Global Snapshot of Viral Hepatitis
Morbidity and Mortality
4th International Conference on Viral Hepatitis
March 17, 2014

Kiren Mitruka, MD, MPH
Division of Viral Hepatitis
National Center for HIV/AIDS, Viral Hepatitis, STD & TB Prevention
Centers for Disease Control and Prevention
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# Leading Causes of Infectious Disease Deaths Worldwide, 2010

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<tr>
<td>Hepatitis B Virus</td>
<td>~786,000</td>
</tr>
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<td>~499,000</td>
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Estimate annual deaths from selected causes by region, 2010

Number of deaths/year

- Asia Pacific
- Americas
- Europe
- Africa & ME

Viral hepatitis
HIV
TB
Malaria

Slide Source: WHO
Mortality associated with Hepatitis B, Hepatitis C, and HIV United States, 1999 – 2010

Viral Hepatitis Global Challenges

- Lack of Awareness & Data
- Lack of Resources
- Complex Epidemiology
- Costly and Complex Treatment
- Lack of Capacity at Country
WHO 2012 program budgets per disease-specific deaths

- Tuberculosis
- HIV
- Malaria
- Viral Hepatitis

Slide: Dr. Stefan Wiktor  WHO
Lozano et al, Global Burden of Disease Study 2010 Lancet 2012
## Types of Viral Hepatitis

<table>
<thead>
<tr>
<th>Source of virus</th>
<th>A</th>
<th>E</th>
<th>B</th>
<th>D</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feces</td>
<td>Feces (blood rarely)</td>
<td>Blood/blood-derived body fluids</td>
<td>Blood/blood-derived body fluids; requires HBV</td>
<td>Blood/blood-derived body fluids</td>
</tr>
<tr>
<td>Route of transmission</td>
<td>Fecal-oral</td>
<td>Fecal-oral</td>
<td>Percutaneous permucosal</td>
<td>Percutaneous permucosal</td>
<td>Percutaneous permucosal</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>No</td>
<td>Yes - immuno-compromised</td>
<td>Yes 5-90% depending on age of acquisition</td>
<td>Yes</td>
<td>Yes 60-75%</td>
</tr>
</tbody>
</table>
Hepatitis A Virus

- 212 million cases/year
- 103,000 deaths/year
- Main source: contaminated food and water
- Children have highest incidence in endemic area
  - No or mild disease
- Improved living standards, infection until later in life
- Effective vaccine available
  - Protective antibody in 2-4 weeks

2005 estimated prevalence

Hepatitis E Virus

- 21 million incident infections
- 70,000 deaths (20% mortality in pregnant women)

**Genotype 1**
- Acute liver failure in Asia
- Outbreaks in refugee settings
- Prevention by water treatment

**Genotype 3**
- Developed countries
- Source: game meat, pork products, unknown
- Chronic infection in solid-organ transplant recipients

**Vaccines**
- Licensed in China-2011
- Indication and WHO prequalification pending

2005 estimated prevalence
### Global Burden of Hepatitis B and Hepatitis C Virus Infection

<table>
<thead>
<tr>
<th></th>
<th>Hepatitis B</th>
<th>Hepatitis C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incidence</strong></td>
<td>~4.5 million</td>
<td>3-4 million</td>
</tr>
<tr>
<td><strong>Prevalence of chronic infection</strong></td>
<td>~240 million (3.7%)</td>
<td>~184 million (2.8%)</td>
</tr>
<tr>
<td><strong>Deaths/year</strong></td>
<td>~780,000</td>
<td>~500,000</td>
</tr>
</tbody>
</table>

HIV Co-infection with HBV and HCV

- HBV
  - 10% (3%–25%) HIV-coinfected

- HCV
  - 30% (2% - 90%) coinfection with HIV
  - Persons who inject drugs: ~80% co-infected

- HIV co-infection with HBV/HCV
  - 2-3 times increased risk for cirrhosis and end-stage liver disease

* MMWR 22 Jul 2011 Vol 60/ No. 28
Hepatitis B Virus Surface Antigen Prevalence in Adults, 2005

