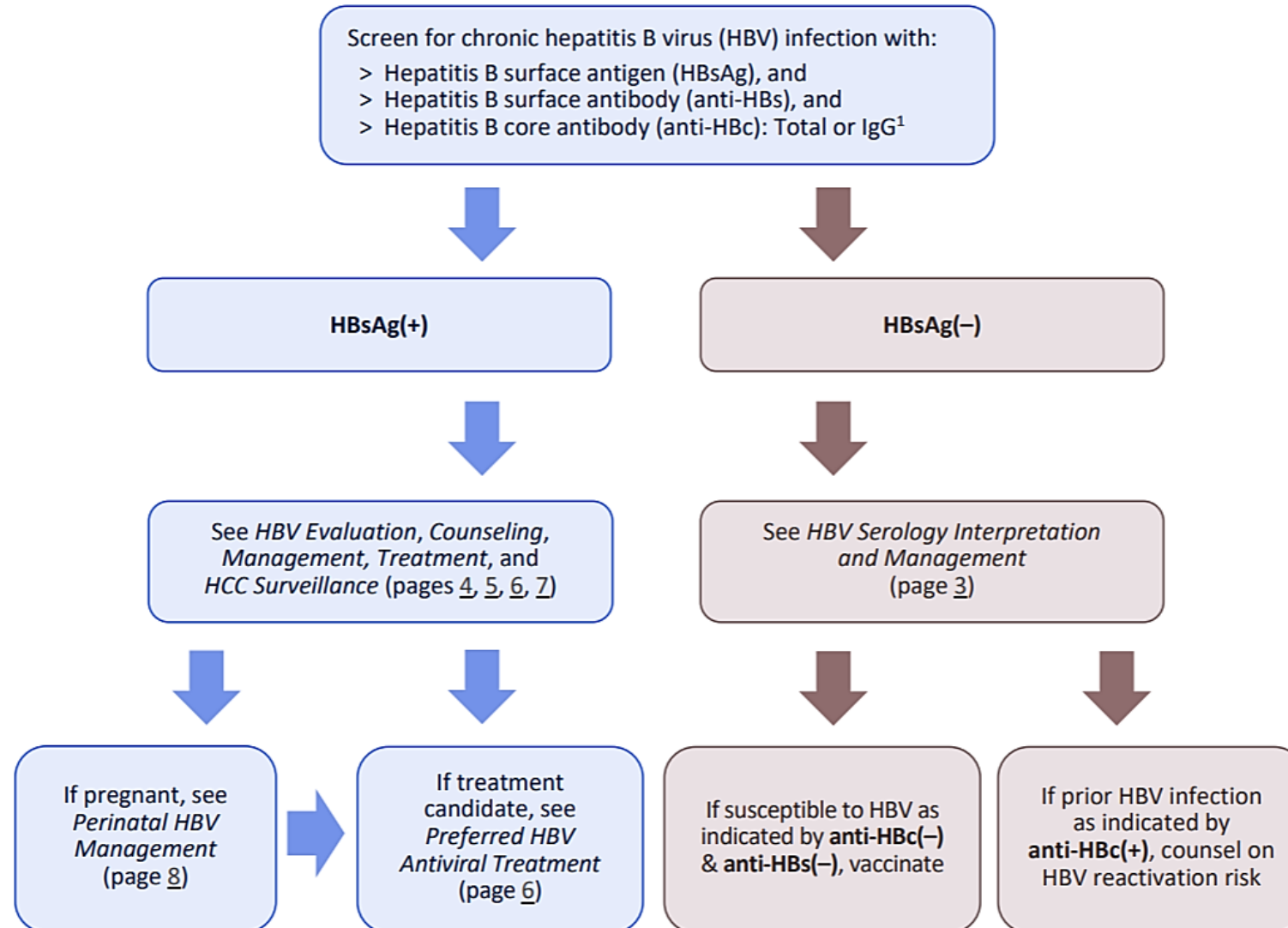
All Patients Need this “Triple Panel” When Evaluating for HBV

- +HBsAg = infection (Test all patients for HDV)
- +Anti-HBc = exposure = cccDNA = persistence
 - Eval for Occult HBV if HBsAg (-)
 - Reactivation risk
 - No vaccine boosting
- +Anti-HBs = immunity, **if anti-HBc is negative**
- Note:
 - HBV is incurable
 - There is no “natural immunity”

