Introduction to Communicable Disease Surveillance and Investigation in North Carolina

Viral Hepatitis B Infection

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Learning Objectives

Apply knowledge of Hepatitis B serology to determine case definition

Describe the modes of transmission of Hepatitis B

Describe preventative measures for Hepatitis B

Locate NC DPH web-based guidance for case investigation and reporting of Hepatitis B

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Hepatitis B is a contagious liver disease.

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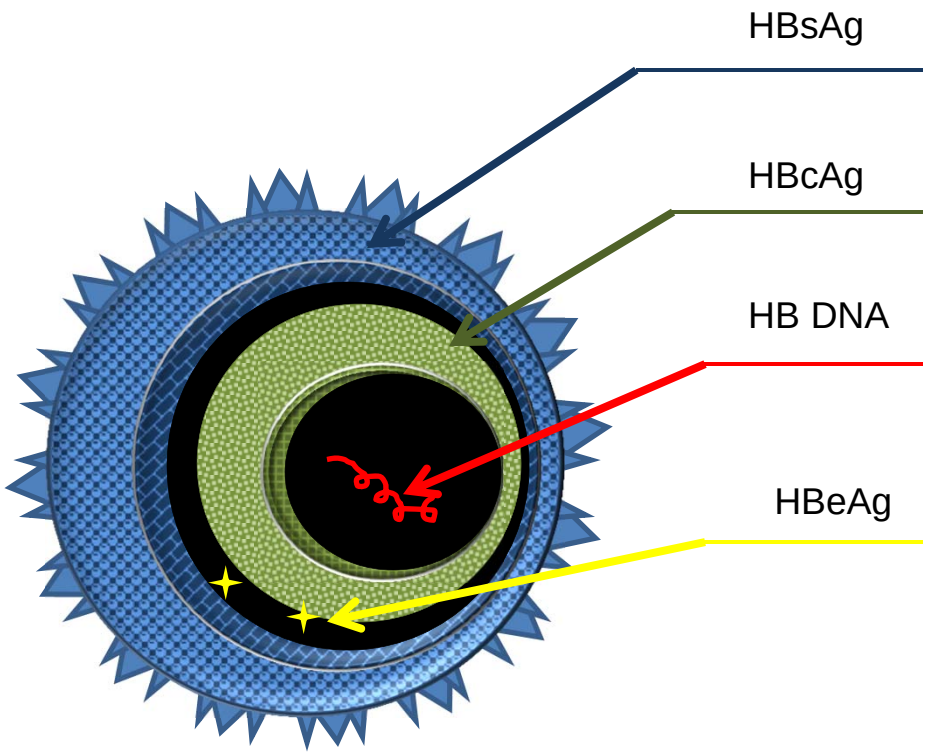

Hepatitis B Virus

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Testing for Hepatitis B

Hepatitis B surface Antigen ***(HBsAg)***

A protein on the surface of the Hepatitis B virus. It can be detected in the blood during acute or chronic Hepatitis B virus infection. The body normally produces antibodies to HBsAg as part of the normal immune response to infection.

A positive test for HBsAg means a person has an acute or chronic Hepatitis B virus infection and can pass the virus to others

A negative test means a person does not have the Hepatitis B virus in his or her blood

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Testing for Hepatitis B

Hepatitis B e Antigen ***(HBeAg)***

A protein found in the blood when the Hepatitis B virus is present and actively replicating.

A positive test means a person has high levels of virus in his or her blood and can easily spread the virus to others. This test is also used to monitor the effectiveness of treatment for chronic Hepatitis B.

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Testing for Hepatitis B

Hepatitis B DNA ***(HB DNA)***

A test to detect the presence of Hepatitis B virus DNA in a person's blood. This test can be reported in different ways, simply as "detected" which means DNA is present or as quantitative results that express how much virus is present in the blood called a "viral load". These viral load results can be stated as the number of DNA copies in a milliliter of blood or the number of International Units (IU) of DNA in a milliliter of blood. Either way it is expressed, a higher number indicates more virus is present making this useful to monitor the effectiveness of drug therapy for chronic Hepatitis B virus infection. If a person has a chronic Hepatitis B virus infection, the presence of viral DNA means that a person is possibly at increased risk for liver damage.

