

Hepatitis B Surveillance: Usefulness and Needed Improvements

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Hepatitis B Virus (HBV) Transmission

- Transmission occurs by percutaneous and permucosal exposure to infective body fluids
- Direct modes of transmission
 - Sexual or close household contact with an infected person
 - Perinatal transmission
 - Injection-drug use
 - Nosocomial exposure
- Indirect modes of transmission
 - Inanimate surfaces
 - Very stable, can live on surfaces for at least 7 days

Hepatitis B Infection

- Most acutely infected patients are asymptomatic
 - <10% of children and 30–50% of adults exhibit symptoms:
 - Jaundice, fatigue, anorexia, abdominal discomfort, nausea, vomiting, dark urine, clay colored feces, joint pain, or rash
- 1.5 new cases per 100,000 persons in the US per year
 - Estimated to be tenfold higher due to significant underreporting
- Rate of development of chronic HBV infection is inversely related to age
 - 90% of infants infected at birth
 - 1–10% of persons infected as older children and adults

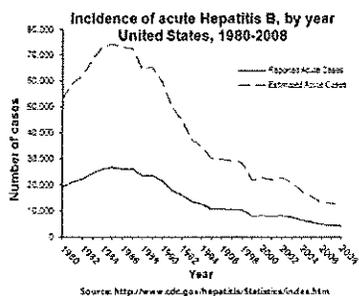
Public Health Significance

- **Chronic HBV is present worldwide**
 - 0.5% of adults in North America
 - Up to 20% in other countries
- **Chronic HBV has major public health impact**
 - Up to 1.4 million persons in the U.S. infected
 - 4,000–5,500 deaths from cirrhosis or hepatocellular carcinoma per year in the U.S.
 - 15–20% will die prematurely
- **One of the most common vaccine preventable diseases**

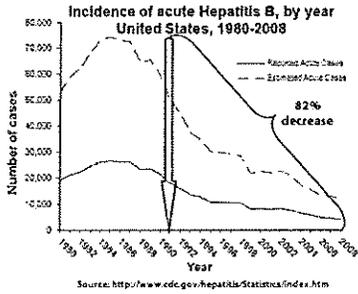
Reporting Hepatitis B Infections

- **Hepatitis B, acute**
 - Nationally notifiable as of 1993
- **Hepatitis B, perinatal**
 - Nationally notifiable as of 2001
- **Hepatitis B, chronic**
 - Nationally notifiable as of 2003

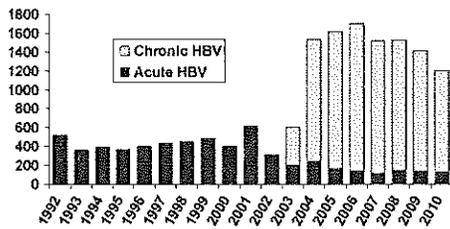
Hepatitis B Incidence, United States



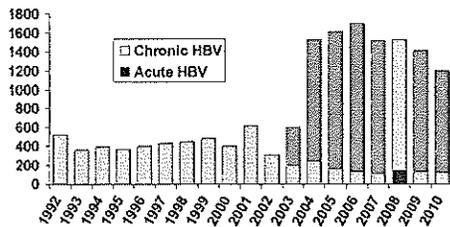
Hepatitis B Incidence, United States



HBV Cases, Michigan (1992-2010)



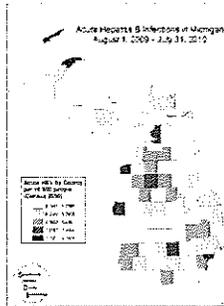
HBV Cases, Michigan (1992-2010)



HBV in Michigan — 2008

	# Confirmed Cases	Rate per 100,000 pop.	Age (Years)	Gender	Race	Ethnicity
Acute HBV	142	1.42	77% 30-59	59% male	49% Caucasian 22% African American 24% Unknown	1.4% Hispanic
Chronic HBV	1340	13.4	68% 30-59	46% male	19% Caucasian 23% African American 13% Asian 38% Unknown	1.4% Hispanic