Interpreting HBV Test Results

Clinical state	HBsAg	anti-HBs	anti-HBc	Action
Chronic infection	+	-	+	Evaluate for treatment
Acute infection	+	-	+ (IgM anti-HBc)	Link to HBV directed care
Resolved infection	-	+	+	Counseling, reassurance
Immune (immunization)	-	+	-	Reassurance
Susceptible (never infected or immunized)	-	-	-	Vaccinate
Exposed	-	-	+	Depends on situation

Chronic HBV Testing and Management Algorithm



Preventing HBV Transmission: Educating Patients

Tell patients:

- Ensure household and sexual contacts are tested and vaccinated
- Use condoms during sex until partners are fully vaccinated against Hep B.
- Use only new or sterile equipment for injection (e.g. drugs, insulin, steroids), tattooing, or acupuncture
- Avoid sharing toothbrushes, razors, needles, nail clippers, nail scissors or washcloths
- Cover cuts and sores, wash hands after touching your blood or body fluids
- Clean blood spills with bleach solution
- Do not donate blood, organs or sperm

HBV-infected children and adults:

- Can participate in all activities including contact sports
- Should not be excluded from daycare or school participation and should not be isolated from other children
- Can safely share food, utensils, and can kiss others

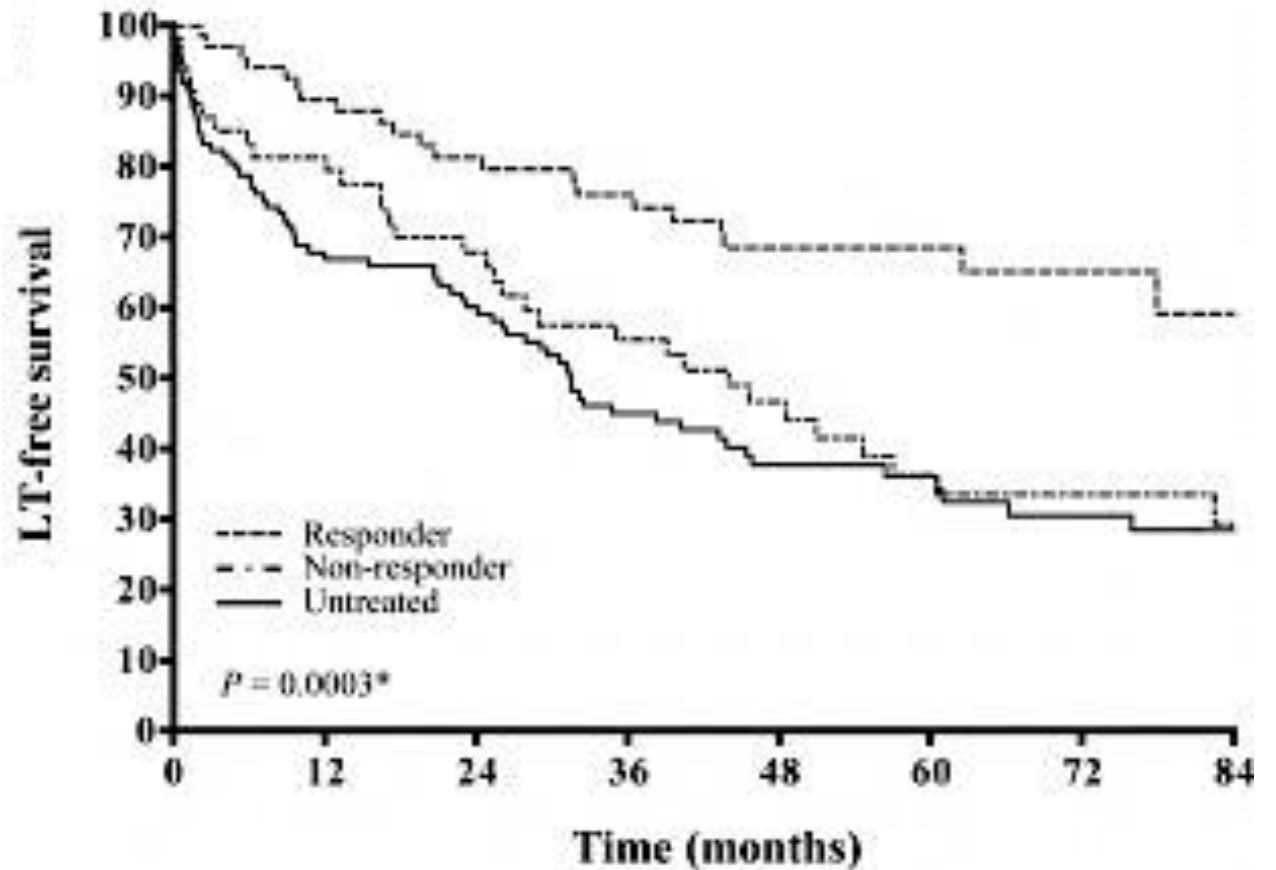
Treatment

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HBV Therapy Reduces Risk of Disease Progression

