



# Increased Hepatitis C Virus (HCV) Detection in Women of Childbearing Age and Potential Risk for Vertical Transmission - United States and Kentucky, 2011-2014

## Viral Hepatitis Prevention Board Meeting

Noele Nelson, MD, PhD, MPH

Medical Epidemiologist

Division of Viral Hepatitis/NCHHSTP/CDC

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# Changing Epidemiology of HCV Infection

- 2.9 fold increase in reported cases of acute HCV from 2010-2015, from 850 to 2436
  - 33,900 (95% CI=26,800–115,000) acute cases in 2015 when adjusting for under-ascertainment and under-reporting
  - Increase predominantly from injection drug use
  - Most occur among young, white persons who live in non-urban areas (particularly in states within the Appalachian, Midwestern, and New England regions of the country)
    - Trends in these states likely indicate an overall increase in HCV incidence throughout the country
    - Kentucky had the highest incidence of acute HCV infection during 2011–2014

# Changing Epidemiology of HCV Infection, cont.

- Increase greatest among persons aged 20-39 years
  - e.g., those of child-bearing age
- Increase among males and females
  - Rates similar among males and females (0.8 and 0.7 cases per 100,000 population, respectively)

# Perinatal HCV Transmission

- Estimated to occur in 5.8% of infants born to HCV-infected, HIV-negative mothers
- Transmission increases with:
  - Maternal HIV co-infection (occurs in 10.8% of infants)
  - High maternal viral load (>6 log: 14.3%; <6 log: 3.9%)
  - Prolonged rupture of membranes >6 hrs (odds ratio=9.3)

# HCV Detection in Infants

- HCV RNA testing: age 2-6 months
  - Up to 20% of infants with virus identified will clear spontaneously by age 5 to 7 years; therefore, RNA-positive infants need further testing, linkage to care, and virologic monitoring
- HCV antibody: age 18 months
  - Passively acquired maternal antibody may be detected up to 18 months
  - Children with negative HCV antibody at age 18 months are not HCV-infected and need no further testing (~95% of children born to HCV-infected mothers)

# Increased HCV Detection in Women of Childbearing Age and Potential Risk for Vertical Transmission - United States and Kentucky, 2011-2014

- Increased reported incidence of HCV infection among persons aged  $\leq 30$  years, raises concern about:
  - Increases in the number of pregnant women with HCV infection, and
  - Increases in the number of infants who could be exposed to HCV at birth
- Data from Quest Diagnostics and birth certificate data (National Center for Health Statistics) were used to investigate trends in:
  - HCV detection among women of childbearing age (15-44 years)
  - HCV testing among children aged  $\leq 2$  years, and
  - Proportions of infants born to HCV-infected women nationally and in Kentucky

Koneru A, Nelson N, Hariri S, Canary L, Sanders KJ, Maxwell JF, Huang X, Leake JA, Ward JW, Vellozzi C. Increased Hepatitis C Virus (HCV) Detection in Women of Childbearing Age and Potential Risk for Vertical Transmission – United States and Kentucky, 2011-2014. MMWR Morb Mortal Wkly Rep. 2016 Jul 22;65(28):705-10.

