

Viral Hepatitis

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Objectives and Learning Outcomes

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

1. Understand the etiology of hepatitis B
2. Describe the national and statewide status of hepatitis B infections
3. Gain knowledge of hepatitis B serology and determine infection status from examples of laboratory results
4. Recognize reporting requirements for viral hepatitis conditions
5. Employ supportive techniques for conducting disease investigations
6. Understand, locate, and utilize available resources for disease information, education, and case investigation

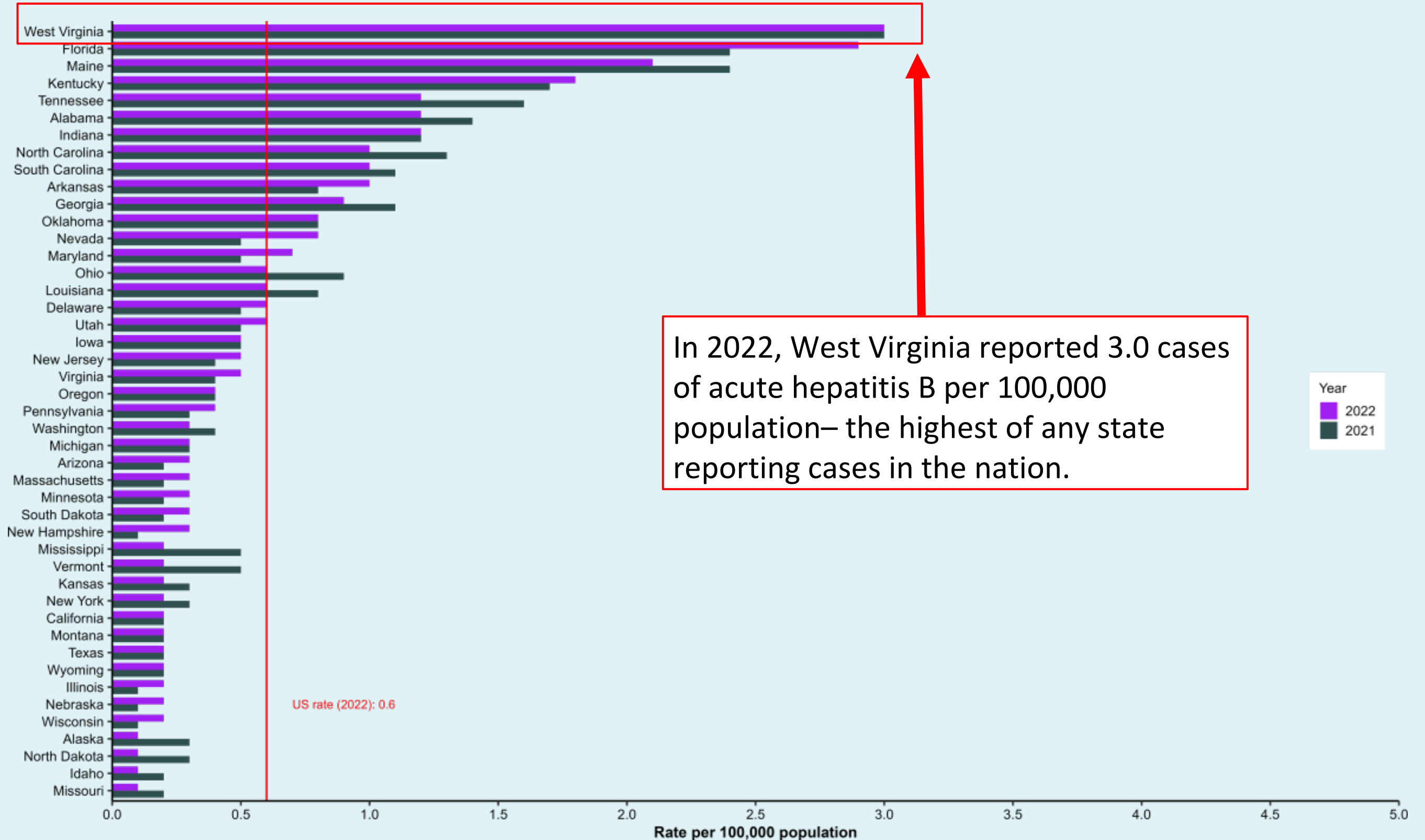
Hepatitis B Virus (HBV)

- Infection: viral liver infection
- Transmission: bloodborne and bodily fluids containing blood
- Symptoms: jaundice, nausea, stomach pain, fatigue, and loss of appetite
- Testing: HBsAg, HBV DNA, and HBeAg diagnostic tests
- Populations at increased risk: people who inject drugs (PWID) or share drug equipment, sex partners of people infected with HBV, men who have sex with men (MSM), healthcare workers, public safety workers, and hemodialysis patients
- Vaccine Preventable: yes

National Viral Hepatitis Data 2022

- 47 states and the District of Columbia reported 2,126 acute HBV cases, corresponding to 13,800 estimated acute HBV infections
- 44 states and the District of Columbia reported a total of 16,729 newly identified chronic HBV cases
- Acute HBV rates remained stable from 2021 to 2022 after a decrease was noted from 2020 to 2021
- West Virginia reported the highest rate of acute HBV cases in 2022 per 100,000 population (3.0)