Prevalence of hepatitis B infection, adults 19-49 years, 2005

## Mode of Transmission of Hepatitis B Virus Based on Endemicity

<table>
<thead>
<tr>
<th>Countries</th>
<th>HBsAg prevalence</th>
<th>Endemicity</th>
<th>Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts of China, Southeast Asia, tropical Africa</td>
<td>≥8%</td>
<td>High</td>
<td>Perinatal Horizontal</td>
</tr>
<tr>
<td>Eastern Europe, Mediterranean, Russia, Southwest Asia</td>
<td>2-7%</td>
<td>Intermediate</td>
<td>Perinatal Horizontal, Health care Sexual</td>
</tr>
<tr>
<td>Europe, North America, Australia, tropical and Central Latin America</td>
<td>&lt;2%</td>
<td>Low</td>
<td>Young persons—sexually or injection drug use</td>
</tr>
</tbody>
</table>
Global HBV-Related Deaths By Age at Acquisition of Infection

- Late Period (31%)
  - children >5
  - adolescents
  - adults

- Early Childhood Period (48%)
  - children ≤5

- Perinatal Period (21%)
Hepatitis B Virus Prevention and Control

- **Hepatitis B vaccination**
  - 3 dose schedule 95% effective in preventing HBV infection
  - Birth dose (within 24 hours of birth) 85% effective in PMTCT

- **Coverage, 2011**
  - 3 dose: 75% (71% in AFRO)
  - Birth dose: ~29% coverage*

- **10 Great Public Health Achievements, Worldwide, 2001-2010**
  - 700,000 deaths averted annually (per birth cohort globally)

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Sources: MMWR. November 2, 2012 / 61(43);883-885; MMWR. 24, 2011 / 60(24);814-818

*Includes any dose prior to first routine DTP*
China National Hepatitis B Serosurvey Comparison of HBsAg Rate, by Age -1992 & 2006

- Increase in HepB vaccine coverage from 1992-2005
  - Infant (3 doses) from 30% to 93.4%
  - Birth dose from 22.2% to 82.6%
- Achieve 1% HBsAg prevalence among children <5 years of age

Liang, X, Vaccine 2009
Burden of Chronic HBV Infection, United States

- Estimate of 0.8–1.4 million prevalent infections*
  - ~65% unaware of infection
  - ~3,000 deaths/years
- ~53,800 chronic hepatitis B cases imported to the U.S. yearly from 2004 through 2008
  - Often asymptomatic, many unaware of infection
  - >50% are Asian-American/Pacific Islanders
- 1 million immigrants enter annually
  - >60% from high or intermediate endemic countries

* Based on NHANES
Hepatitis B Virus: Prevention and Control U.S. Measures

- Screening all pregnant women for infection (>90% achieved)
- Vaccination
  - All infants, preferably beginning at birth (70% coverage achieved)
  - All children and adolescents (through age 18)
    - Timely completion hepatitis B vaccine series (>93%)
  - Adults in high-risk groups (e.g., STD, MSM, IDU, HIV-infected)
- Screening for infection
  - High risk groups
  - Foreign-born persons from countries with prevalence ≥2%
- Education

CDC, MMWR 2012, 2013
Hepatitis C Virus Antibody Prevalence, 2005

Anti-HCV seroprevalence by GBD region, 2005

Note: Estimates are derived from a meta-analysis of data from 232 studies published between 1997-2007, and NHANES data up to 2010. Point prevalence estimates are calculated using regional population age weights.
## Mode of Transmission of Hepatitis C Virus Based on Prevalence

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Low Prevalence</th>
<th>Medium Prevalence</th>
<th>High Prevalence</th>
</tr>
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<tbody>
<tr>
<td>Injection drug use</td>
<td>+++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Transfusions (unscreened)</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Unsafe therapeutic injections</td>
<td>+</td>
<td>+++++</td>
<td>+++++</td>
</tr>
<tr>
<td>Occupational</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Perinatal</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>High-risk sex</td>
<td>++</td>
<td>+</td>
<td>+/-</td>
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Source: Alter M World J Gastroenterol 2007 May; 13 (17): 2436-2441
Advances in HCV Therapy

Sustained Virologic Response (%)

IFN 6 m 16% 6%
IFN 12 m 34% 42%
IFN/RBV 6 m 39% 39%
Peg-IFN (PEG) 12 m 54 – 56%
PEG/RBV 12 m 67-72%
Peg/ RBV DAA 6 m >90%
Peg/RBV/ + new DAA- 3 m