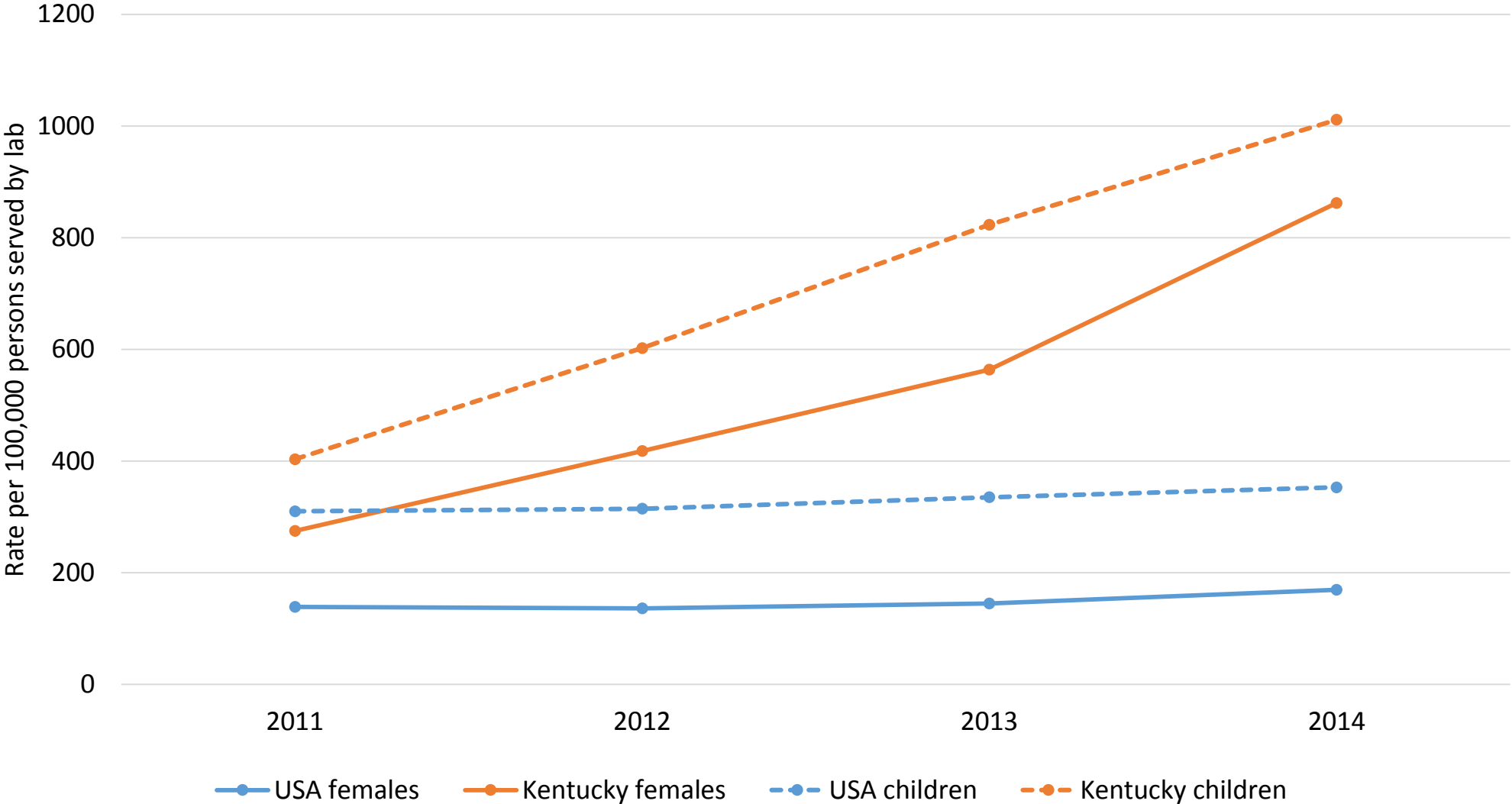
Zibbell JE, et al. Increases in hepatitis C virus infection related to injection drug use among persons aged  $\leq 30$  years - Kentucky, Tennessee, Virginia, and West Virginia, 2006-2012. MMWR Morb Mortal Wkly Rep. 2015 May 8;64(17):453-8.

Dunkelberg et al, 2014

# Study Results

- During 2011–2014, the national rate of HCV detection among women of childbearing age served by Quest increased 22%, from 139 to 169 per 100,000
- Rate of HCV testing among children aged  $\leq 2$  years served by Quest increased 14%, from 310 to 353 per 100,000 (Figure 1).
- During the same time, the rate of HCV detection among women of childbearing age in Kentucky increased 213%, from 275 to 862 per 100,000, and the rate of HCV testing among children aged  $\leq 2$  years increased 151%, from 403 to 1,011 per 100,000 (Figure 1).
- During this time, the proportion of infants born to HCV-infected women nationally increased 68%, from one in 536 (0.19%) to one in 308 (0.32%) (Figure 2).
- Proportion of infants born to HCV-infected women increased 124%, from one in 142 (0.71%) to one in 63 (1.59%) (Figure 2).
- HCV case reporting to KDPH identified 777 pregnant women with HCV antibody positivity
  - 527 (68%) were aged 20–29 years,
  - 218 (28%) were aged 30–39 years,
  - 653 (84%) were non-Hispanic white, and
  - 293 (38%) reported past or current injection drug use.