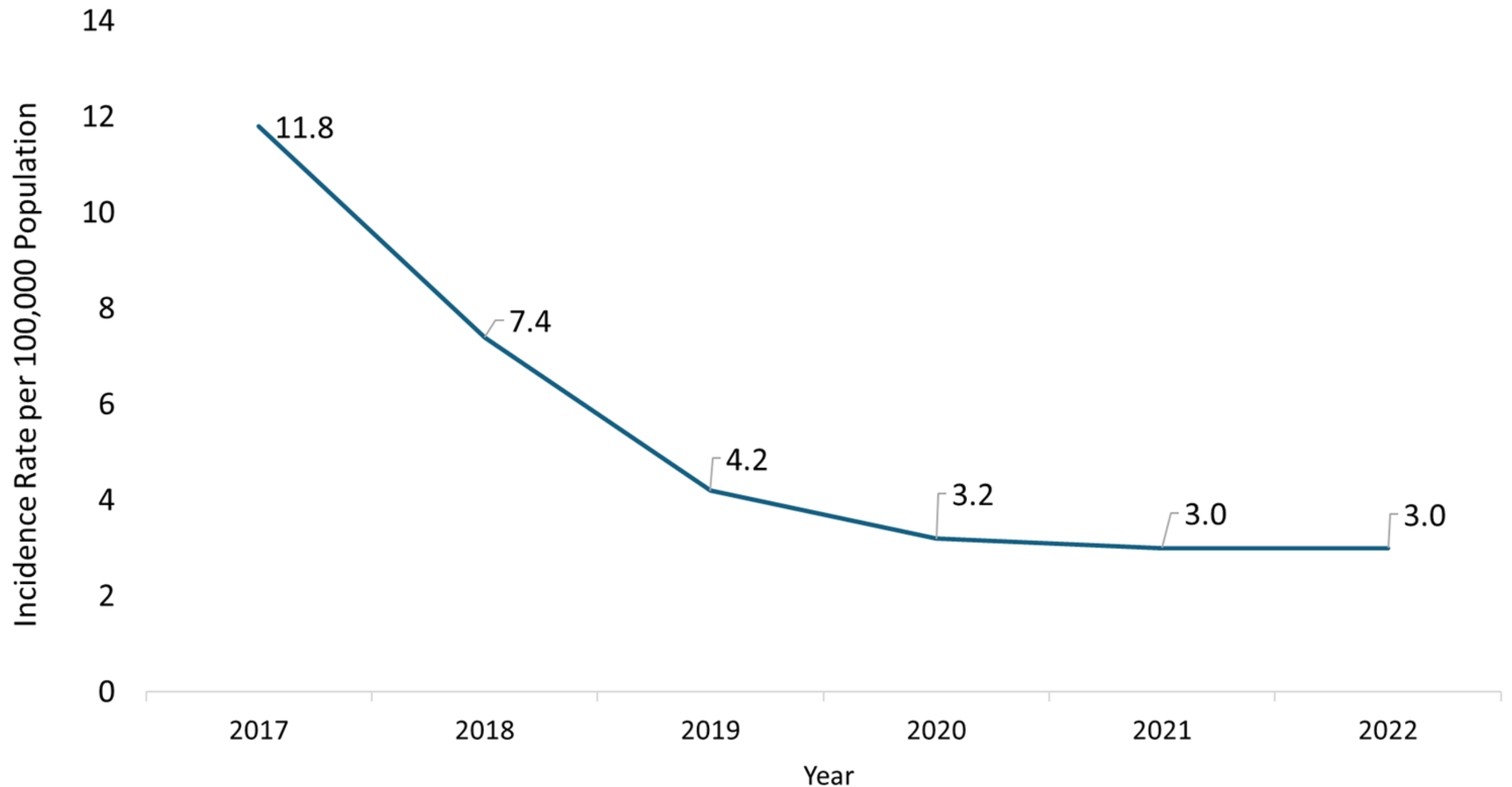
Rates of Acute HBV by State



In 2022, West Virginia reported 3.0 cases of acute hepatitis B per 100,000 population– the highest of any state reporting cases in the nation.

