

# Pregnant Women & Infants: Improving the Hepatitis C Care Cascade

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Hepatitis C Medicaid Affinity Group Monthly Call Series Webinar

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# Disclosures

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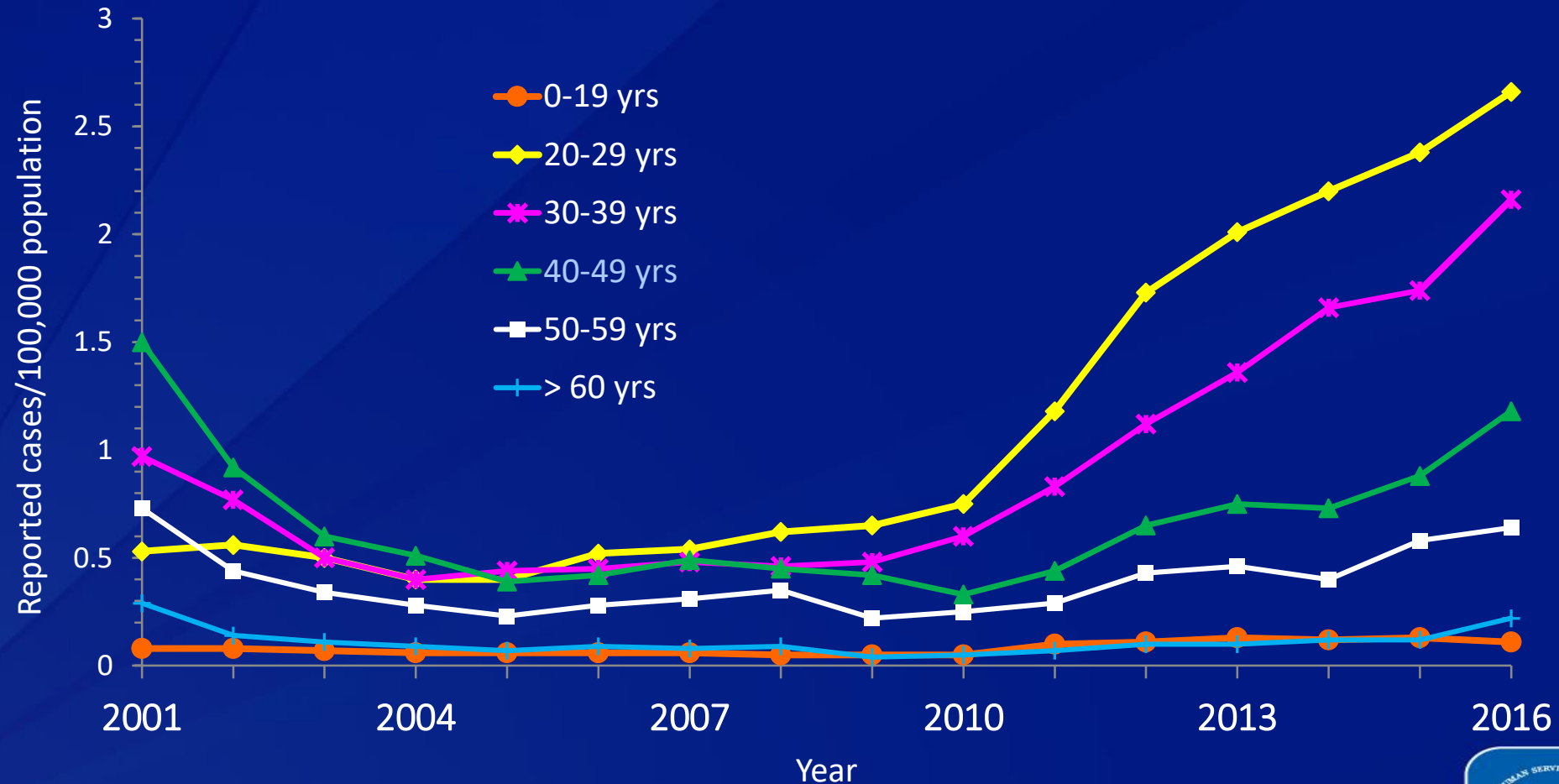
- No conflicts of interest to disclose

# Objectives

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- **Discuss HCV epidemiology and testing recommendations in pregnant women and infants**
- Explore implications of expanding testing and linkage for pregnant women and infants
- Explore prevention prior to pregnancy

