Hepatitis C Virus Infection in Massachusetts:
A tale of two epidemics

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Goals of presentation

- Provide an overview of viral hepatitis, with a focus on hepatitis C virus (HCV)
- Discuss HCV epidemiology, transmission, testing and treatment
- Describe surveillance for viral hepatitis and recent trends in in Massachusetts
- Discuss role of public health nurses

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

Outcome	HAV	HBV	HCV	HIV
New Infections	21,000	38,000	(17,000)	47,500
Chronic Infections	NA	0.8-1.4 million	2.7-3.9 million	1.1 million
Deaths/ year	~80	3,000	15,100	12,700
Percent aware of infection status	NA	35%	25-50%	82%

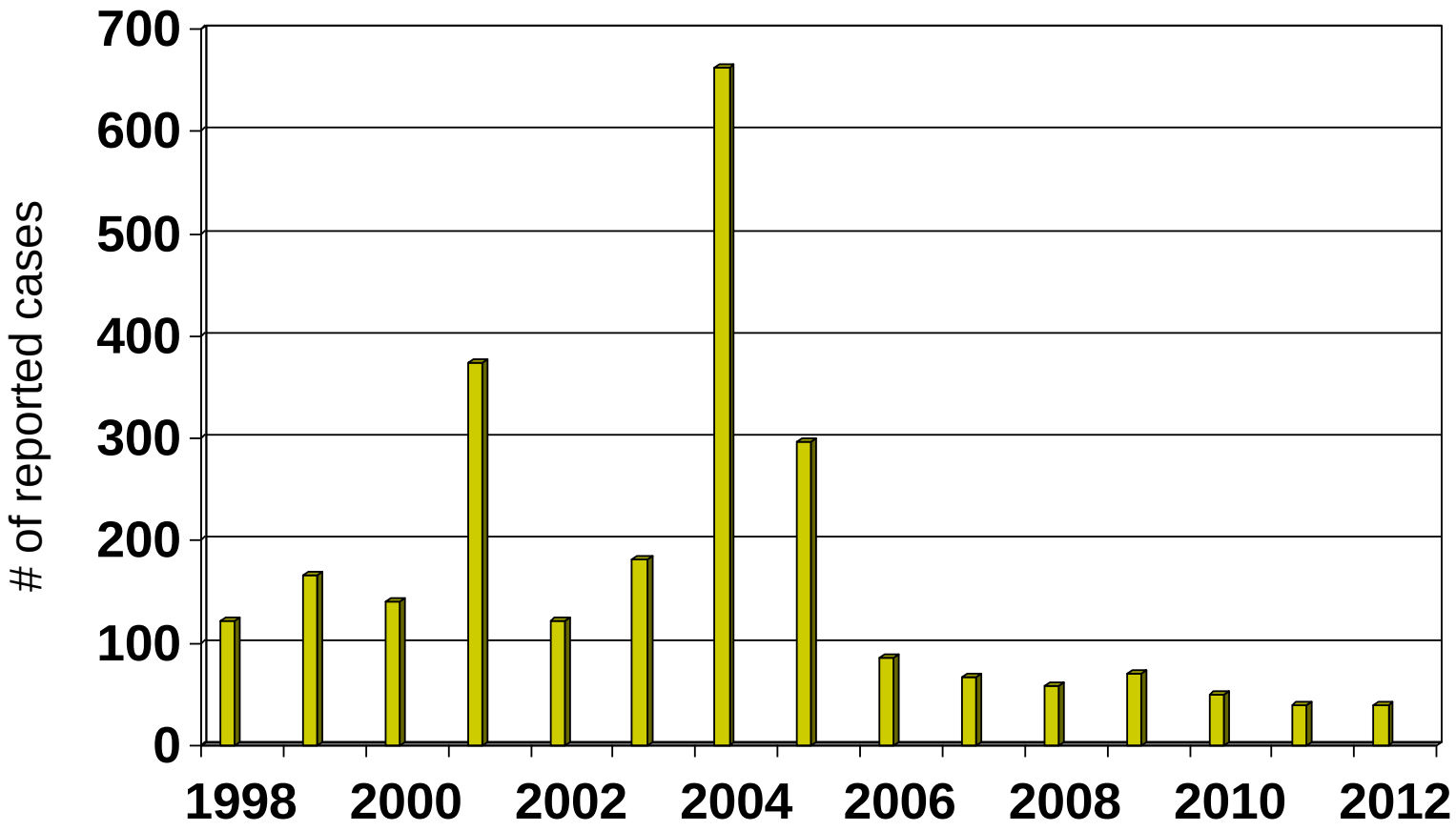
IOM, 2010; CDC 2006-2008; CDC, 2013; Ly, et al, 2012

Hepatitis A epidemiology in Massachusetts

- Number of cases in sharp decline since 2006
- Statewide and localized outbreaks detected in past among MSM, IDU and homeless
  - Adult HAV vaccination programs implemented in past to respond to epidemiological findings
- HAV vaccine recommended for all children at age of one year since 2006.

Hepatitis A

Reported confirmed acute HAV infections in Massachusetts by year, 1998-2012



Data as of 2/11/13 and are subject to change

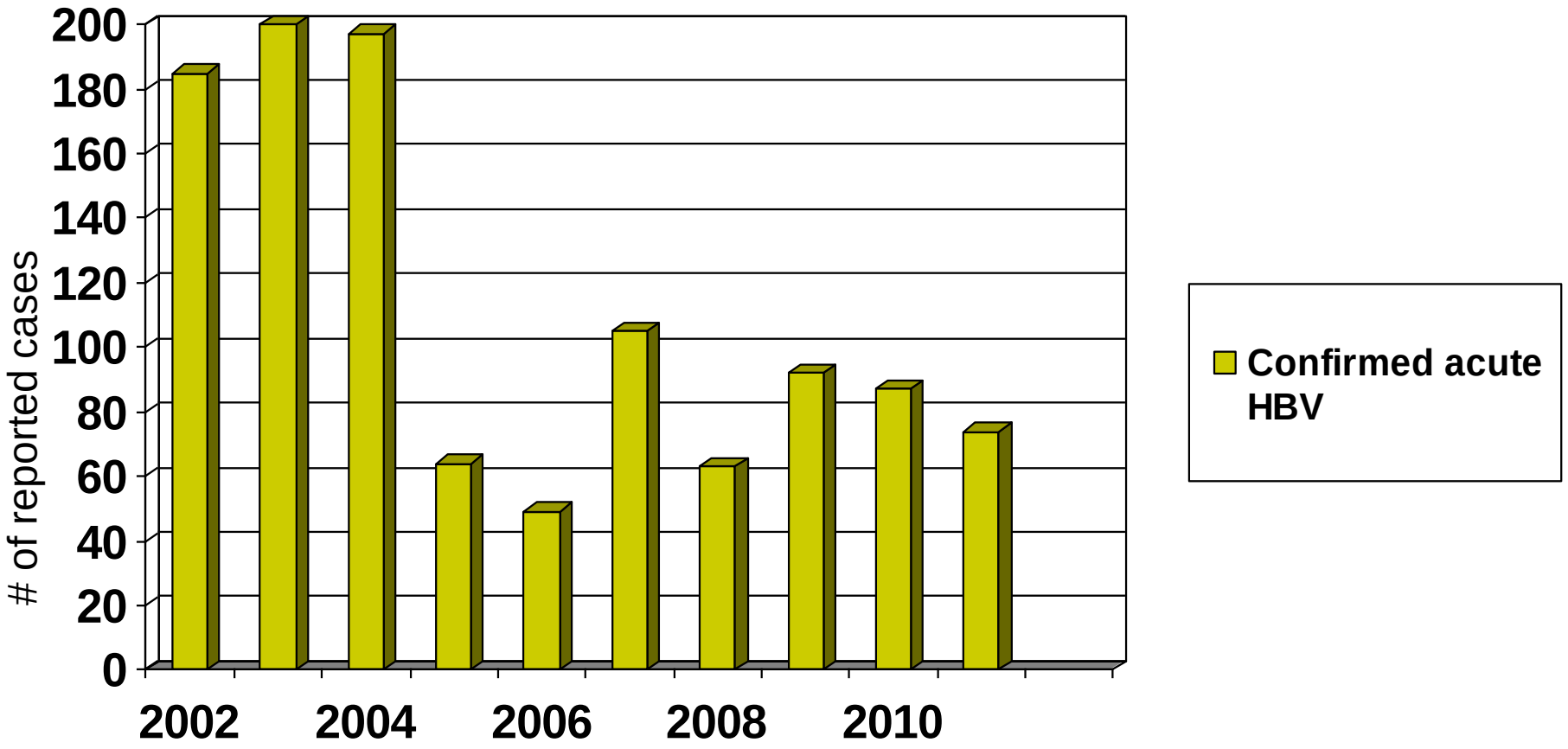
Source: MDPH Office of Integrated Surveillance and Informatics Services