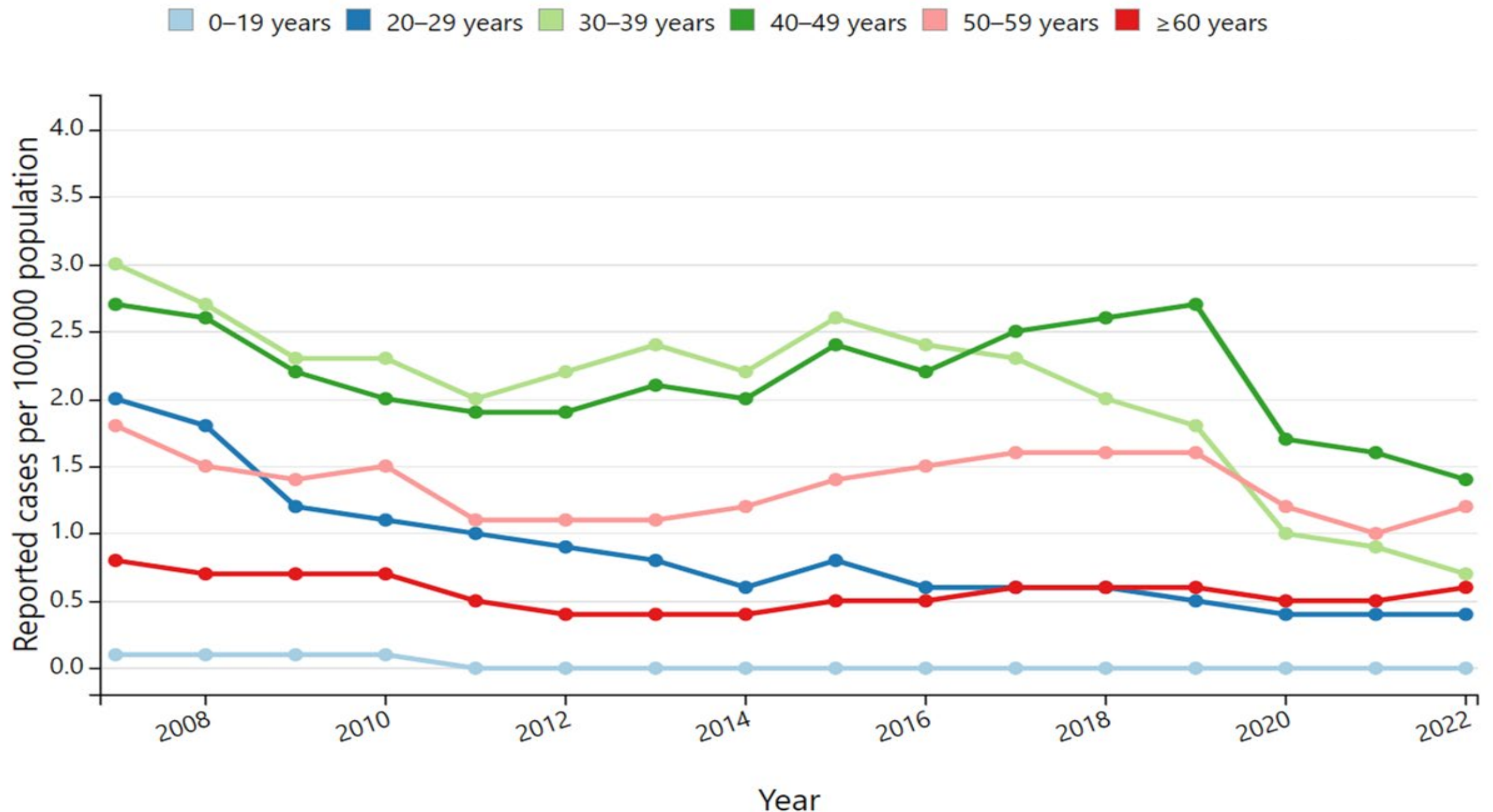
Rate of Acute HBV in West Virginia

Acute HBV Incidence Rate, West Virginia, 2017-2022



Acute HBV Case Rates by Age Group

Rates of acute hepatitis B cases by age group, United States, 2007-2022



According to the CDC...

It is likely that only a fraction of viral hepatitis healthcare related outbreaks that have occurred are detected due to the asymptomatic course of acute infections and the reporting of these outbreaks locally and at the state level is not required

- 25 outbreaks (two or more cases) of HBV cases related to health care were reported to the CDC from 2008-2019; of these, 62 (94%) cases occurred in non-hospital settings
- 19 outbreaks occurred in long-term care facilities with at least 133 outbreak-associated cases of HBV and 1,679 at risk persons notified for screening
- 6 outbreaks of HBV occurred in other settings: cardiology clinic, free dental clinic in school gym, outpatient oncology clinic, hospital surgery service, and two at pain remediation clinics

HBV Testing Recommendations

- All adults aged 18 years and older at least once in their lifetime
- All pregnant people early during each pregnancy
- Infants born to pregnant people with HBV infection
- Any person who requests HBV testing should receive it
- Anyone with ongoing risk factors should be tested periodically

HBV Treatment Recommendations

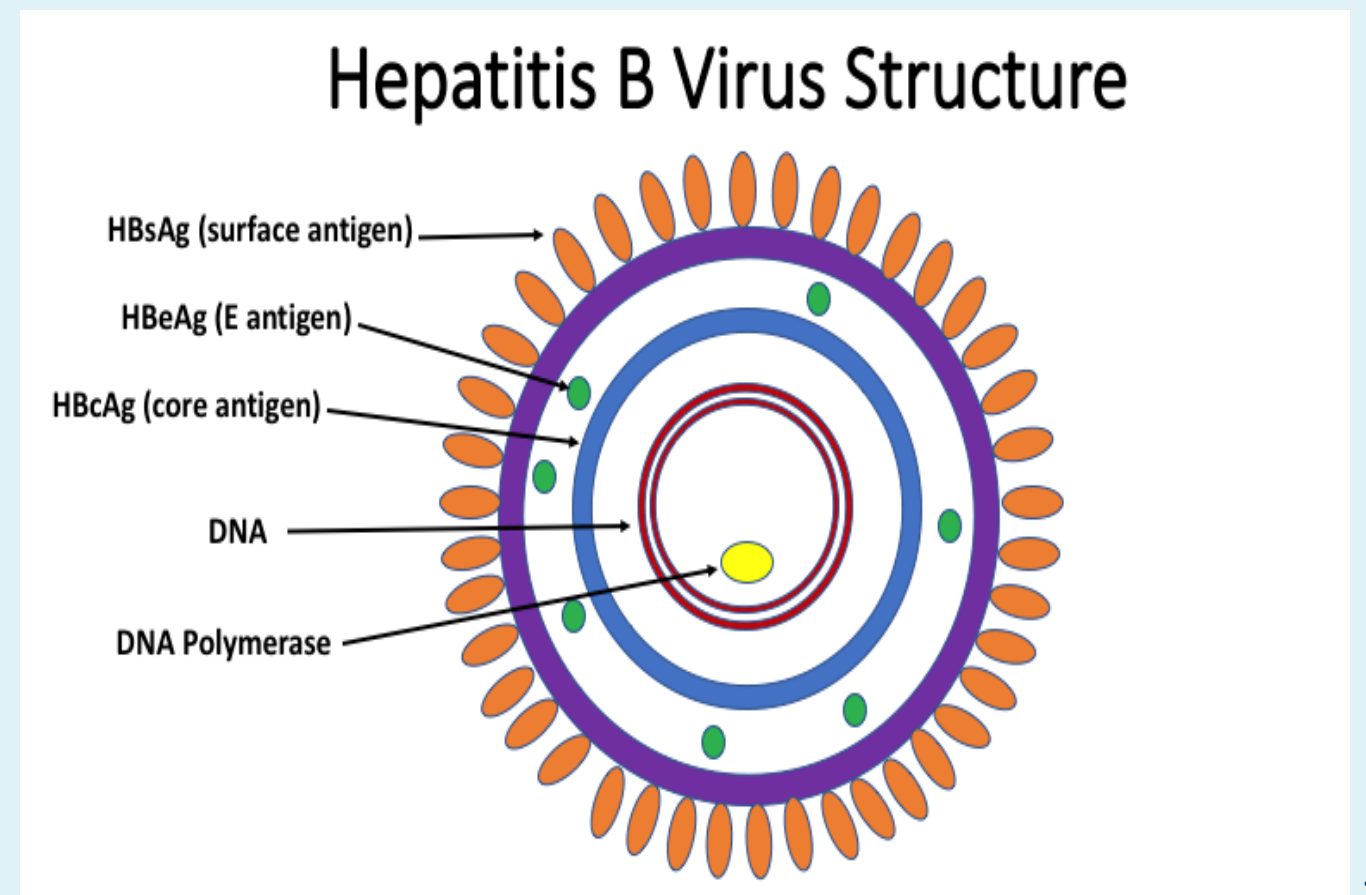
- People who test positive for acute HBV are usually treated through supportive care (rest, adequate nutrition, and fluids) to help relieve symptoms. There is no specific medication available
- People with chronic HBV can be treated with antiviral drugs and should be monitored regularly for signs of liver disease progression

HBV Vaccination Recommendations

- All infants, children and adolescents younger than 19 years of age
- All adults aged 19 through 59 years
- Adults aged 60 years and older with risk factors for HBV
- Adults 60 years and older without known risk factors for HBV may also receive HBV vaccines
- Anyone who requests vaccination

Hepatitis B surface antigen (HBsAg): A protein on the surface of HBV; it can be detected in high levels in serum during acute or chronic HBV infection.