**Figure 1: Hepatitis C virus (HCV) detection rate among females aged 15–44 years and HCV testing rate among children aged ≤2 years — United States and Kentucky, 2011–2014\***

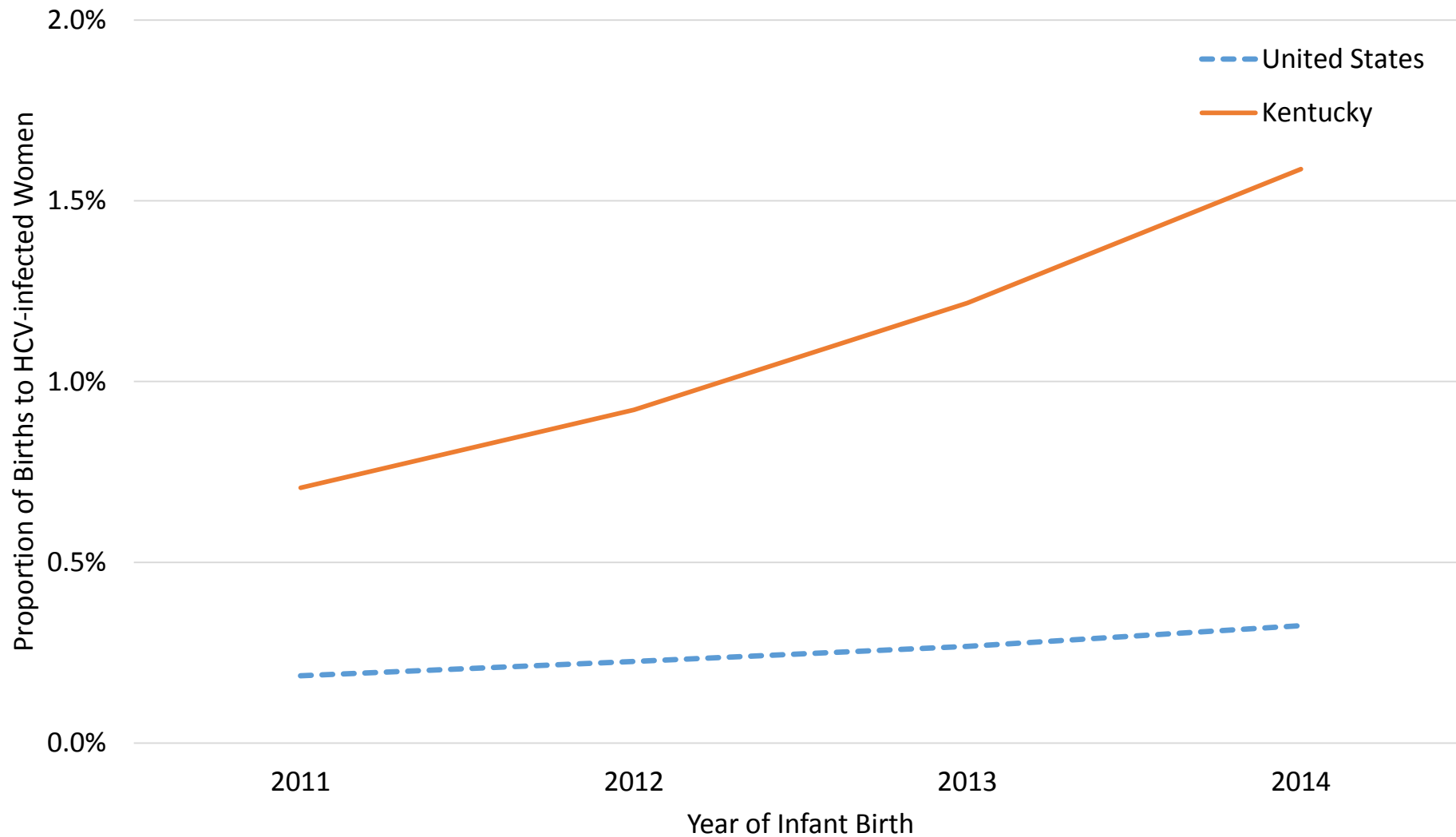


**Source:** Quest Diagnostics laboratory data.

\* HCV detection rates were calculated as number of females aged 15–44 years who received a positive HCV antibody and/or RNA result per 100,000 females aged 15–44 years served by Quest Diagnostics (i.e., received a laboratory test for any reason) by area of residence. HCV testing rates among children were calculated as number of children aged ≤2 years who received a test for HCV antibody and/or RNA per 100,000 children aged ≤2 years served by Quest Diagnostics by area of residence.