Hepatitis B epidemiology in Massachusetts

- The number of reported cases of acute hepatitis B reported to MDPH has been decreasing since 2005
  - Birth dose of HBV vaccine recommended
  - Mandatory vaccination requirements in schools
- Testing among pregnant women and follow-up with infected mothers to reduce transmission to the infant and household contacts (MDPH Perinatal Hepatitis B Prevention Program)
- Cases only represent those people who have been screened, tested and reported to MDPH

Acute HBV infection

Confirmed acute HBV cases reported in Massachusetts by year, 2002-2011



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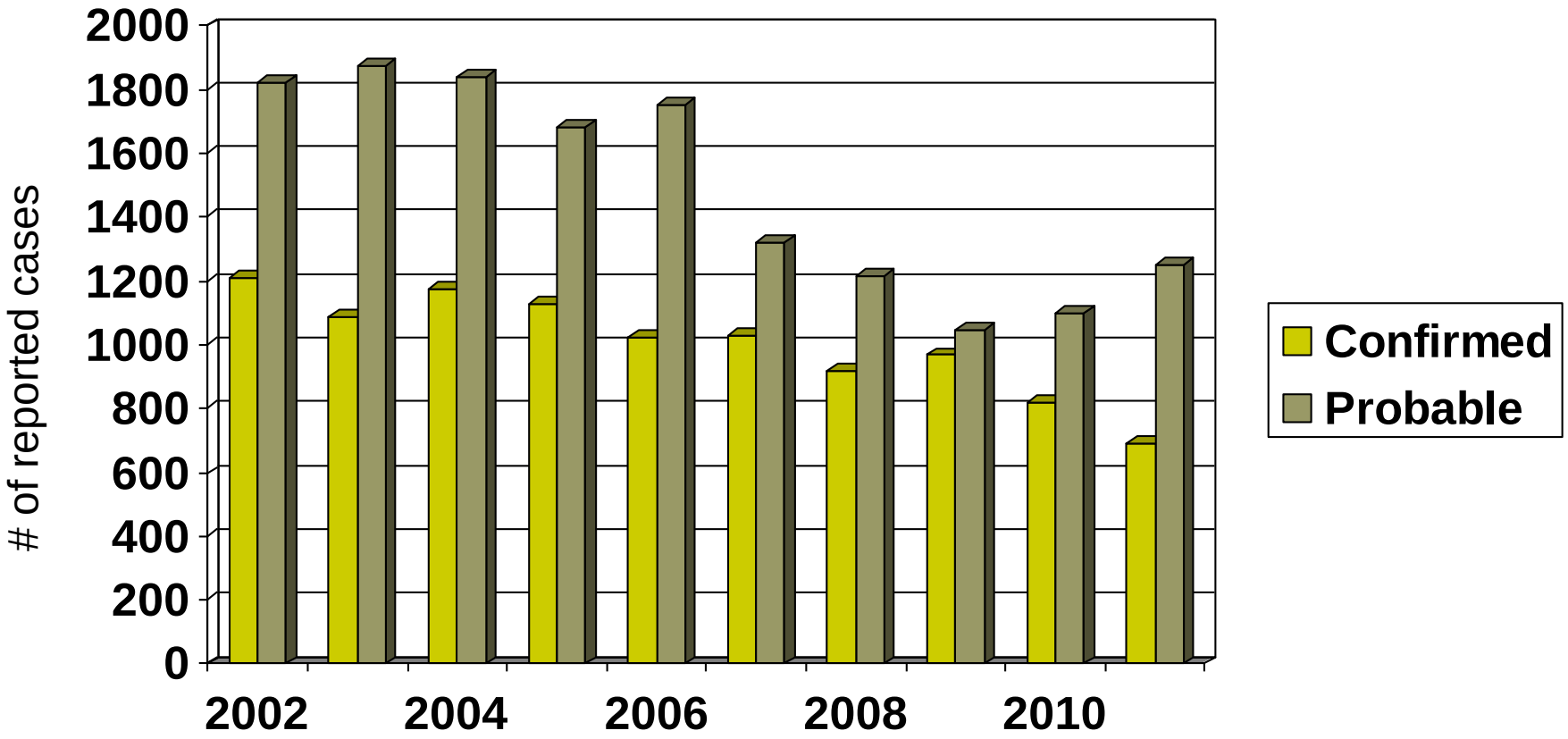
Source: MDPH Office of Integrated Surveillance and Informatics Services

Chronic hepatitis B infection

Chronic HBV cases by year and case status in Massachusetts, 2002-2011



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Hepatitis C – the virus

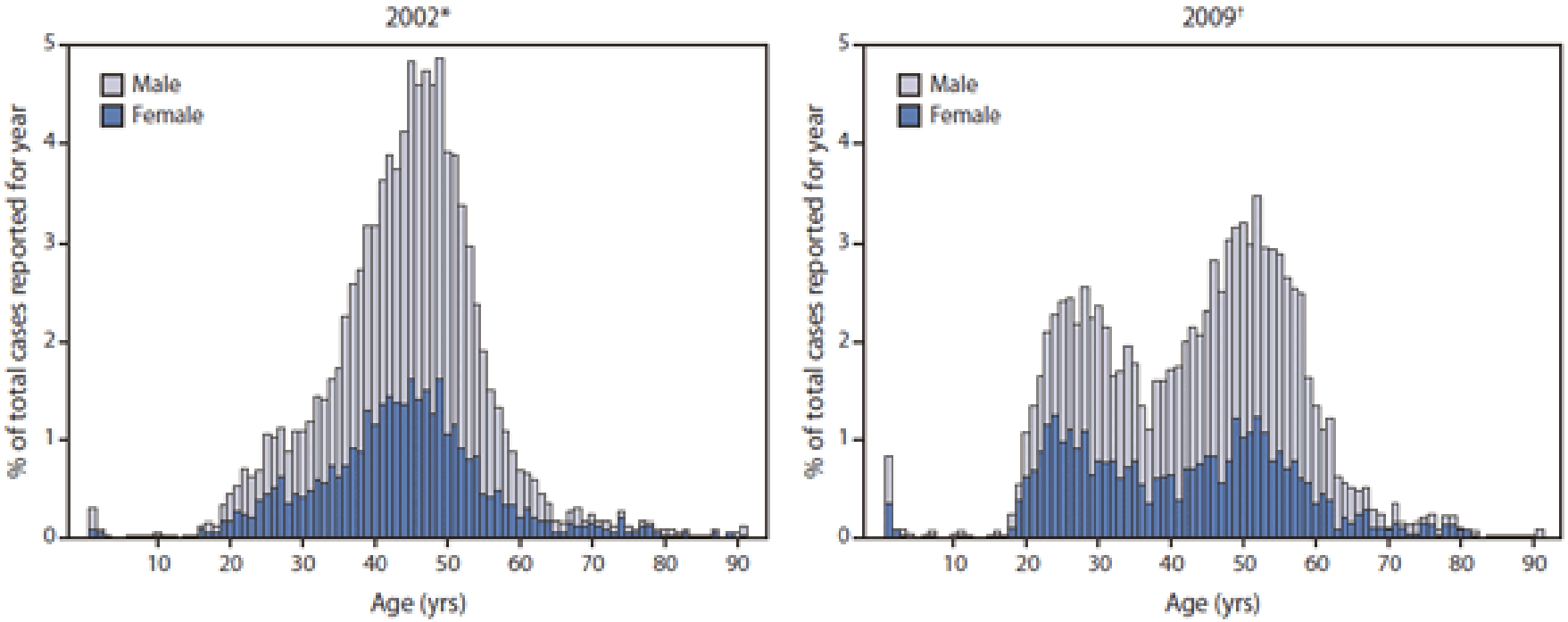
- RNA virus
- Enters the bloodstream, goes into liver cells to reproduce, causing inflammation
- Mutates rapidly, evades the immune system
- Causes chronic infection in 75%-85% of infected individuals
- Viral infectivity:
  - Up to 63 days in a syringe barrel
  - Up to 21 days in H2O in a plastic container
  - Up to 14 days on inanimate faces

