AETC AIDS Education & Training Center Program Southeast

KY AETC Kentucky AIDS Education Training Center

Hepatitis B Basics

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Faculty Disclosure

Nothing to disclose

Educational Need/Practice Gap

Viral hepatitis screening includes multiple tests and can be complex. Interpretation of HBV serology and recognition of cirrhosis are challenging.

Knowledge gaps in hepatitis B diagnosis and management translate into missed opportunities to screen for hepatitis B infection, to vaccinate those susceptible, and to prevent disease complications.

Objectives

Upon completion of this educational activity, you will be able to:

- discuss the causes, transmission, and symptoms of HBV
- describe the laboratory tests performed to aid in the diagnosis and treatment of HBV
- describe how to prevent HBV infection

Expected Outcome

- Increase screening and vaccinations for patients at risk
- Reduce transmission of vaccine preventable viral hepatitis
- Increase appropriate referral to specialists

EPIDEMIOLOGY

Globally, approximately how many people are living with chronic HBV infection?

(HIV 37 million)

A. 20 million
B. 85 million
C. 260 million
D. 515 million

Epidemiology of HBV Infection

Global (2015)

- 257 million have chronic HBV infection
- Prevalence: 3.7%
- HCV 71 M, HIV 37 M

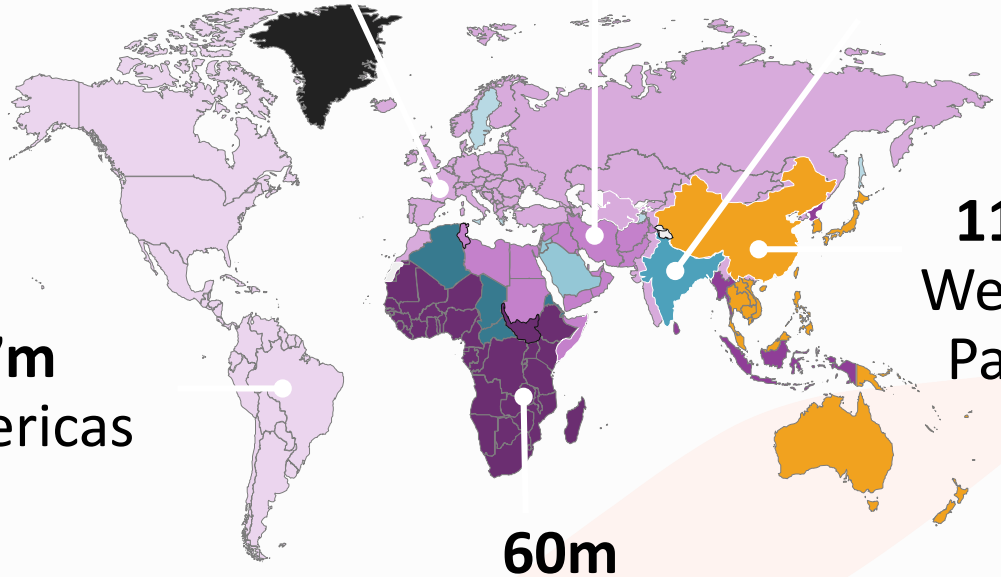
US (2016)

- 862,000 (668,000-1,056,000) were infected with HBV
- Prevalence: 0.3%-0.5%
- 2,000-4,000 die each year

Vaccine 30(2012) 2212-2219https://www.cdc.gov/hepatitis/statistics/2017surveillance/index.htmhttps://www.who.int/news-room/fact-sheets/detail/hepatitis-b

Estimated Global Prevalence of Chronic Hepatitis B in 2015:

257 Million



WHO. Global hepatitis report, 2017

Slide credit: clinicaloptions.com

Globally, what is the most common mode of HBV transmission?

A. Perinatal transmission
B. Sexual contact
C. Blood transfusion
D. Injection drug use

World Organi
REGIONAL OFFICE FOR Africa

95% of hepatitis infections are in children under 5.

The increasing burden of imported chronic hepatitis B--United States, 1974-2008

27.9M immigrants, 63% from HBV endemic areas

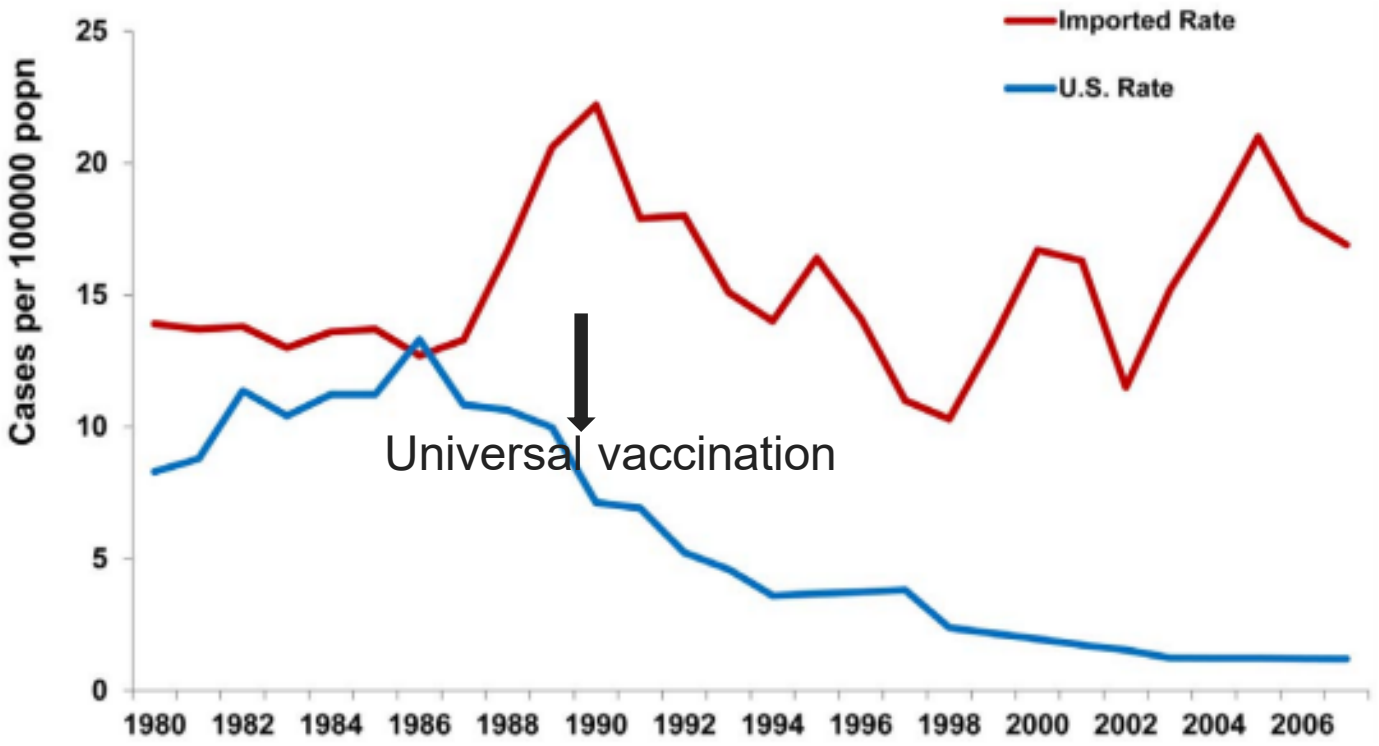
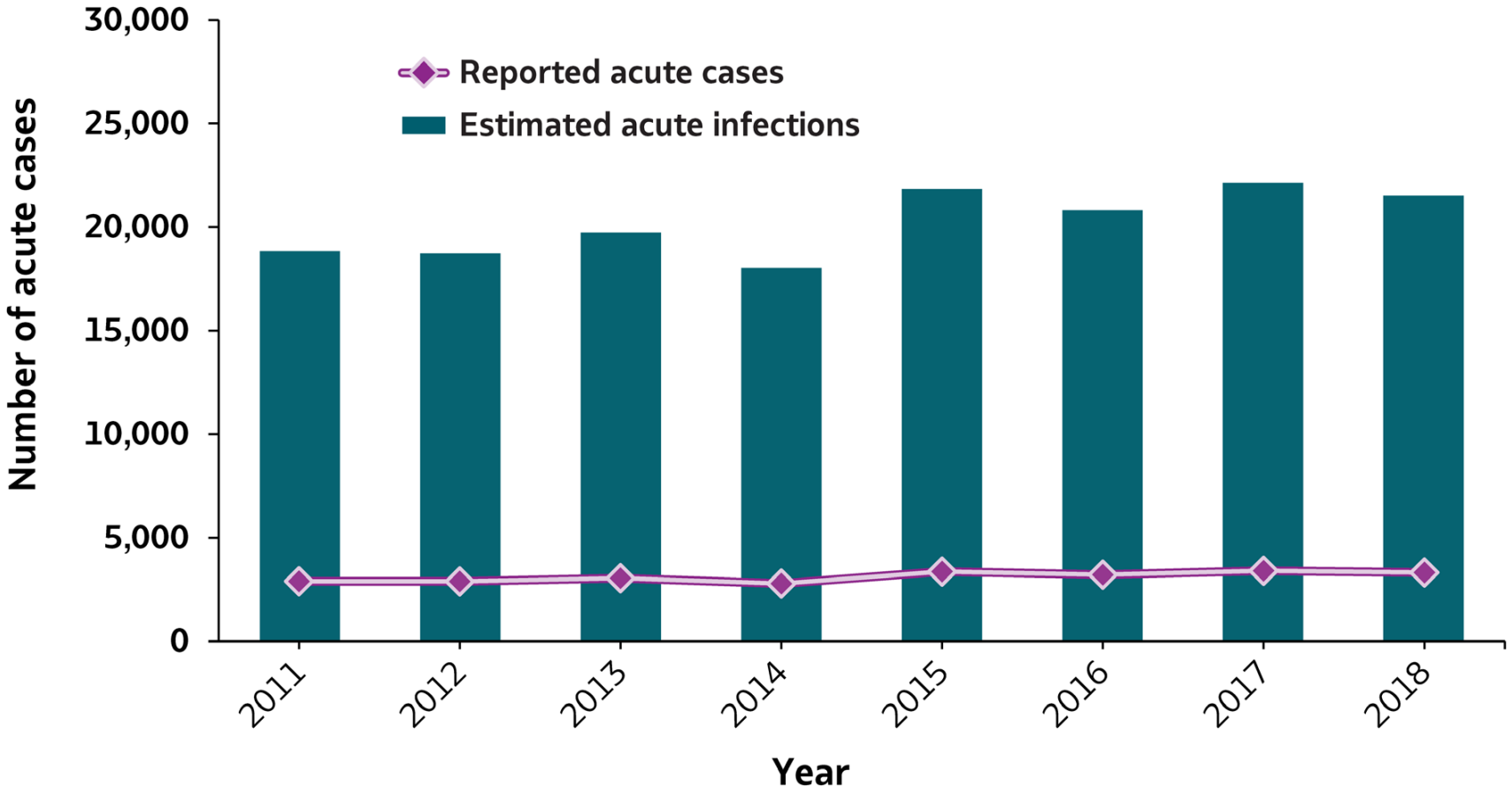


Figure 3. Incidence of Chronic Hepatitis B, U.S.-Acquired vs. Estimated Imported, United States, 1980–2008.
doi:10.1371/journal.pone.0027717.g003

PLoS One 2011; 6(12): e27717

Figure 2.1. Number of reported acute hepatitis B cases and estimated infections* — United States, 2011–2018



Source: CDC, National Notifiable Diseases Surveillance System

* The number of estimated viral hepatitis infections was determined by multiplying the number of reported cases by a factor that adjusted for under-ascertainment and under-reporting[7]. The 95% bootstrap confidence intervals for the estimated number of infections are shown in the Appendix.