Testing for Hepatitis B

Hepatitis B core Antibody IgM ***(IgM anti-HBc)***

Initial antibody produced by the body in response to the presence of Hepatitis B Core antigen. It is used to detect an acute infection. A positive test means a person was probably infected with Hepatitis B virus within the last 6 months. There are some individuals who remain IgM positive throughout their life.

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Testing for Hepatitis B

Hepatitis B core Antibody total ***(anti-HBc)***

Is a total of IgM and IgG antibodies produced by the body in response to the presence of Hepatitis B Core antigen. The meaning of this test often depends on the results of two other tests, anti-HBs and HBsAg. A positive test means a person is either currently infected with the Hepatitis B virus or was infected in the past .

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Testing for Hepatitis B

Hepatitis B surface Antibody ***(anti-HBs)***

An antibody that is produced by the body in response to the Hepatitis B surface antigen. A positive test means a person is protected or immune from getting the Hepatitis B virus for one of two reasons, successful vaccination against Hepatitis B or recovery from an acute infection.

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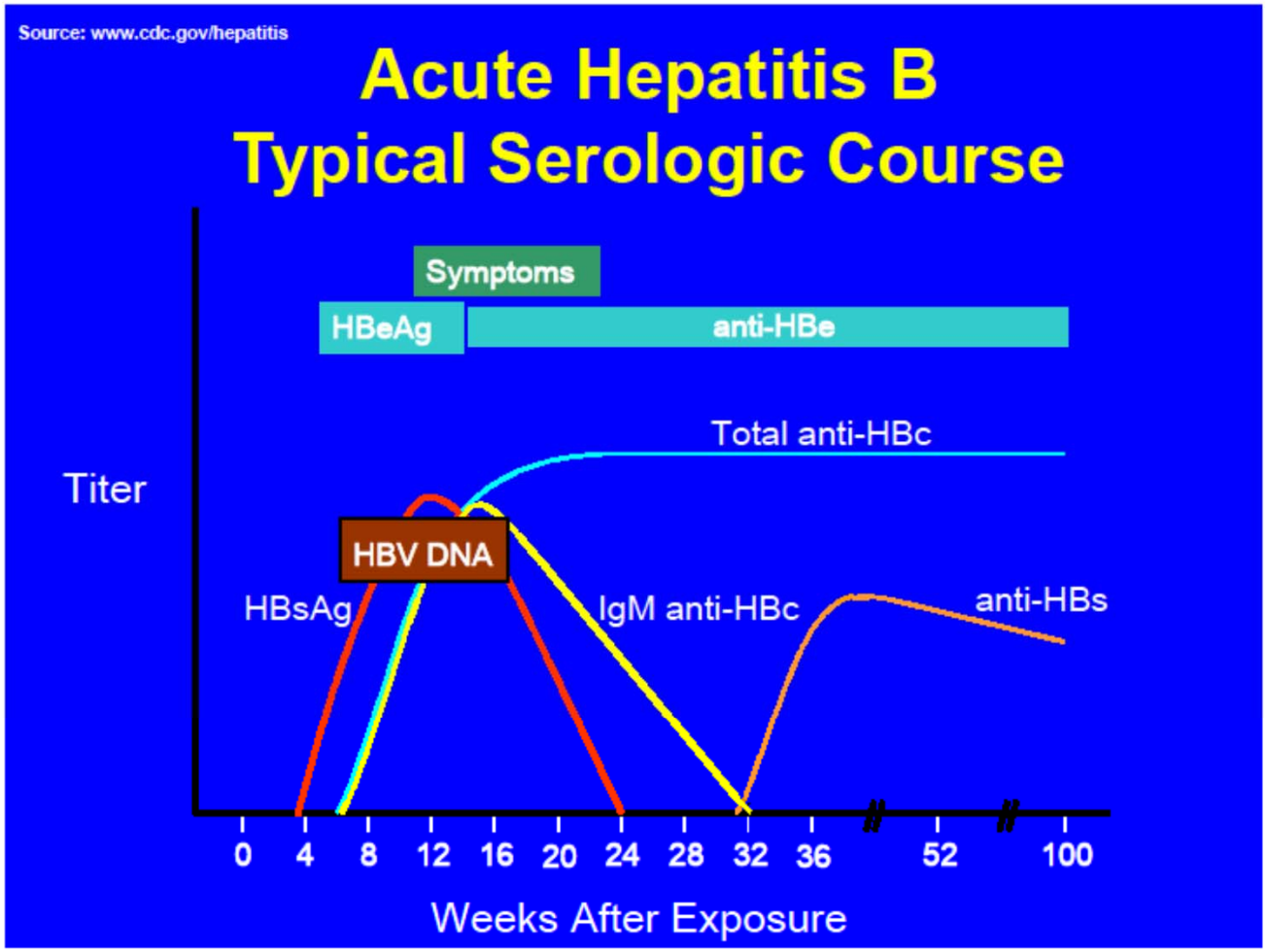
Source: www.cdc.gov/hepatitis