HCV – the virus

- 6 genotypes
- Most Americans have genotype 1
  - Genotype 1 remains the most challenging to treat
- A person can be infected or re-infected with more than 1 genotype
- There is no vaccine for HCV

What are the two HCV epidemics?

Reported HCV cases in Massachusetts: 2002 and 2009



HCV in the United States

- Estimated 2.7-3.9 million people have chronic HCV in the United States
- Current incidence not well established
- Prevalence highest in groups with risk factors that include:
  - Current or former injection drug use
  - People who received blood products before June 1992
  - Long term hemodialysis

IOM, 2010;
CDC *Disease Burden from Viral Hepatitis A,B,C in the United States* updated 9/13/11

HCV prevalence

- NHANES
  - General population: 1.6%
  - Males: 2.1%
  - Born between 1945-1965
  - Non-Hispanic blacks: 3.0%
  - Transfusion before 1992: 5.8%
- Injection Drug Users (IDUs):
  - 70% - 90% (Alter, 1998; Hagan, 2008)
- Incarcerated:
  - 12% - 35% (Boutwell, et al, 2005)

HCV transmission

- Bloodborne pathogen
- Asymptomatic still potentially infectious
- Most people infected through:
  - Injection drug use (sharing drug injection equipment)
  - Blood transfusions/clotting factors/organ transplants prior to 1992
  - Chronic hemodialysis
  - Sexual transmission - inefficient but does occur
  - Vertical transmission – 4-7% of births to infected mothers (20% in HIV/HCV co-infected)

Possible transmission risks

- Occupational exposures
  - Risk from needlestick:
    - HIV=3/1000 HCV=2/100 HBV=3/10
  - Prevalence of HCV in health care workers is the same as the general population
- Sharing personal/household items with blood
- Intranasal drug use
- Tattoo/body piercing: nonsterile practices

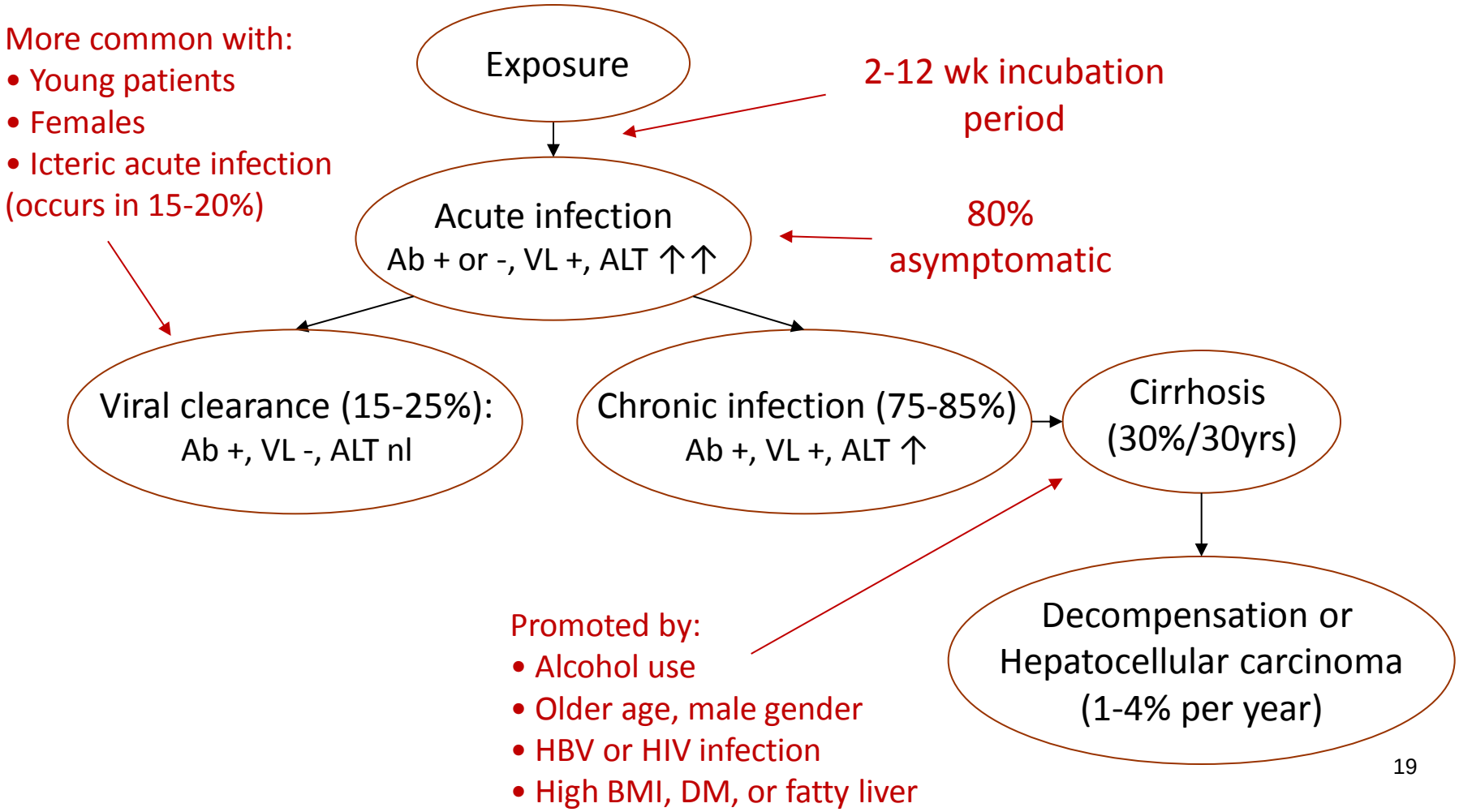
HCV – injection drug users (IDU)

- IDU accounts for 68% of all new infections (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
- HCV infection CAN be prevented among injection drug users
  - Access to sterile injection equipment and multi-component prevention programs is critical