Prospective cohort study in HBV pts with first-onset complications of decompensated cirrhosis (n = 707) treated predominantly with lamivudine (n = 203) or entecavir (n = 19)

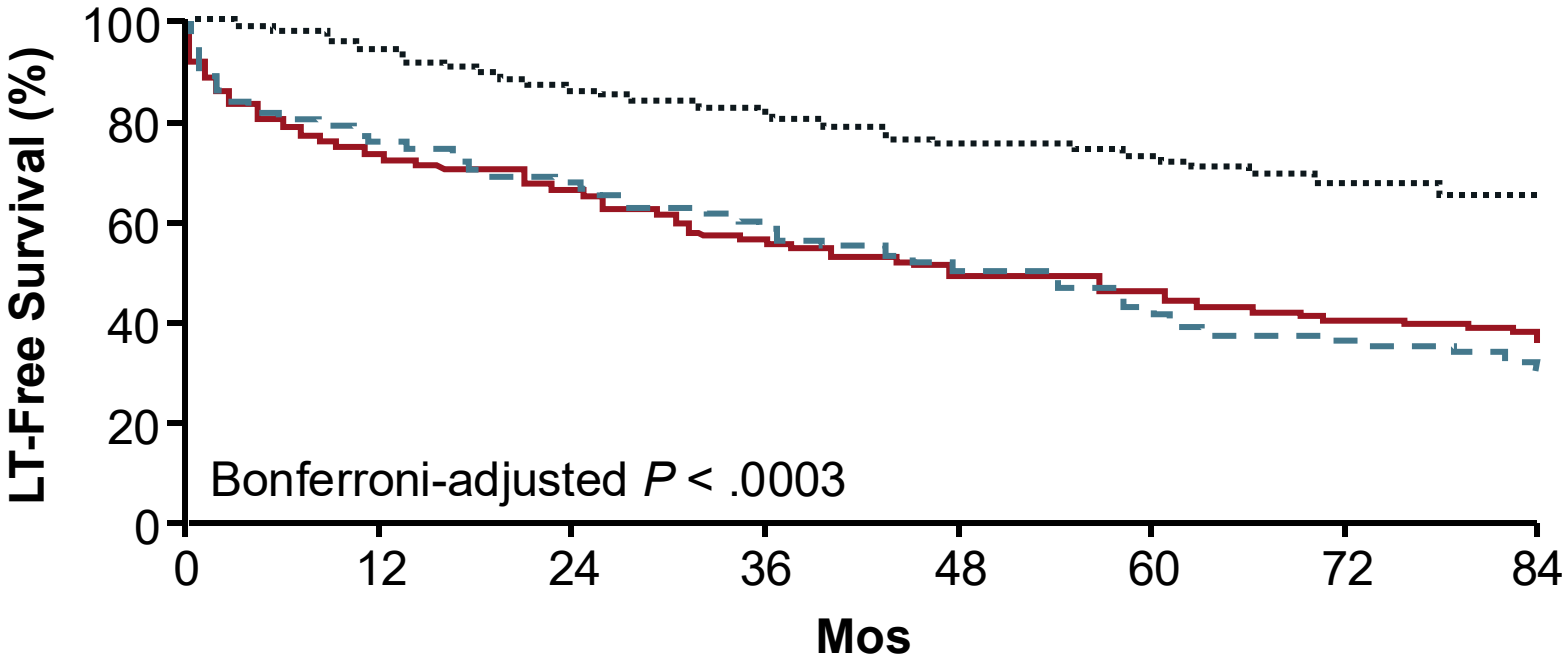
Antiviral therapy improved transplant-free survival over mean follow-up of 49 mos ($p = .0098$ vs untreated)



*Nonresponders included pts with HBV rebound or genotypic resistance, primary nonresponse, Not evaluable due to early event (death, LT, LTFU).

