Epidemiology and Prevention of Viral Hepatitis B and C: An Overview

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Hepatitis
Inflammation of the liver

- Can be caused by:
  - Immune cells in the body attacking the liver
  - Infections from viruses (i.e. Hepatitis A, B, C), bacteria or parasites
  - Liver damage from alcohol, poisonous mushrooms, or other poisons i.e. cocaine
  - Medications i.e. acetaminophen, EES, Sulfa

Viral Hepatitis - Overview

<table>
<thead>
<tr>
<th>Type of Hepatitis</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<td>Source of virus</td>
<td>blood/ blood-derived body fluids</td>
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<td>percutaneous</td>
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<td>pre/post-exposure immunization</td>
<td>blood donor screening; risk behavior modification</td>
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STD Treatment Guidelines
MMWR May 10, 2002 51(RR06)

“Vaccination against hepatitis is the most effective means of preventing sexual transmission of hepatitis A and B.”

Hepatitis B

Incubation | (exposure to onset of symptoms) 6 weeks – 6 months
Isolation | blood saliva, semen, vaginal secretions, wound exudates
Progression | acute (self limiting) or chronic

Lives outside of body x 7 days

Transmission of HBV Infection

- Transfusion (blood, blood products)
- Sex with infected partner
- Mother to baby
- Contaminated needles and syringes / paraphernalia
- Organs and tissue transplantation
- Body fluids blood, semen, Sores [toothbrush/razor]
Signs & Symptoms: **Acute** Hepatitis B

- May Be Asymptomatic (50%)
- "Flu-like" Symptoms
  - muscle aches, nausea, vomiting, fever
- Skin Rash
- Jaundice (yellow skin, eyes), itching
- Light-colored Stools
- Dark Urine

Signs & Symptoms: **Chronic** Hepatitis B

- Usually Asymptomatic
- Malaise/Fatigue
- Extrahepatic Symptoms
  (i.e. myalgias, arthralgias, skin rashes, N/V)
- Liver Failure (1%) [ascites, esophageal varices]
- Hepatocellular Carcinoma and/or Death (15-25%)

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**Hepatitis B - Clinical Features**

- Clinical illness (jaundice): <5 yrs, <10%
  ≥5 yrs, 30%-50%
- Chronic infection: <5 yrs, 30%-90%
  ≥5 yrs, 2%-10%
- Premature mortality from chronic liver disease: 15%-25%
Geographic Distribution of Chronic HBV Infection

HBsAg Prevalence
- ≥8% - High
- 2-7% - Intermediate
- <2% - Low

Figure 3.2. Incidence of acute hepatitis B, by age group — United States, 1990–2009

Figure 3.3. Incidence of acute hepatitis B, by sex — United States, 1990–2009
Examples of screenings

<table>
<thead>
<tr>
<th>State/setting</th>
<th>No. persons identified for screening</th>
<th>No. confirmed cases</th>
<th>Suspected mode of transmission*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Florida: Multiple assistant living</td>
<td>62</td>
<td>9</td>
<td>Unsafe practices with assisted blood glucose monitoring</td>
</tr>
<tr>
<td>Illinois: Long term care facility</td>
<td>193</td>
<td>8</td>
<td>Sexual contact</td>
</tr>
<tr>
<td>New Jersey: Out Patient oncology clinic</td>
<td>4,600</td>
<td>29</td>
<td>Breaches in infection control</td>
</tr>
<tr>
<td>Virginia</td>
<td>329</td>
<td>2</td>
<td>Orthopedic surgeon with high viral load performing procedures</td>
</tr>
</tbody>
</table>

Surveillance for Viral Hepatitis — United States, 2009

<table>
<thead>
<tr>
<th>State/setting</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>1.0 (44)</td>
<td>0.3 (13)</td>
<td>0.5 (24)</td>
<td>0.3 (12)</td>
<td>0.3 (12)</td>
</tr>
<tr>
<td>Georgia</td>
<td>1.4 (124)</td>
<td>0.6 (56)</td>
<td>0.7 (67)</td>
<td>0.6 (57)</td>
<td>0.6 (54)</td>
</tr>
<tr>
<td>Tennessee</td>
<td>2.4 (145)</td>
<td>1.1 (70)</td>
<td>0.9 (57)</td>
<td>0.5 (32)</td>
<td>0.2 (13)</td>
</tr>
<tr>
<td>Texas</td>
<td>2.0 (461)</td>
<td>1.4 (330)</td>
<td>1.1 (260)</td>
<td>1.1 (259)</td>
<td>0.7 (184)</td>
</tr>
</tbody>
</table>

Interpretation of Diagnostic Tests for Hepatitis B

<table>
<thead>
<tr>
<th>Test</th>
<th>HBsAg</th>
<th>IgM anti-HBc</th>
<th>Total anti-HBsAg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Cleared</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Chronic</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Treatments for Chronic Hepatitis B