Which State Had the Highest Acute HBV Rate in 2017?

A. California
B. Florida
C. Kentucky
D. West Virginia

Midwest is A Hot Spot

Acute HBV Cases per Population

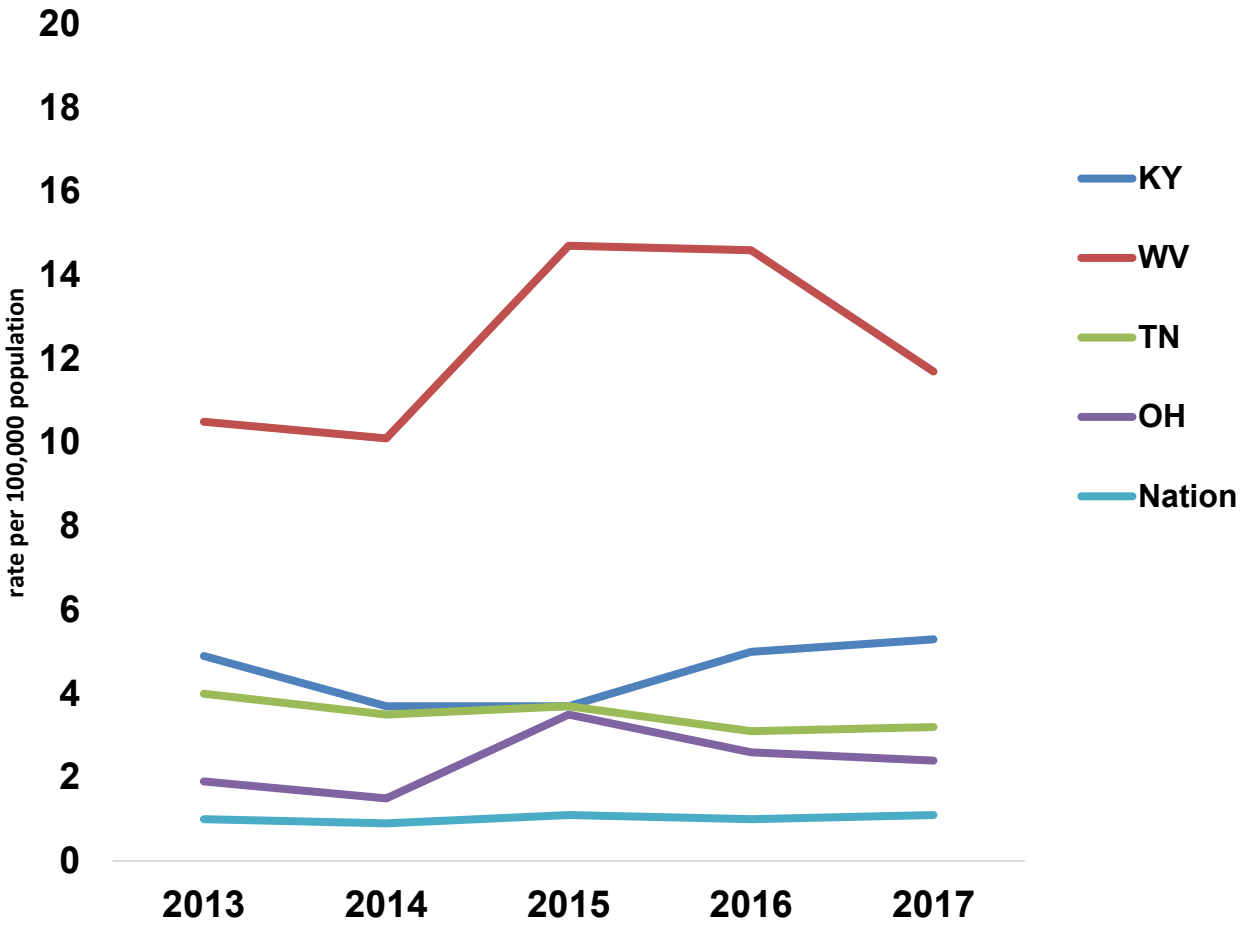


Figure 2.2. Rates of reported acute hepatitis B, by state* — United States, 2017–2018

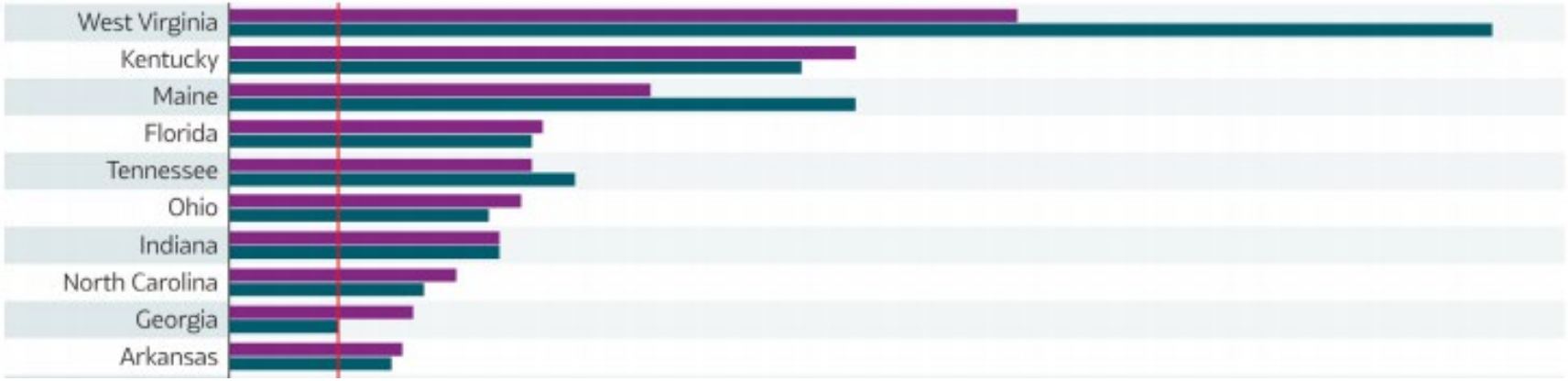
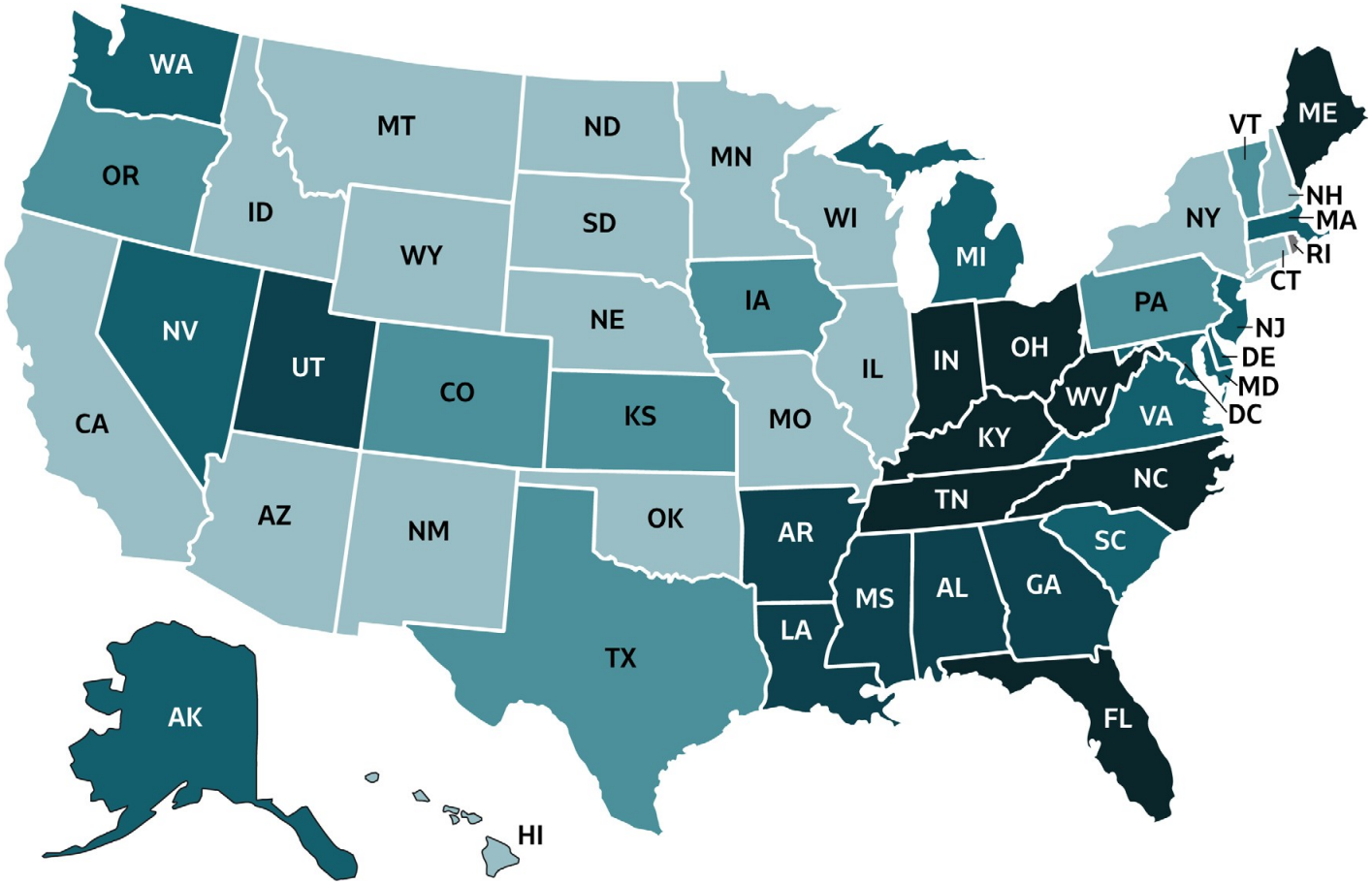
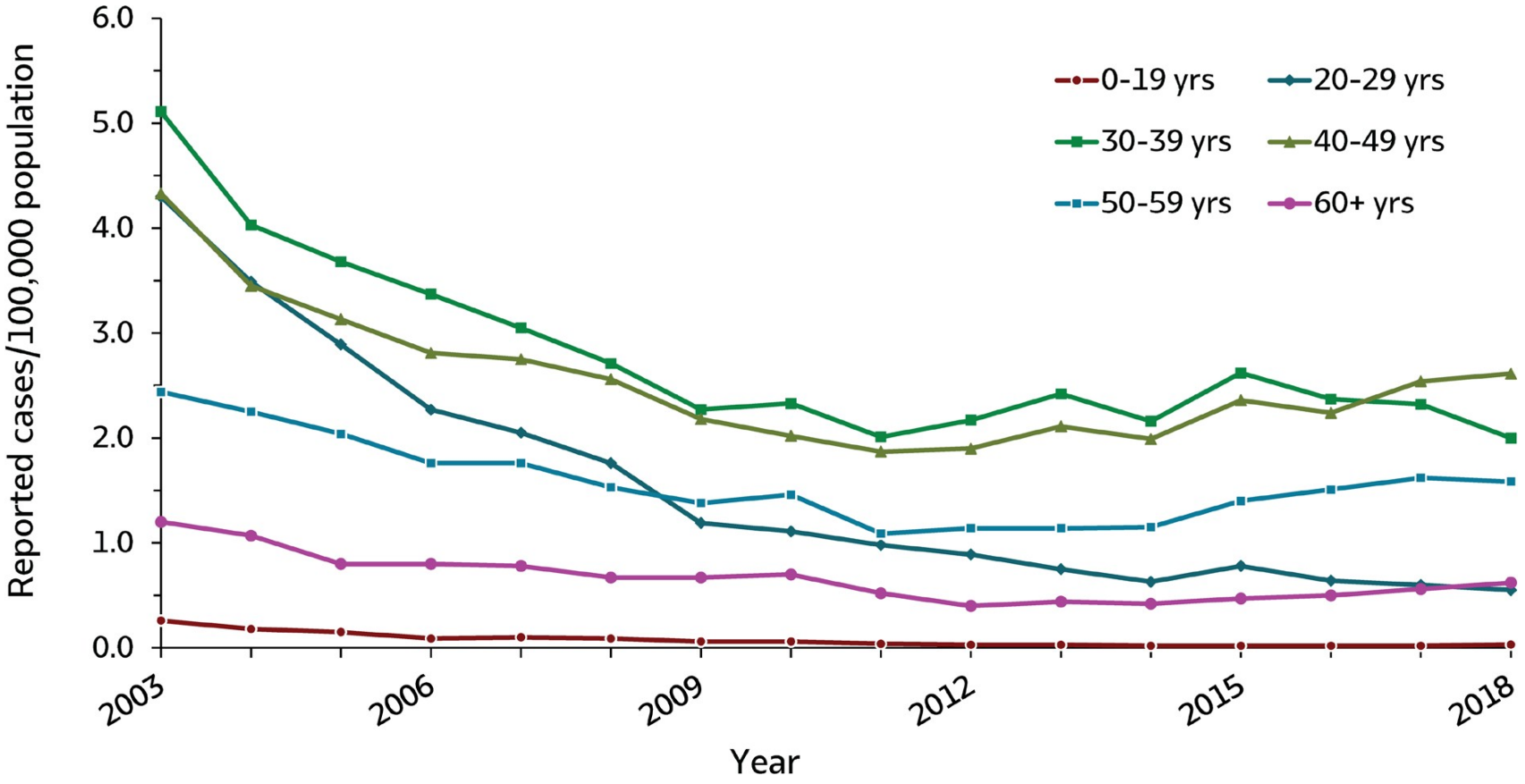