Acute Hepatitis B
Typical Serologic Course



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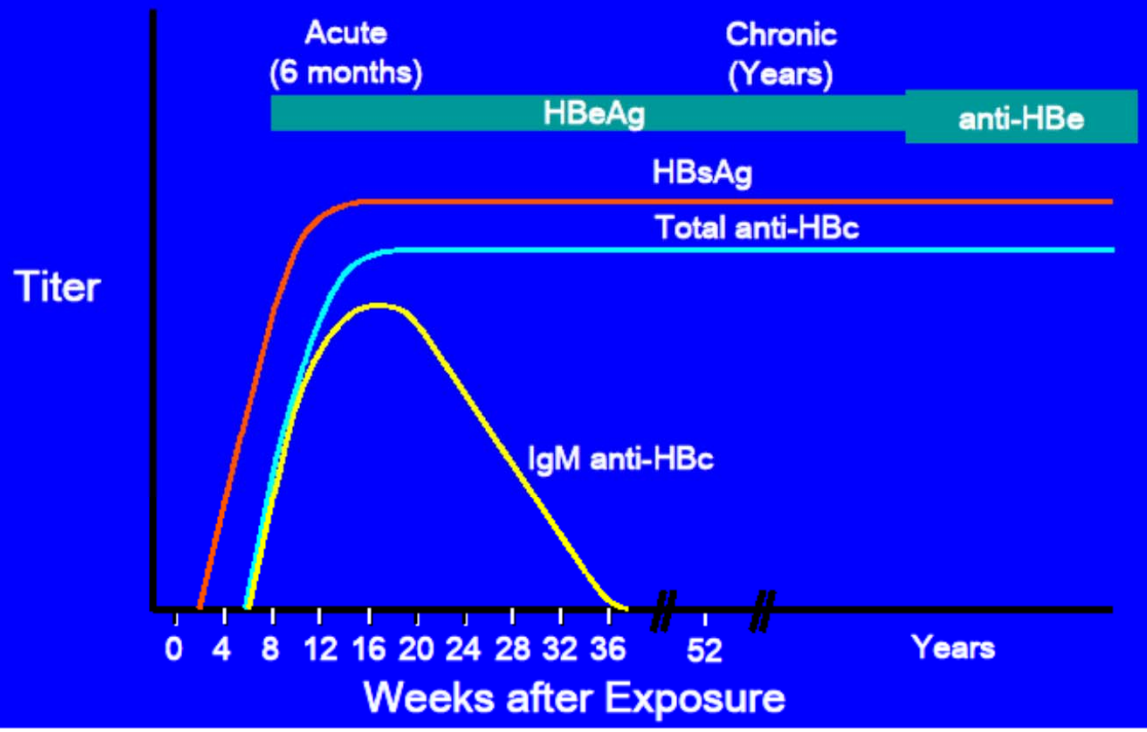
Source: www.cdc.gov/hepatitis