Currently approved therapies for chronic hepatitis B

- Interferon alfa
- Lamivudine (Epivir, 3TC)
- Adefovir
- Entecavir
- Tenofovir
- those who have low levels of virus, abnormal liver tests, and moderate damage on biopsy respond best

Hepatitis B Vaccine

Recommended for:

- Everyone 18 years of age and younger
- Adults over 18 who are at risk:
  - multiple sex partners
  - men who have sex with men
  - sex contacts of infected people
  - injection drug users
  - health care and public safety workers
  - household contacts of persons with Hep B
  - hemodialysis patients
Hepatitis B Vaccine Side Effects

- Soreness at site of shot (1 of 4)
- Mild to moderate fever (1 of 100)
- Severe allergic reaction (very rare)
  - high fever, difficulty breathing, hoarseness, wheezing, hives, paleness, weakness, fast heart beat, dizziness

Do not give if
- patient sick.
- person has a yeast allergy or had a serious reaction to a prior dose

Baker's yeast (bread)

Hepatitis B Vaccine

- Adults:
  3 doses
  - Dose 1 at Time 0
  - Dose 2 at 1 month later
  - Dose 3 at 6 months later

PEP for HBV

- Perinatal exposure to an HBsAg-, HBeAg-positive mother-
  - HBIG and initiation of the hepatitis B vaccine series at birth is 85%—95% effective in preventing HBV infection
- Occupational exposure-
  - multiple doses of HBIG initiated within 1 week following percutaneous exposure to HBsAg-positive blood provides an estimated 75% protection from HBV infection
  - Give the hepatitis B vaccine series.

Hepatitis C Virus
HCV Prevalence by Selected Groups
United States

Transmission of HCV

Percutaneous
- Injecting drug use
- Clotting factors before viral inactivation
- Transfusion, transplant from infected donor
- Therapeutic (contaminated equipment, unsafe injection practices)
- Occupational (needlestick)

Permucosal
- Perinatal
- Sexual

State | # chronic Hepatitis C Reported
--- | ---
Georgia | 723
Illinois | 7,188
Pennsylvania | 9498
New Jersey | 4495

**Sources of Infection for Persons with Hepatitis C**

- Injecting drug use 60%
- Sexual 15%
- Transfusion 10% (before screening)
- Other* 5%
- Unknown 10%

*Nosocomial; Health-care work; Perinatal

Source: Centers for Disease Control and Prevention

**Injecting Drug Use and HCV Transmission**

- Highly efficient among injection drug users
- Rapidly acquired after initiation
- Four times more common than HIV
- Prevalence 60-90% after 5 years

**Nosocomial Transmission of HCV**

Examples:

- Contaminated equipment
  - hemodialysis
  - endoscopy
- Unsafe injection practices
  - plasmapheresis, phlebotomy
  - multiple dose medication vials
  - therapeutic injections

**Occupational Transmission of HCV**

Occupational exposures (rare)

- 1.8% following needle stick from HCV-positive source
  - Associated with hollow-bore needles
- Case reports of transmission from blood splash to eye
  - No reports of transmission from skin exposures to blood

**Perinatal Transmission of HCV**

- Transmission only from women HCV-RNA positive at delivery
  - Average rate of infection 6%
  - Higher (17%) if woman co-infected with HIV
  - Role of viral titer unclear
- No association with
  - Delivery method
  - Breastfeeding
- Infected infants do well
  - Severe hepatitis is rare

**Sexual Transmission of HCV**

- Occurs, but efficiency is low
  - Rare between long-term steady partners
  - Factors that facilitate transmission between partners unknown (e.g., viral titer)

Accounts for 15-20% of acute and chronic infections in the United States

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Household Transmission of HCV

- Rare but not absent
- Could occur through percutaneous/mucosal exposures to blood
  - Ex: sharing of contaminated personal articles (razors, toothbrushes)
  - Contaminated equipment used for home therapies
    • Injections
    • Folk remedies

Other Potential Exposures to Blood

- No or insufficient data showing increased risk
  - Intranasal cocaine use, tattooing, body piercing, acupuncture, military service

Features of Hepatitis C Virus Infection

- Incubation period: Average 6-7 weeks, Range 2-26 weeks
- Acute illness (jaundice): Mild (<20%)
- Case fatality rate: Low
- Chronic infection: 75%-85%
- Chronic hepatitis: 70% (most ax)
- Cirrhosis: 10%-20%
- Mortality from CLD: 1%-5%

Chronic Hepatitis C

Factors Promoting Progression or Severity

- Increased alcohol intake
- Age > 40 years at time of infection
- HIV co-infection
- Other
  - Male gender
  - Other co-infections (e.g., HBV)

Natural History of HCV Infection

Exposure (Acute phase) → Resolved → Chronic (85% (85)) → Chronic Cirrhosis (20% (17)) → Slowly Progressive → Cirrhosis (75% (13)) → HCC Transplant Death

