Phone and Webinar Etiquette

- All attendee telephones will be muted
- If you have a question for the presenter:
  - Type it in the Question Window on the right side of your screen
  - Click on “send privately” button
- Questions will be answered at the end of the session in the order in which they are received
- Please refrain from sending messages to “entire audience” during the presentation

Disclosures

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Accreditation Statement

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Hepatitis C: A Tale of Two Epidemics:

Daniel Church, MPH
Bureau of Infectious Disease
Webinar Goals

• Provide a brief overview of viral hepatitis
• Consider key myths about both HCV epidemics and how we can use data to understand them
Learning Objectives

• Describe the two epidemics of hepatitis C infection in the United States
• Explain the testing recommendations for hepatitis C infection
• Discuss the prevention strategies for hepatitis C infection among people who use drugs
Viral hepatitis

- Hepatitis A Virus (HAV, fecal-oral transmission, vaccine available)
- Hepatitis B Virus (HBV, blood-borne, vaccine available)
- **Hepatitis C Virus (HCV, blood-borne)**
- Hepatitis D Virus – (blood-borne, only causes problems for people infected with HBV)
- Hepatitis E Virus (fecal-oral, occurs rarely in U.S.)
### Disease burden in the U.S.

*all numbers shown are estimates*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>HBV</th>
<th>HCV</th>
<th>HIV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Infections</strong></td>
<td>38,000</td>
<td>(17,000)</td>
<td>47,500</td>
</tr>
<tr>
<td><strong>Chronic Infections</strong></td>
<td>0.8-1.4 million</td>
<td>2.7-3.9 million</td>
<td>1.1 million</td>
</tr>
<tr>
<td><strong>Deaths/year</strong></td>
<td>3,000</td>
<td>15,100</td>
<td>12,700</td>
</tr>
<tr>
<td><strong>Percent aware of infection status</strong></td>
<td>35%</td>
<td>25-50%</td>
<td>84%</td>
</tr>
</tbody>
</table>

IOM, 2010; CDC 2006-2008; CDC, 2013; Ly et al., 2012
Why do we do surveillance for viral hepatitis?

• Detect potential outbreaks
Viral hepatitis surveillance rationale

- Inform public health action
  - Interrupt transmission
    - Identify source of transmission and at-risk contacts
    - Provide harm reduction messages
  - Support linkage to care
  - Identify at-risk populations and emerging issues
  - Target areas for services
- Provide infrastructure for research and analysis
- Justify increasing public investment in hepatitis control
Surveillance for viral hepatitis in the United States

- Passive system with limited capacity to monitor cases of HBV and HCV infection at the local and state level
- States electronically report acute and chronic HBV and HCV cases to CDC weekly (if reportable in the state)
- 7 jurisdictions funded by CDC to conduct viral hepatitis surveillance
HCV – a quick overview

- Bloodborne virus
- No HCV vaccine
- Causes chronic infection in 75%-85% of infected individuals
- 6 genotypes
  - Most Americans have genotype 1
- Most people infected via injection drug use (sharing drug injection equipment)
  - Reinfection is possible
- Long-term infection can lead to cirrhosis, liver cancer, death
- HCV can be cured
Natural history of hepatitis C

Acute infection
- Ab + or -, VL +, ALT ↑↑

Chronic infection (75-85%)
- Ab +, VL +, ALT ↑

Cirrhosis (30%/30 yrs)

Viral clearance (15-25%):
- Ab +, VL -, ALT nl

2-12 wk incubation period
80% asymptomatic

More common with:
- Young patients
- Females
- Icteric acute infection (occurs in 15-20%)

Promoted by:
- Alcohol use
- Older age, male gender
- HBV or HIV infection
- High BMI or fatty liver

Decompensation or Hepatocellular carcinoma (1-4% per year)

Slide courtesy of J Morrill, MD (2013)
HCV transmission: all about the blood
Hepatitis C virus infectivity

- Viral infectivity:
  - Up to 63 days in a syringe barrel (Doerbecker et al., 2013)
  - Up to 21 days in H2O in a plastic container (Doerbecker et al., 2013)
  - Up to 5 days on inanimate surfaces (Doerbecker et al., 2011)
HCV and injection drug users

- IDU accounts for 68% of all new HCV infections in the US (CDC)
- As many as 32% of IDUs are infected with HCV within 1 year of first injecting; 53% within 5 years (Hagan et al., 2008)
- Sharing of syringes, cookers, cottons, rinse water, etc. from injection drug use is the greatest risk for HCV transmission
  - Shared use of any of these items are risk factors for HCV acquisition (Pouget et al., 2012)
Key issues related to HCV surveillance

- Asymptomatic acute and chronic infections
- No available test for acute infection
- 15-25% of cases spontaneously resolve their infection
- Significant number of undiagnosed HCV infections
- Populations most at risk for chronic HCV infection less likely to be in care (people who inject drugs)
- People reported to public health authorities only represent cases tested by a provider
Massachusetts state reporting of HCV