Chronic Hepatitis B
Typical Serologic Course



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Hepatitis B Case Definitions

Acute Hepatitis B

Chronic Hepatitis B

Perinatal Hepatitis B

Current case definitions are located at:

http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/toc.html

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Hepatitis B, Acute
2012 Case Definition
CSTE Position Statement Number: 11-ID-03

Clinical Description

An acute illness with a discrete onset of any sign or symptom* consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and either a) jaundice, or b) elevated serum alanine aminotransferase (ALT) levels >100 IU/L.

*A documented negative hepatitis B surface antigen (HBsAg) laboratory test result within 6 months prior to a positive test (either HBsAg, hepatitis B "e" antigen (HBeAg), or hepatitis B virus nucleic acid testing (HBV NAT) including genotype) result does not require an acute clinical presentation to meet the surveillance case definition.

Laboratory Criteria for Diagnosis

HBsAg positive,

AND

Immunoglobulin M (IgM) antibody to hepatitis B core antigen (IgM anti-HBc) positive (if done)

Case Classification

Confirmed

A case that meets the clinical case definition is laboratory confirmed, and is not known to have chronic hepatitis B.

Hepatitis B, Chronic
2012 Case Definition
CSTE Position Statement Number: 11-ID-04
Clinical Description
No symptoms are required. Persons with chronic hepatitis B virus (HBV) infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer.

Laboratory Criteria for Diagnosis
Immunoglobulin M (IgM) antibodies to hepatitis B core antigen (IgM anti-HBc) negative AND a positive result on one of the following tests: hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), or nucleic acid test for hepatitis B virus DNA (including qualitative, quantitative and genotype testing),

OR

HBsAg positive or nucleic acid test for HBV DNA positive (including qualitative, quantitative and genotype testing) or HBeAg positive two times at least 6 months apart (Any combination of these tests performed 6 months apart is acceptable)

Case Classification
Probable
A person with a single HBsAg positive or HBV DNA positive (including qualitative, quantitative and genotype testing) or HBeAg positive lab result and does not meet the case definition for acute hepatitis B.
Confirmed
A person who meets either of the above laboratory criteria for diagnosis.

Hepatitis, Viral, Perinatal Hepatitis B Virus Infection Acquired in the United States or U.S. Territories

1995 CDC Case Definition

The 1995 case definition appearing on this page was re-published incorrectly in the 1997 MMWR Recommendations and Reports titled Case Definitions for Infectious Conditions Under Public Health Surveillance [MMWR 1997;46(RR10)] (available at http://www.cdc.gov/mmwr/preview/mmwrhtml/00047449.htm). Thus, the 1995 and the 1997 versions of this case definition are not identical, and the 1995 version is the correct one.

Clinical case definition

Perinatal hepatitis B in the newborn may range from asymptomatic to fulminant hepatitis.

Laboratory criteria for diagnosis:

Hepatitis B surface antigen (HBsAg) positive

Case classification

HBsAg positivity in any infant aged >1-24 months who was born in the United States or in U.S. territories to an HBsAg-positive mother

Comment

Infants born to HBsAg-positive mothers should receive hepatitis B immune globulin (HBIG) and the first dose of hepatitis B vaccine within 12 hours of birth, followed by the second and third doses of vaccine at 1 and 6 months of age, respectively. Postvaccination testing for HBsAg and anti-HBs (antibody to HBsAg) is recommended from 3 to 6 months following completion of the vaccine series. If HBIG and the initial dose of vaccine are delayed for >1 month after birth, testing for HBsAg may determine if the infant is already infected.