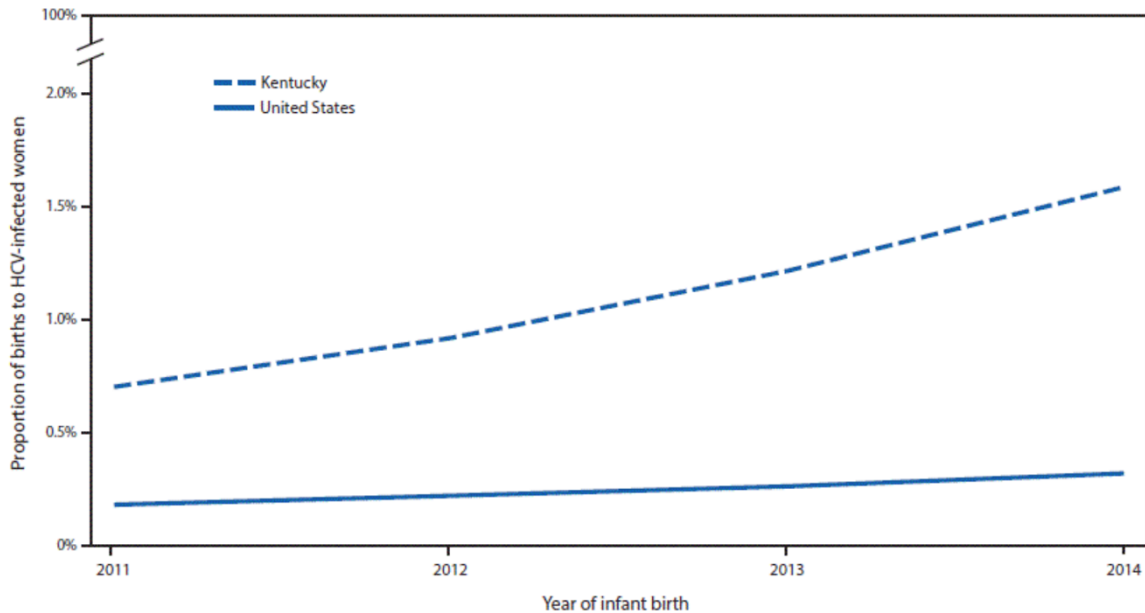
# Incidence of acute hepatitis C, by age group — United States, 2001–2016



# Proportion of infants born to women with HCV infection

## Kentucky

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



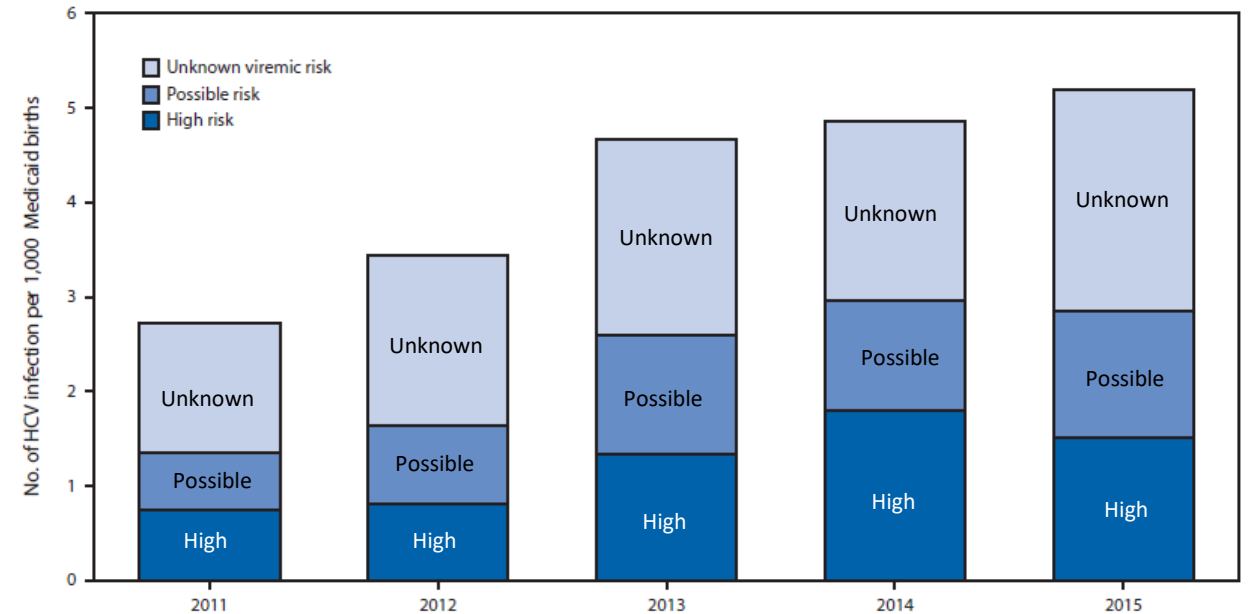
\* Proportion calculated annually as infants born to HCV-infected women divided by total infants born.