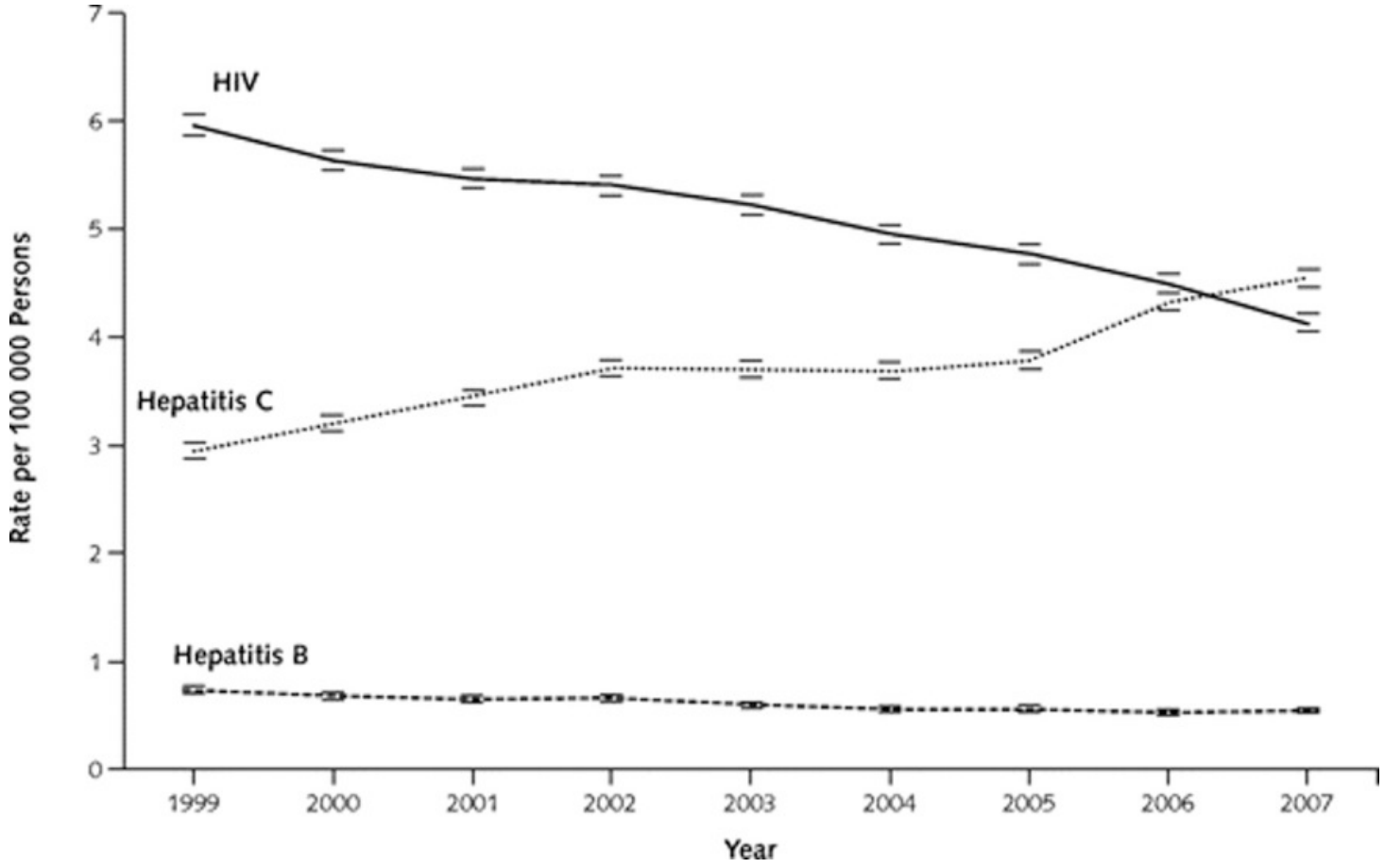
Sexual transmission of HCV

- Occurs, but efficiency is low
- Low incidence (0.01-0.13%) among monogamous long-term partners, or one per 190,000 sexual contacts (Terrault, et al, 2013)
- May account for 15-20% of acute and chronic infections in the United States (CDC)
- Increased transmission among HIV+ MSM (CDC, 2011)

Natural history of hepatitis C



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

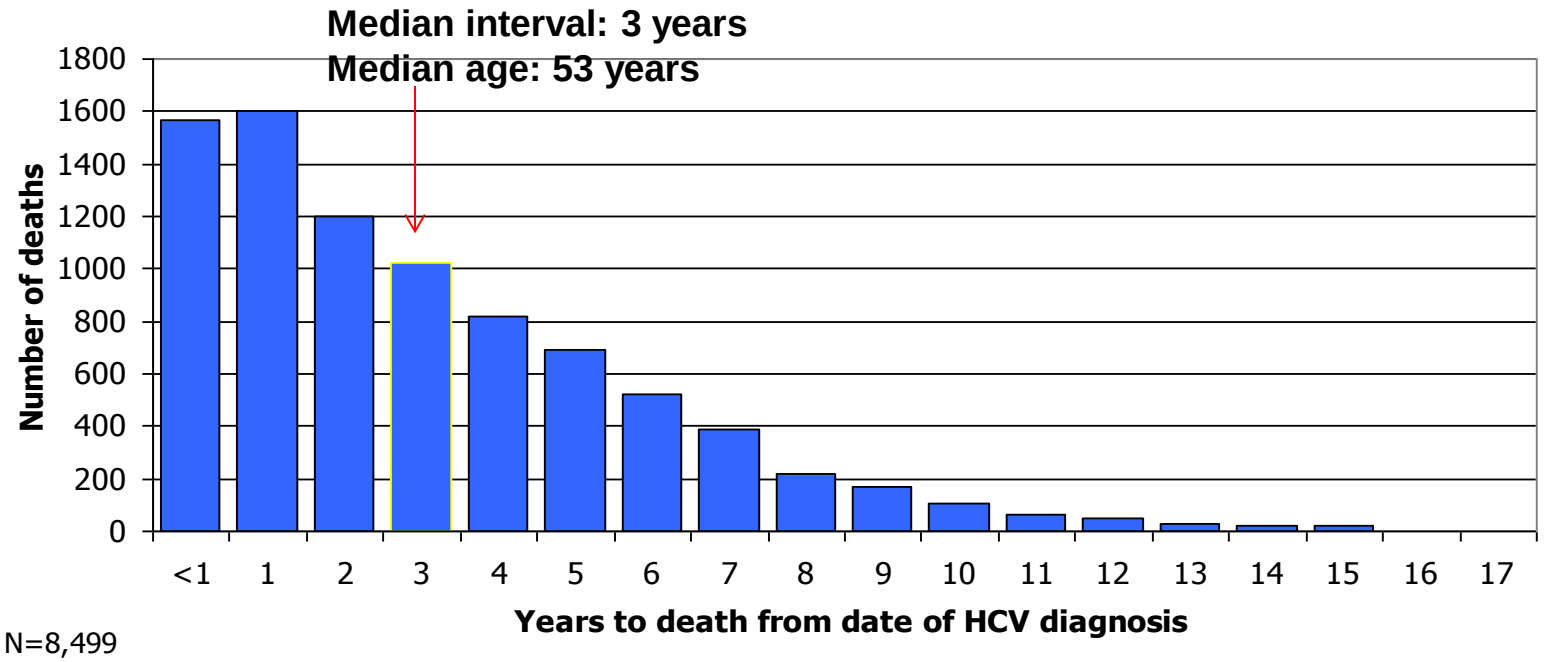


Ly K et al. Ann Intern Med 2012;156:271-278

Mortality among HCV cases in Massachusetts

Lijewski, et al, 2012

Timing of mortality among known HCV cases in Massachusetts, 1992-2009



N=8,499

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.

Why should we screen for HCV?

- Public & personal health
  - Those infected may transmit to others
  - ESLD due to HCV great burden on health care system
  - 18,000 deaths/year by 2020, 35,000 deaths/year by 2030
- We can do something about it
  - Over half (70-80%) of those with chronic HCV can be cured

CDC risk-based HCV screening recommendations (1998)

- Ever injected illicit drugs
- Received a transfusion or blood products before July 1992
- Received clotting factor prior to 1988
- Children >18 months born to HCV-positive women
- Ever on hemodialysis
- HIV-positive
- Healthcare, emergency, public safety workers after needlestick/mucosal exposures to HCV-positive blood

How successful are current screening recommendations?