Reporting Hepatitis B

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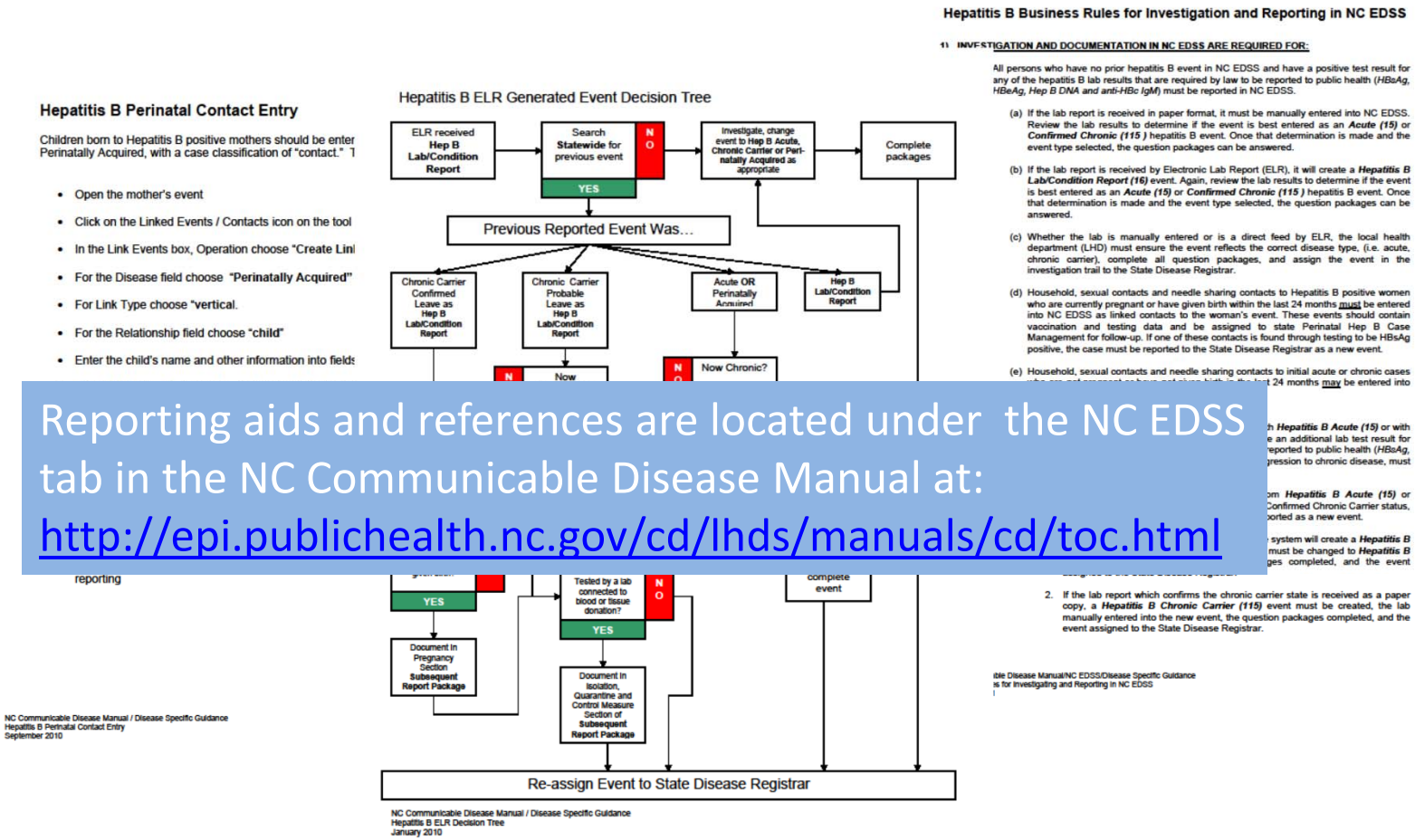
Reporting Hepatitis B



Hepatitis B Perinatal Contact Entry

Children born to Hepatitis B positive mothers should be enter
Perinatally Acquired, with a case classification of "contact."

