HEPATITIS C VIRUS: TEST, TREAT AND CURE, PART 1
Epidemiology, Transmission/Prevention, Natural History
Tracy Swan
Hepatitis/HIV Project Director
Treatment Action Group

DISCLOSURE
Ms. Swan has no disclosures
LEARNING OBJECTIVES:

1. Hepatitis C Virus Epidemiology
2. Hepatitis C Virus Transmission/Prevention
3. Hepatitis C Virus: Natural History

WHAT IS HEPATITIS C?

A small, tough blood borne virus

Can survive for weeks in dried blood

Enters the bloodstream, infects liver cells

Becomes a chronic infection in ~75%

Over time, can cause liver scarring leading to liver failure, liver cancer— and a range of other non-liver-related health problems

Paintsill et al; J Infect Dis 2014; Grebley et al; Hepatol 2014
HCV Epidemiology
In the United States:

A. More people have hepatitis C than HIV
B. Most HIV-positive people also have hepatitis C
C. Most people who have hepatitis C are under 50 years old
D. All of the above

HCV Epidemiology
High-prevalence populations are:

A. Health care providers
B. Prisoners
C. Asian males
D. None of the above
# Global, National, State and City

## Global
185 million people have been infected; 150 to 170 million are chronically infected

## National
NHANES: 2.7 million chronically infected; true prevalence could be >5 million

## State
New York State: 175,785

## City
New York City: 146,500

Mohd Hannafiah et al; Hepatology 2013; Denniston et al; Ann Intern Med 2014; Chak et al; Liver Int 2011; NYS Dept of Health, Al; 2012; Balter et al; Epidemio and Infect 2013

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# HCV Prevalence Among “Baby Boomers”

27% of US population born 1945-1965
75% of US HCV cases in this birth cohort

- HCV is twice as prevalent among males in this birth cohort
- Highest among non-Hispanic Black males (8%)
- White males 4%
- Mexican-American males 3%

CDC recommends one-time HCV screening for all “baby boomers”

Smith et al; MMWR 2012
HCV and African-American Men

• Highest prevalence group in US

  – 2.9% prevalence among males

  – 2.2% among “baby boomer” males (vs. 1.3% among non-Hispanic white males)

  – African Americans more likely to develop chronic hepatitis C (than White, Asian, Hispanic/Latino)

Mir et al; J Clin Gastroentero 2012

US Age- and Race-Specific HCV Prevalence

Ditah et al; J Hepatol 2014
Snapshots: HCV in Key Populations

**PWID (people who inject drugs)**

IDU: most common risk for HCV

6,613,000 PWID in the US (estimated)

- HCV prevalence of 30-90 %
- HCV prevalence among New York City PWID: 67%

Lansky et al; *PLOS 1* 2015; Jordan, et al; *Drug Alcohol Depend* 2015

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Snapshots: HCV in Key Populations

**Prisoners**

In 2013, there were 6,899,000 people in US jails and prisons

1 of 3 has HCV (~2,300,000)

Snapshots: HCV in Key Populations
People with HIV/AIDS

In the US, >1.2 million people are HIV-positive

- 25% -- or 300,000 -- are coinfectected with HCV
- Up to 90% of people who got HIV from IDU are HIV/HCV coinfectected

For the past 15 years, outbreaks of sexually transmitted HCV among HIV+ MSM have been reported in the US, EU, Australia

CDC; HIV in the United States: At a Glance; May 2015; CDC; Viral Hepatitis Populations; 2014; van der Larr et at; AIDS 2010

Snapshots: HCV in Key Populations
Veterans

54% of ~5,450,000 screened

- Overall prevalence: 6.1%

Differs significantly by birth cohort, gender, race/ethnicity

Backus et al; Am J Pub Health 2014
HCV, Male Veterans

Race/Ethnicity

Backus et al; Am J Pub Health 2014

HCV, Female Veterans

Race/Ethnicity

Backus et al; Am J Pub Health 2014
HCV Incidence
In the United States,

A. HCV incidence peaked in 1985
B. HCV incidence has increased since 2010
C. HCV incidence has stayed at the same level for decades

Hepatitis C Incidence in the US

Incidence of acute hepatitis C, by year
United States, 1982-2013

CDC; Viral Hepatitis Statistics and Surveillance; 2015
**How is HCV Incidence Measured**

Limited capacity to monitor acute and chronic HCV

Number of reported cases are a fraction of all cases

Acute HCV usually “silent”

PWID don’t always seek health care

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**Why did HCV Incidence Decrease in the 1990s?**

Virus identified in 1989 – blood screening began

Infection control procedures instituted in 1980s

Access to harm reduction

Crack use increased

In NY, less IDU, more “sniffing”

- In NY, IDU decreased (71% to 39%) and sniffing increased 25% to 59%) between 1988 and 1998
- Potency of street heroin increased
- Fear of HIV infection  
  
  Frank; Mt Sinai J Med 2000
Is HCV Incidence Increasing?

800-1000 cases / year from 2006 to 2010

- Acute HCV cases increased by 45% from 2006-2010 to 2010-2012
- Acute HCV increased by 75% between 2010 and 2012

CDC estimates that there were >21,000 new cases in 2012

CDC; Surveillance for Viral Hepatitis – United States, 2012

Why is HCV Incidence Increasing?