Only 25-50% of those infected with HCV are aware of their diagnosis

Kwiatkowski Addiction 2002
Wasley et al. J Clin Virol 2006
Hagan et al. Pub Health Rep 2006
Volk et al. Hepatology 2009

Changes to 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
  - Alcohol use screening and treatment for HCV+
- Risk-based screening still important

Treatment regimens

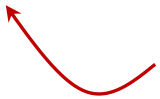
HCV Genotype	Treatment Regimen	Success (SVR*) rate	Side-effects
1	• Peginterferon • Ribavirin • 12 week "boost" with a Direct Acting Antiviral (DAA): NS3 protease inhibitor (Telaprevir or Boceprevir) Duration: 24-48 weeks depending on early response	62-80%	• Flu-like sx • Mood changes • Pancytopenia • Autoimmunity • Hemolytic anemia • Teratogenicity For protease inhibitor regimens: • More severe anemia • Pruritus and rash • Dysguesia
2 and 3	• Peginterferon • Ribavirin Duration: 24 weeks	78-82%	

And coming very soon:

More DAAs:
- More protease inhibitors
- NS5A inhibitors
- Nucleotide polymerase inhibitors (e.g., Sofosbuvir)

Interferon-free regimens?

Human pharmacogenetics
- IL28B polymorphisms



*** Sustained Virologic Response = negative HCV viral load 24 weeks after treatment**

Harm reduction

- HAV and HBV vaccination
- Alcohol cessation
- Avoidance of hepatotoxic medications or OTC products
- Hepatitis C education
- Counseling about transmission
- Referral to psychiatric or addiction treatment when appropriate
- Referral to hepatology for cirrhotics

HCV harm reduction for IDUs

To reduce spread of HCV, IDUs should:

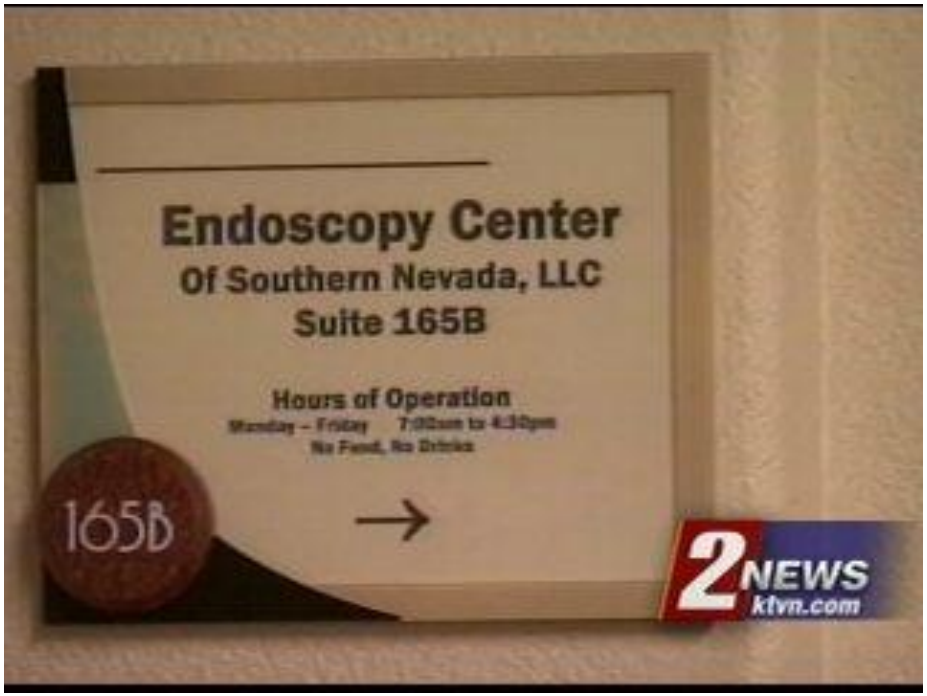
- Be provided information on drug treatment options
- Be informed about existing needle exchange programs and pharmacy access
- Have access to harm reduction education
  - Clean works
  - Safe injection practices
  - Overdose prevention
  - Opioid replacement therapy

Hepatitis C surveillance

- Estimated ~100,000 people in Massachusetts exposed to HCV in the past
- Number of cases relatively stable since 2002 with 8-10,000 newly diagnosed cases reported to MDPH annually
- Cases only represent those people who have been screened, tested and reported to MDPH
- Confirmed and probable case definitions according to CDC classification
- Data entered into and managed in MAVEN

Why do we do surveillance?

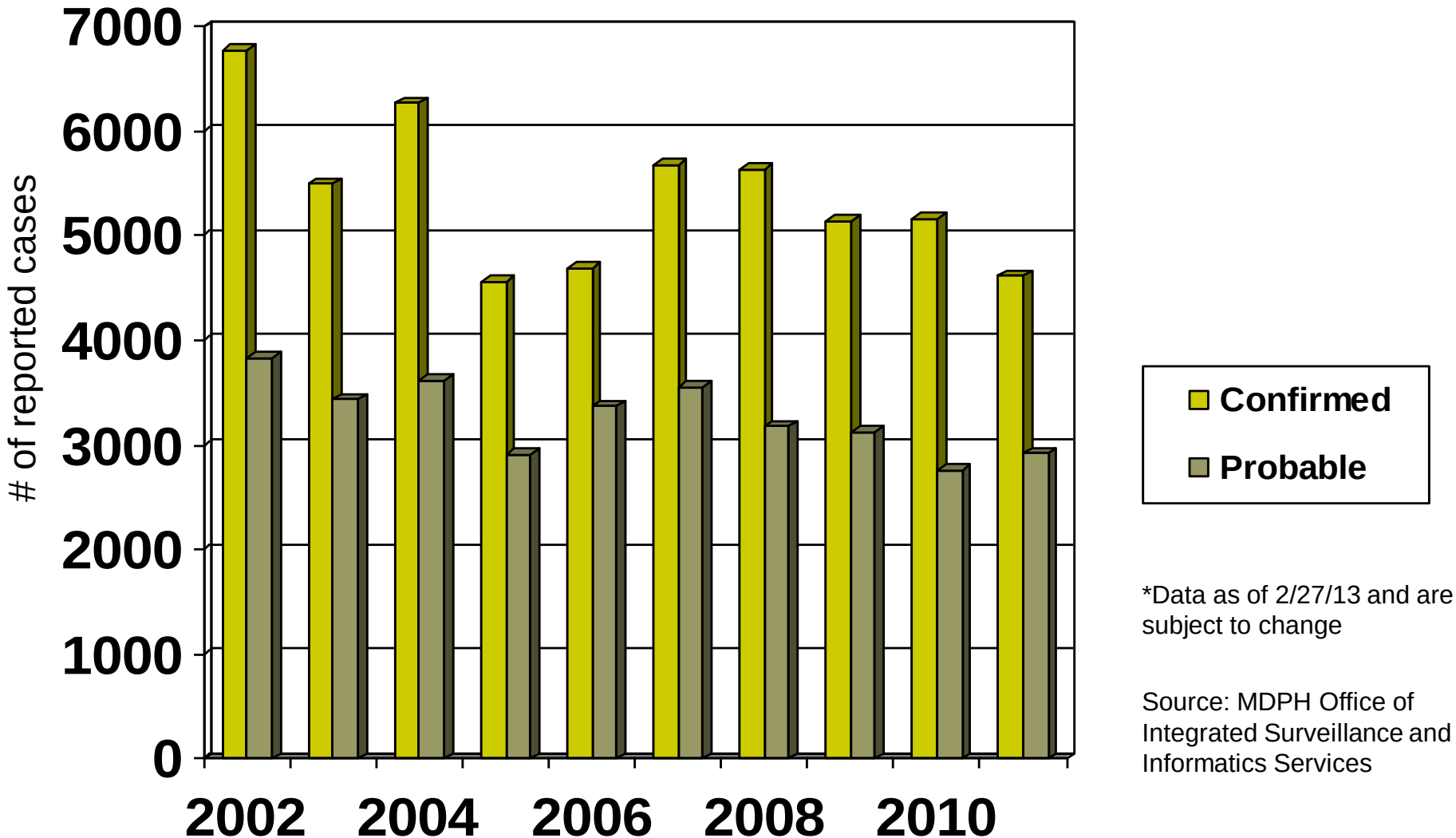
- Detect potential outbreaks



Why do we do surveillance?