The presence of HBsAg indicates that the person is infectious. The body normally produces antibodies to HBsAg as part of the normal immune response to infection. HBsAg is the antigen used to make HBV vaccine.

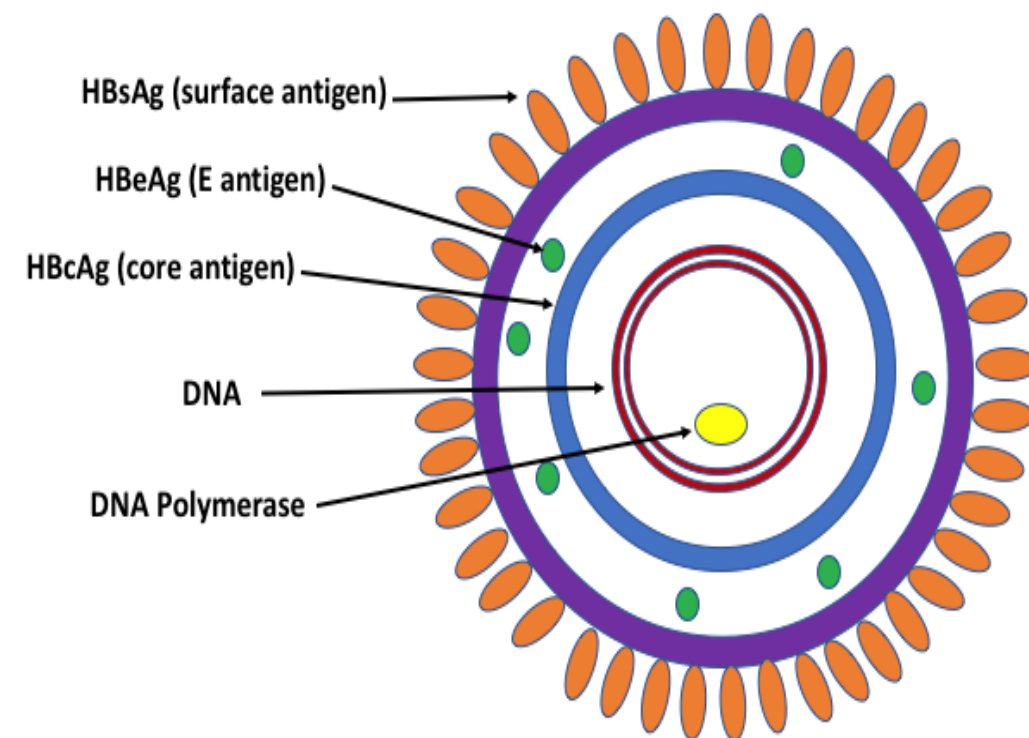


Hepatitis B Virus DNA (HBV DNA)

Other names: HBV DNA, HBV PCR, HBV Quantification, HBV DNA Quantitation, HBV viral load, Hepatitis B Viral Load, Hepatitis B Quantitation

The HBV DNA detection test is used to detect and quantify HBV infection in chronically infected patients. Also used to monitor patient response to anti-HBV therapy.

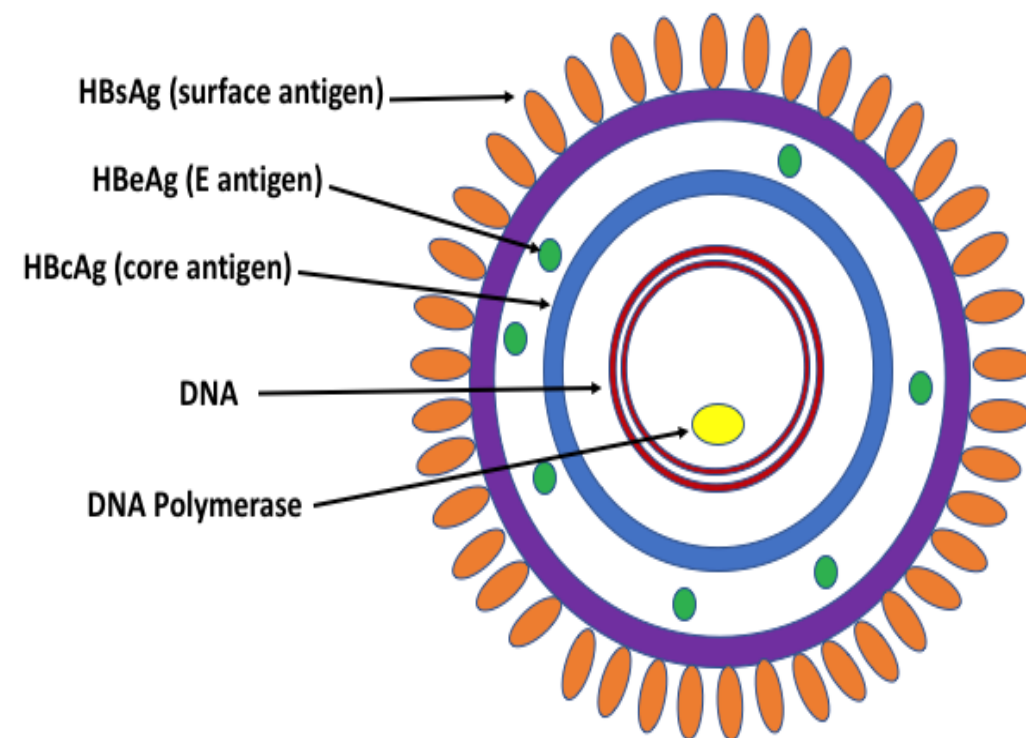
Hepatitis B Virus Structure



Hepatitis B 'e' antigen (HBeAg): a secreted product of the nucleocapsid gene of the HBV that is found in serum during acute and chronic HBV infection. Its presence indicates that the virus is replicating and the infected person has high levels of HBV.