HBV Treatment Reduces Risk of Liver Transplant

Prospective cohort study in pts with HBV and first-onset complications of decompensated cirrhosis (n = 707)

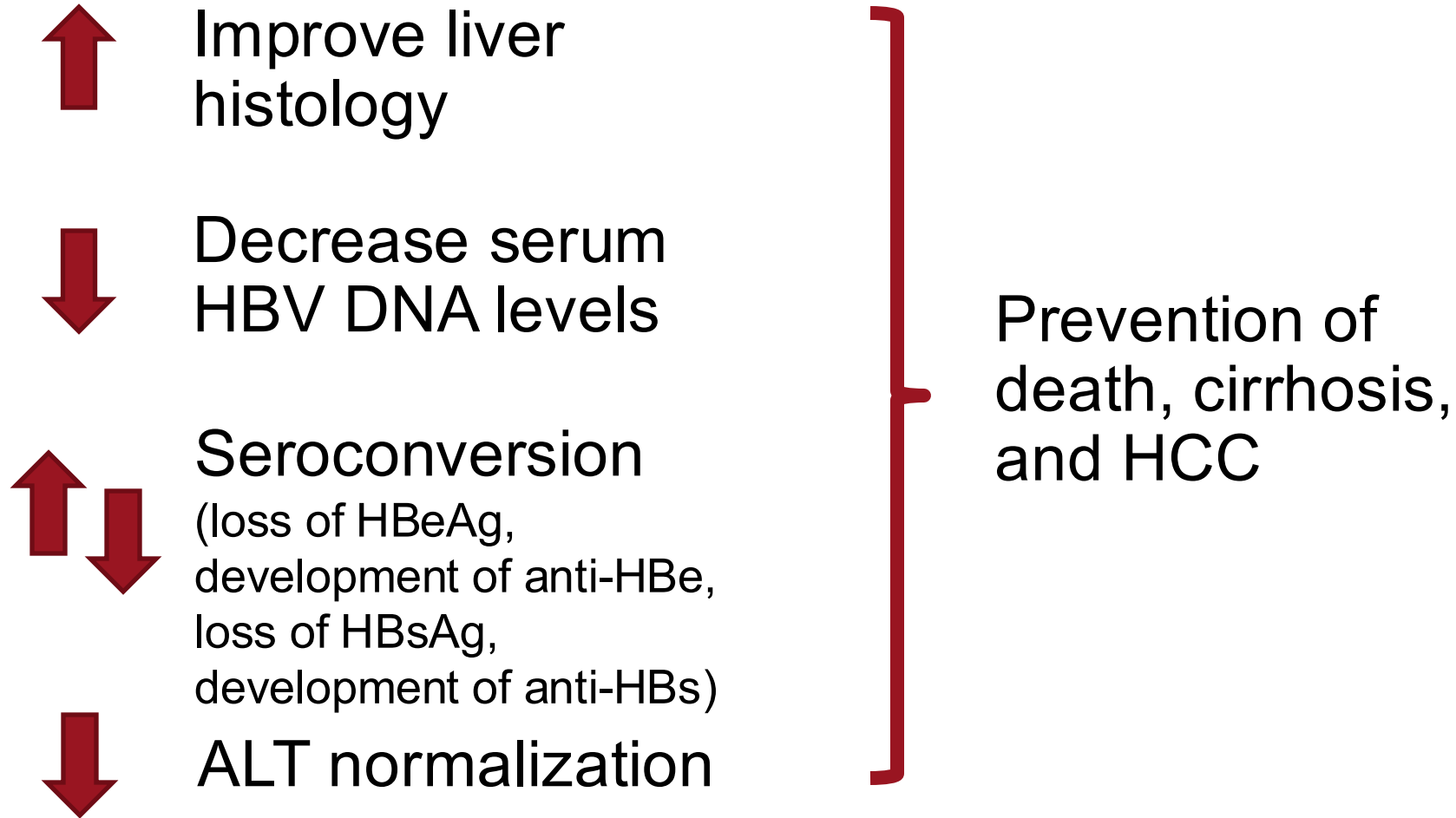


Antiviral therapy improved transplant-free survival over 5 years ($p = .0098$ vs untreated)

..... Treated,* responder (n = 245)
- - - Treated,* nonresponder (n = 178)
— Untreated (n = 284)

*Treated predominantly with lamivudine (n = 203) or entecavir (n = 198).