- Interrupt transmission
  - Provide harm reduction messages
- Identify at-risk populations and emerging issues
- Target areas for services

Reported cases of HCV infection in Massachusetts: 2000-2011



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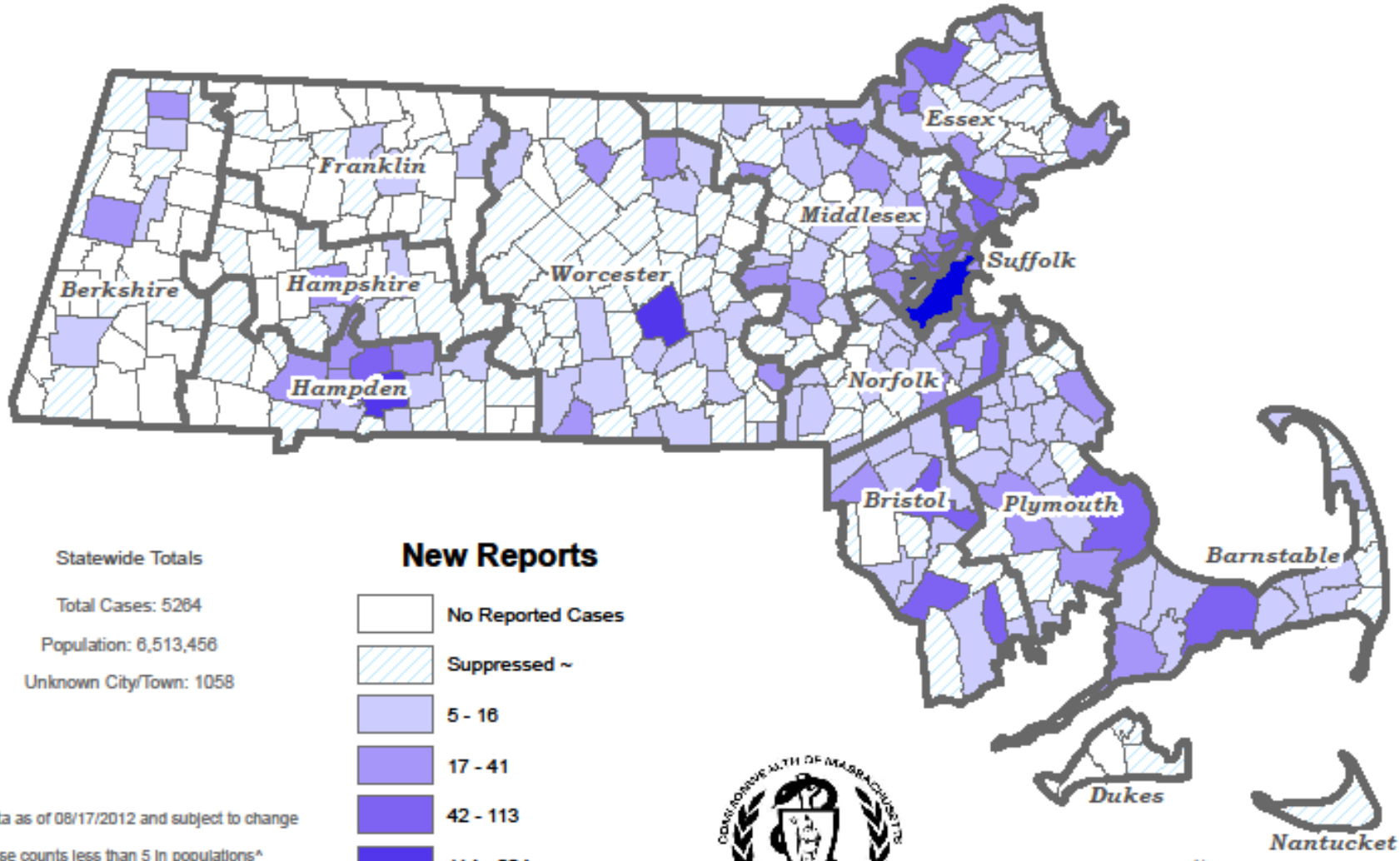
Source: MDPH Office of Integrated Surveillance and Informatics Services

New Reports of Confirmed Chronic Hepatitis C Cases by Massachusetts City/Town: 2011*



Statewide Totals

Total Cases: 5264

Population: 6,513,456

Unknown City/Town: 1058

New Reports

- No Reported Cases
- Suppressed ~
- 5 - 16
- 17 - 41
- 42 - 113
- 114 - 224
- 225 - 481

* Data as of 08/17/2012 and subject to change

~ Case counts less than 5 in populations^ less than 50,000 are suppressed to maintain patient confidentiality.

^ Population based on 2010 Census data.

N

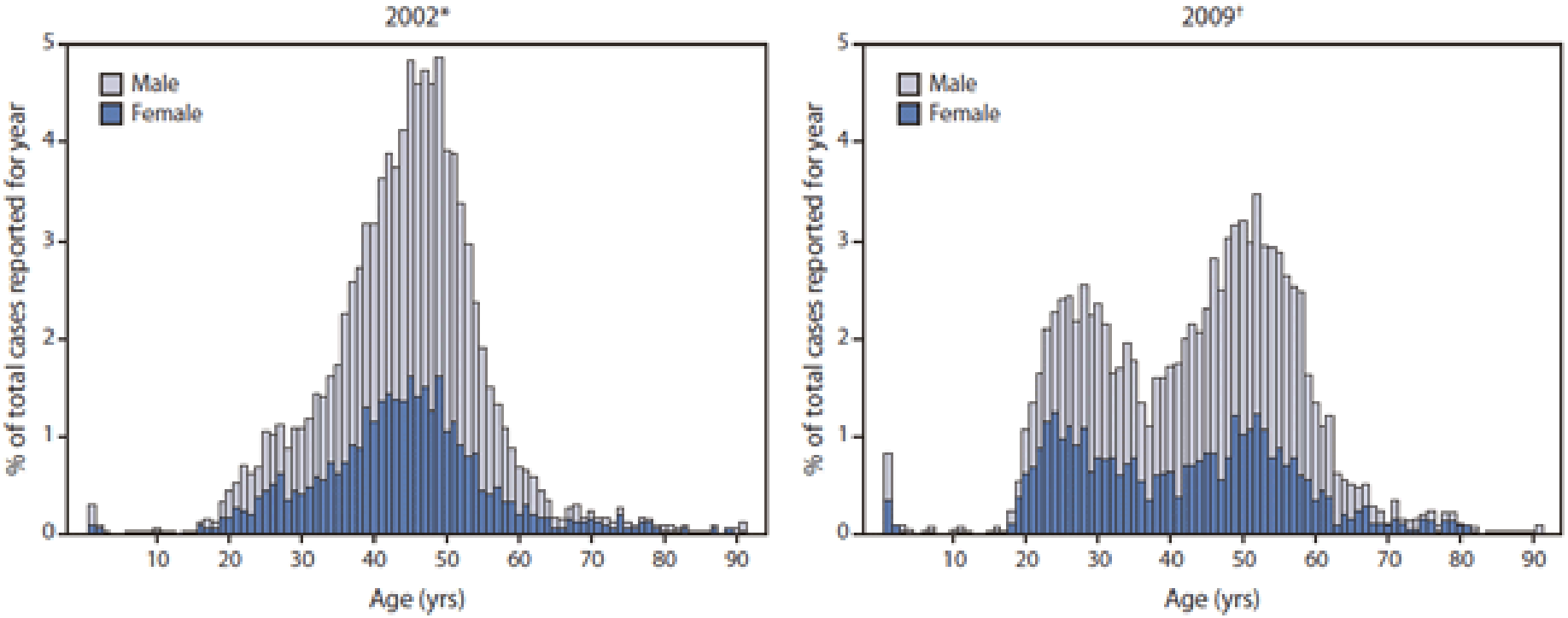
1 inch = 20 miles

Bureau of Infectious Disease
Office of Integrated Surveillance & Informatics Services