- HBeAg Indicates high level of HBV
- HBeAg presence could indicate an acute or chronic infection

Hepatitis B Virus Structure



Hepatitis B surface antibody (anti-HBs):

The presence of anti-HBs is generally interpreted as indicating recovery and immunity from HBV infection. Anti-HBs also develops in a person who has been successfully vaccinated against HBV. Among vaccine responders who completed a vaccine series, anti-HBs levels can decline over time, however the majority are still immune and will mount a response when exposed to HBV.

Total antibody to hepatitis B core antigen (anti-HBc):

Appears at the onset of symptoms in acute HBV, is a measure of both IgM and IgG, and persists for life. The presence of total anti-HBc indicates previous or ongoing infection with HBV in an undefined time frame. People who have immunity to HBV from a vaccine do not develop anti-HBc.

IgM antibody to hepatitis B core antigen (IgM anti-HBc):

Positivity indicates recent infection with HBV (<6 mos). Its presence indicates acute infection. IgM anti-HBc should be ordered only when acute HBV infection is a concern.

CDC Hepatitis B Virus Serology Training Video

<https://www.cdc.gov/hepatitis/resources/professionals/training/serology/training.htm>

CDC Hepatitis B Virus Serology Training Video (YouTube)

<https://www.youtube.com/watch?v=21eVTf0otUw&t=44s>

HBV Test Result Example: 1

Test Type	Test Result
Hepatitis B Surface Antigen	Negative
Hepatitis B Core Antibody Total	Positive
Hepatitis B Virus DNA	Negative
Hepatitis B virus anti-HBc IgM	Positive

HBV Test Result Example: 2

Test Type	Test Result
Hepatitis B Surface Antigen	Positive
Hepatitis B Core Antibody Total	Positive
Hepatitis B Virus DNA	Positive
Hepatitis B virus anti-HBc IgM	Negative

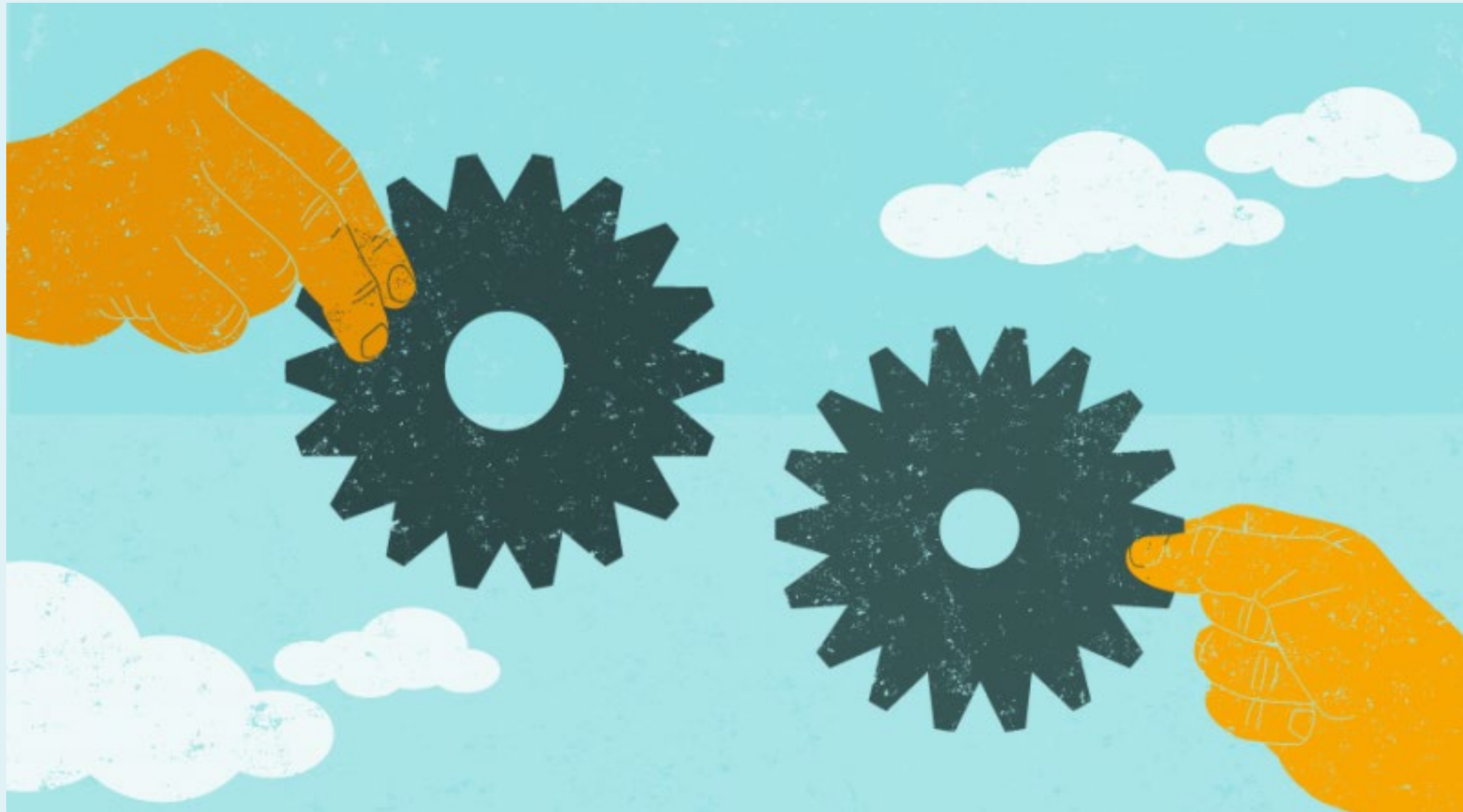
HBV Test Result Example: 3

Test Type	Test Result
Hepatitis B Surface Antigen	Positive
Hepatitis B Core Antibody Total	Negative
Hepatitis B Virus DNA	Positive
Hepatitis B virus anti-HBc IgM	Positive

HBV Test Result Example: 4

Test Type	Test Result
Hepatitis B Surface Antigen	Negative
Hepatitis B Core Antibody Total	Positive
Hepatitis B Surface Antibody	Positive
Hepatitis B virus anti-HBc IgM	Negative

Reporting and Disease Investigation



Viral Hepatitis Lab and Case Reports

West Virginia Reportable Infectious Diseases Facilities and Providers (WV Code 16-3-1; 64CSR7)