Acute HBV Incidence by County



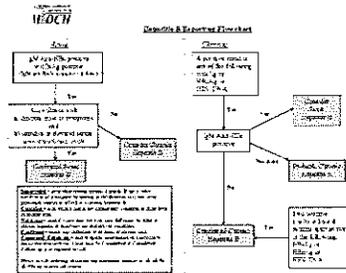
Acute HBV Case Definition

- **Clinical case definition:**
 - An acute illness with discrete onset of symptoms and either jaundice or elevated serum aminotransferase levels
- **Laboratory criteria for diagnosis:**
 - IgM antibody to hepatitis B core antigen (anti-HBc) positive or hepatitis B surface antigen (HBsAg) positive and IgM anti-HAV negative (if performed)
- **Case classification:**
 - Confirmed case requires both clinical case definition and laboratory confirmation

Chronic HBV Case Definition

- **Clinical case definition:**
 - Persons with chronic HBV may have no evidence of liver disease (asymptomatic) or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer
- **Laboratory criteria for diagnosis:**
 - IgM antibodies to hepatitis B core antigen (anti-HBc) negative and a positive result on one of the following tests: HBsAg, HBeAg, or HBV DNA
 - or HBsAg positive or HBV DNA positive two times at least 6 months apart
- **Case classification:**
 - Confirmed = a case that meets either lab criteria for diagnosis
 - Probable = a case with a single HBsAg, HBV DNA, or HBeAg positive lab results when no IgM anti-HBc results are available

HBV Classification Algorithm



Source: http://www.michigan.gov/documents/mdch/HepBReportingFlowchart_328506_7.pdf

Acceptable Case Status for HBV Reporting

	Unknown	Suspect	Probable	Confirmed	Not a Case
HBV, acute	---	---	---	Valid	Valid
HBV, chronic	---	---	Valid	Valid	Valid

**Acute HBV Classification
August 1, 2009 – July 31, 2010**

N = 477	Unknown	Suspect	Probable	Confirmed	Not a Case
HBV, acute	92, 19%	2, 0.4%	35, 7%	137, 29%	211, 44%

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- 81 cases lacked follow-up
- 3 were chronic cases
- All cases lacked follow-up/interviews
- 6 met case definition as confirmed
- 2 chronic cases
- 5 not a case

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↓
Completed =
113 cases

**Completeness of Data
Confirmed, Completed (N=113)**

Required Information	# Complete	% Complete
Full Name	113	100%
Full Address	111	98%
Phone #	109	96%
DOB	113	100%
Sex	112	99%
Lab test info	108	96%
Referral info	63	56%
Physician info	92	81%
Race	88	78%

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**Completeness of Data
Confirmed, Completed (N=113)**

Additional Information	# Complete	% Complete
Onset Date	21	19%
Diagnosis Date	30	27%
Notes (HTML)	83	73%
Notes (PDF)	75	66%
Hospitalization status	69	61%
Symptoms (Y/N)	66	58%
Jaundiced (Y/N)	65	58%
Pregnant (Y/N) for women (N=62)	35	57%
Date of Interview	52	46%
Meets case definition	47	42%

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**Misclassification of Data
Confirmed, Completed Cases (N=113)**

- Acute, confirmed, completed cases only
 - 66/113 did not meet case definition
 - No reported symptoms (25)
 - No reported symptoms and no reported increased liver values (21)
 - No reported increase in liver values or reported jaundice (5)
 - Prior chronic case (9)
 - Prior acute case (2)
 - Not supported by adequate HBV lab data (4)

**Acute HBV Classification
August 1, 2009 – July 31, 2010**

N = 477	Unknown	Suspect	Probable	Confirmed	Not a Case
HBV, acute	92, 19%	2, 0.4%	35, 7%	137, 29%	211, 44%

- 112 (58%) misclassified
- 11 should have been completed as not a case rather than cancelled
- 92 required additional follow-up to meet or not meet the case definition