HCV among youth in Massachusetts 2007-2011

- Starting in 2007 an increase of newly diagnosed HCV infection has been noted among youth ages 15-25
- Between 2002 and 2011, an increase of 62 to 132 cases per 100,000 population was reported in this age group
- Data suggest that the increase is due to youth injecting drugs (mostly heroin)
- Other jurisdictions have also seen this trend (CT, HI, KY, ME, MN, NY, PA and others)

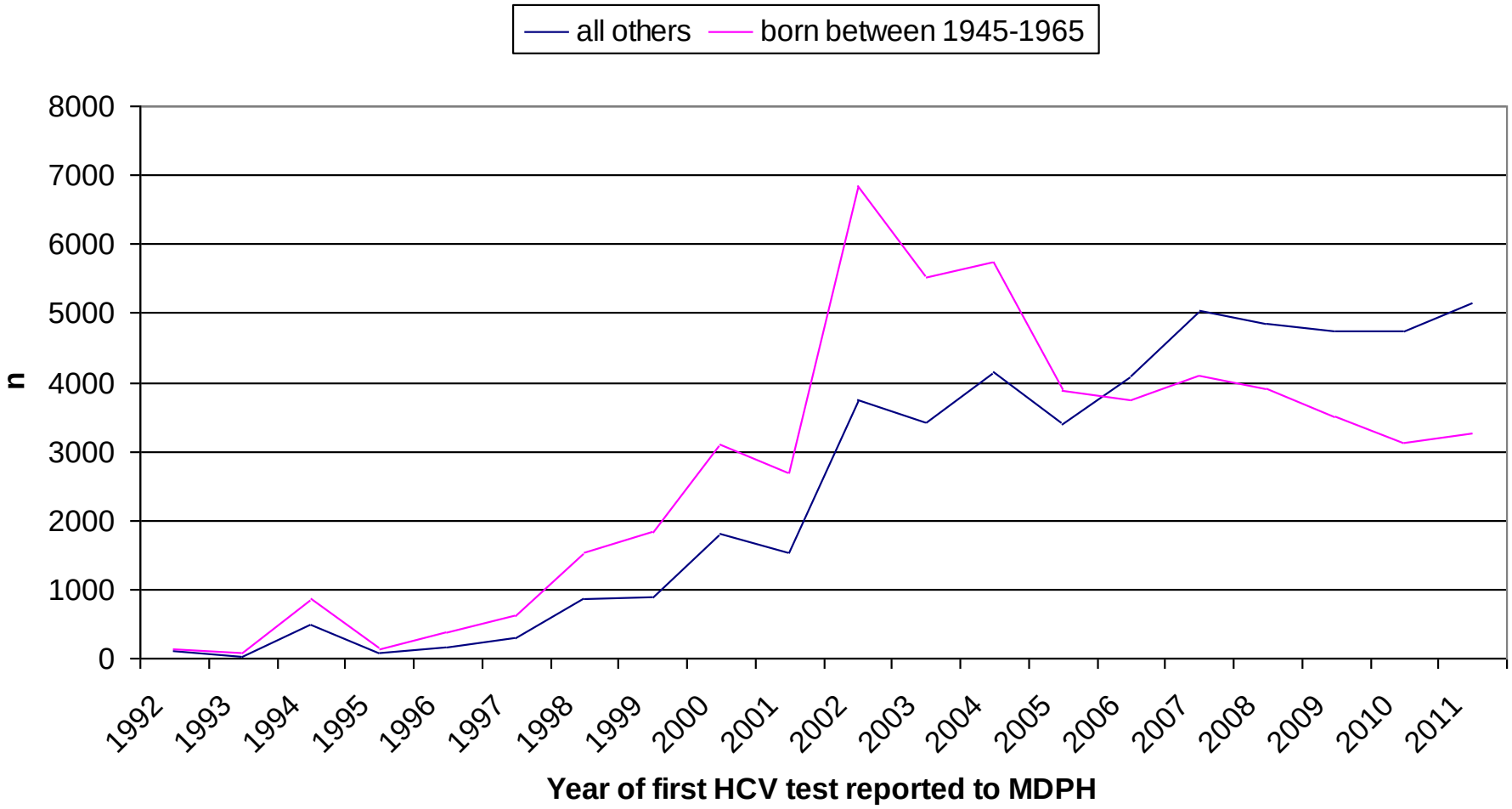
MMWR: Age distribution of newly reported confirmed cases of hepatitis C virus infection --- Massachusetts, 2002 and 2009



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

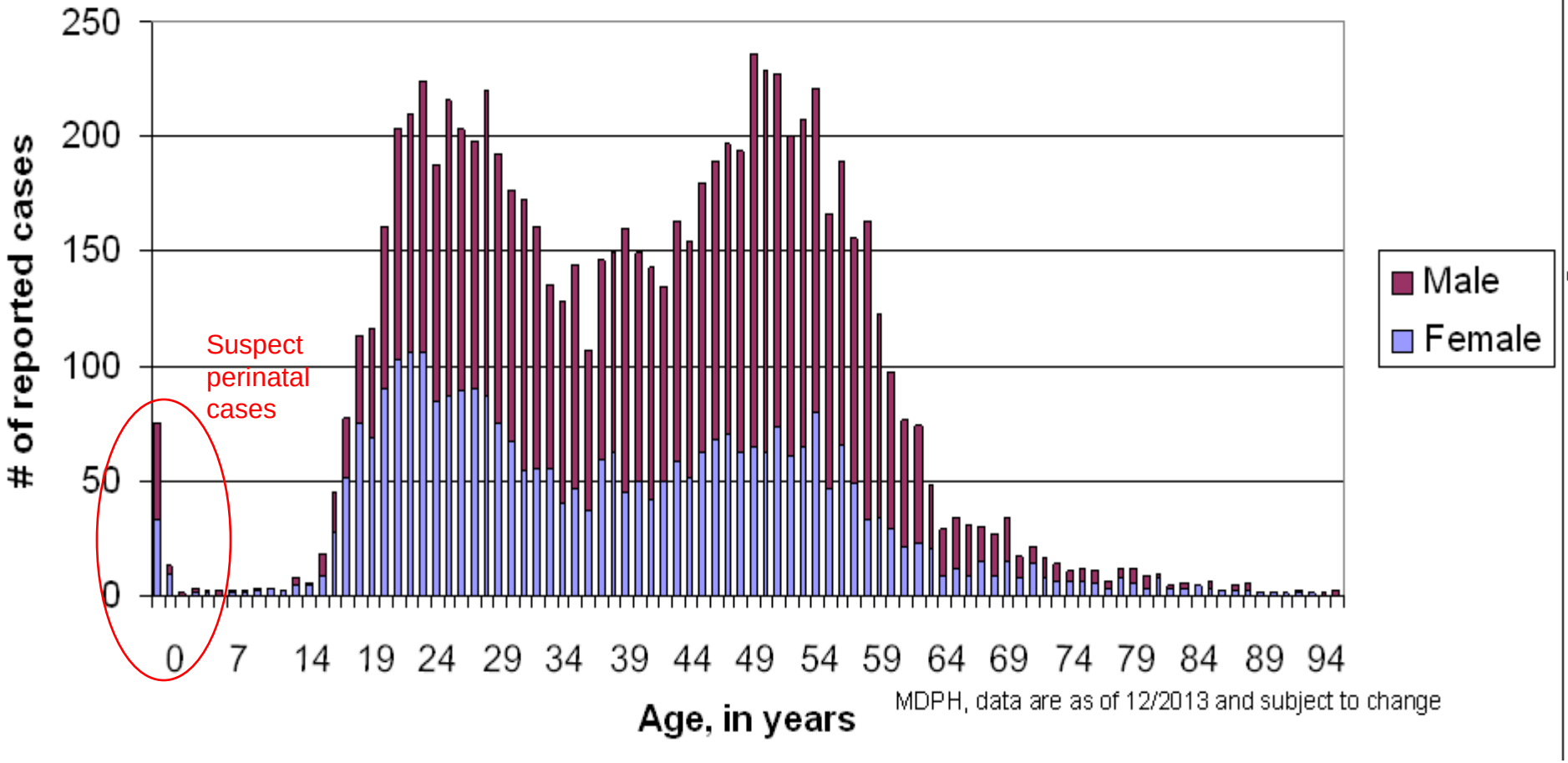
Source: Onofrey et al MMWR: **May 6, 2011 / 60(17);537-541**