Reporting of the following communicable diseases is required by law as follows:

December 2015



Category I Report suspect or confirmed cases immediately to the Local Health Department	Category II Report within 24 hours to the Local Health Department	Category III Report within 72 hours to the Local Health Department	Category IV Report within 1 week to the Local Health Department	Category V Report within 1 week to the state health department
<ul style="list-style-type: none"> • Anthrax • Bioterrorist event • Botulism • Foodborne outbreak • Intentional exposure to an infectious agent or biological toxin • Middle East respiratory syndrome coronavirus (MERS-CoV) • Novel influenza infection, animal or human 	<ul style="list-style-type: none"> • Animal bites • Brucellosis • Cholera • Dengue fever • Diphtheria • <i>Haemophilus influenzae</i>, invasive disease³ • Hemolytic Uremic Syndrome, postdiarrheal • Hepatitis A, acute⁴ • Hepatitis B, acute, chronic or perinatal⁴ • Hepatitis D⁴ 	<ul style="list-style-type: none"> • Campylobacteriosis • Cryptosporidiosis • Cyclospora • Giardiasis • Listeriosis • Salmonellosis (except Typhoid fever)³ • Shigellosis³ • Trichinosis • Vibriosis 	<ul style="list-style-type: none"> • Acute flaccid myelitis (AFM) • Anaplasmosis • Arboviral infection • Babesiosis • Chickenpox (numerical totals only) • Ehrlichiosis • Hantavirus pulmonary syndrome • Influenza-related death in an individual less than 18 years of age • Legionellosis 	<ul style="list-style-type: none"> • AIDS • Chancroid • Chlamydia • Gonococcal conjunctivitis of the newborn (within 24 hours) • Gonococcal disease, drug resistant (within 24 hours) • Gonococcal disease, all other • Hepatitis C, acute⁴ • HIV

West Virginia Reportable Infectious Diseases Laboratories (WV Code 16-3-1; 64CSR7)

Reporting of the following communicable diseases is required by law as follows:

December 2015



Category I Report suspect or confirmed cases immediately to the Local Health Department	Category II Report within 24 hours to the Local Health Department	Category III Report within 72 hours to the local health department	Category IV Report within 1 week to the local health department	Category V Report within 1 week to the state health department
<ul style="list-style-type: none"> • <i>Bacillus anthracis</i>^a • Bioterrorist event^c • <i>Clostridium botulinum</i>^c • Foodborne outbreak^c • <i>Francisella tularensis</i>^{a,b} • Intentional exposure to an infectious agent^c • Middle East respiratory syndrome coronavirus (MERS-CoV)^f • Novel influenza infection, animal or human^a • Orthopox infection^c • Outbreak or cluster^c • Rubella^b • Rubeola (measles)^b • SARS coronavirus infection^c • Smallpox^c • Viral hemorrhagic fever^b • Waterborne outbreak^c • <i>Yersinia pestis</i>^a 	<ul style="list-style-type: none"> • <i>Bordetella pertussis</i> • <i>Brucella</i> species^{a,b} • <i>Corynebacterium diphtheriae</i>^a • <i>Coxiella burnetii</i> • Dengue Fever^b • <i>Haemophilus influenzae</i> from a normally sterile site^{1,a} • Hepatitis A, positive IgM² • Hepatitis B, positive anti-HBc IgM or HBsAg² • Hepatitis D² • Mumps, evidence of acute infection from any site^{a,b} • <i>Mycobacterium tuberculosis</i> from any site^{1,a} • <i>Neisseria meningitidis</i> from a normally sterile site^a • Poliomyelitis^c • Rabies, animal or human^c • <i>Salmonella typhi</i> from any site^a • Shiga toxin-producing <i>Escherichia coli</i> (STEC)^a • <i>Staphylococcus aureus</i>, glycopeptide intermediate (GISA/VISA) or glycopeptide resistant (GRSA/VRSA)^{1,a} • <i>Vibrio cholerae</i>^{a,b} • Yellow Fever^{b,c} • Any other unusual condition or emerging infectious 	<ul style="list-style-type: none"> • <i>Campylobacter</i> species • <i>Cryptosporidium</i> species • <i>Cyclospora</i> species • <i>Giardia lamblia</i> • <i>Listeria monocytogenes</i>^a • <i>Salmonella</i> species (except <i>Salmonella typhi</i>)^{1,a} • <i>Shigella</i> species^{1,a} • <i>Trichinella</i> species • Non-cholera <i>Vibrio</i> species^a 	<ul style="list-style-type: none"> • <i>Anaplasma phagocytophilum</i> • Arboviral infection^b <ul style="list-style-type: none"> ▪ LaCrosse encephalitis ▪ West Nile virus ▪ Eastern equine encephalitis ▪ Saint Louis encephalitis ▪ Powassan encephalitis ▪ Western equine encephalitis • <i>Babesia</i> species • <i>Borrelia burgdorferi</i> (with Western blot confirmation) • Carbapenem resistant <i>Enterobacteriaceae</i>¹ • <i>Ehrlichia</i> species • Hantavirus infection^b • <i>Legionella pneumophila</i> • <i>Leptospira interrogans</i> • Malaria (<i>Plasmodium</i> species) • <i>Mycobacterium tuberculosis</i> by interferon gamma release assay (IGRA) • Psittacosis (<i>Chlamydia psittaci</i>) • <i>Rickettsia</i> species 	<ul style="list-style-type: none"> • CD4+ T lymphocyte or percentages¹ • <i>Chlamydia trachomatis</i> • Enterovirus (non-polio), culture confirmed, numerical totals only, by serotype as available • <i>Haemophilus ducreyi</i> • Hepatitis C² • HIV type 1 or 2 • HIV-1/2 Type-Differentiating Immunoassay (Multi-spot) • HIV-1 RNA/DNA NAAT (Qualitative) • HIV-2 RNA/DNA NAAT (Qualitative) • HIV-1 RNA/DNA NAAT (Quantitative viral load) • HIV-2 RNA/DNA NAAT (Quantitative viral load) • Influenza, confirmed by culture, PCR or immunofluorescence, numerical totals only, by type and subtype as available • <i>Mycobacterium tuberculosis</i> from any site (report within 24 hours)^{1,a} • <i>Neisseria gonorrhoeae</i>: drug resistant from any site; from the female upper genital tract; or from the eye of a newborn (within 24 hours)

Category II

Providers and facilities should report Conditions to the Local Health Department within 24 hours:

Hepatitis A, acute*

Hepatitis B, acute and perinatal*

Hepatitis D*

**including any associated transaminase and bilirubin results*

Category V

Providers and facilities should report by written filing to the State Health Department within one week of diagnosis:

Perinatal hepatitis C**

Acute hepatitis C**

Chronic hepatitis C**

***including all results of hepatitis A and B serologies and transaminase and bilirubin levels*

According to the WV Reportable Disease Rule...