- Open the mother's event
- Click on the Linked Events / Contacts icon on the tool
- In the Link Events box, Operation choose "Create Lin
- For the Disease field choose "Perinatally Acquired"
- For Link Type choose "vertical.
- For the Relationship field choose "child"
- Enter the child's name and other information into fields

reporting

NC Communicable Disease Manual / Disease Specific Guidance
Hepatitis B Perinatal Contact Entry
September 2010

Hepatitis B ELR Generated Event Decision Tree

ELR received Hep B Lab/Condition Report

Search Statewide for previous event

NO

YES

Investigate, change event to Hep B Acute, Chronic Carrier or Perinatally Acquired as appropriate

Complete packages

Previous Reported Event Was...

Chronic Carrier Confirmed Leave as Hep B Lab/Condition Report

Chronic Carrier Probable Leave as Hep B Lab/Condition Report

Acute OR Perinatally Acquired

Hep B Lab/Condition Report

Now Chronic?

Tested by a lab connected to blood or tissue donation?

Document in Pregnancy Section Subsequent Report Package

Document in Isolation, Quarantine and Control Measure Section of Subsequent Report Package

complete event

Re-assign Event to State Disease Registrar

NC Communicable Disease Manual / Disease Specific Guidance
Hepatitis B ELR Decision Tree
January 2010

Hepatitis B Business Rules for Investigation and Reporting in NC EDSS

1) INVESTIGATION AND DOCUMENTATION IN NC EDSS ARE REQUIRED FOR:

All persons who have no prior hepatitis B event in NC EDSS and have a positive test result for any of the hepatitis B lab results that are required by law to be reported to public health (*HBsAg, HBeAg, Hep B DNA and anti-HBc IgM*) must be reported in NC EDSS.

(a) If the lab report is received in paper format, it must be manually entered into NC EDSS. Review the lab results to determine if the event is best entered as an ***Acute (15)*** or ***Confirmed Chronic (115)*** hepatitis B event. Once that determination is made and the event type selected, the question packages can be answered.

(b) If the lab report is received by Electronic Lab Report (ELR), it will create a ***Hepatitis B Lab/Condition Report (16)*** event. Again, review the lab results to determine if the event is best entered as an ***Acute (15)*** or ***Confirmed Chronic (115)*** hepatitis B event. Once that determination is made and the event type selected, the question packages can be answered.

(c) Whether the lab is manually entered or is a direct feed by ELR, the local health department (LHD) must ensure the event reflects the correct disease type, (i.e. acute, chronic carrier), complete all question packages, and assign the event in the investigation trail to the State Disease Registrar.

(d) Household, sexual contacts and needle sharing contacts to Hepatitis B positive women who are currently pregnant or have given birth within the last 24 months must be entered into NC EDSS as linked contacts to the woman's event. These events should contain vaccination and testing data and be assigned to state Perinatal Hep B Case Management for follow-up. If one of these contacts is found through testing to be HBsAg positive, the case must be reported to the State Disease Registrar as a new event.

(e) Household, sexual contacts and needle sharing contacts to initial acute or chronic cases

h Hepatitis B Acute (15) or with
e an additional lab test result for
reported to public health (*HBsAg,*
gression to chronic disease, must

om Hepatitis B Acute (15) or
Confirmed Chronic Carrier status,
orted as a new event.

system will create a ***Hepatitis B***
must be changed to ***Hepatitis B***
ges completed, and the event

2. If the lab report which confirms the chronic carrier state is received as a paper copy, a ***Hepatitis B Chronic Carrier (115)*** event must be created, the lab manually entered into the new event, the question packages completed, and the event assigned to the State Disease Registrar.

ible Disease Manual/NC EDSS/Disease Specific Guidance
s for Investigating and Reporting in NC EDSS

Reporting aids and references are located under the NC EDSS tab in the NC Communicable Disease Manual at: http://epi.publichealth.nc.gov/cd/lhds/manuals/cd/toc.html

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Modes of Transmission for Hepatitis B

Hepatitis B is spread when a susceptible person is exposed to infected blood, semen, vaginal secretions, wound exudates or other body fluids. People can become infected with the virus during activities such as:

- Birth (spread from an infected mother to her baby during delivery)
- Sex with an infected partner
- Sharing needles, syringes, or other drug-injection equipment
- Sharing items such as razors or toothbrushes with an infected person
- Direct contact with the blood or open sores of an infected person
- Exposure to blood from needle sticks or other sharp instruments

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Who is at risk for Hepatitis B?