**Figure 2. Proportion\* of infants born to hepatitis C virus (HCV)-infected women† —United States and Kentucky, 2011–2014**



\* Proportion calculated annually as infants born to HCV-infected women divided by total infants born.

† HCV infection status of mother is determined by notation on infant's birth certificate. Birth categorization is based on mother's place of residence.

# Study Conclusions

- Primary prevention services and following current recommendations to identify persons (including pregnant women) at risk for HCV infection and testing accordingly, would improve early identification of HCV-infected infants and linkage of the mother and infant to care and treatment
- Identifying HCV-infected women of childbearing age before pregnancy, with linkage to care, treatment, and cure, would avoid HCV infection during pregnancy and prevent mother-to-child transmission
- Expanding current and developing new public health policies to increase HCV detection among women of childbearing age (especially pregnant women) and infants should be considered
- Additional data are needed to better assess HCV prevalence among pregnant women and their infants and investigate options for perinatal prevention, care, and treatment.

# Characteristics of HCV-Infected Women of Child-Bearing Age (WCBA), 2006-2014

- Among women with acute and past/present HCV infection (n=171,801)\*:
  - Age
    - 15-30 years: 47.0%
    - 31-44 years: 53.0%
  - Injection drug use
    - Yes: 5.4%
    - No: 2.7%
    - Missing/unknown: 91.9%
  - Geographic location
    - Midwest: 27.5%
    - Northeast: 30.1%
    - South: 29.6%
    - West: 12.8%
  - Race/ethnicity
    - Non-Hispanic white: 23.6%
    - Non-Hispanic black: 1.9%
    - Asian/Pacific Islander: 0.5%
    - American Indian/Alaskan native: 1.3%
    - Hispanic: 3.0%
    - Non-Hispanic other: 3.2%
    - Missing/unknown: 66.5%

\*National Notifiable Diseases Surveillance System (NNDSS)

Ly KN, et al. Hepatitis C Virus Infection Among Reproductive-Aged Women and Children in the United States, 2006 to 2014.

Ann Intern Med. 2017 May 9.

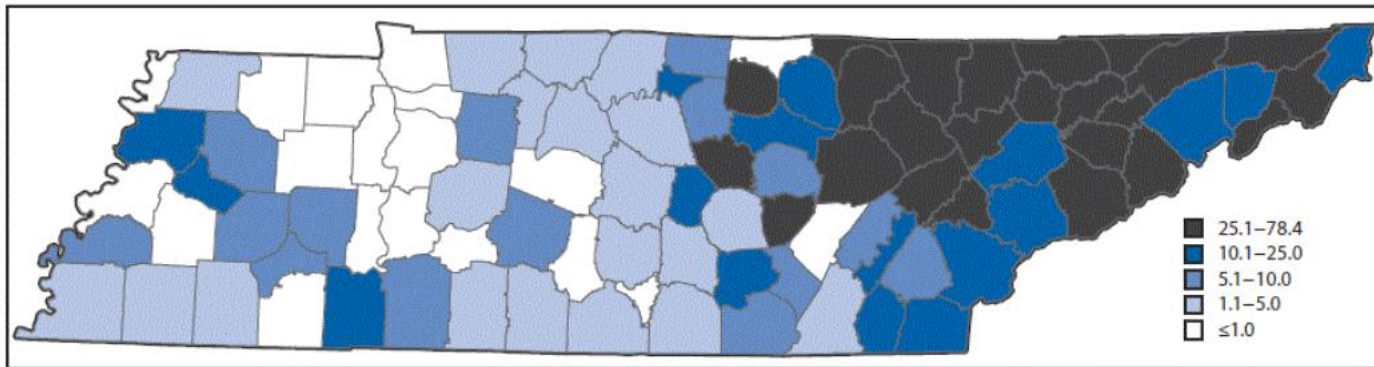
# Births to HCV-Infected WCBA

- The number of reproductive-aged women with acute and past/present HCV-infection doubled from 15,550 in 2006 to 31,039 in 2014\*
  - Applying a laboratory-derived infection rate to annual live births from 2011-2014, an estimated 29,000 HCV-infected women gave birth to 1,700 HCV-infected infants each year