Category II

Laboratories shall report cases of **Category II** diseases or conditions by telephone to the local health department serving the patient's county of residence within 24 hours of diagnosis and follow up with a written copy of the lab report. A laboratory designated by the Commissioner to be a validated submitter to the WVHIN or West Virginia Electronic Disease Surveillance System (WVEDSS) may substitute real-time electronic laboratory reporting using HL7 messaging for the required paper based reporting.

Category V

Laboratories shall report **Category V** conditions through written copy of the laboratory report. A laboratory designated by the Commissioner to be a validated submitter to the WVHIN (West Virginia Health Information Network) or WVEDSS may substitute real-time electronic laboratory reporting using HL7 standards for the required paper-based reporting.

Category II Hepatitis Conditions

- Hepatitis A, acute (including results of hepatitis serologies, transaminase levels and bilirubin)
- Hepatitis B, acute, chronic or perinatal (including results of hepatitis A and B serologies, transaminase levels and bilirubin)
- Hepatitis D (including results of hepatitis A and B serologies, transaminase levels and bilirubin **including results of hepatitis A serologies, transaminase levels and bilirubin*)

Category V Hepatitis Conditions

- Hepatitis C, virologic or serologic evidence*
** including results of hepatitis A and B serologies and transaminase and bilirubin levels*

Local Health Departments (LHD) are responsible for conducting the case investigations for the following conditions:

- Hepatitis A: acute
- Hepatitis B: acute, chronic, perinatal
- Hepatitis C: acute
- Hepatitis D: acute/chronic
- Hepatitis E: acute (WVEDSS page now available)

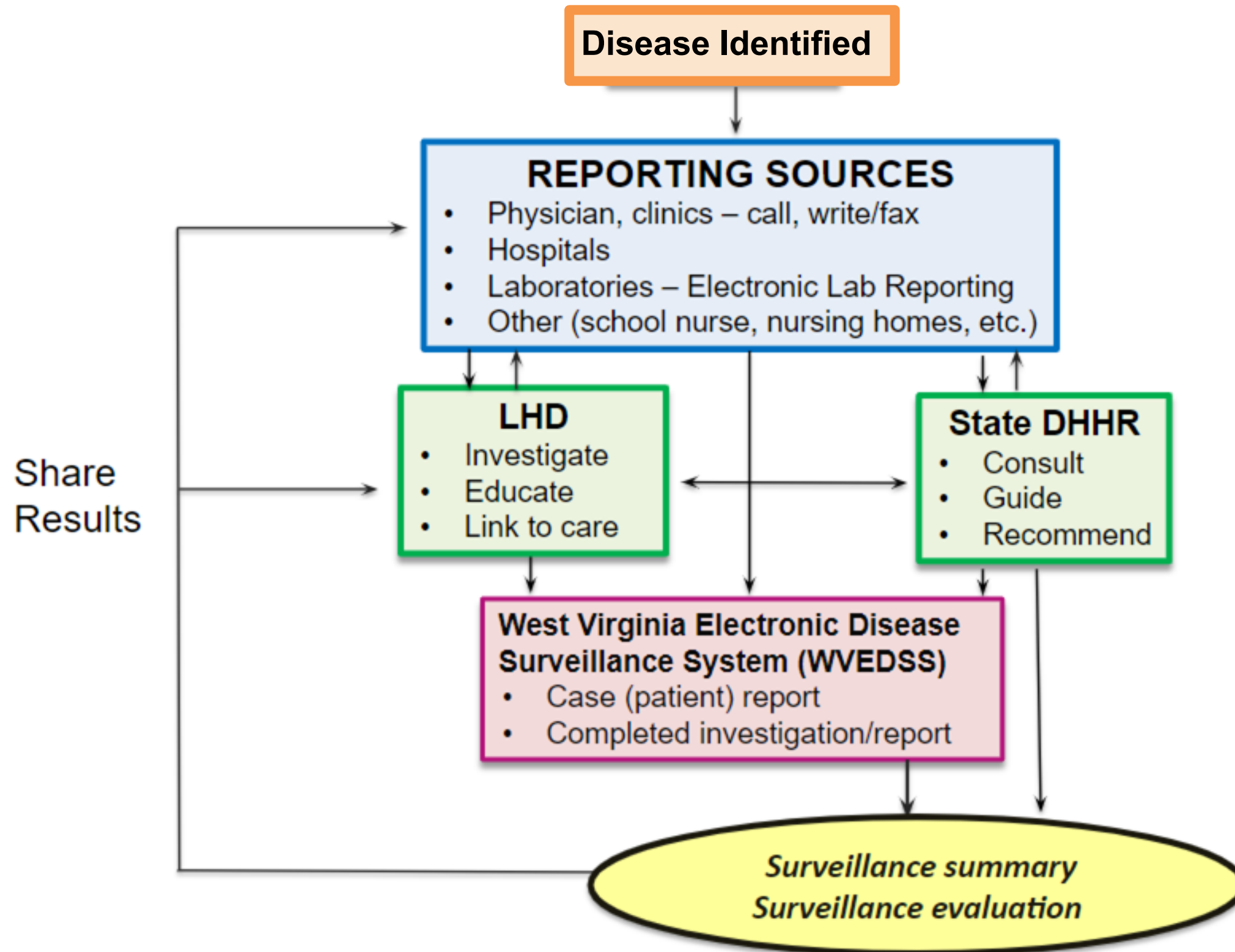


Local Health Department Responsibilities



- Educate providers on prevention and screening of hepatitis
- Provide education to the general public about hepatitis risk factors, prevention, and transmission
- Receive positive hepatitis laboratory results and case reports
- Review WVEDSS for case patient profile, enter reported test results, and create case investigation if necessary
- Contact healthcare facility and collect any relevant information on case patient to include in investigation
- Contact case patient and conduct hepatitis interview
- Elicit any relevant contact information and assess the need for post exposure prophylaxis (PEP)
- Provide information on disease condition, transmission, and link to care/treatment

Disease Investigation Process



Disease Investigation Interviews



Viral Hepatitis Disease Investigation Part 1

Audio File: Introduction and Demographics

Thoughts on the style and technique of the Disease Investigator?