Features of MAVEN
- Multiple users use same interface
- Real-time info. sharing
- Data standards
- Quality control
- Case investigation/management
- Outbreak-cluster management
- Analysis and evaluation

Clinician

Laboratory

Public Health Lab or Reference Lab

Real-time electronic reporting

Local Board of Health

MAVEN Integrated surveillance

Features of MAVEN
- Multiple users use same interface
- Real-time info. sharing
- Data standards
- Quality control
- Case investigation/management
- Analysis and evaluation
Six common myths about HCV infection

• “HCV cases are only in older people”
• “There is no reason to test people”
• “HCV treatments are too difficult to take”
• “Because HCV can be cured, we are done!”
• “The numbers of people with HCV are going down”
• “There is nothing you can do to prevent HCV in people who use drugs”
Myth #1

HCV cases are only in older people
MMWR: Age distribution of newly reported confirmed cases of hepatitis C virus infection --- Massachusetts, 2002 and 2009

* N = 6,281; excludes 35 cases with missing age or sex information.
† N = 3,904; excludes 346 cases with missing age or sex information.

Source: Onofrey et al., MMWR: May 6, 2011 / 60(17);537-541
Reported confirmed and probable cases of HCV infection in MA, 2013

Suspect perinatal HCV cases
Police: When prescription pill abuse becomes too expensive, users switch to cheaper heroin

By Phil Traylor
Beacon Journal staff writer
Published: January 6, 2014 - 12:55 PM

In the 60s, the focus was on LSD, marijuana, turning on and turning out. In the 70s, it was cocaine at the discothèque. The 80s meant crack cocaine abuse, that urban nemesis that lied Nancy Reagan to plead "Say no to drugs." The 90s saw a rise in methamphetamine and homemade potions. Americans learned the drug could be made with similar household products.

As the century turned, opiate use, such as prescription painkillers and heroin, came into vogue. Abuse rose, and the government and media are reacting.

To many, the opiate/heroin plague is simply a shift in America's attention on drug abuse. Efforts to stamp out pill abuse simply led to the increased popularity of heroin, a dark drug that has been judgmental in the hamlet and downtown at these.

Heroin has replaced pain pills as drug of choice in some parts of Kentucky

BY DIPTI MURUGAN
bmurugan@herald- lemonad.com

Heroin has rapidly replaced prescription pain pills as the drug of choice in much of Northern Kentucky and Louisville, raising fears that a heroin scourge will soon ravage the state.

In Northern Kentucky, police are finding people passed out in cars at gas stations with needles poking from their arms. In Louisville, initial statistics suggest more than 50 people died of heroin overdoses in 2012.

"We've even found parents in the front seat with kids in the back seat in a car seat, wondering what was going on," said Covington police Chief Spike Jones.

Police in Louisville and the Northern Kentucky suburbs of Cincinnati said they began seeing more heroin as early as four years ago, but it was in the last 12 months that heroin surpassed pain pills as the preferred drug of addicts.

Heroin and pill abuse stir a battle cry in Vermont

Associated Press

MONTPELIER, Vt. (AP) — Behind the facade of pristine ski slopes, craft beer, quaint village greens and one of the lowest unemployment rates in the country, Vermont is grappling with pill and heroin abuse, a challenge leaders say is having come and worsening lives and families disproportionately in this tiny state.

Nearly every day, police across Vermont respond to burglaries or armed robberies investigators believe are prompted by the unrelenting hunger for money to fund heroin or pill habits. In many cases, law enforcement officials say, what began as the abuse of prescription drugs has turned into heroin use because it's less expensive and more readily, easier to get.
Myth #2

There is no reason to test people for HCV
Annual age-adjusted mortality rates from hepatitis B and hepatitis C virus and HIV infections listed as causes of death in the United States between 1999 and 2007

Ly K et al., Ann Intern Med 2012;156:271-278
Mortality among reported HIV and HCV cases in Massachusetts, 2002-2011

Data represent all-cause mortality
Data as of 2/12/2012 and subject to change
Timing of mortality among known HCV cases in Massachusetts, 1992-2009

Median interval: 3 years
Median age: 53 years

76,122 HCV diagnoses were reported to the MDPH between 1992 and 2009, 8,499 of these reported HCV cases died and are represented in the figure. Data as of 1/11/2011.
CDC HCV screening recommendations (2012)

• Move to focus on age-based screening
  2/3 of HCV cases among “baby-boomer” population
• Recommendation: One-time HCV screening for all people born between 1945-1965
• Risk-based screening still important
Myth #3

HCV treatments are too difficult to take
HCV treatment evolution

• Goal of treatment is to CURE
• HCV treatment is improving rapidly
• Interferon-free regimens now available
• More effective, easier to tolerate, all-oral
• However…new medications are very expensive
  – Significant restrictions in place limiting impact
Myth #4