Although anyone can get Hepatitis B, some people are at greater risk, such as those who:

- Have sex with an infected person
- Have multiple sex partners
- Have a sexually transmitted disease
- Are men who have sexual contact with other men
- Inject drugs or share needles, syringes, or other drug equipment
- Live with a person who has chronic Hepatitis B
- Are infants born to infected mothers
- Are exposed to blood on the job
- Are hemodialysis patients
- Travel to countries with moderate to high rates of Hepatitis B

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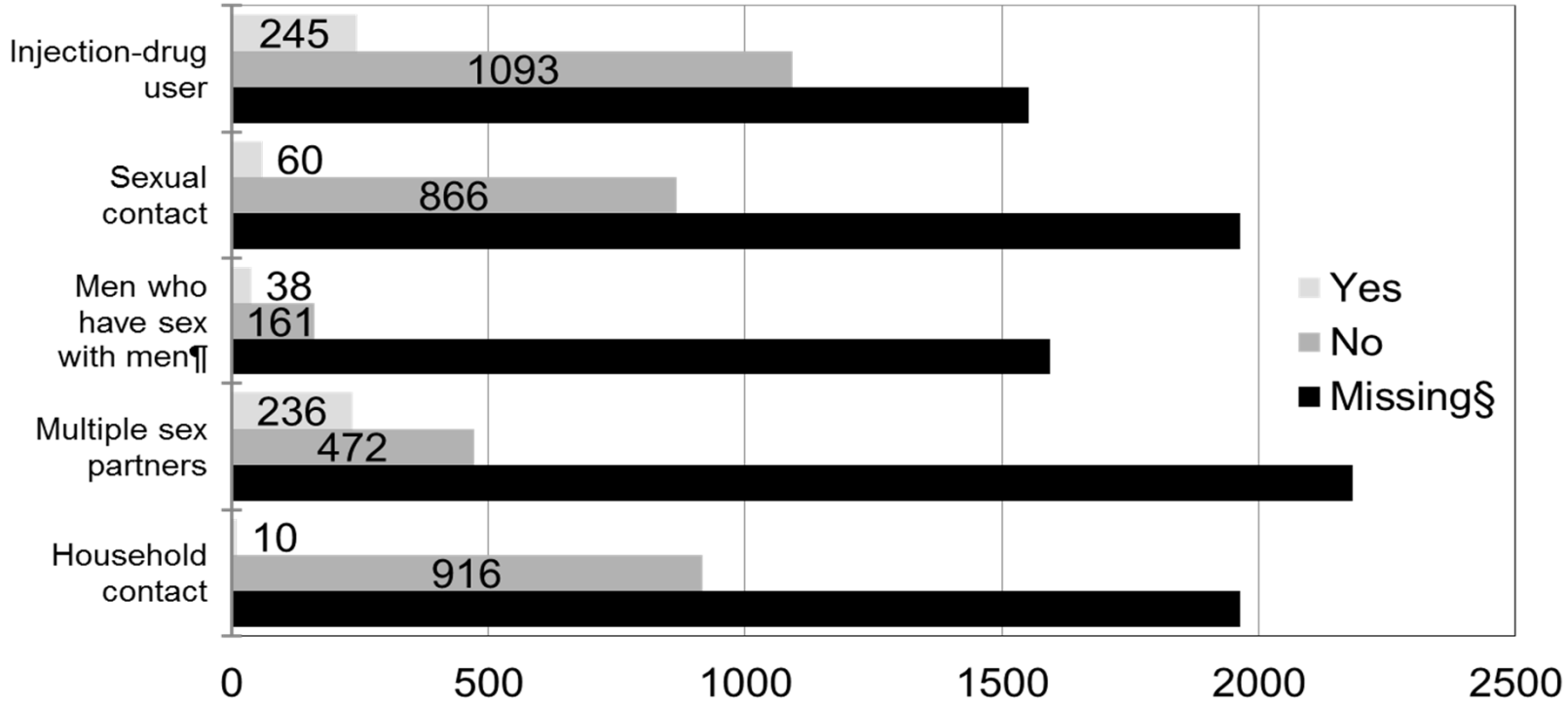
Hepatitis B Modes of Transmission