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

Koneru A, Nelson N, Hariri S, et al. 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;65:705–710. DOI: <http://dx.doi.org.ezproxy.bu.edu/10.15585/mmwr.mm6528a2>.

## Wisconsin

FIGURE 2. Proportion of pregnant Medicaid recipients with evidence of hepatitis C virus (HCV) infection before delivery, by risk category\* — Wisconsin Medicaid data and the Wisconsin Electronic Disease Surveillance System, Wisconsin, 2011–2015



Watts T, Stockman L, Martin J, Guilfoyle S, Vergeront JM. Increased Risk for Mother-to-Infant Transmission of Hepatitis C Virus Among Medicaid Recipients — Wisconsin, 2011–2015. *MMWR Morb Mortal Wkly Rep* 2017;66:1136–1139. DOI: <http://dx.doi.org.ezproxy.bu.edu/10.15585/mmwr.mm6642a3>

# HCV Testing in Pregnancy

- Current CDC/USPSTF recommendations: Risk factor-based

• May 2018



HCV Guidance: Recommendations for  
Testing, Managing, and Treating  
Hepatitis C



- Test all pregnant women, at entry to prenatal care
- Why? Poor testing rates, substantial cases without identified risk factors<sup>1,2</sup>

# Perinatal Transmission of HCV: Implications

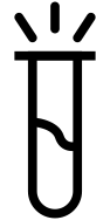
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- Risk of transmission: 5.8%
- Risk Factors:
  - HIV co-infection (11%), HCV viral load >600,000, prolonged rupture of membranes
- Avoid if HCV-infected: Invasive fetal monitoring
- C-section NOT recommended on basis of HCV alone
- Breastfeeding is NOT contraindicated

# Identification of HCV in pregnancy: Advantages

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- Venue for testing and identifying women





# Identification of HCV in pregnancy: Advantages

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- Venue for testing and identifying women
- Avoid risk factors during pregnancy

# Identification of HCV in pregnancy: Advantages

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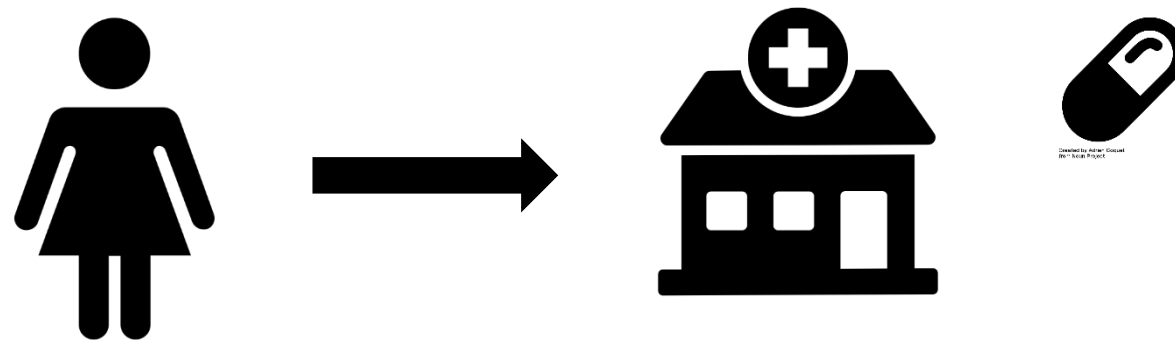
- Venue for testing and identification of women
- Avoid risk factors during pregnancy
- Ability to identify exposed infant



Created by Andrew Doane  
from Noun Project

# Identification of HCV in pregnancy: Advantages

- Venue for testing and identification of women
- Avoid risk factors during pregnancy
- Ability to identify exposed infant
- Opportunity to link to care during/after pregnancy



# Identification of HCV in pregnancy: Advantages

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- Avoid risk factors during pregnancy
- Ability to identify exposed infant
- Opportunity to link to care during/after pregnancy
- Treatment after pregnancy should eliminate risk to any subsequent pregnancies

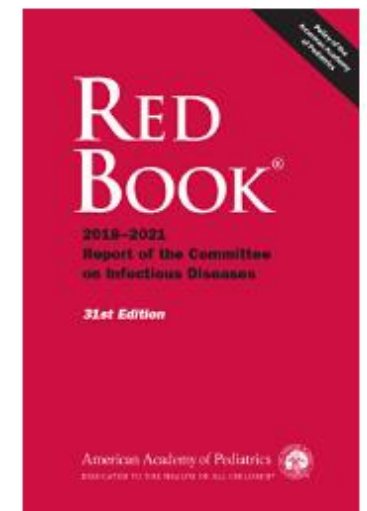


# Infant HCV Testing Guidelines

- HCV Ab testing at 18 months

OR

- HCV RNA testing can be performed as early as 1-2 months if:
  - Follow-up concerns
  - Family desire
  - Antiviral therapy becomes available to infants