Because HCV infection can be cured, we are done!
HCV Test, Care and Cure Continuum

- All HCV infected: 100%
- Anti-HCV tested: 50%
- HCV care: 38%
- HCV RNA tested: 23%
- Treated: 11%
- SVR: 6%

Mooreman et al., NEJM, 2013
HCV diagnosis and access to care

Laboratory results for reported cases of hepatitis C virus infection in MA, 2007-2010

34,023 HCV events in MAVEN with lab results

15,036 with only an antibody test reported (44.2%)
18,987 with any NAT/genotype reported (55.8%)

Data as of December 2012 and are subject to change

Barton et al., 2013
Myth #5

The numbers of people with HCV infection are going down
What is the prevalence of HCV in Massachusetts?

• If the recent NHANES data (2014) are applied to the Massachusetts population:
  ~65,000 people living with HCV infection

• How accurate is this?
Reported cases of HCV infection in Massachusetts: 2002-2013

*Data as of June, 2014 and subject to change

Source: MDPH Office of Integrated Surveillance and Informatics Services

Total # of reported cases since 1992:

120,781

*Data as of June, 2014 and subject to change

Source: MDPH Office of Integrated Surveillance and Informatics Services
The Massachusetts example

• How many cases does a jurisdiction have evidence for? 120,781
  – What proportion of cases are estimated to have been diagnosed? 45% (HHS Action Plan)
  – How many cases have spontaneously cleared the virus? 15-25%
  – How many cases have been treated successfully (cured)? 5%
  – How many cases have died? 9%
Translation of the MA numbers to prevalence estimates

• Most conservative measure = 174,000 (~3x the NHANES measure)
  – 25% clearance, 45% diagnosed

• The middle of the road measure (but still pretty conservative) = 197,000
  – 15% clearance, 45% diagnosed

• A less conservative measure = 374,000
  – 15% clearance, 25% diagnosed
How reliable are current estimates of HCV incidence?

- CDC estimates 17,000 new HCV infections annually
  - This equates to 354 annual incident cases in Massachusetts
  - Over 2,500 cases of HCV infection in people under the age of 30 years were reported to MDPH in 2013 alone
Assessing the CDC incidence estimate...

• In 2013, MDPH worked with two clinical/research partners (Dr. Arthur Kim and Dr. Barbara McGovern) to determine how many of the 188 clinically acute HCV patients in their study (BAHSTION) had been reported to MDPH and CDC as acute HCV infection
Methods

- Determined the proportion of adult clinical diagnoses of acute HCV in BAHSTION present in MAVEN and reported to CDC via name and age-based matching
- Compared laboratory data in MAVEN compared to clinical data in BAHSTION
Results: clinically acute HCV infection vs the confirmed case definition

188 cases
- 5 lived out of state

183 cases
- 34/183 (18.6%) never reported to MDPH

149 cases
- ~46 cases no follow-up case report form
  - ~ 11 not confirmed by CDC definition
  - Reasons: No S/CO ratio, RIBA, positive PCR or genotype

92 cases
- ~69 cases were not investigated for acute status
  - Reasons: Over 25 yrs, no jaundice, ALT <400

23 cases
- ~22 cases did not meet CDC definition for acute status
  - Reasons: Lack of complete HAV/HBV data or of acute illness or ALT <400

1 case reported to CDC as acute HCV
What would be a better measurement of incidence?

• Develop methodology that accounts for cases of HCV infection reported in people under the age of 30 years
• Limit the influence of acute HCV case reporting on incidence calculations
The Massachusetts example

• In Massachusetts between 2010 and 2012, the average annual # of reported HCV cases in people under the age of 30 was 2,146
  – Assumptions:
    • Cases were recently infected
    • Most cases exposed via injection drug use
    • PWID are less likely to access health care (and therefore use the lower proportion of known diagnosis – 25%)
    • Do not need to account for viral clearance, mortality, treatment
    • Revised (and likely conservative) estimate of 8,584 annual incident cases among people under 30 years in Massachusetts (24x the CDC estimate)
Myth #6

There is nothing you can do to prevent HCV infection in people who use drugs
Prevention of HCV among IDU

• Even with no vaccine available, HCV is preventable among IDU
  – Multi-component prevention works
    • Provision of sterile equipment and substance use treatment critical (Hagan et al., 2011)
    • Opioid substitution therapy helps prevent HCV transmission (Alavian et al., 2013; White et al., 2014)
    • Peer education reduces risk behavior (Mackesy-Amiti et al., 2013)
    • Harm reduction practices effective, e.g. encouraging intranasal drug use as an alternative among IDU (Des Jarlais et al., 2011)
Resources

- National Viral Hepatitis Roundtable [www.nvhr.org](http://www.nvhr.org)
- Treatment Action Group [www.treatmentactiongroup.org/hepatitis](http://www.treatmentactiongroup.org/hepatitis)
Questions?

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