Acute hepatitis B reports*, by risk behavior† — United States, 2011



*A total of 2,890 case reports of hepatitis B were received in 2011.
† More than one risk behavior may be indicated on each case report.
§ No risk data reported.
¶A total of 1,792 hepatitis B cases were reported among males in 2011..
Source: National Notifiable Diseases Surveillance System (NNDSS)

Preventing Hepatitis B

Vaccine
For persons susceptible to infection with identified risk

Control Measures
For persons infected with Hepatitis B

Universal Precautions
For healthcare workers who are exposed to blood and body fluids

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Hepatitis B vaccination is recommended for:

- All infants, starting with the first dose of Hepatitis B vaccine at birth
- All children and adolescents younger than 19 years of age who have not been vaccinated
- People whose sex partners have Hepatitis B
- Sexually active persons who are not in a long-term, mutually monogamous relationship.
- Persons seeking evaluation or treatment for a sexually transmitted disease
- Men who have sexual contact with other men
- People who share needles, syringes, or other drug-injection equipment
- People who have close household contact with someone infected with the Hepatitis B virus
- Health care and public safety workers at risk for exposure to blood or blood-contaminated body fluids on the job
- People with end-stage renal disease, including predialysis, hemodialysis, peritoneal dialysis, and home dialysis patients
- Residents and staff of facilities for developmentally disabled persons
- Travelers to regions with moderate or high rates of Hepatitis B
- People with chronic liver disease
- People with HIV infection
- Anyone who wishes to be protected from Hepatitis B virus infection

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Preventing Hepatitis B

10A NCAC 41A .0203 CONTROL MEASURES - HEPATITIS B

(1) refrain from sexual intercourse unless condoms are used except when the partner is known to be infected with or immune to hepatitis B

(2) not share needles or syringes

(3) not donate or sell blood, plasma, platelets, other blood products, semen, ova, tissues, organs, or breast milk

(4) if the time of initial infection is known, identify to the local health director all sexual intercourse and needle partners since the date of infection; and, if the date of initial infection is unknown, identify persons who have been sexual intercourse or needle partners during the previous six months

(5) for the duration of the infection, notify future sexual intercourse partners of the infection and refer them to their attending physician or the local health director for control measures; and for the duration of the infection, notify the local health director of all new sexual intercourse partners

(6) identify to the local health director all current household contacts

(7) be tested six months after diagnosis to determine if they are chronic carriers, and when necessary to determine appropriate control measures for persons exposed pursuant to Paragraph (b) of this Rule;

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Preventing Hepatitis B

References:

ACIP Recommendations: A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States:Part I: Immunization of Infants, Children and Adolescents, MMWR, December 23, 2005, Vol. 54 (RR16).
Part II: Immunization of Adults, MMWR, December 8, 2006, Vol. 55 (RR16).

Microbiology and Immunology On-line, University of South Carolina School of Medicine. VIROLOGY CHAPTER EIGHTEEN HEPATITIS VIRUSES, Dr Richard Hunt: http://pathmicro.med.sc.edu/virol/hepatitis-virus.htm

Recommendations for Identification and Public Health Management of Persons With Chronic Hepatitis B Virus Infection, MMWR, September 19, 2008, Vol. 57 (RR-8).

Recommendations for Preventing Transmission of Infections Among Chronic Hemodialysis Patients, MMWR, April 27, 2001, Vol. 50 (RR- 5).

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis, MMWR, June 29, 2001, Vol.50 (RR11).