Hepatitis C Virus Infection: Egypt

- Infected population (8-10 million): 10%
- Ongoing Transmission
  - 165,000 new infections/year
  - Health/Dental Care, Blood Transfusion, IDU
- Care and Treatment Program since 2008
  - Largest nationally funded program (20% of MOH budget)
  - > 30,000/year received care and treatment
    - 50% SVR (cure)
## Hepatitis C Virus: Global Prevention and Control

### Primary Prevention (prevent infection)
- Screen blood supply
- Ensure safe therapeutic injection practices
- Practice universal precautions in medical practices
- Counsel infected person to reduce transmission risk behavior
- Reduce illicit drug use and ensure safety (e.g., needle exchange)

### Secondary prevention (prevent disease)
- Test to detect active infection
- Counsel to avoid alcohol intake
- Vaccinate for hepatitis A and B
- Treat with antivirals

Adapted from Thomas D. Nature Medicine July 2013: (19) 850-859
Burden of Hepatitis C Infection, United States

- Approximately 3-4 million chronically infected
- Leading cause of liver transplant and HCC
- 1999-2007: deaths doubled to >15,000/year
- Acute infections declining
  - Since 1992, with screening of blood supply
  - >70% incident infections in persons who inject drugs
  - Increasing incidence among young white persons, non-urban settings, previous IDU and oxycontin use*
- Increasing transmission among HIV-infected MSM
- Outbreaks in diverse healthcare settings

MMWR 2011;60(17);537-541
Broader National HCV Testing Recommendations

- One time test for adults born during 1945–1965
  - CDC (2012)
  - USPSTF (2013)
- Limitations in risk-based testing, 5x higher prevalence in birth cohort, and benefits of therapy in reducing
  - Liver cancer risk: 70%
  - All-cause mortality: 50%
CDC Measures to Enhance Hepatitis C Testing and Care

- Broaden testing recommendations
- Simplify testing algorithms
- Educate communities and training providers
- Update Hepatitis C Treatment Guidelines
- Build capacity for testing and linkage to care
- Develop hepatitis C electronic performance measures and clinical decision support tools
Airport Diorama Placements
United States HHS Viral Hepatitis Action Plan: A Template for Other Countries

- Educate providers and communities to reduce health disparities
- Improve testing, care and treatment
- Strengthen surveillance
- Eliminate transmission of vaccine-preventable hepatitis
- Reduce viral hepatitis caused by drug-use behaviors
- Protect patients and workers from healthcare-associated hepatitis
World Health Organization

- World Health Assembly Resolution 63.81 (2010)
  - Comprehensive approach viral hepatitis
  - World Hepatitis Day (July 28)
- Global Hepatitis Program (2012): 4 Strategic Axis
  - Education, Advocacy, Partnership
  - Essential Data (burden, surveillance, other)
  - Prevention
  - Care and Treatment
  - Enhance regional/country capacity
Global Hepatitis Strategy

- Immunization
- Safe health care
- Harm reduction
- Safe food and water
- Safe sex
- Disease burden
- Impact assessment
- Surveillance
- Country profiles
- Research agenda
- Partnerships, resource mobilization and communication
- Data for policy and action
- Screening, care and treatment of Viral Hepatitis
- Prevention of Viral hepatitis Transmission
- Counseling and testing
- Diagnostic standards
- Care and treatment
- Training
- Equity in access
- World Hepatitis Day
- Global VH Network
- Resource Mobilization
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Summary: Global Burden of Viral Hepatitis

- 150 million new infections each year
- 400 million living with chronic infection with HBV or HCV
- A preventable cause of liver cancer
  - Responsible for 73% of all liver cancer deaths
- ~ 1 million deaths per year
Conclusion

- Viral hepatitis is a significant health problem globally

- Progress has been made
  - Policy makers more aware
  - Advances in prevention of transmission
  - New policies and activities are underway

- Substantial gaps remain with continued need to improve
  - Improve education and awareness
  - Surveillance to monitor viral hepatitis burden and estimates
  - Hepatitis B birth dose: improve coverage
  - Access to care and treatment for HBV and HCV
World Hepatitis Day
28 July

HEPATITIS AFFECTS EVERYONE, EVERYWHERE.

KNOW IT. CONFRONT IT. PROTECT YOURSELF.