Reported confirmed and probable HCV infections in MA, 1992-2011



Data as of January 23, 2013 and are subject to change

Confirmed and probable cases of HCV infection by age and gender in Massachusetts, 2011



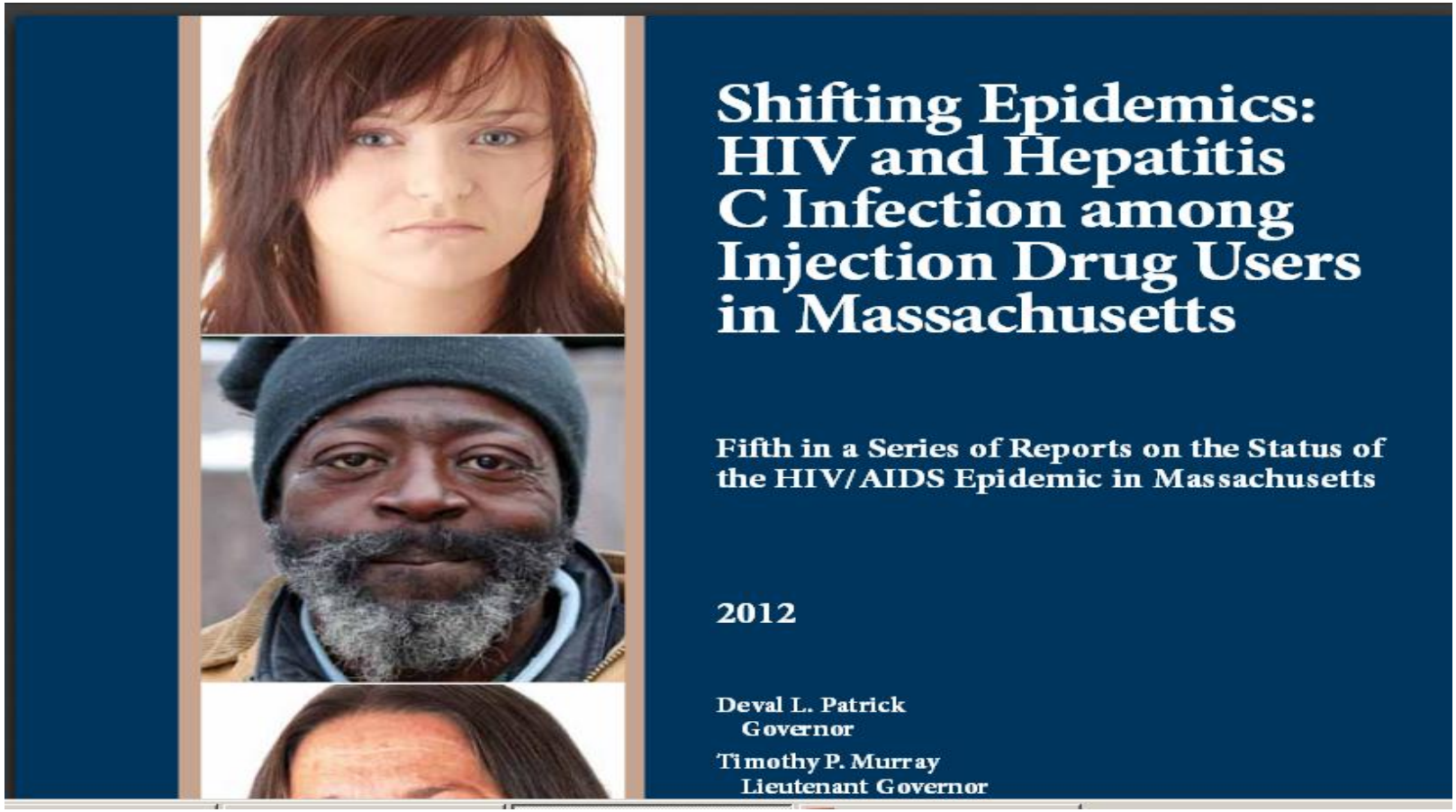
Role of Public Health Nurses

- Investigate suspect cases of acute HBV and HCV infection
  - Work with medical providers and cases as possible to gather information indicated in MAVEN
    - MDPH epidemiologists will contact you and provide guidance – tip sheets in MAVEN forthcoming
  - Key issues: Determine acute status (when was the case first exposed?), risk history (was this health care acquired?), and provide education to case
- Be a resource for their communities for viral hepatitis information and referrals

Programs in Massachusetts

- No direct viral hepatitis funding from state legislature
- Integration of HCV services (prevention education, screening, testing) has been fully implemented with all HIV prevention and screening programs (34 programs)
  - Requirement of completing case report form recently implemented for those conducting point-of-care testing, including rapid HCV tests
- Integration of HCV medical management into HIV case management services (5 programs)
- For program location and contact information: http://www.mass.gov/eohhs/docs/dph/aids/resources-guide.pdf

New report available



http://www.mass.gov/eohhs/docs/dph/aids/shifting-epidemics-report.pdf

Massachusetts Viral Hepatitis Coalition

- Conducts advocacy and education on viral hepatitis in Massachusetts
- Members include medical and social service providers, consumers, pharmaceutical companies and other community partners
- Quarterly meetings with some sub-committees
- For more information and to get involved contact Katie Boos (kboos@aac.org)

Resources: Provider Education

- CDC http://www.cdc.gov/hepatitis/
- Hepatitis Web Study: http://depts.washington.edu/hepstudy/
- National Training Center for Integrated Hepatitis, HIV and STD Prevention Services

  www.knowhepatitis.org
- Treatment Action Group www.treatmentactiongroup.org/hepatitis
- Caring Ambassadors Program: Hepatitis C http://www.hepcchallenge.org/index.htm

Resources: Patient Education

- CDC http://www.cdc.gov/hepatitis/
  - "Know Hepatitis" campaign
- Harm Reduction Coalition http://harmreduction.org/
- Hepatitis C Support Project
  http://www.hcvadvocate.org/
- Treatment Action Group
  www.treatmentactiongroup.org/hepatitis
- Caring Ambassadors Program: Hepatitis C
  http://www.hepcchallenge.org/index.htm

Resources: Policy

- US Department of Health and Human Services Viral Hepatitis Action Plan (2011)

  http://www.hhs.gov/ash/initiatives/hepatitis/actionplan_viralhepatitis2011.pdf
- Institute of Medicine Report on Hepatitis and Liver Cancer (2010)

  http://www.cdc.gov/hepatitis/IOMnews.htm
- National Viral Hepatitis Roundtable www.nvhr.org
- National Alliance of State and Territorial AIDS Directors (NASTAD) www.nastad.org

Questions?

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