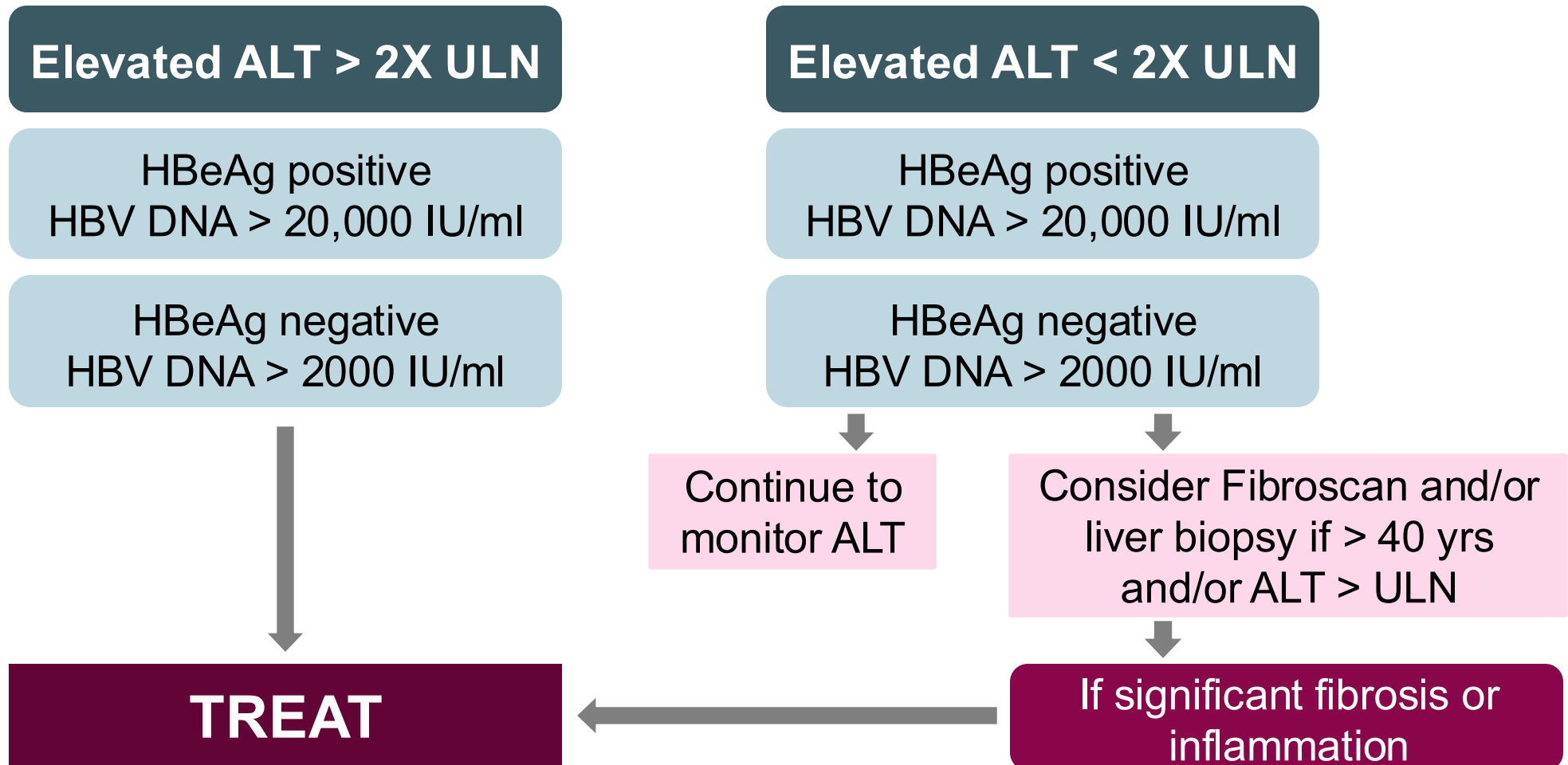
Goals of HBV Therapy



FDA Approved Therapies

- **First line therapy**
 - 2005: Peg interferon alfa-2a
 - 2005: Entecavir
 - 2008: Tenofovir disoproxil fumarate “TDF”
 - 2016: Tenofovir alafenamide “TAF”
 - **Second line therapy**
 - 2002: Adefovir dipivoxil, not available in the US
 - 2006: Telbivudine, not available in the US
- **Third line therapy**
 - 1998: Lamivudine, should not be used

American Association for the Study of Liver Diseases Algorithm for Treatment Decisions in HBV



AASLD HBV Treatment Recommendations

- Patients with cirrhosis, regardless of HBeAg status or ALT level with detectable HBV DNA should be treated
- Patients with normal ALT and HBV DNA > 1,000,000 IU/ml, regardless of HBeAg status, should be treated if there is moderate to severe inflammation/fibrosis and/or > 40 years of age