More Issues in Proper Reporting Acute HBV

- **VA Medical Centers**
 - Some VA Medical Centers in Michigan are open to assisting with reporting to the state surveillance system
 - Not mandated to report to the state, report directly to CDC

- One VA Medical Center has not routinely cooperated with case investigations/follow-up
 - Automatic laboratory reporting into MDSS
 - 86 cases reported as not a case, 81 needed additional follow-up
 - 65 cases reported as unknown, all needed follow-up
 - Demonstrates need for further dialogue with this facility to properly classify these cases

Conclusions

- Usefulness?
- Does not address the needs of traditional disease surveillance
 - Poor data quality
 - Complexity of the case definition requires follow-up
 - Low LHD acceptability

Recommendations

- Offer LHDs training for proper case classification
- Create checks requiring case definition data entry prior to case closure
- Increase electronic laboratory reporting into MDSS
- Link electronic medical records with MDSS data
- Provide LHD funding for training, education, and case investigation
- Consider CSTE and CDC review of existing case definition utility

Recommendations for Case Managers

- Prioritize case reviews, resources (time, personnel)**
 - Women of child-bearing age (10-60 years old)
 - Hepatitis B Surface Antigen positive (HBsAg+)
- Importance of patient interviews**
 - This is a vaccine preventable disease!
 - Recommendation to patient for testing and vaccination of close contacts

Lessons Learned

- Lack of funding**
 - No adult HBV funding, limited perinatal HBV funding
- Lack of human resources to follow-up**
 - Ex: One LHD staff person was responsible for 175 of the 477 acute HBV cases
 - 16,361 total reportable condition cases
 - 167/175 (95%) acute HBV cases misclassified
- Issues in MI not novel**
 - Institute of Medicine 2010 report on Hepatitis B and C
 - Link: <http://www.iom.edu/Reports/2010/Hepatitis-and-Liver-Cancer-A-National-Strategy-for-Prevention-and-Control-of-Hepatitis-B-and-C.aspx>

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For more information please contact Centers for Disease Control and Prevention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



Office of Surveillance, Epidemiology, and Laboratory Services
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Hepatitis C Surveillance

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Hepatitis C Virus (HCV) Transmission

- HCV is transmitted primarily through large or repeated percutaneous exposures to infectious blood, such as:
 - Injection drug use (currently the most common means of HCV transmission in the United States)
 - Receipt of donated blood, blood products, and organs (once a common means of transmission but now rare in the United States since blood screening became available in 1992)
 - Needlestick injuries in health care settings
 - Birth to an HCV-infected mother

HCV Transmission

- HCV can also be spread infrequently through:
 - Sex with an HCV-infected person (an inefficient means of transmission)
 - Sharing personal items contaminated with infectious blood, such as razors or toothbrushes (also inefficient vectors of transmission)
 - Health care procedures that involve invasive procedures, such as injections (usually recognized in the context of outbreaks)

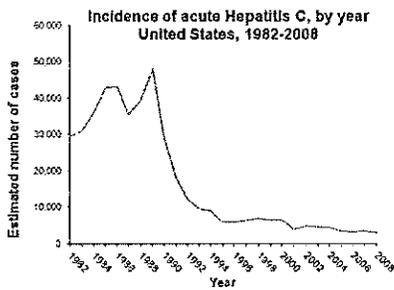
Hepatitis C Infection

- Acute illness is uncommon. Only 20%–30% of newly infected persons develop symptoms of acute disease.
- 75%–85% of newly infected persons develop chronic infection.
- 60%–70% of chronically infected persons develop chronic liver disease.
- 5%–20% develop cirrhosis over a period of 20–30 years.
- 1%–5% will die from cirrhosis or liver cancer.

Public health significance

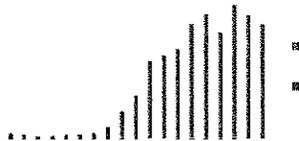
- CDC estimates that approximately 17,000 new HCV infections occurred nationally in 2007, after adjusting for asymptomatic infection and underreporting.
- Approximately 3.2 million persons in the United States have chronic HCV infection. Infection is most prevalent among those born during 1945–1965, the majority of whom were likely infected during the 1970s and 1980s when rates were highest.
- Chronic HCV infection is the leading indication for liver transplants in the United States and accounts for an estimated 8,000–10,000 deaths each year.
- No vaccine for Hepatitis C is available. Research into the development of a vaccine is under way.