Figure 2.3. Rates of reported acute hepatitis B, by state or jurisdiction — United States, 2018



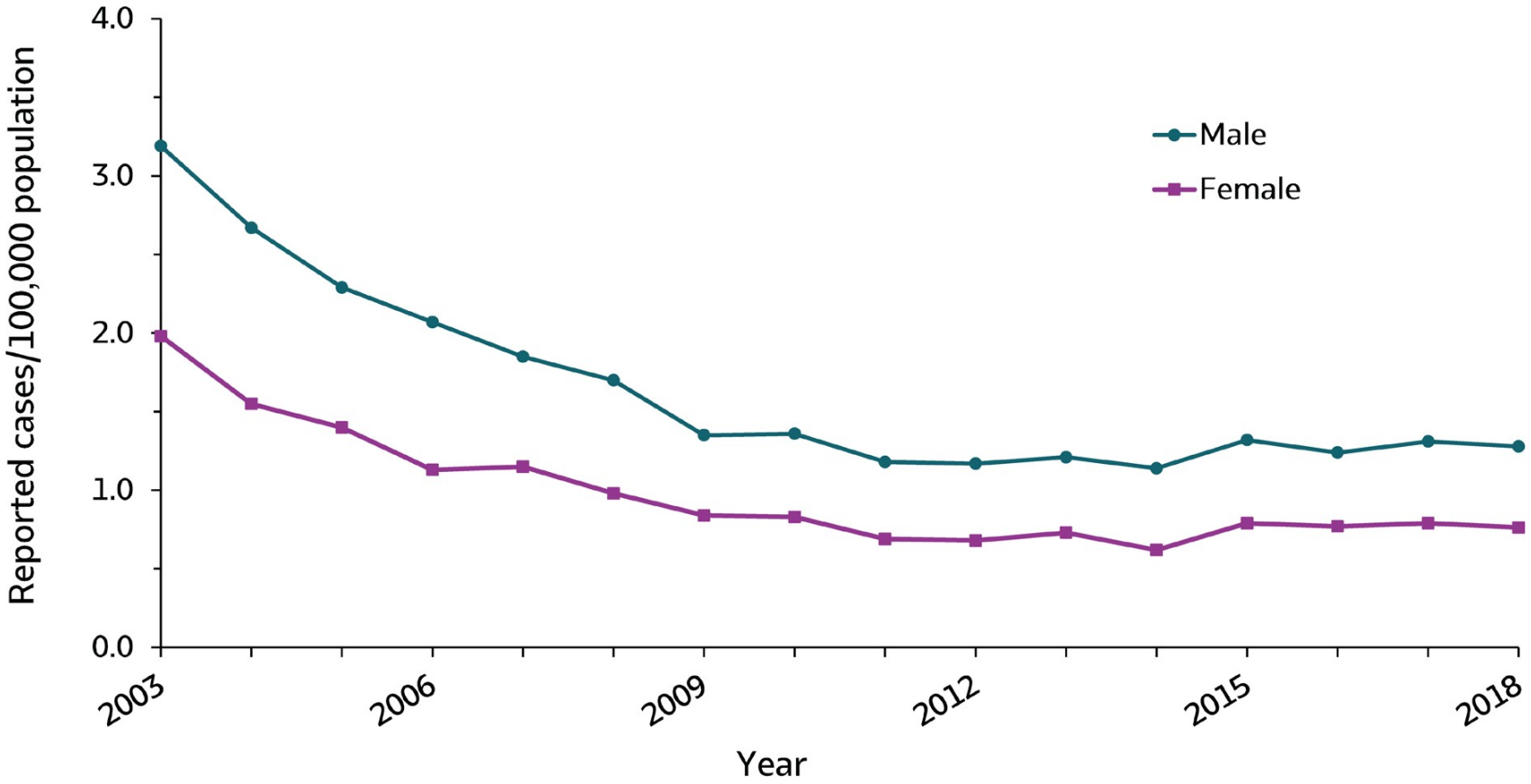
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.4. Rates of reported acute hepatitis B, by age group — United States, 2003–2018



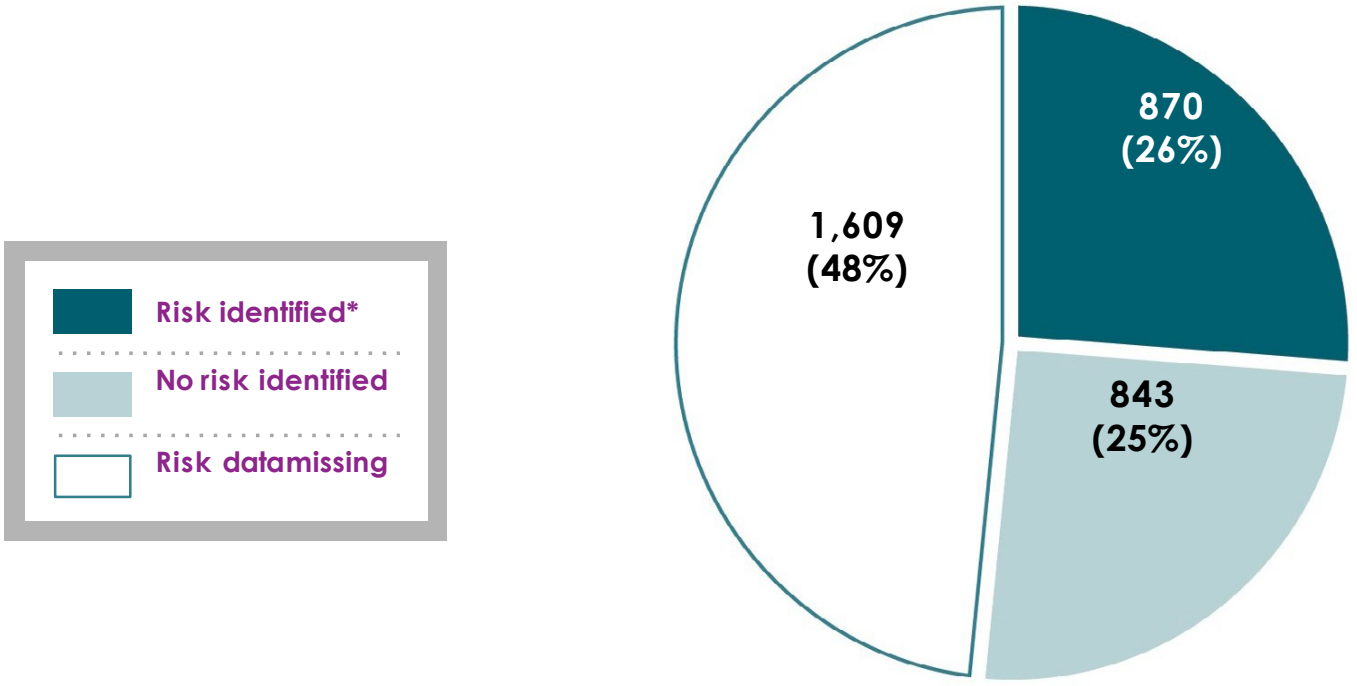
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.5. Rates of reported acute hepatitis B, by sex — United States, 2003–2018



Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.7. Availability of information on risk behaviors/exposures* associated with reported cases of acute hepatitis B — United States, 2018



Source: CDC, Nationally Notifiable Diseases Surveillance System.
* Case reports with at least one of the following risk behaviors/ exposures reported 6 weeks to 6 months prior to symptom onset: 1) injection drug use; 2) multiple sex partners; 3) underwent surgery; 4) men who have sex with men; 5) sexual contact with suspected/confirmed hepatitis B case; 6) sustained a percutaneous injury; 7) household contact with suspected/confirmed hepatitis B case; 8) occupational exposure to blood; 9) dialysis; and 10) transfusion.

Table 2.3. Reported risk behaviors/exposures† among reported cases of acute hepatitis B — United States, 2018

Risk behaviors/exposures	Risk identified*	No risk identified	Risk data missing
Injection drug use	549	969	1,804
Multiple sex partners	199	671	2,452
Surgery	117	962	2,243
Men who have sex with men §	49	353	1,648
Sexual Contact ¶	42	603	2,677
Needlestick	71	959	2,292
Household contact (non-sexual) §	12	633	2,677
Occupational	4	1,369	1,949
Dialysis patient	13	1,022	2,287
Transfusion	1	1,103	2,218

Source: CDC, Nationally Notifiable Diseases Surveillance System.