Anti-Viral Treatment Options for HBV

Name	Anti-viral Potency	Side effects	Risk of resistance	Caveats
Peg-IFN alfa 2a	++	Fatigue, cytopenias, depression	None	Not recommended in cirrhosis, cardiopulmonary disease, psychiatric disease, uncontrolled seizures, pregnancy
Entecavir	+++	Lactic acidosis very rare	Very low (except if prior tx with Lam)	Not recommended if prior nucleoside analogue treatment Dose adjustment if Cr cl < 50 ml/min
TDF	+++	Renal and bone toxicity Lactic acidosis very rare	Very low	Dose adjustment if Cr cl < 50 ml/min
TAF	+++	Minimal renal and bone toxicity Lactic acidosis very rare	Very very low	No dose adjustment if Cr cl < 15 ml/min

Sample Case

- 36 yr. old female born in China
- Her mother had hepatitis B
- Feels well
- Unsure if has been tested for HBV previously
- What do you do now?
- Screen with HBV serologies
- HBsAg and anti-HBc +, anti-HBs –
 - Active infection, likely vertical transmission
- What to do next?
- Evaluate for treatment
 - Send HBeAg/anti-HBe, HBV DNA PCR quant, liver tests, HCC Screening

Sample Case

- 39 yr. old male
- Household contact with person recently diagnosed with HBV
- Feels well
- Unsure of prior HBV testing or vaccination
- What do you do now?
 - Needs screening
 - HBsAg - sAb - cAb -
- What to do next?
 - Needs to be vaccinated

