Hepatitis C Virus (HCV) Infection

- Most common chronic blood-borne infection in the U.S.
- 3.2 million people are chronically infected in the U.S.
- Leading cause of chronic liver disease, liver cancer and liver transplants
- Infection is most prevalent among those born during 1945-1965
- 70% to 80% of persons are either asymptomatic or have only a mild clinical illness

http://www.cdc.gov/hepatitis/hcv/index.htm
Hepatitis C Virus (HCV) Infection (Continued)

• Acute Hepatitis C virus infection

• Chronic Hepatitis C virus infection (past/present infection)
Etiologic Agent

- RNA virus - genus (Hepacivirus) in the Flaviviridae family
- 6 different genotypes – Genotype 1 (subtype 1a and 1b) is the most common (60% to 70%) of the HCV infections in U.S.
- Genotype 1a is most common in West Virginia

Reservoir

- Only in humans
Mode of Transmission - transmitted by the **parenteral** route

- Injection drug use is the most common risk factor for the transmission
- Other modes of transmission
  - Transfusion or organ transplantation, prior to 1992
  - Hemodialysis
  - High-risk sexual activity
  - Tattoo and body piercing if instruments not sterilized
  - Sharing personal items
  - Perinatal exposure
  - Occupational exposure
Incubation and Infectious Periods

**Incubation Period**
2 weeks to 6 months; average 45 days

**Infectious Period**
2 weeks after exposure for an indefinite period of time
Symptoms

**Acute Hepatitis C**
- 25%-30% of persons will experience the classic symptoms of hepatitis
- Indistinguishable from acute hepatitis due to other viruses

**Chronic Hepatitis C**
- Most of the persons are asymptomatic
- 5%-20% HCV infected persons will go on to develop cirrhosis
- Hepatocellular carcinoma is estimated to occur in about 1%-4% of persons with cirrhosis every year
Incidence of Acute Hepatitis C in WV and US

* WV rate: Number of cases reported by year of onset of disease, based on 2010 population estimate.
Incidence of Acute Hepatitis C in 2014
Acute Hepatitis C Distribution by Age Group, WV (2007-2014)

N=298

Percentage of cases

Age groups

19 or less 20-29 30-39 40-49 50 and older
Acute Hepatitis C Risk Factors Reported in WV (2012-2014)

N=172

Risk Factors

- Injection Drug Use
- Used Street Drugs
- Contact of Hepatitis C case
- Incarcerated for More than 24 Hours
- Treated for STD
- Tattoo
- Body Piercing
- Accidental stick with needle contaminated with blood
- Exposure to someone else’s blood

Patient can report more than one risk factor

www.dhhr.wv.gov/oeps
Hepatitis C Case Investigation

Lab report received by LHD

- Paper labs
- +ve HCV lab and ALT >400

DIDE enters case in WVEDSS and sends back to LHD

LHD investigates the case as acute Hepatitis C

Provider reports

- +ve HCV lab

ELR

Hepatitis C Coordinator enters the lab in WVEDSS and closes the case
Common Laboratory Tests

Hepatitis C virus (HCV), antibody
Hepatitis C virus (HCV) quantitative by PCR
Hepatitis C virus (HCV) qualitative by PCR
Hepatitis C virus (HCV) genotyping
Aspartate aminotransferase (AST (SGOT))
Alanine aminotransferase (ALT (SGPT))
Laboratory Markers of Hepatitis C

[Graph showing the concentration over time after exposure to HCV, with markers for Symptoms +/-, Anti-HCV, HCV RNA, and ALT.]
## Interpretation of Hepatitis C Tests

<table>
<thead>
<tr>
<th>Test Outcome</th>
<th>Interpretation</th>
<th>Further Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCV antibody non-reactive</td>
<td>No HCV antibody detected</td>
<td>No further action&lt;br&gt;If recent exposure, test for HCV RNA by PCR</td>
</tr>
<tr>
<td>HCV antibody reactive</td>
<td>Presumptive HCV infection</td>
<td>Current, past infection that is resolved or false positive&lt;br&gt;Perform RNA PCR test to identify current/past/resolved infection</td>
</tr>
<tr>
<td>HCV antibody reactive, HCV RNA detected</td>
<td>Current infection</td>
<td>Counsel and link to care</td>
</tr>
<tr>
<td>HCV antibody reactive, HCV RNA not detected</td>
<td>No current infection</td>
<td>No further action, except provide risk factor prevention information</td>
</tr>
</tbody>
</table>
Illness with **discrete** onset of symptoms of viral hepatitis and either jaundice or elevated ALT (>400 IU/L)

AND

Anti-HCV positive with a **signal to cut off ratio** predictive of true positive results

OR

NAT for HCV RNA (including qualitative, quantitative and genotyping)

OR

Positive Recombinant Immunoblot Assay (RIBA)

Confirmed: A case that meets the clinical case definition is laboratory confirmed and is not known to have chronic Hepatitis C. A documented -ve HCV laboratory test result followed within 6 months by a positive test.
Anti-HCV positive with a **signal to cut off ratio** predictive of true positive results