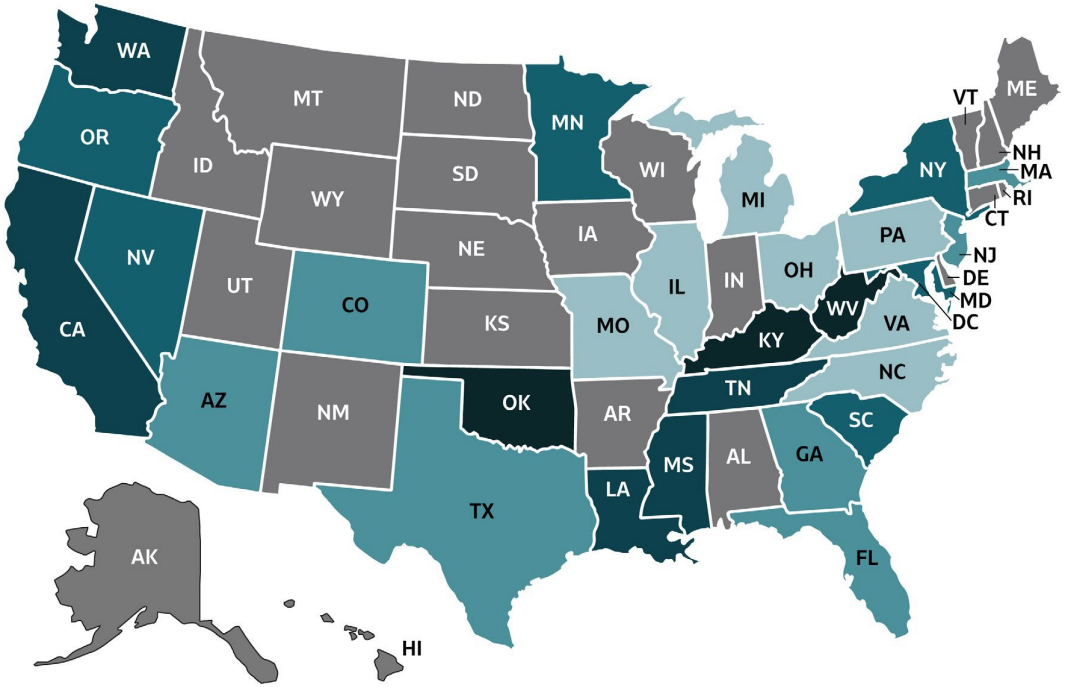
* Case reports with at least one of the following risk behaviors/ exposures reported 6 weeks to 6 months prior to symptom onset: 1) injection drug use; 2) multiple sex partners; 3) underwent surgery; 4) men who have sex with men; 5) sexual contact with suspected/confirmed hepatitis B case; 6) sustained apercutaneous injury; 7) household contact with suspected/confirmed hepatitis B case; 8) occupational exposure to blood; 9) dialysis; and 10) transfusion.

†Reported cases may include more than one risk behavior/exposure.

§ A total of 2,050 acute hepatitis B cases were reported among males in 2018.

¶ Cases with more than one type of contact reported were categorized according to a hierarchy: (1) sexual contact; (2) household contact (non-sexual).

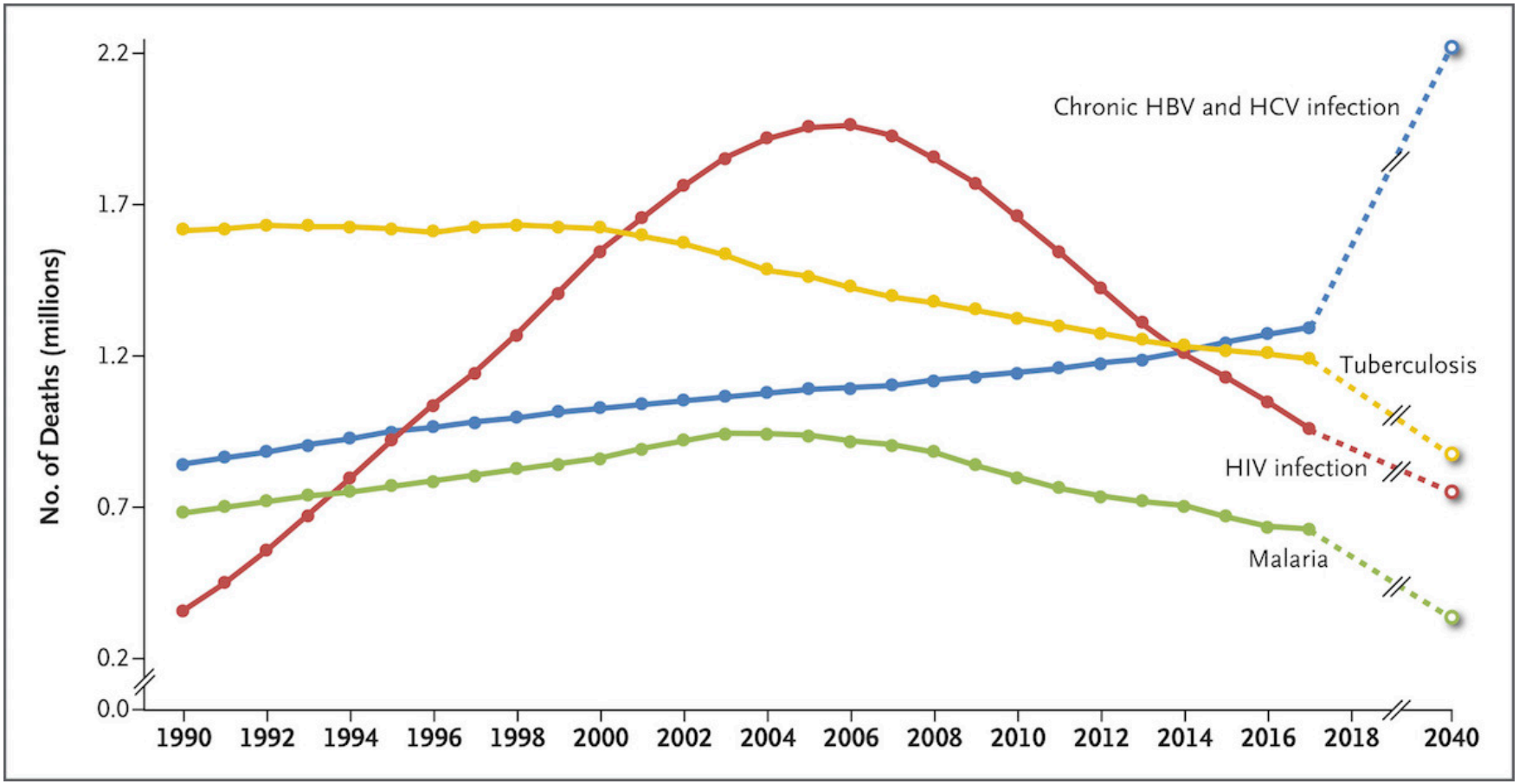
Figure 2.8. Rate of deaths with hepatitis B listed as a cause of death among U.S. residents, by jurisdiction and year — United States, 2018



Color Key	Cases/100,000 Population	States
	0-0.33	IL, MI, MO, NC, OH, PA, VA
	>0.33-0.41	AZ, CO, FL, GA, MA, NJ, TX
	>0.41-0.52	MD, MN, NV, NY, OR, SC
	>0.52-0.68	CA, LA, MS, TN, WA
	>0.68-1.26	KY, OK, WV
	Unreliable rate	AL, AK, AR, CT, DE, DC, HI, ID, IN, IA, KS, ME, MT, NE, NH, NM, ND, RI, SD, UT, VT, WI, WY

Source: CDC, National Center for Health Statistics, Multiple Cause of Death 2018 on CDC WONDER Online Database. Unreliable rates where death counts were less than 20 were not displayed due to the instability associated with those rates.

Global Burden of HBV Infection



N Engl J Med. 2019;380:2041-50

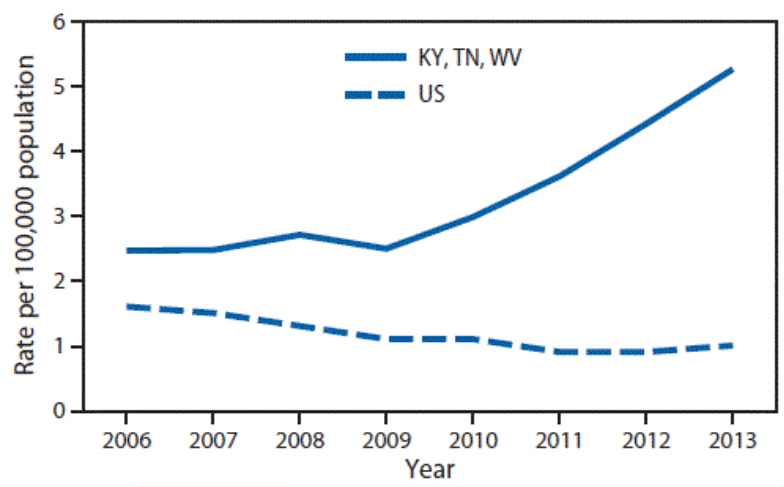
Which one of the following groups has the highest HBV prevalence in the United States?

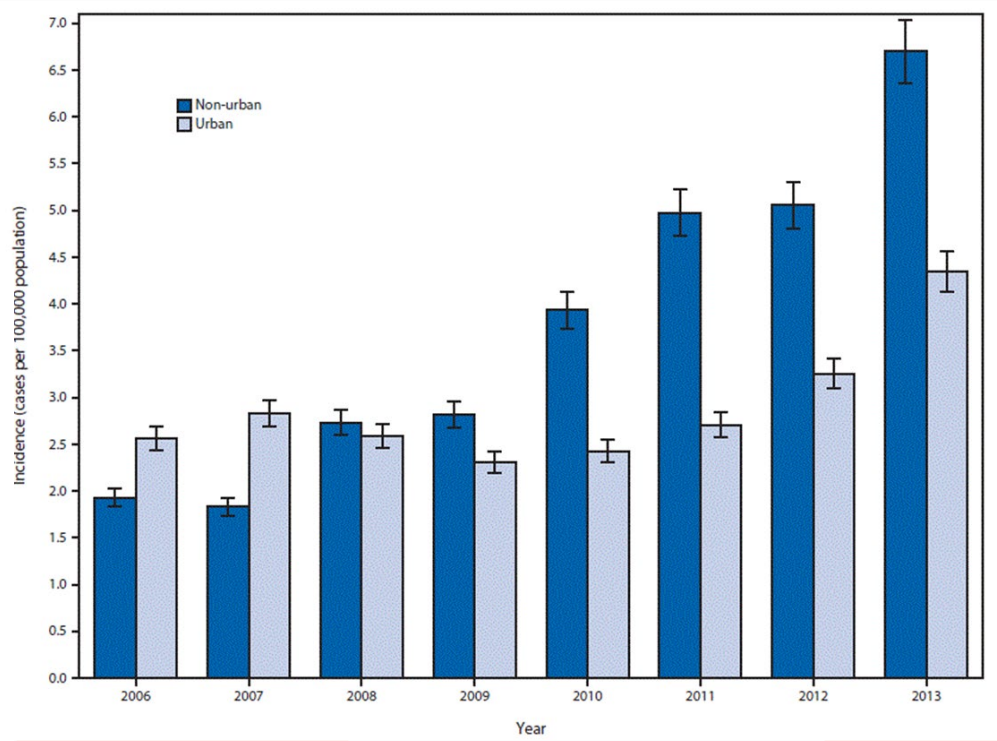
A. Children and adolescents under the age of 20
B. Recipients of blood transfusion
C. Foreign-born persons
D. Persons with HIV infection