\*National Notifiable Diseases Surveillance System (NNDSS)  
Ly et al, 2017

# Births to HCV-Infected Mothers – Tennessee, 2014\*

FIGURE 2. Rate of hepatitis C infection among pregnant women per 1,000 live births, by county – Tennessee, 2014



The above figure is a map of Tennessee, showing the rate of hepatitis C infection among pregnant women per 1,000 live births, by county in 2014.

- Variation among 95 counties
  - Highest rates in Appalachian counties (Eastern TN)
- Surveillance to identify high-risk populations and areas

\*Tennessee Vital Records

Patrick SW, et al. Hepatitis C Virus Infection Among Women Giving Birth — Tennessee and United States, 2009–2014.

MMWR Morb Mortal Wkly Rep 2017;66:470–473.

# Manuscript in Progress – Division of Viral Hepatitis

## HCV Infection in U.S- Women of Child-Bearing Age, Pregnant Women, and Young Children

- National Center for Health Statistics data from birth certificates was used to assess HCV-infected women with live births in 2015
- Data from two national commercial laboratories were used to analyze HCV testing (antibody, RNA, or genotype), positivity, and detection among WCBA, pregnant women, and children aged <5 years from 2011-2016
- Results show a substantial increase in HCV infection among WCBA and pregnant women, indicating increased risk of perinatal HCV transmission

# Existing Recommendations

- Risk-based HCV testing recommendations apply to pregnant women
  - Injection drug use, blood transfusion before 1992, long-term hemodialysis, being born to an HCV-infected mother, incarceration, intranasal drug use, getting an unregulated tattoo, and other percutaneous exposures (such as in health care workers or from having surgery before the implementation of universal precautions)\*
  - CDC, U.S. Preventive Services Task Force (USPSTF); World Health Organization (WHO); American Association for the Study of Liver Diseases (AASLD); Infectious Disease Society of America (IDSA); American College of Gastroenterology (ACG); American Academy of Family Physicians (AAFP); American Academy of Pediatrics (AAP), North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHN)
- Recommendations for testing persons born during 1945-1965 (anti-HCV prevalence 3.25%)

\*USPSTF; MMWR 2012

# Existing Recommendations, cont.

- Recommendations for testing infants born to HCV-infected mothers exist
  - CDC, USPSTF, WHO, AASLD, IDSA, ACG, AAFP, AAP, NASPGHN
  - Specific testing algorithms could provide clarity
  - Perinatal HCV case definition for surveillance – proposed for CSTE adoption, 2017



# Proposed CSTE Perinatal HCV Case Definition

- Laboratory criteria
  - HCV RNA positive for infants 2-36 months of age;
  - Or, HCV genotype test results for infants 2-36 months of age;
  - Or, HCV antigen test results for infants 2-36 months of age
- Epidemiologic linkage
  - Maternal infection with HCV of any duration, if known

*Test results at earlier infant ages than specified above should not be reported. Test results at later infant ages than specified above should be reported under the 2015 Acute and Chronic HCV Infection case classification and not as perinatal HCV infection.*

# HCV Treatment

- HCV can be cured in >90% of persons with direct acting antiviral agents (DAAs) administered daily for 8-12 weeks
  - Safety and efficacy during pregnancy has not been established
    - *Sovaldi package insert: No adequate human data are available to establish whether or not SOVALDI poses a risk to pregnancy outcomes*
  - Ledipasvir/Sofosbuvir is an effective and well-tolerated treatment for children aged 6-11 years with chronic HCV

# HCV Treatment, cont.

- Treatment before pregnancy optimal to prevent infant infection as well as maternal disease progression
  - Challenges regarding Medicaid treatment restrictions (e.g., in drug treatment programs); a priority for some Medicaid programs (e.g., California)
- Treatment guidance from IDSA/AASLD

For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