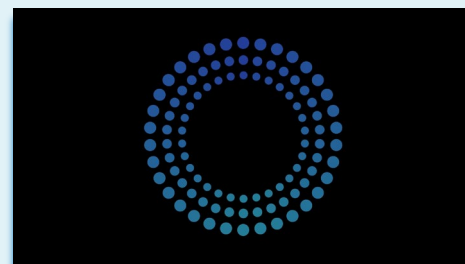
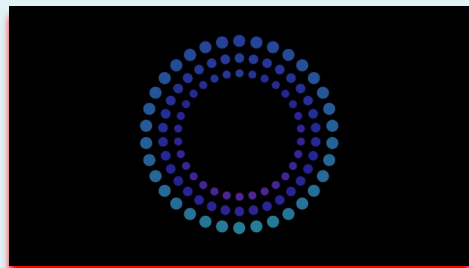
What potential issues did you hear?

How could the Disease Investigator improve their interview style?

If the Disease Investigator was a colleague, how would you discuss your feedback with them?

What impact could this have on the Case Patient?

What larger public health implications did you identify?



Viral Hepatitis Disease Investigation Part 2

Audio File: Clinical Information

Thoughts on the style and technique of the Disease Investigator?

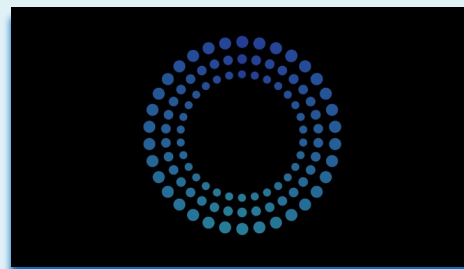
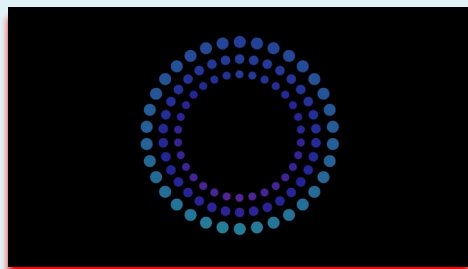
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Viral Hepatitis Disease Investigation Part 3

Audio File: Risk Factors

Thoughts on the style and technique of the Disease Investigator?

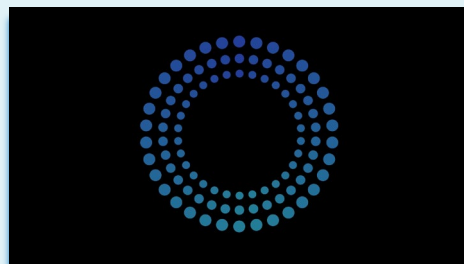
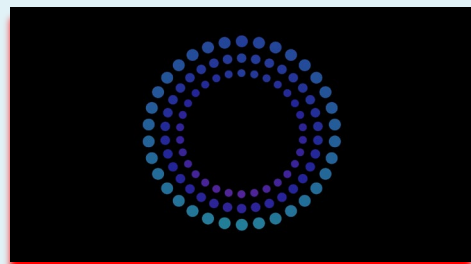
What potential issues did you hear?

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What impact could this have on the Case Patient?

What larger public health implications did you identify?



Viral Hepatitis Disease Investigation Part 4

Audio File: Healthcare Exposures and Conclusion

Thoughts on the style and technique of the Disease Investigator?

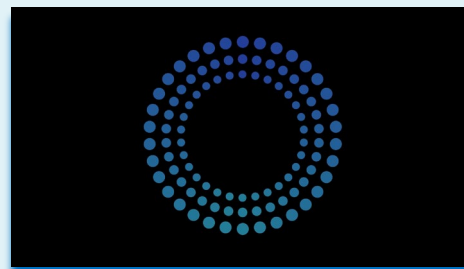
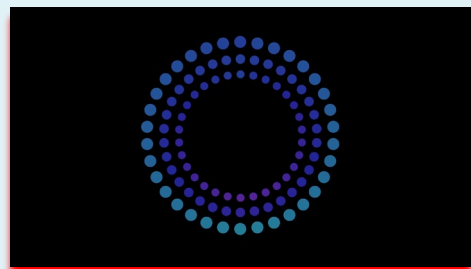
What potential issues did you hear?

How could the Disease Investigator improve their interview style?

If the Disease Investigator was a colleague, how would you discuss your feedback with them?

What impact could this have on the Case Patient?

What larger public health implications did you identify?



Case Investigation Reminders

- Case investigations in WVEDSS should be complete and well documented
- Case patient close contact information should also be complete and appropriate public health follow up actions be taken
- Case patients should always be contacted and interviewed to the best of your ability— medical records are helpful but should not be relied upon alone to complete the investigation
- Case investigations cannot be designated Lost to Follow Up (LTFU) without appropriate contact attempts being made and documented in the investigation
- Any pregnant person with HBV should be reported immediately to the Perinatal Hepatitis B Prevention Coordinator – each pregnancy should be followed regardless of the investigation status in WVEDSS

Disease Investigation Discussion

Can you share tips for conducting a successful interview investigation?

Are there trainings you've attended that address these types of skills?

How can we help equip you to enhance and improve your interviewing skills?



- *Viral Hepatitis Surveillance and Case Management: Guidance for State, Territorial, and Local Health Departments*
- Disease Protocols
- Case Ascertainment Tool
- CDC Viral Hepatitis Serology Trainings
- Regional Epidemiologists
- State Programmatic Epidemiologists and Registrar Staff
- Staff at the Office for Laboratory Services (OLS)
- Division of Immunization Services Staff (vaccines)
- Find a Provider Tool (HCV only)

Questions



Contact Information



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