The Two Hepatitis C Epidemics in Massachusetts: Myths and Realities

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Goals of presentation

• Provide a brief overview of viral hepatitis
• Discuss the two epidemics of hepatitis C virus (HCV) infection
• Consider key myths about both HCV epidemics and how we can use data to understand them
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, no vaccine)**
- 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>HAV</th>
<th>HBV</th>
<th>HCV</th>
<th>HIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Infections</td>
<td>3,400</td>
<td>20,000</td>
<td>(30,000)</td>
<td>47,500</td>
</tr>
<tr>
<td>Chronic Infections</td>
<td>n/a</td>
<td>0.8-1.4 million</td>
<td>2.7-3.9 million</td>
<td>1.2 million</td>
</tr>
<tr>
<td>Deaths/ year</td>
<td>80</td>
<td>1,800</td>
<td>19,300</td>
<td>13,700</td>
</tr>
<tr>
<td>Percent aware of infection status</td>
<td>n/a</td>
<td>35%</td>
<td>25-50%</td>
<td>84%</td>
</tr>
</tbody>
</table>

HCV – a quick overview

• Two different epidemics:
  – Baby boomers (born between 1945-1965)
  – Young people who inject drugs

• Most people infected via injection drug use (sharing drug injection equipment)
  – Reinfection is possible

• 6 genotypes
  – Most Americans have genotype 1

• Long-term infection can lead to cirrhosis, liver cancer, death

• HCV can be cured
Natural history of hepatitis C

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

Exposure

2-12 wk incubation period

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

80% asymptomatic

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

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

Cirrhosis (30%/30yrs)

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

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

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 (1)
  - Up to 21 days in H2O in a plastic container (1)
  - Up to 5 days on inanimate surfaces (2)

1 - Doerbecker, et al, 2013
2 - Doerbecker, et al, 2011
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

Local Board of Health

MAVEN Integrated surveillance

Real-time electronic reporting

Public Health Lab or Reference Lab
Confirmed Acute HCV Infection:
- Positive HCV antibody test result confirmed by supplemental assay (or supplemental assay on its own)
- Symptoms, elevated ALT
- Rule out other acute hepatitis infections (if testing done)
- Documented seroconversion within 6 months optional

Confirmed (non-acute) HCV Infection:
- Positive HCV antibody test result confirmed by supplemental assay (or supplemental assay on its own)

Probable (non-acute) HCV Infection:
- Positive HCV antibody test result
Reported confirmed cases of HCV and HIV infection in MA: 2002-2012

Total # of reported cases:

HIV: 31,384
HCV: 120,781

*Data as of 11/13/2013 and subject to change

Source: MDPH ISIS and HIV/AIDS Surveillance
New Reports of Confirmed Chronic Hepatitis C Cases by Massachusetts City/Town: 2013

Data Source: MDPH, Bureau of Infectious Disease
Demographics of cases of HCV infection reported to MDPH in 2013

2013: N= 7,860

<table>
<thead>
<tr>
<th>Gender</th>
<th>Race</th>
<th>Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>58% Male</td>
<td>51% White</td>
<td>60% Non-Hispanic</td>
</tr>
<tr>
<td>40% Female</td>
<td>5% Black</td>
<td>12% Hispanic</td>
</tr>
<tr>
<td>2% Unknown</td>
<td>2% Asian</td>
<td>28% Unknown</td>
</tr>
<tr>
<td>5% Other</td>
<td>5% Other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>37% Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Source: MDPH Integrated Surveillance and Informatics Services.

Data as of June 12, 2014 and are subject to change.
Prevalence of HIV infection cases co-infected with HCV*

- Total living with HIV and HCV: 3,802 (17% of total HIV infections)
  - 29% female/ 71% male
  - 66% report IDU

*Data as of January 1, 2014 and are subject to change

Death data from HIV/AIDS Surveillance Program. Cases diagnosed with HIV infection while residing in another jurisdiction are excluded
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
Massachusetts sees spike in heroin overdoses, deaths

Written by Gabi Arriaga and Steve Friedman - February 5, 2015 5:37 am

Ten months after former Massachusetts Gov. Deval Patrick’s declaration of a public health emergency in March 2014 to combat opiate abuse, the Massachusetts Department of Public Health saw a spike in heroin overdoses and deaths in December.

Scott Zoback, manager of communications at the DPH, said the state’s problem with heroin and other opioate overdoses needs to be addressed to prevent more fatalities.