HBV and Asian Americans

- Less than 0.5% Americans have Hepatitis B
- 10-15% Asian Americans have Hepatitis B
- **50%** of the people in the US with chronic hepatitis B are Asian Americans

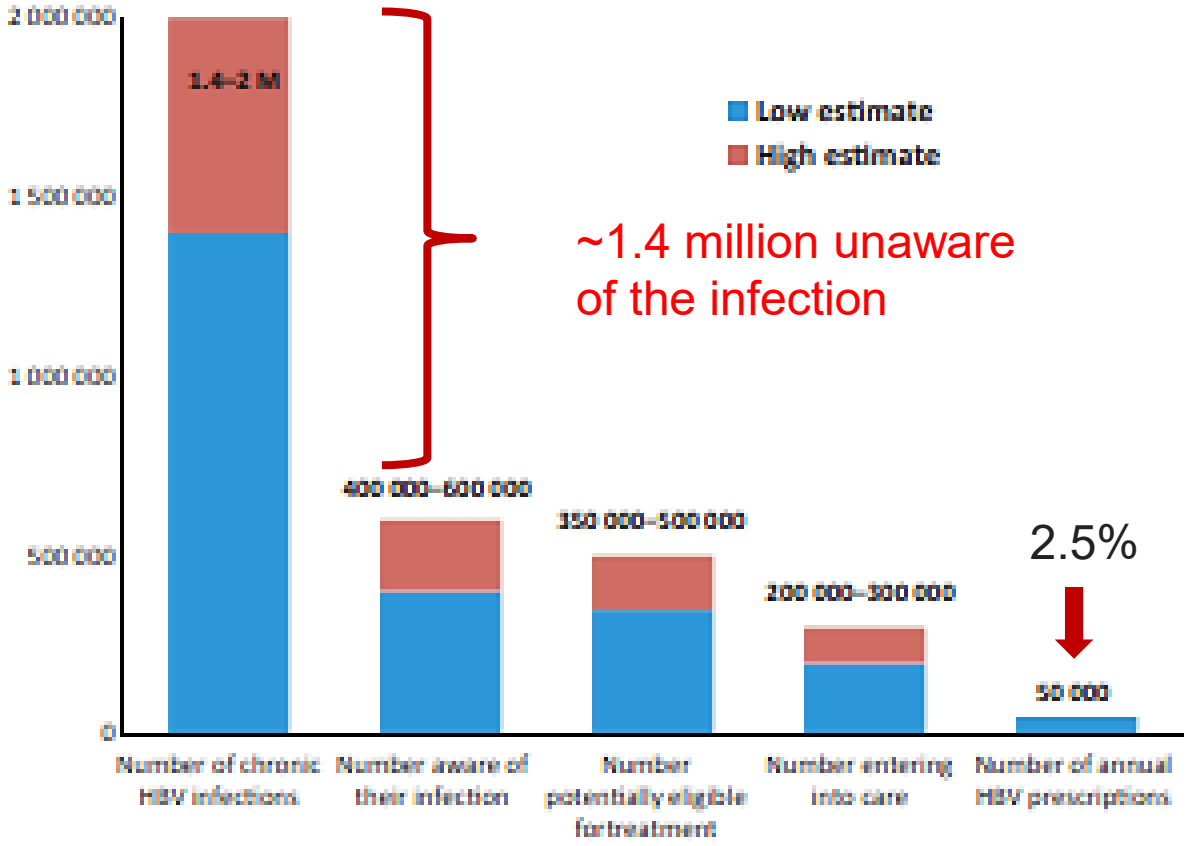
HBV Increased in Non-urban Counties





Continuum of Care

2.5 % Receiving HBV Treatment



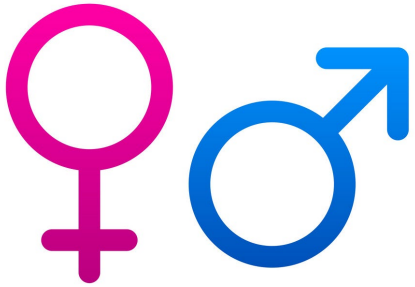
Journal of Viral Hepatitis, 2011 (18): 377-383

Take Home Message

- There are 10x more people with chronic HBV than HIV/AIDS worldwide
- Health disparity in the US
  - HBV disproportionally affects Asian and Pacific Islanders
  - 1 in 10 Asian American has HBV.
  - Liver cancer is the 2nd most common cause of cancer death in Asian men
- Acute and chronic HBV cases are increasing due to injection drug use in Kentucky

TRANSMISSION

Blood Birth Sex



Which one of the following is the most common risk factor for HBV transmission in the US?

A. Injection drug use
B. Household contact
C. Perinatal transmission
D. Blood transfusion

Prevalence of HBV infection in the United States

	Chronically infected %	Ever infected%
General population	0.3	4.8
HIV+	4-17	24-76
IDU	3-6	20-70
MSM	1-3	10-40
Sexual contacts of HBe Ag+	3.5-9	25-59
Household contacts	3-20	15-60

MMWR, 2008;57: 1-20

CDC recommends routine screening for HBV in which one of the following groups?

A. Persons diagnosed with community acquired pneumonia
B. Men who have sex with men
C. Men 45 years of age or older
D. Women diagnosed with gonorrhea or chlamydia

CDC Recommends Routine Testing for HBV infection

- Persons born in geographic regions with HBsAg prevalence of ≥2%
- US born persons not vaccinated as infants whose parents were born in geographic regions with HBsAg prevalence of ≥8%
- injection-drug users
- MSM
- persons with elevated ALT/AST of unknown etiology
- persons with selected medical conditions who require immunosuppressive therapy
- pregnant women
- infants born to HBsAg+ mothers
- household contacts and sex partners of HBV-infected persons
- persons who are the source of blood or body fluid exposures that might warrant postexposure prophylaxis (e.g., needlestick injury to a health care worker)
- persons infected with HIV

MMWR September 19, 2008 / 57(RR08);1-20

Common Myths

HBV is NOT spread through

Hugging or kissing

Breastfeeding

Coughing or sneezing

Sharing food, water, utensils or drinking glasses

Mosquitoes

Tears, sweat, urine or stools

Case B H

- A 32 yo woman with history of IDU for 10 years presents for her first prenatal visit at 11 weeks gestation. She reports she has been abstinent from illicit drugs and alcohol for the past 5 years. She is married and in a monogamous relationship with husband. She and husband both tested negative for HIV a year ago. She has never been tested for HBV and never received HBV vaccine.

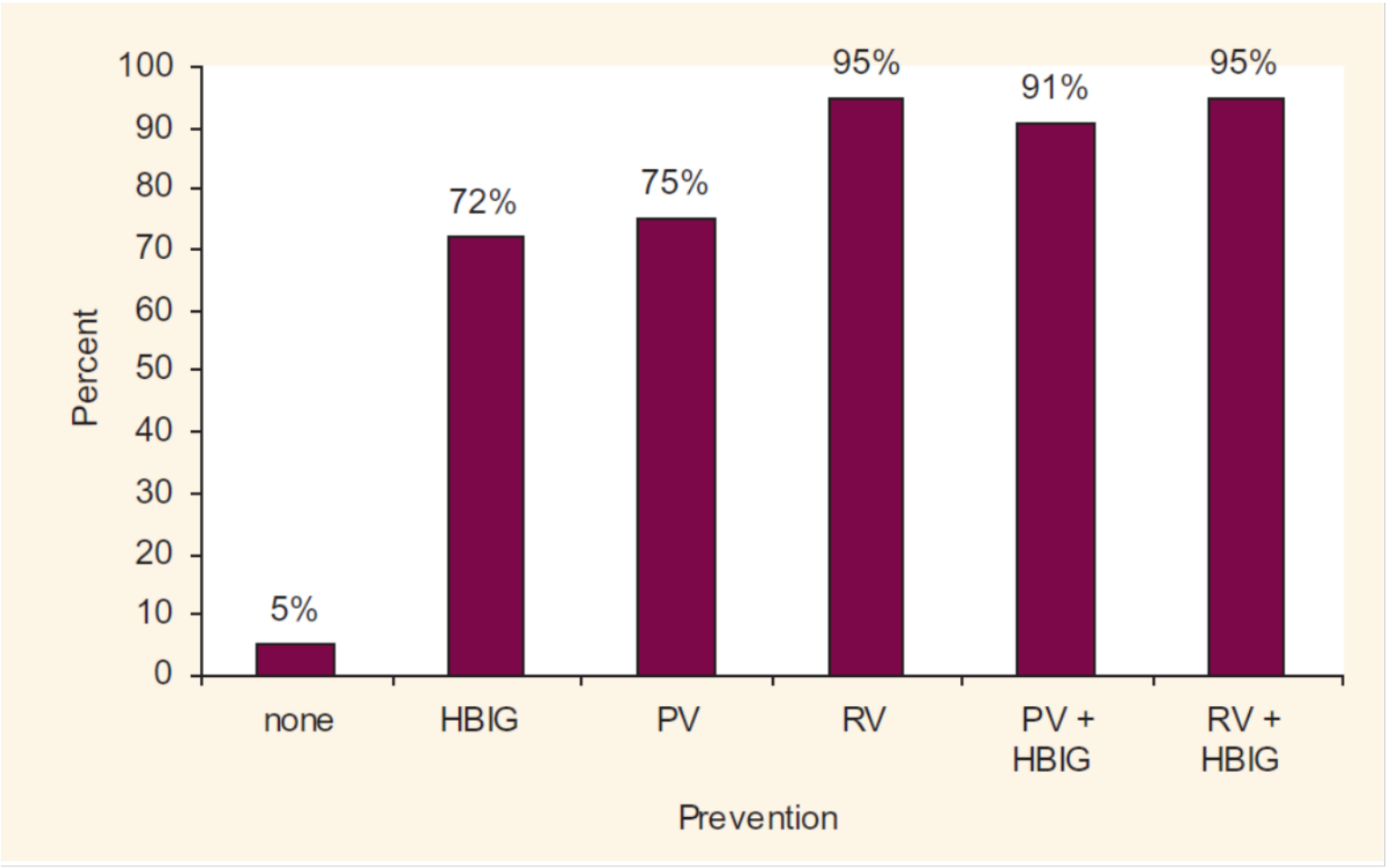
Which of the following is the most important step in evaluating this patient with regard to her hepatitis B status?