In US, non-medical use of prescription opioids (PO) increasing among young people; many begin IDU

Young PO injectors 3X more likely to have HCV than people who injected other drugs

Frequent (100 to 365 days /year) users 4X more likely to inject heroin, almost 8X more likely to become dependent

(Many switch to heroin because it is cheaper)

Valdiserri et al; Am J Pub Health Jones; Drug Alcohol Depend 2013; Lakenau et al; Drug; Mars et al; Int J Drug Policy  2014
HCV Transmission

HCV is spread by:

A. Raw shellfish from contaminated water
B. Sharing cups, plates, silverware
C. Kissing
D. None of the above

HCV Transmission

HCV can be transmitted via:

A. Unprotected anal sex
B. People who don’t actually have it
C. Mother-to-infant
D. All of the above
HCV Transmission
A person can be infected with hepatitis C

A. More than once
B. Only once
C. Multiple times, if they are at risk
D. None of the above

HCV Transmission

**BLOODBORNE:** IDU: shared needles, syringes, cookers, cotton, ties
possibly from sniffing/smoking drugs

Tattooing (or piercing) w/ shared needles, ink, inkwells

Needlestick/sharps injuries
- risk ~1.8% (range: 0%–10%)

Mother-to-infant transmission
- 3% to 10%
- Higher if mother is also HIV+ (and untreated)

Outbreaks in health care settings, dialysis centers
Shared personal care equipment (razors, toothbrushes)
Sexual transmission (especially among HIV+ MSM)

CDC DVH; HCV FAQs for Health Care Professionals 2014;
Yeung et al; *World J Hepatol* 2014
Sexually Transmitted HCV

Cluster of biological, cultural risk factors:
- HIV itself is a risk – less common in HIV- MSM
- Serosorting
- Non-injection drug use
- Rougher, longer anal sex (tissue tearing)
- Fisting; can be spread by uninfected people
- Sex with multiple partners; sex parties
- Other STIs

Sometimes HIV+ MSM without these risk factors have sexually transmitted HCV

Richardson et al; J Infect Dis 2008

HCV Reinfection

A person can become re-infected or superinfected with HCV
- After spontaneous viral clearance
- After being cured by treatment
- While still chronically infected
HCV Prevention
Diagnosing and curing people!
CasP: cure as prevention
• Infection control procedures in medical settings
• Adequate access to injection equipment
• Adequate access to MAT
• Adequate access to drug treatment (upon request)
• Information, education, risk reduction, for sexually transmitted HCV

HCV Natural History
Hepatitis C virus infection

A. Is always chronic
B. Causes serious liver damage in 75% of people who have it
C. Can cause or worsen other health problems
D. All of the above
HCV Natural History
Hepatitis C virus infection

A. Has characteristic symptoms
B. Increases the risk for liver-related illness and death
C. Increases the risk of death from non-liver-related causes
D. B and C

ACUTE HCV
The first 6 months after HCV infection

Often silent; only 20% have symptoms
(fatigue, abdominal pain, appetite loss, jaundice)

Spontaneous viral clearance occurs in ~25%; more likely in:
• young females
• people with the IL28B “CC” genotype
• HCV genotype 1
• HIV-negative people

CDC DVH; HCV FAQs for Health Care Professionals 2014; Grebley et al; Hepatol 2014; Vogel et al; J Antimicrob Chemother 2010
**Natural History of HCV Infection**

- **Acute Hepatitis C**
- **Chronic Hepatitis**
  - 75-85%
- **Cirrhosis**
  - 20%
- **End-stage liver disease**
- **Hepatocellular carcinoma**
- **Death ≥25%**

20-30 years
Often asymptomatic

Slide courtesy of Dr. Kara Chew; Hoofnagle et al; *Hepatology* 1997;
Di Bisceglie et al; *Hepatology* 2000; Klevens et al; *Clin Infect Dis* 2012

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**Chronic HCV Symptoms**

*Do not correspond to severity of liver damage*

Often are non-specific:
- Fatigue, forgetfulness, depression
- Joint pain

**Extra-hepatic manifestations include:**
Skin, rheumatic, autoimmune, cardiovascular
bone, renal, endocrine, lymphoproliferative
disorders

Treating, curing HCV can prevent, improve these
What Worsens Liver Damage?

- Alcohol – especially higher intake
- HIV, especially if it is untreated
- Immunosuppression
- HBV
- Being male
- Being overweight (steatosis)
- Age
- Duration of infection
Hepatitis C and Liver-Related Mortality

Slide courtesy of Dr. Kara Chew; Lee et al, *J Infect Dis* 2012

Hepatitis C and Non-Liver Related Mortality

People with HCV have a higher incidence of, and mortality from cancer; diagnosis and death occurs when they are younger

People with HCV are *dying 2 decades earlier* from non-liver related causes (such as heart disease, respiratory failure)

Allison et al; *J Hepatol* 2015; Ly et al; *Clin Infect Dis* 2014
Hepatitis C and All-Cause Mortality

HCV more than doubles all-cause mortality

Rising HCV Death Rate in U.S.

Since 2007, more people have died from HCV than AIDS

Slide courtesy of Dr. Kara Chew; Lee et al; J Infect Dis 2012

~17,000 deaths per year from HCV

~70% of them in people from 45 to 64 years old

QUESTIONS?