Serologic Pattern of Acute HCV Infection with Recovery

- Time after Exposure
- Anti-HCV
- ALT
- Normal
HCV Testing Routinely Recommended

**Increased risk for infection**
- Ever injected illegal drugs
- Received clotting factors made before 1987
- Received blood/organs before July 1992
- Ever on chronic hemodialysis
- Evidence of liver disease
- As of July 2012, anyone born between 1945-1965

**Based on need for exposure management**
- Healthcare, emergency, public safety workers after needle stick/mucosal exposures to HCV-positive blood
- Children born to HCV-positive women


Routine HCV Testing of Uncertain Need

**Not confirmed as risk factor/prevalence unknown**
- Recipients of transplanted tissue
- Intranasal cocaine or other non-injecting illegal drug users
- History of tattooing, body piercing

**Confirmed risk factor but prevalence of infection low**
- History of STDs or multiple sex partners
- Long-term steady sex partners of HCV-positive persons


Medical Evaluation and Management for Chronic HCV Infection

- Assess for biochemical evidence of CLD
- Assess for severity of disease and possible treatment, according to current practice guidelines
- Counsel to reduce further harm to liver
  - Limit or abstain from alcohol
  - Vaccinate against hepatitis A


Treatment of Chronic HCV Infection

- Most are not candidates
- Pegylated interferon and ribavirin for 6 months to 1 year
- Response rates ~50% in gt 1, 80% in gt 2 or 3
- Late May 2011- two new agents (Protease inhibitors) were approved for gt 1 infection:
  - Telaprevir
  - Boceprevir
- Response rates with new agents ~70%

Preventing HCV Transmission to Others

**Avoid Direct Exposure to Blood**
- Do not donate blood, body organs, other tissue or semen
- Do not share items that might have blood on them
  - personal care (e.g., razor, toothbrush)
  - home therapy (e.g., needles)
- Cover cuts and sores on the skin

Persons Using Illegal Drugs

- Provide risk reduction counseling, education
  - Stop using and injecting
  - Refer to substance abuse treatment program
  - If continuing to inject
    - Never reuse or share syringes, needles, or drug preparation equipment
    - Vaccinate against hepatitis B and hepatitis A
    - Refer to community-based risk reduction programs
Mother-to-Infant Transmission of HCV

- Postexposure prophylaxis not available
- No need to avoid pregnancy or breastfeeding
  - Consider bottle feeding if nipples cracked/bleeding
- No need to determine mode of delivery based on HCV infection status
- Test infants born to HCV-positive women
  - Consider testing any children born since woman became infected
  - Evaluate infected children for CLD

Sexual Transmission of HCV

Persons with One Long-Term Steady Sex Partner

- Do not need to change their sexual practices
- Should discuss with their partner
  - Risk (low but not absent) of sexual transmission
  - Routine testing not recommended but counseling and testing of partner should be individualized
  - May provide couple with reassurance
  - Some couples might decide to use barrier precautions to lower limited risk further

Persons with High-Risk Sexual Behaviors

- At risk for sexually transmitted diseases, e.g., HIV, HBV, gonorrhea, chlamydia, etc.
- Reduce risk
  - Limit number of partners
  - Use latex condoms
  - Get vaccinated against hepatitis B
  - MSMs also get vaccinated against hepatitis A

Other Transmission Issues

- HCV not spread by kissing, hugging, sneezing, coughing, food or water, sharing eating utensils or drinking glasses, or casual contact
- Do not exclude from work, school, play, childcare or other settings based on HCV infection status

Postexposure Management for HCV

- IG, antivirals not recommended for prophylaxis
- Follow-up after needlesticks, sharps, or mucosal exposures to HCV-positive blood
  - Test source for anti-HCV
  - Test worker if source anti-HCV positive
    - Anti-HCV and ALT at baseline and 4-6 months later
    - For earlier diagnosis, HCV RNA by PCR at 4-6 weeks
  - Confirm all anti-HCV results with RIBA
- Refer infected worker to specialist for medical evaluation and management

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http://www.cdc.gov/hepatitis/Pub/ManFacts.html
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<tr>
<td>Source of virus</td>
<td>feces</td>
<td>blood/ blood-derived body fluids</td>
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<td>feces</td>
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<td>fecal-oral</td>
<td>percutaneous</td>
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Source of virus: feces, blood/ blood-derived body fluids, blood/ blood-derived body fluids, blood/ blood-derived body fluids, feces.

Route of transmission: fecal-oral, percutaneous, percutaneous, percutaneous, fecal-oral.

Chronic infection: no, yes, yes, yes, no.

Prevention: pre/post-exposure immunization, blood donor screening; risk behavior modification, pre/post-exposure immunization; risk behavior modification, ensure safe drinking water.