Hepatitis C Incidence, US



<http://www.cdc.gov/hepatitis/Statistics/index.htm>

Hepatitis C cases reported to MDCH



Acute hepatitis C case definition

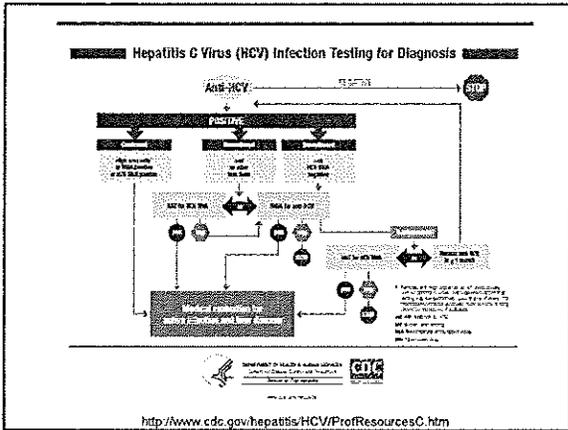
- AND, meets the following two criteria:
 - IgM antibody to hepatitis A virus (IgM anti-HAV) negative, AND
 - IgM antibody to hepatitis B core antigen (IgM anti-HBc) negative
- Case classification
 - *Confirmed*: a case that meets the clinical case definition, is laboratory confirmed, and is not known to have chronic hepatitis C.

Chronic hepatitis C case definition

- Clinical case definition
 - No symptoms are required. Most HCV-infected persons are asymptomatic; however, many have chronic liver disease, which can range from mild to severe.
- Laboratory criteria for diagnosis – one or more of the following criteria:
 - Anti-HCV positive (repeatedly reactive) by enzyme immunoassay (EIA) verified by at least one additional more specific assay, OR
 - HCV RIBA (recombinant immunoblot assay) positive, OR
 - Nucleic Acid Test (NAT) positive for HCV RNA (including genotype), OR
 - Antibodies to hepatitis C virus (anti-HCV) screening-test-positive with a signal to cut-off ratio predictive of a true positive as determined for the particular assay and posted by CDC.

Chronic hepatitis C case definition

- Case classification
 - *Confirmed*: a case that is laboratory confirmed and does not meet the case definition for acute hepatitis C.
 - *Probable*: a case that is anti-HCV positive (repeat reactive) by EIA and has alanine aminotransferase (ALT or SGPT) values above the upper limit of normal, but the anti-HCV EIA result has not been verified by an additional more specific assay or the signal to cut-off ratio is unknown.



Viral hepatitis cases of particular public health significance

- Hepatitis B or C cases among adults ≥ 70 years of age. These cases might represent healthcare associated transmission.
- Hepatitis B or C cases associated with a blood transfusion. Please examine the date of transfusion to ensure that the transfusion occurred within the incubation period of hepatitis B or C infection.
- Hepatitis B cases among persons ≤ 20 years of age. Please check vaccination status of any cases of hepatitis B among persons ≤ 20 years of age. These cases are of concern because they are potentially indicative of vaccination failures.
- Hepatitis A among children ≤ 5 years of age in all states. Please check vaccination status of any cases of Hepatitis A among children ≤ 5 because this may potentially be an indication of vaccination failure.
- Perinatal hepatitis B cases. Contact the MDCH Perinatal Hepatitis B Prevention Program.

Viral Hepatitis Surveillance Workgroup

- Composed of local health department staff and MDCH regional epidemiologists and viral hepatitis staff
- Goal is to improve the quality of hepatitis data
- Meets quarterly
- Working on guidelines for laboratories, guidelines for prioritizing follow-up, and a pilot of focused surveillance

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