A. No testing for HBV is indicated since it is highly likely that she has received HBV vaccine as a child.
B. No testing for HBV is indicated. Start a series of HBV vaccine
C. Check for HBsAg
D. Check for anti HBsAb

Perinatal HBV Transmission

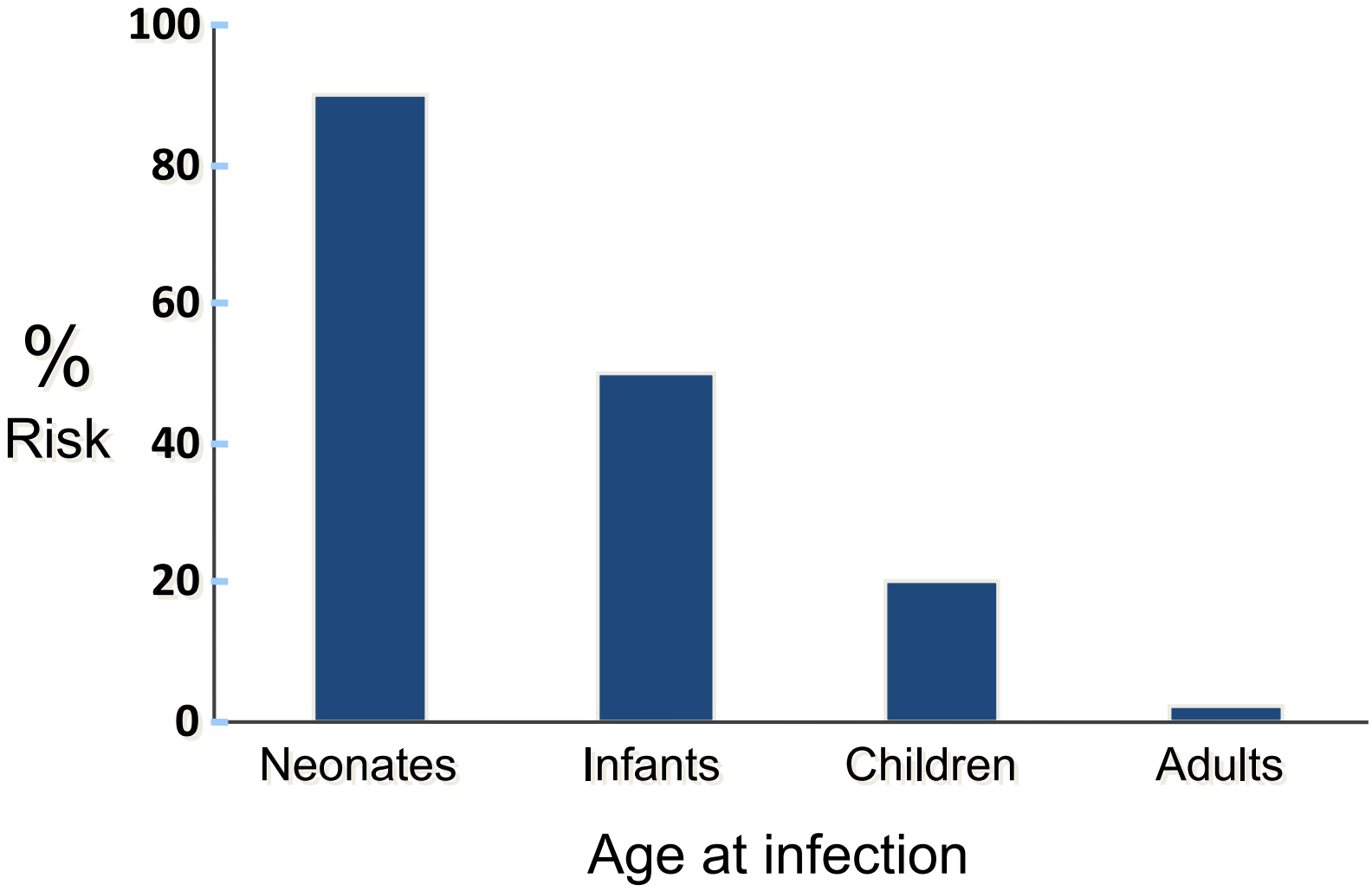
- Vertical HBV transmission
  - 5~90% without prophylaxis
    - HBeAg positive: 70~90%
    - HBeAg negative: <10%
- The risk reduced to 3~15% if the infant receives HBIG and HBV vaccine series

Prevention strategy



Protective efficacy rates in neonates born to HBeAg positive mothers after passive Immunization (HBIg), active immunization (PV: plasmatic vaccine, RV: recombinant vaccine) and combination

Risk of Chronic HBV Infection

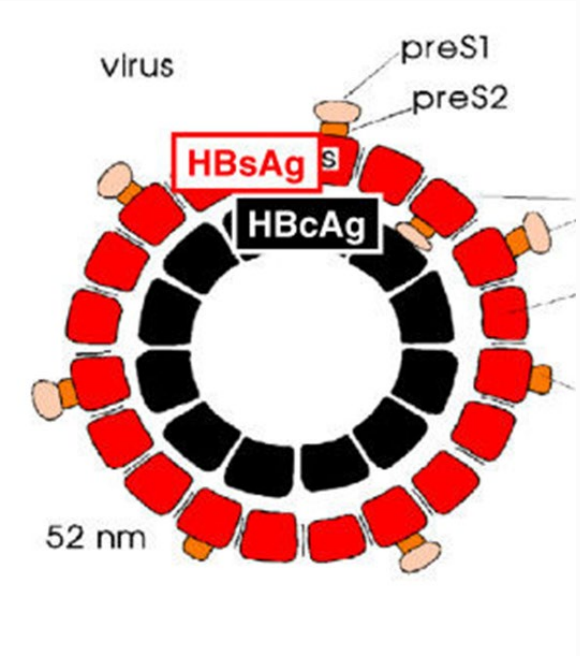


CDC recommends which one of the following when screening for HBV in persons who inject drugs?

A. HBsAg plus either anti-HBs or anti-HBc
B. Anti-HBs and anti-HBc
C. HBs Ag and HBV DNA
D. HBsAg, HBeAg, and anti-HBc

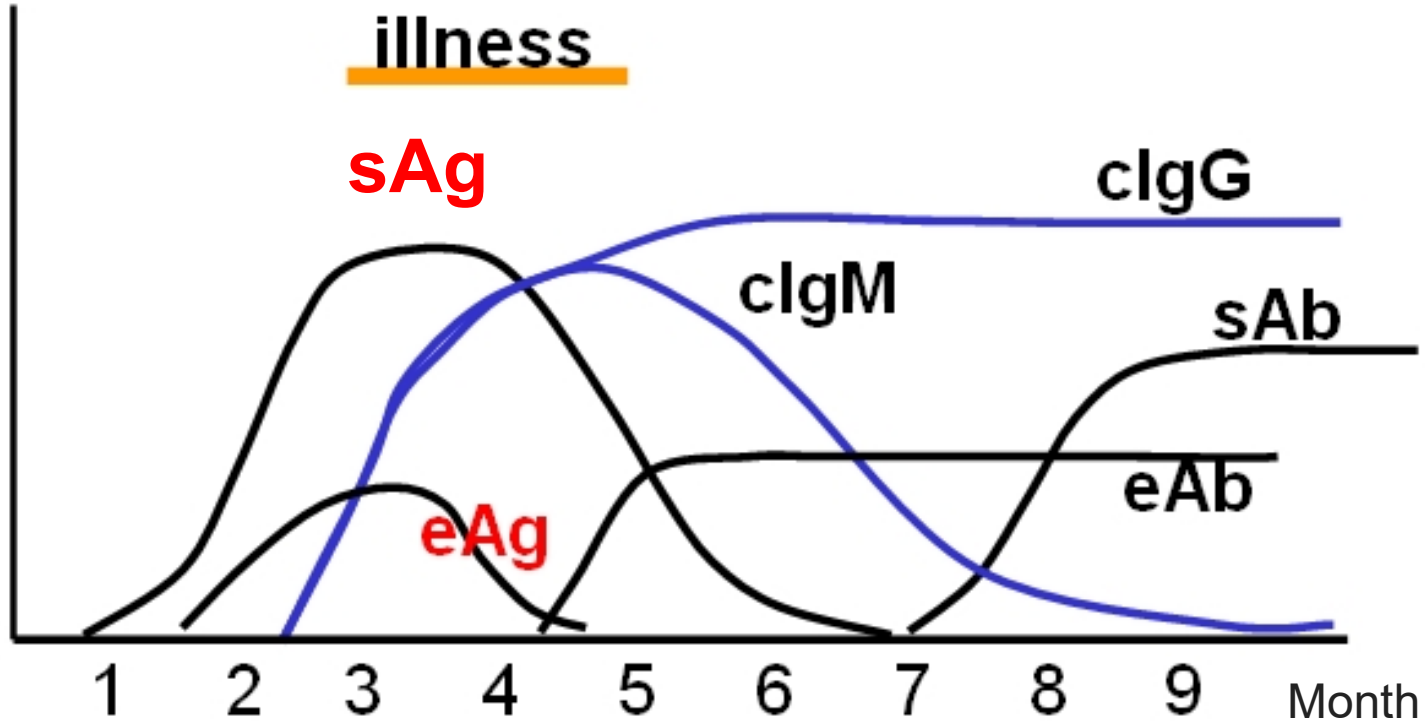
DIAGNOSIS

HBV Serology



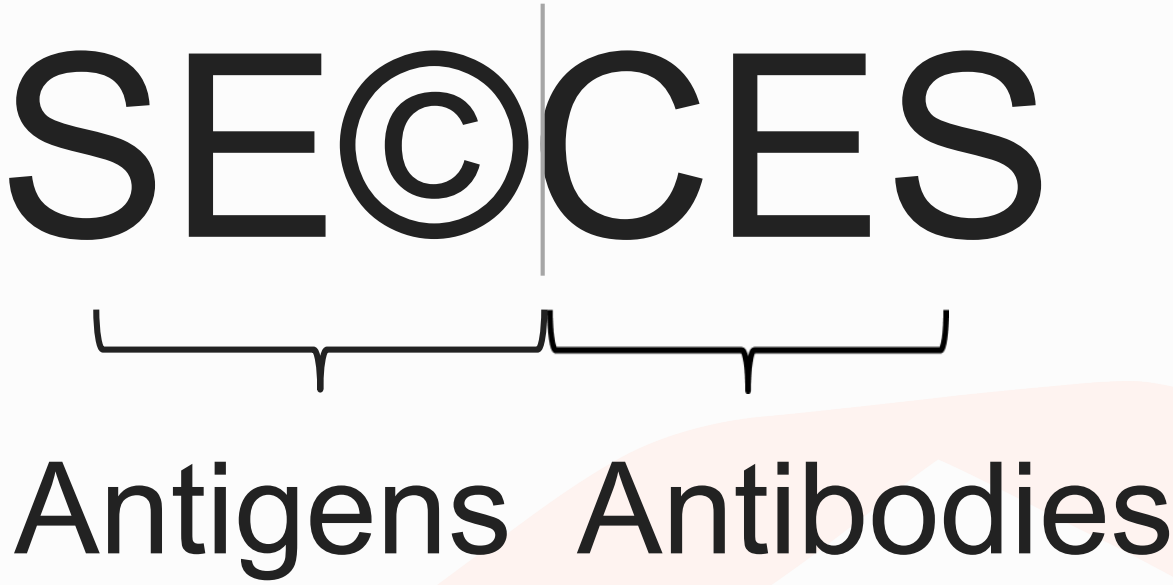
- Virus
  - Hepatitis B surface antigen
  - Hepatitis B core antigen
  - Hepatitis B e antigen
- Host
  - HBV surface antibody
  - HBV core antibody
  - HBV e antibody