“Like many states across the country, Massachusetts is facing an epidemic of opioid addiction and overdose deaths,” he said. “We need to address this crisis, which requires taking action in four areas: prevention, intervention, treatment and recovery support.”

Data gathered by DPH revealed that opioid fatalities have been growing over the past several years. In 2013, there were 908 confirmed opioid-related deaths among Massachusetts residents, up nearly 200 from 2012.
Opioid deaths, sales, and treatment admissions have increased in lock step.

- **Opioid Deaths (per 100k)**
- **Opioid Sales (kg per 10k)**
- **Opioid Treatment Admissions (per 10k)**

Graph courtesy of Jon Zibbell, PhD (CDC)
HCV transmission among people who inject drugs

• Transmission risks
  – Injection duration
  – Frequency of injecting
  – Equipment sharing, not just sharing needles

• HCV prevalence
  – 27-51% in recent cohort studies

• Highest incidence among new injectors
• Incidence declined in response to harm reduction for HIV (e.g., syringe access programs)

Kwon, JAIDS 2009.

Slide courtesy of John Ward, MD (CDC)
Reported acute HCV cases in the United States (2006—2013)

Figure 1a

- Aged ≤30 Years
- All Ages

Reported Cases (No.)

Year Reported

2006 2007 2008 2009 2010 2011 2012

0 200 400 600 800 1000 1200 1400 1600 1800 2000

Figure 1b

- Aged ≤30 Years
- All Ages

Reported Incidence (per 100,000)

Year Reported

2006 2007 2008 2009 2010 2011 2012

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8

Slide courtesy of Jon Zibbell, PhD (CDC)

Suryaprasad et al., CID. 2014
Myth #2

“There is no reason to test people for HCV”
Increases in HCV Mortality, 1999-2013

Reported Deaths 19,368
Median age- 59 years

Rate per 100,000 Persons

Year


Slide courtesy of Dr. John Ward, CDC 2015
Mortality among reported HIV and HCV cases in Massachusetts, 2002-2012

Data represent all-cause mortality
Data as of 2/12/2012 and subject to change
Years to death from laboratory diagnosis date among HCV cases reported to MDPH: 2002-2013

102,589 HCV diagnoses were reported to MDPH between 2002 and 2013, 9,796 of these reported HCV cases died and are represented in the figure. Data as of 11/15/2014

Mean years to death=3.55 years
25% of cases died within one year of initial reported laboratory test
• Change 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 (but cost-effective)
Myth #4

“Because HCV infection can be cured, we are done!”
Laboratory test results for reported cases of hepatitis C virus infection in MA, 2007-2010

34,023 HCV events in MAVEN with laboratory test results

- 15,036 had only an antibody test result reported (44.2%)
- 18,987 had NAT and/or genotype test reported (55.8%)

Data as of 12/2012 and subject to change

Barton, et al, 2013
Myth #5

“The numbers of people with HCV infection are going down”
Prevalence and incidence of HCV in Massachusetts?

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

• If CDC incidence estimates are applied in Massachusetts:
  – 354 annual incident cases in Massachusetts

• However, these estimates do NOT match MDPH surveillance data
  – 120,781 cases of HCV infection reported since 1992
  – Over 2,500 cases of HCV infection reported in people under 30 years of age in 2013 alone
Improving estimates of HCV prevalence – 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? **9.5%**
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 can estimates of incident cases be improved?

• Utilize a 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
  – Significant problems with using acute case surveillance data
What does this look like in Massachusetts?

• 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
    • Unknown how quickly people are getting tested/into care
    • Do not need to account for viral clearance, mortality, treatment
    • Revised (and likely conservative) estimate of 2,146-8,584 annual incident cases among people under 30 years in Massachusetts (16-24x the CDC estimate)
• 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%**
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• A less conservative measure = 374,000
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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
    - 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)

- What is the role of anti-viral treatment?
HIV outbreak in southeastern Indiana

- As of 4/30/2015: 149 confirmed HIV cases (Austin/Scott county)
- First documented HIV outbreak related to injection of prescription opioids (Opana®, oxymorphone)
- Small number of cases linked through sexual transmission
- Occurring in HCV epidemic—more than 95% co-infected with HCV

- Network Characteristics
  - <36 years
  - Equally women and men
  - White, non-Hispanic
  - Indigent
  - Endemic injection equipment sharing

Slide courtesy of Jon Zibbell, PhD (CDC)
Questions?

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