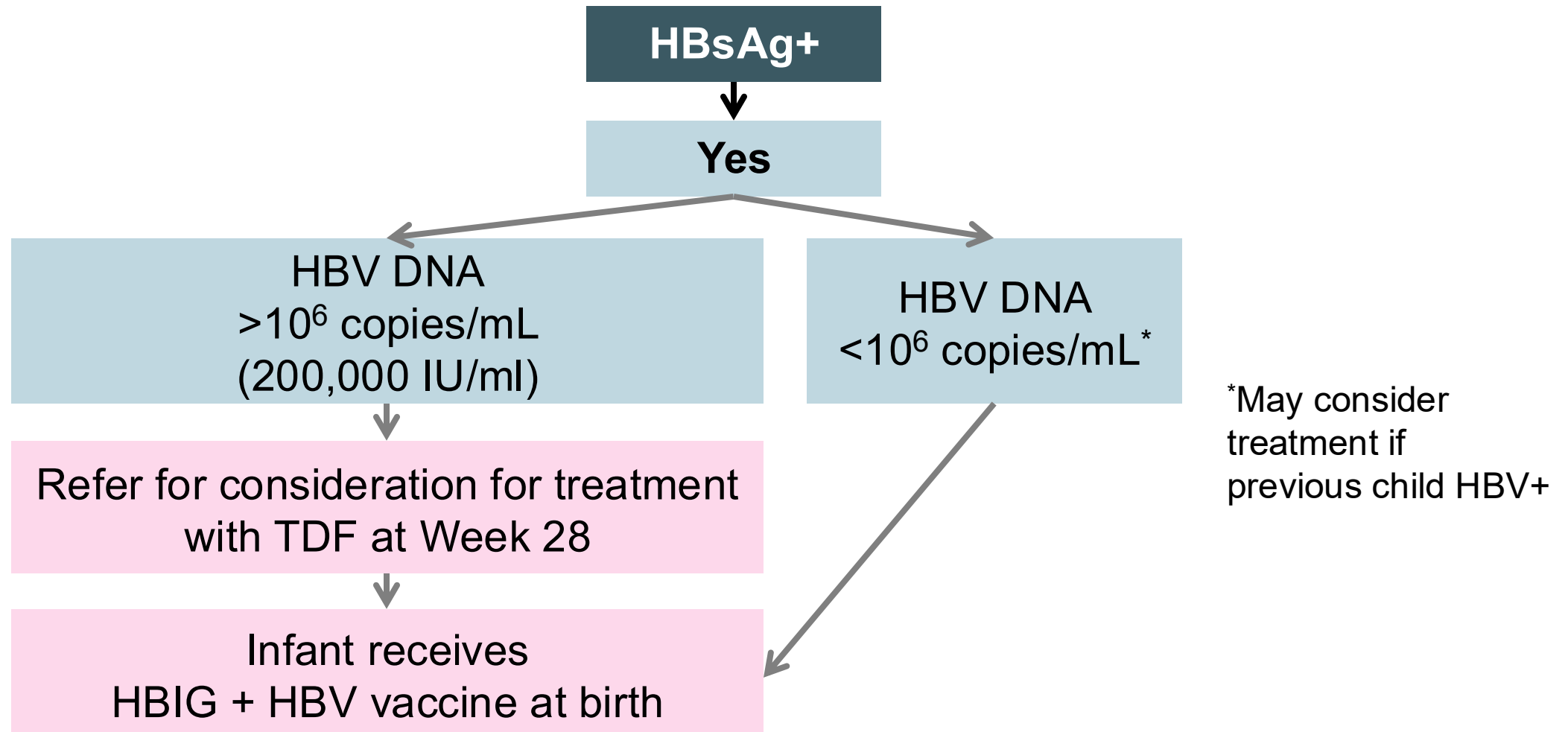
HBV and Pregnancy



HBV Screening During Pregnancy

- All pregnant people should be screened for HBV (with HBsAg at minimum) during each pregnancy, regardless of prior HBV screening results.
- If no prior screening has been performed, send complete HBV profile(HBsAg, HBsAb to determine immunity and HBcAb IgG or total for evidence of prior infection).


Suggested Management of HBV Infection During Pregnancy



Prevention of Perinatal Transmission of HBV

- All infants born to HBsAg-positive mothers should be administered:
 - HBV immune globulin (HBIG) and 1st dose of HBV vaccine within 12 hours of birth
 - 2nd dose of hepatitis B vaccine at 1 month of age
- Infants born to HBsAg-positive mothers should complete the hepatitis B vaccination series following the recommended routine childhood immunization schedule
- All children born to hepatitis B infected mothers should be tested for both HBsAg and hepatitis B surface antibody (anti-HBs) at 9 months of age.
- Infants born to women with unknown HBsAg status should be administered the 1st dose of HBV vaccine (without HBIG) if HBsAg testing results are not available within 12 hours of birth.
 - If the mother is determined to be HBsAg positive, HBIG should be administered as soon as possible and no later than age 7 days.
- All other infants should receive their first dose of HBV vaccine before discharge
- Chest/breast feeding is generally safe after baby receives HBIG

Role of Primary Care Provider (PCP)



Role of PCP in HBV Care

1. Identify patients
2. If you are not treating them, link HBV patients to treatment centers
3. Discuss modes of transmission and prevention
4. Discuss HBV testing and vaccination for household members and close contacts (including children, especially if born in country with >2% prevalence)
5. Vaccinate for hepatitis A if susceptible
6. Screen for HCV