OR

NAT for HCV RNA (including qualitative, quantitative and genotyping)

OR

Positive RIBA

**Confirmed**: A case that is laboratory confirmed and does not meet the case definition for acute Hepatitis C.

**Probable**: A case that does not meet the case definition for acute Hepatitis C is anti-HCV positive (repeat reactive) and has ALT above the upper limit of normal, but the anti-HCV result has not been verified by an additional more specific assay or the signal to cut-off ratio is unknown.
### 2016 Case Definition – Key Changes

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Current case definition</th>
<th>Changes in 2016 case definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical</td>
<td>Illness with discrete onset of symptoms and either Jaundice or elevated ALT &gt;400 IU/L</td>
<td>ALT level reduced to 200 IU/L</td>
</tr>
<tr>
<td>Laboratory</td>
<td>Antibody positive test requires signal cut off ratio</td>
<td>• Antibody positive test does not require signal cut off ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Positive HCV antigen listed as one of the lab test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• RIBA not included in the case definition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sero conversion changed from 6 months to 12 months</td>
</tr>
</tbody>
</table>
2016 Clinical Criteria

Illness with discrete onset of any signs or symptoms consistent with acute viral hepatitis

AND

Jaundice

OR

Peak ALT > 200IU/L during period of acute illness
2016 Laboratory Criteria

Positive test for antibodies to Hepatitis C

Hepatitis Virus detection by Nucleic Acid Testing (NAT)

Positive test for Hepatitis C Virus antigens
• Meets clinical criteria **AND** has a positive Hepatitis C virus detection test (RNA or Antigen) **OR**
• Documented negative HCV antibody, HCV antigen or NAT test result followed within 12 months by a positive result of any of these tests

• Meets clinical criteria but has **no report** of a positive Hepatitis C virus detection test **AND**
• Does not have test conversion within 12 months or has no report of test conversion
2016 Chronic Hepatitis C

**Chronic, Confirmed**
- A case that does not meet the clinical criteria or has no report of clinical criteria **AND**
- Does not have test conversion within 12 months or has no report of test conversion **AND**
- Has a positive HCV NAT or HCV antigen test

**Chronic, Probable**
- A case that does not meet the clinical criteria or has no report of clinical criteria **AND**
- Does not have test conversion within 12 months or has no report of test conversion **AND**
- Has a positive anti-HCV antibody test, but no report of a positive HCV detection test
• A new case is an incident case that has not previously been reported as meeting case criteria for Hepatitis C
  • New acute infection (incidence)
  • Newly diagnosed chronic infection

• Cases may be reclassified
  • Probable acute case may become reclassified confirmed acute if subsequent HCV detection tests are reported in the same year
  • Acute probable or acute confirmed may become reclassified as a confirmed chronic case if subsequent HCV detection tests are reported one year or longer after acute onset
  • Confirmed acute cases do not become probable chronic cases
Surveillance Objectives

• Determine the incidence of acute Hepatitis C

• Annually estimate the number of newly diagnosed cases of chronic Hepatitis C

• Prospectively identify the risk factors associated with acute Hepatitis C

• Identify demographic characteristics of persons with Hepatitis C infection
Surveillance Objectives (Continued)

• Periodically assess access to care and quality of care for patients with Hepatitis C infection through special studies

• Periodically identify the lifetime risk factors associated with chronic Hepatitis C infection through special studies

• Detect outbreaks or clusters of Hepatitis C infection
Responses to Acute Hepatitis C Risk Factors, WV (2014)

N=62

Risk factors

- Injection Drug Use
- Used Street Drugs
- Contact of Hepatitis C case
- Incarcerated for More than 24 Hours
- Treated for STD
- Tattoo
- Body Piercing
- Exposure to someone else’s blood
- Possible healthcare associated infection
- Accidental stick with needle contaminated with blood

Percentage

- Yes
- No data
- No
Surveillance Indicators

- Proportion of acute cases of Hepatitis C with complete demographic information
- Proportion of acute cases of Hepatitis C with complete information on risk factors
- Proportion of acute cases of Hepatitis C who have been educated
- Proportion of chronic Hepatitis C cases with complete demographic and locating information
Important Public Health Actions

• Ensure the patient is educated about Hepatitis C transmission, prevention, and control

• A single case of possible healthcare associated Hepatitis C (case who had an invasive medical procedure during the 2 weeks to 6 months prior to onset and no other risk factors for Hepatitis C) is defined as an outbreak and should be investigated

Use CDC Healthcare Investigation Guide to investigate healthcare associated infection

(http://www.cdc.gov/hepatitis/outbreaks/healthcareinvestigationguide.htm)
Contact

Leena Anil, Ph.D.
ELC Epidemiologist
West Virginia Department of Health & Human Resources
Bureau for Public Health
Office of Epidemiology and Prevention Services
Division of Infectious Disease Epidemiology
350 Capitol Street, Room 125
Charleston, WV 25301
Phone: (304) 356-4006   Fax: (304) 358-8736
Email: leena.anil@wv.gov
www.dide.wv.gov