Acute Hepatitis B serology

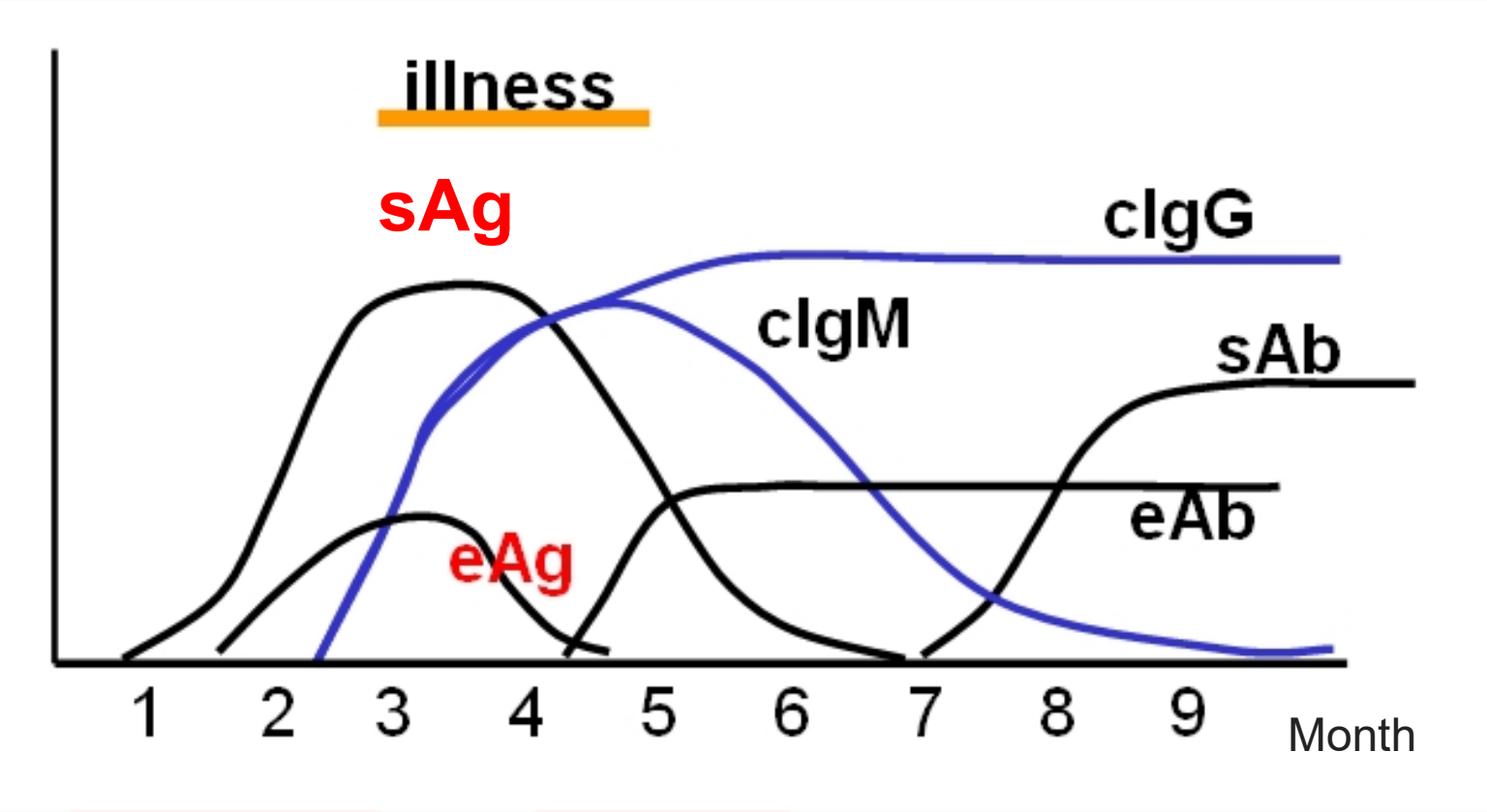


http://www.virology.uct.ac.za/teachhepatitis.html

HepB Serology



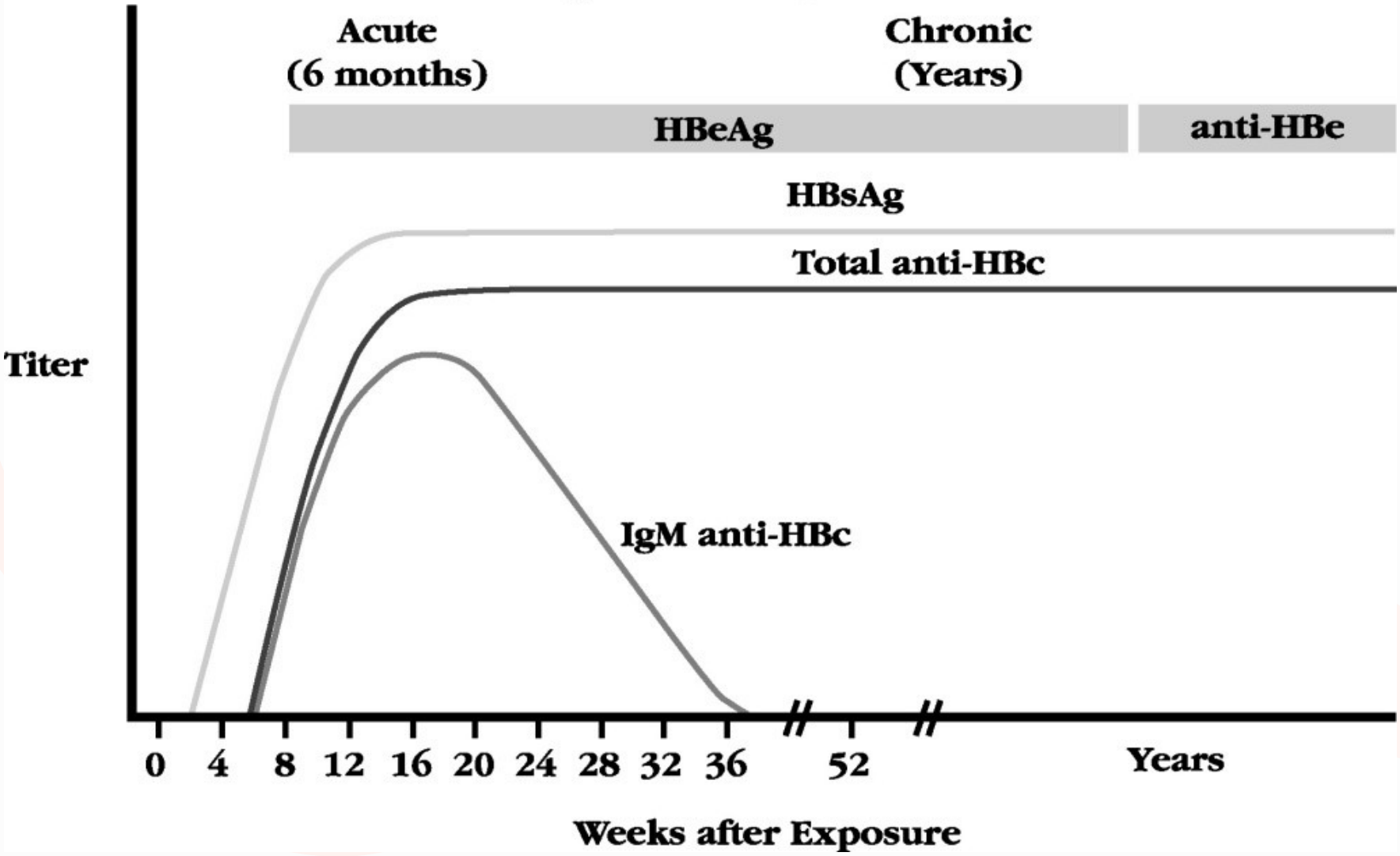
Acute Hepatitis B Serology SE©CES



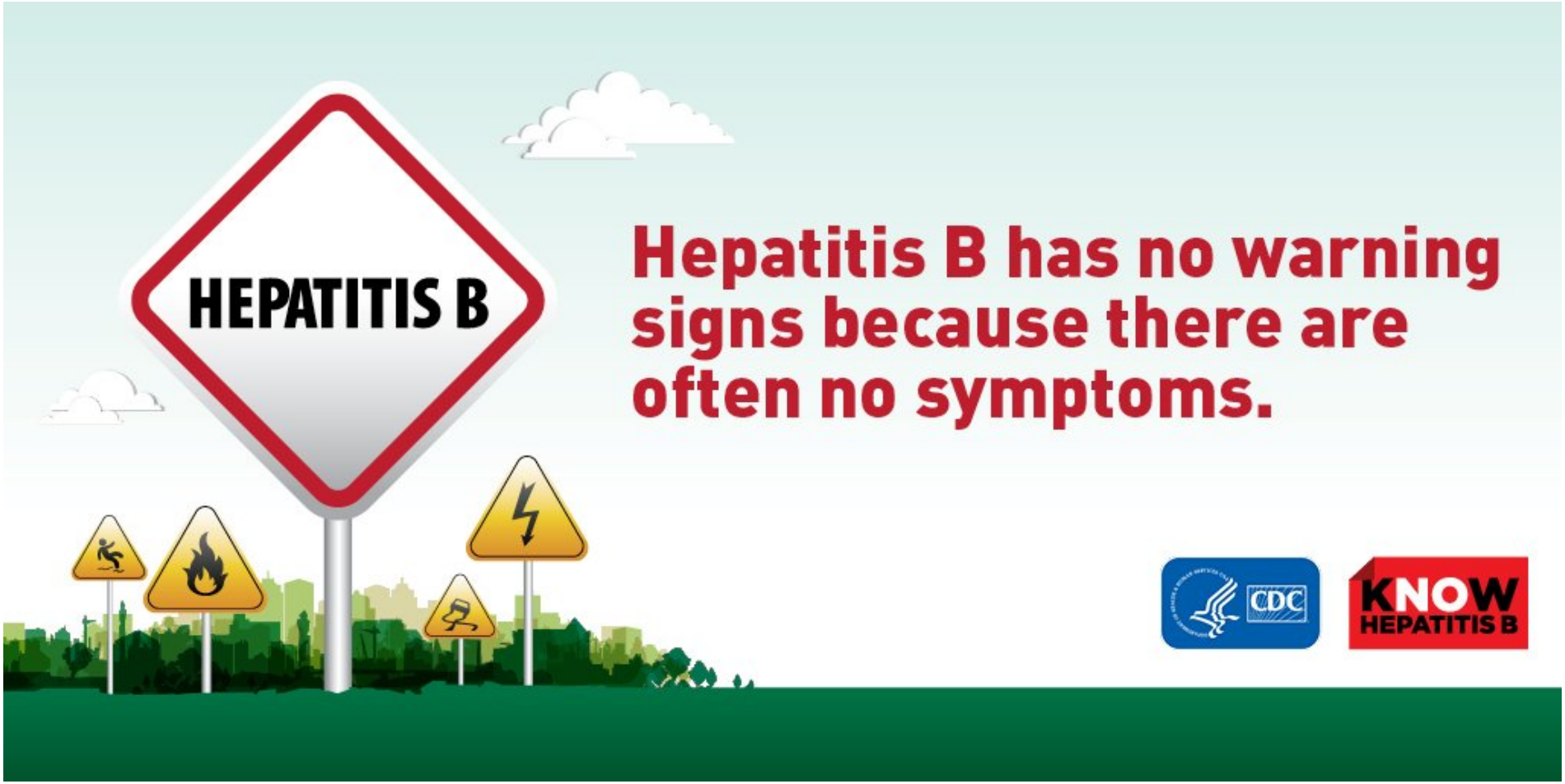
http://www.virology.uct.ac.za/teachhepatitis.html