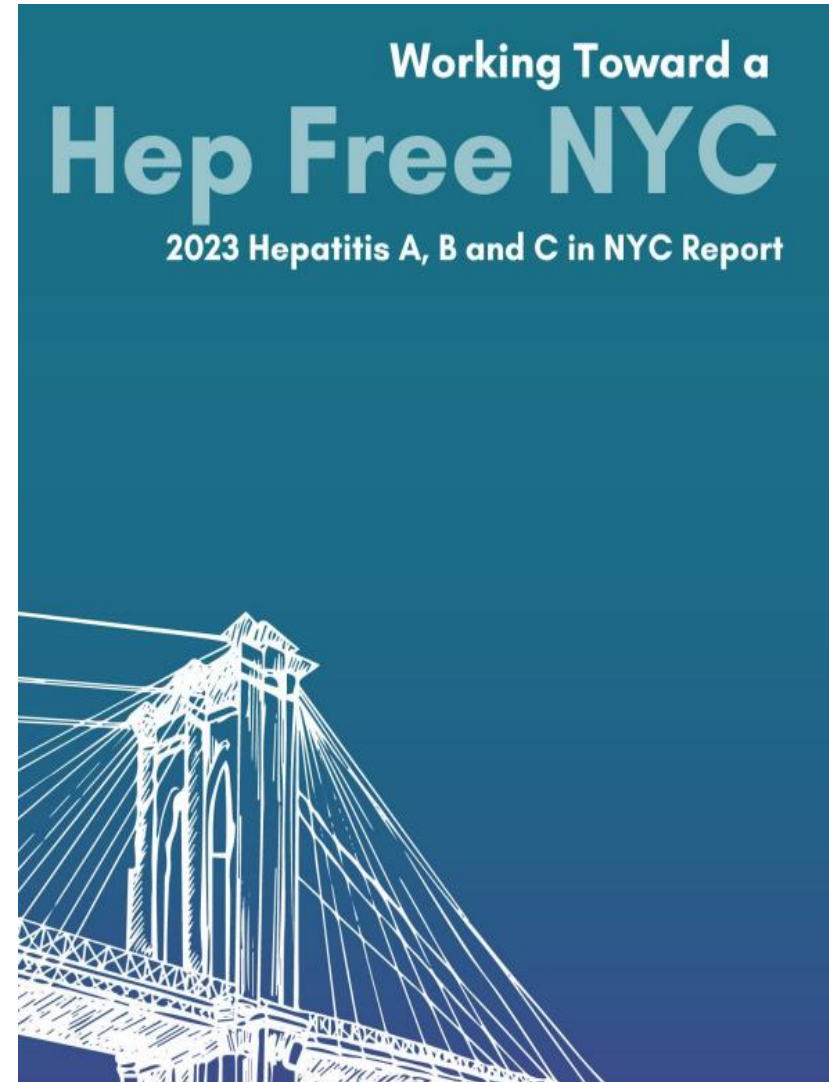
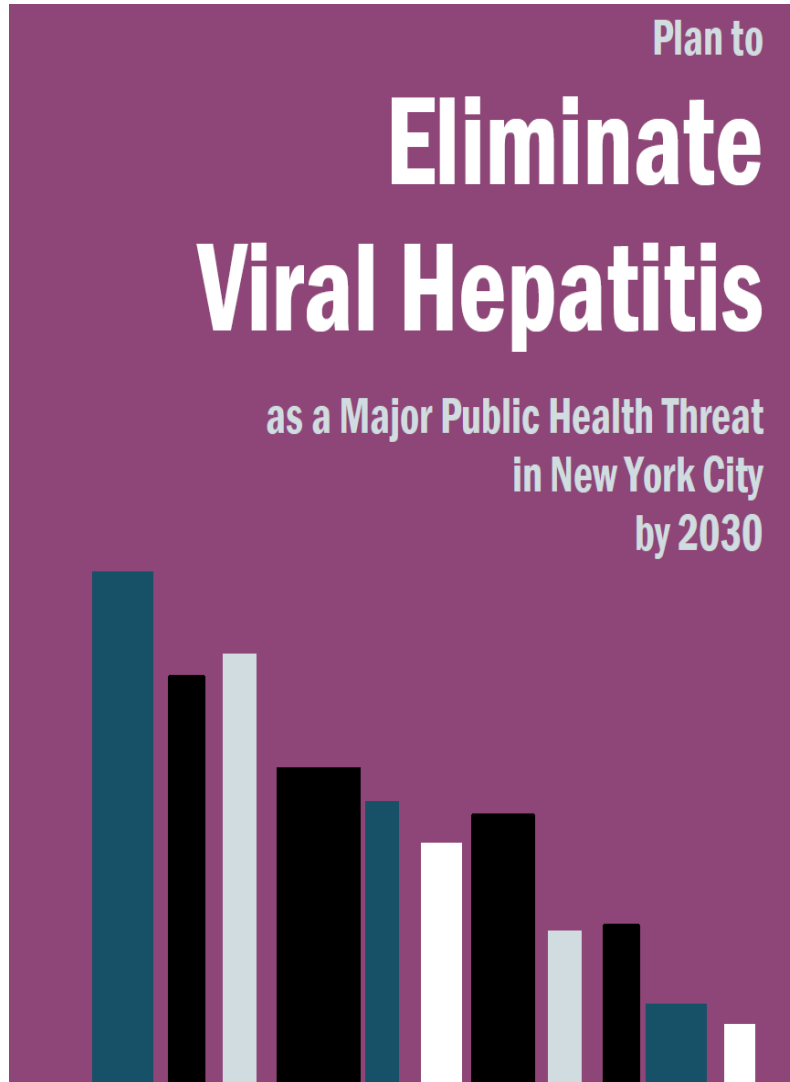
Hepatitis B Treatment Guidelines and Resources

- Treatment Guidelines - [AASLD](#)
- Drug-Drug Interactions - <https://www.hep-druginteractions.org/>

Hepatitis B Resources

- www.HepFree.NYC
 - [Hep B Coalition](#)
 - [Clinical Resources](#)
 - [Capacity building tools](#)
 - [Advocacy Committee](#)
- Hepatitis B patient information page: www.nyc.gov/health/hepb
 - Free or low-cost testing and treatment

Elimination Plan and Annual Report



Contact Us

For CMEs or educational opportunities, contact:

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