Progression to Chronic Hepatitis B Virus Infection

Typical Serologic Course

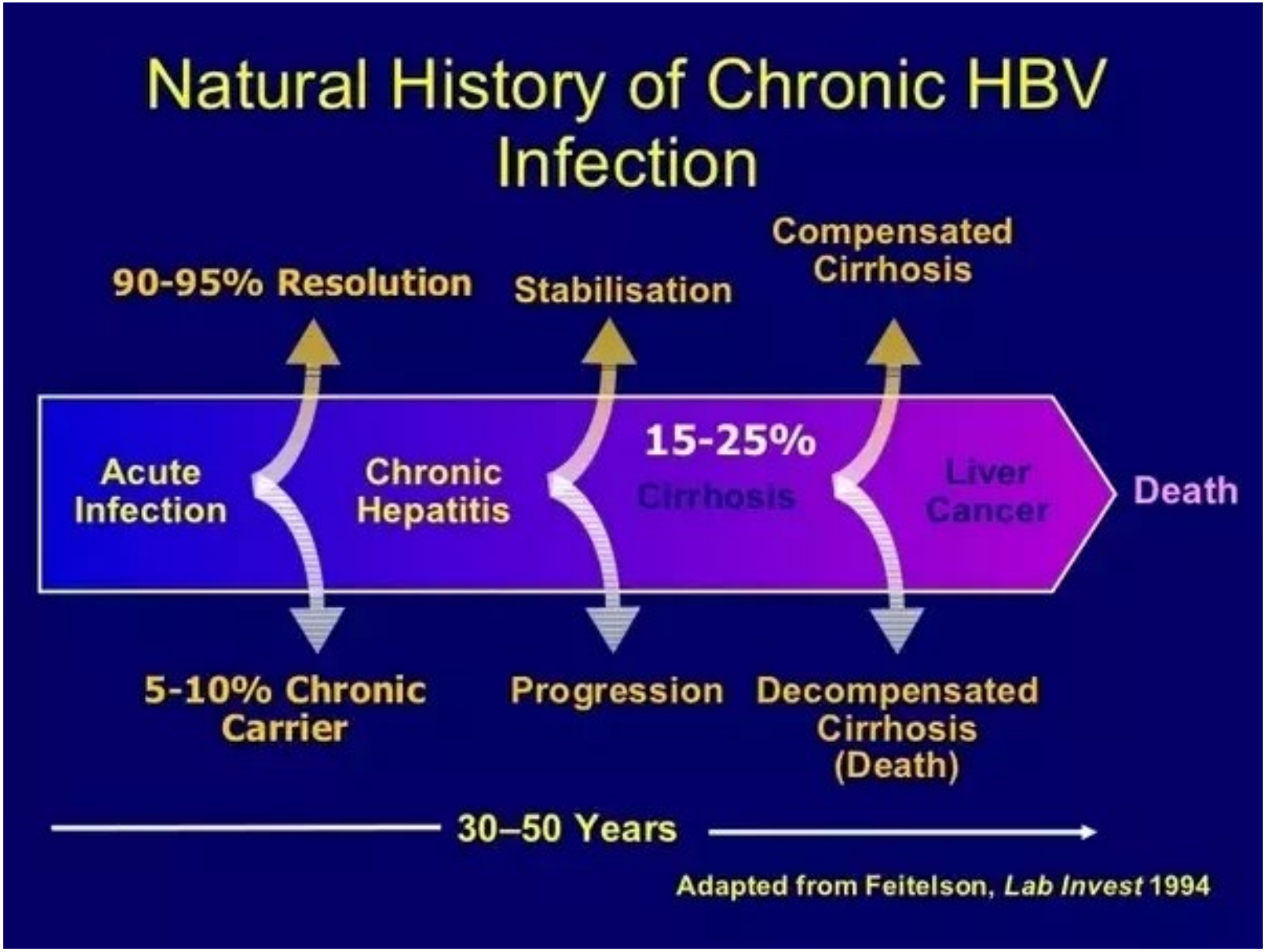


SYMPTOMS


HEPATITIS B
Hepatitis B has no warning signs because there are often no symptoms.
CDC
KNOW HEPATITIS B

Symptoms and Signs of Chronic HBV

- Remain symptom free for decades
- Signs of advanced liver disease
  - Jaundice
  - Loss of appetite
  - Nausea
  - Abdominal pain
  - Ascites
  - Leg edema
  - Altered mental status
  - GI bleed


Natural History of Chronic HBV Infection
90-95% Resolution
Stabilisation
Compensated Cirrhosis
Acute Infection
Chronic Hepatitis
15-25% Cirrhosis
Liver Cancer
Death
5-10% Chronic Carrier
Progression
Decompensated Cirrhosis (Death)
30–50 Years
Adapted from Feitelson, Lab Invest 1994

Advise Your Patients

- Tell their household, sex, and needle-sharing partners to screen and get vaccinated for HBV
- Use barrier protection (condoms) during sex
- Cover their cuts and clean up blood and bodily fluid spills with 1:10 diluted bleach
- Do not share toothbrushes, razors, nail clippers, personal injection equipment

No Sharing

Post Exposure Prophylaxis

Case: Occupational Exposure

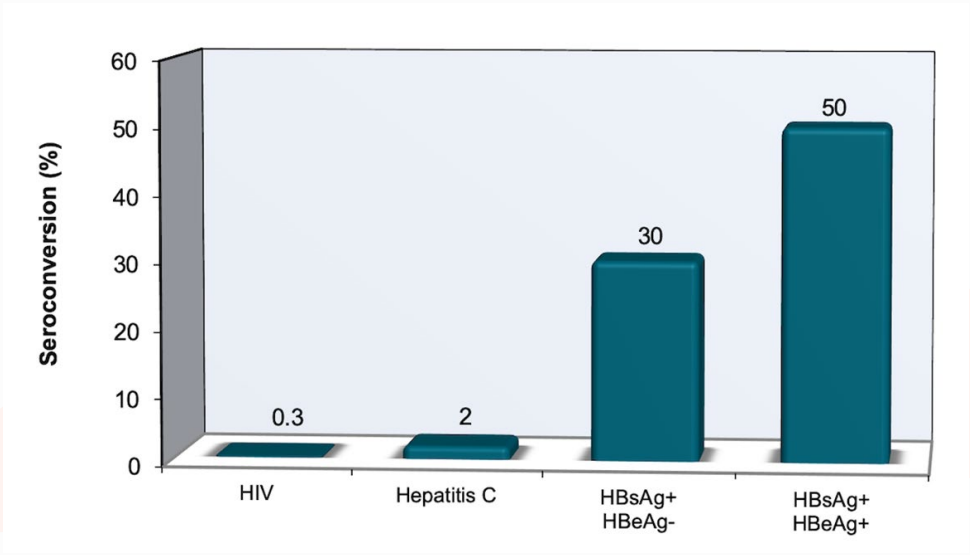
A 32 yo ICU nurse is starting an IV on a patient with liver failure secondary to acute hepatitis B. As she inserts the needle and accesses the vein, the patient jerks and the needle punctures her forearm.

You tell her the risk of HBV transmission with a needlestick is

A. 1/3 (33%)
B. 1/33 (3%)
C. 1/100 (1%)
D. 1/1000 (0.1%)

Rule of 3

- The rate of Hepatitis B transmission with a needle stick is 30%
- Hepatitis C 3%
- HIV 0.3%



Occupational exposure

25 yo nurse is splashed in her eye and mouth with urine from a patient with chronic HBV. The patient was recently diagnosed with decompensated cirrhosis.

You recommend:

A. Start PEP immediately with HBV vaccination
B. Start PEP with HBV vaccination and HBV immune globulin
C. Start PEP with tenofovir
D. She does not need PEP

Occupational Exposure

- Urine, sputum, and vomitus are not considered potentially infectious unless contaminated with blood

MMWR Recomm Rep. 2013;62:1-19

PREVENTION

VACCINATION

Case

- A 35-year-old woman with injection drug use is seen in clinic. She received her first HBV vaccine dose 1 year ago but did not return for additional doses.

What is the best course of action to complete the hepatitis B vaccine series in this woman?

A. Give the 2nd dose now, followed by the 3rd dose in 2-5 months
B. Give the 2nd dose now, followed by the 3rd dose 1 month later
C. Restart the HBV vaccine series and administer 3 doses
D. Give 1 dose now, but further doses are not indicated, for it has been more than 6 months since the 1st dose

What To Do about Missed Doses

- No need to restart
- Pick up the schedule where it was left
- If interrupted after the 1st dose, the 2nd dose should be administered as soon as possible
- Separate the 2nd and the 3rd by at least 8 weeks

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.

Who should be vaccinated?

- All infants
- Persons at risk by sexual exposure
- Persons at risk by blood exposure
  - HCW
  - IDU
  - Hemodialysis
  - Household contacts
  - Residents and staff in facilities for developmentally disabled
- Others
  - International travelers
  - HIV

CDC now recommends the hepatitis B vaccine for adults with diabetes

All unvaccinated adults with diabetes who are younger than 60 years of age

MMWR December 23, 2011 / 60(50);1709-1711

24 outbreaks of HBV

- 24 outbreaks during 2008-2016
- 179 outbreak-associated cases
- >10,935 persons notified for screening
- 18 occurred in long-term care facilities
  - 15 through infection control breaks during blood glucose monitoring
- 5 occurred in a free dental clinic, an oncology clinic, pain clinics, a hospital surgery service

Unsafe Diabetes Care

Use of fingerstick devices or insulin pens on multiple persons

Sharing of blood glucose meters without cleaning and disinfection between uses

Failure to perform hand hygiene or change gloves between procedures

HBV Vaccine Is Highly Effective

	HBVs Ab (>10IU/ml)
1st dose	20~55%
2nd dose	75~80%
3rd dose	90~95%

Efficacy Decreased in the Older Adults

- 95% seroconversion; 20 yo
- 86% 40yo
- 46% >60 yo
- Seroconversion rate is lower: obese, smoker, male, immunocompromised host

Q & A