# Perinatal HCV Testing



Complete Follow-Up/Testing



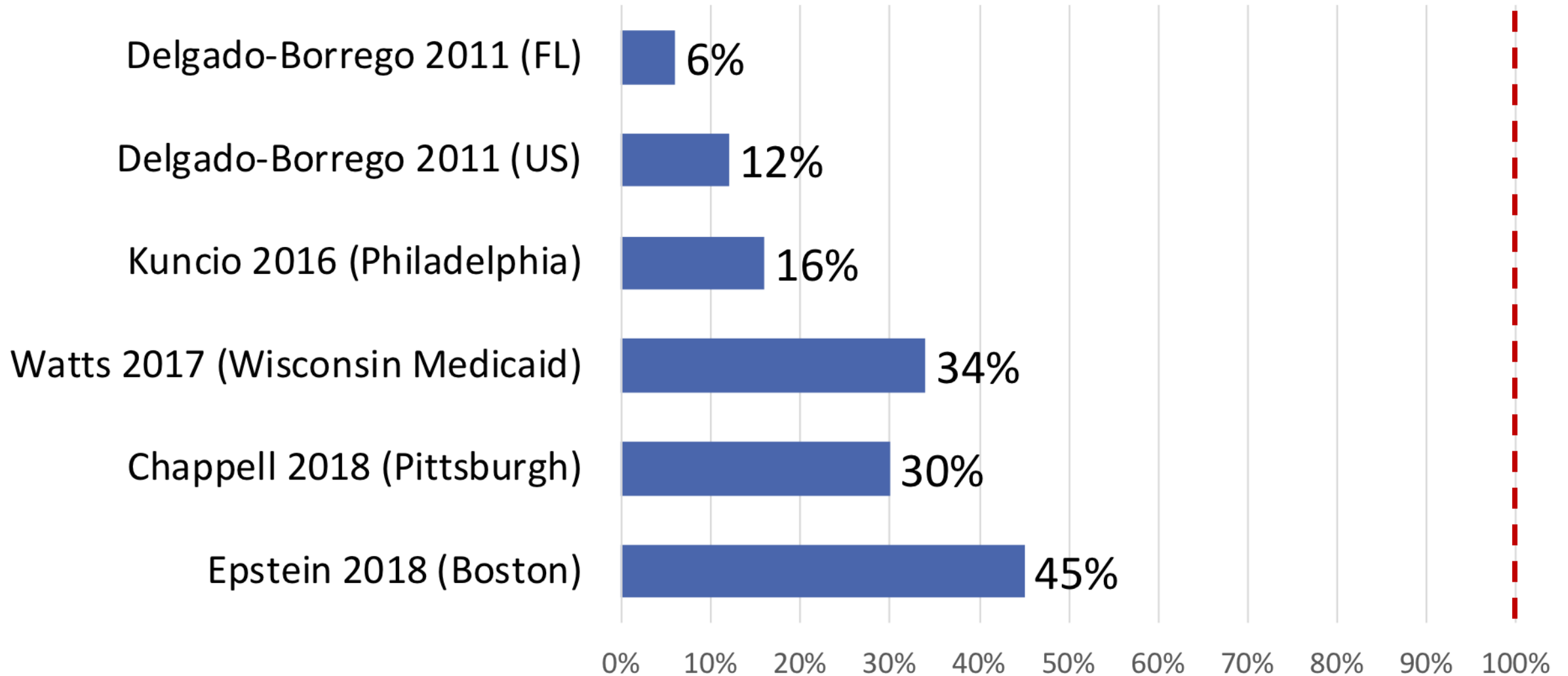
HCV Ab **positive**  $\geq$  18mo  
HCV RNA **positive** x 2

- HCV-infected

HCV Ab **negative** anytime  
HCV RNA **negative** x 2

- HCV-negative

# Proportion of HCV-exposed infants tested for HCV



# Objectives

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- Discuss HCV epidemiology and testing recommendations in pregnant women and infants
- **Explore implications of expanding testing and linkage for pregnant women and infants**
- Explore prevention prior to pregnancy



# Short-Term Effects and Long-Term Cost-Effectiveness of Universal Hepatitis C Testing in Prenatal Care

*Abriana Tasillo, Golnaz Eftekhari Yazdi, MSc, Shayla Nolen, MPH, Sarah Schillie, MD, MPH, Claudia Vellozzi, MD, MPH, Rachel Epstein, MD, MA, Liisa Randall, PhD, Joshua A. Salomon, PhD, and Benjamin P. Linas, MD, MPH*

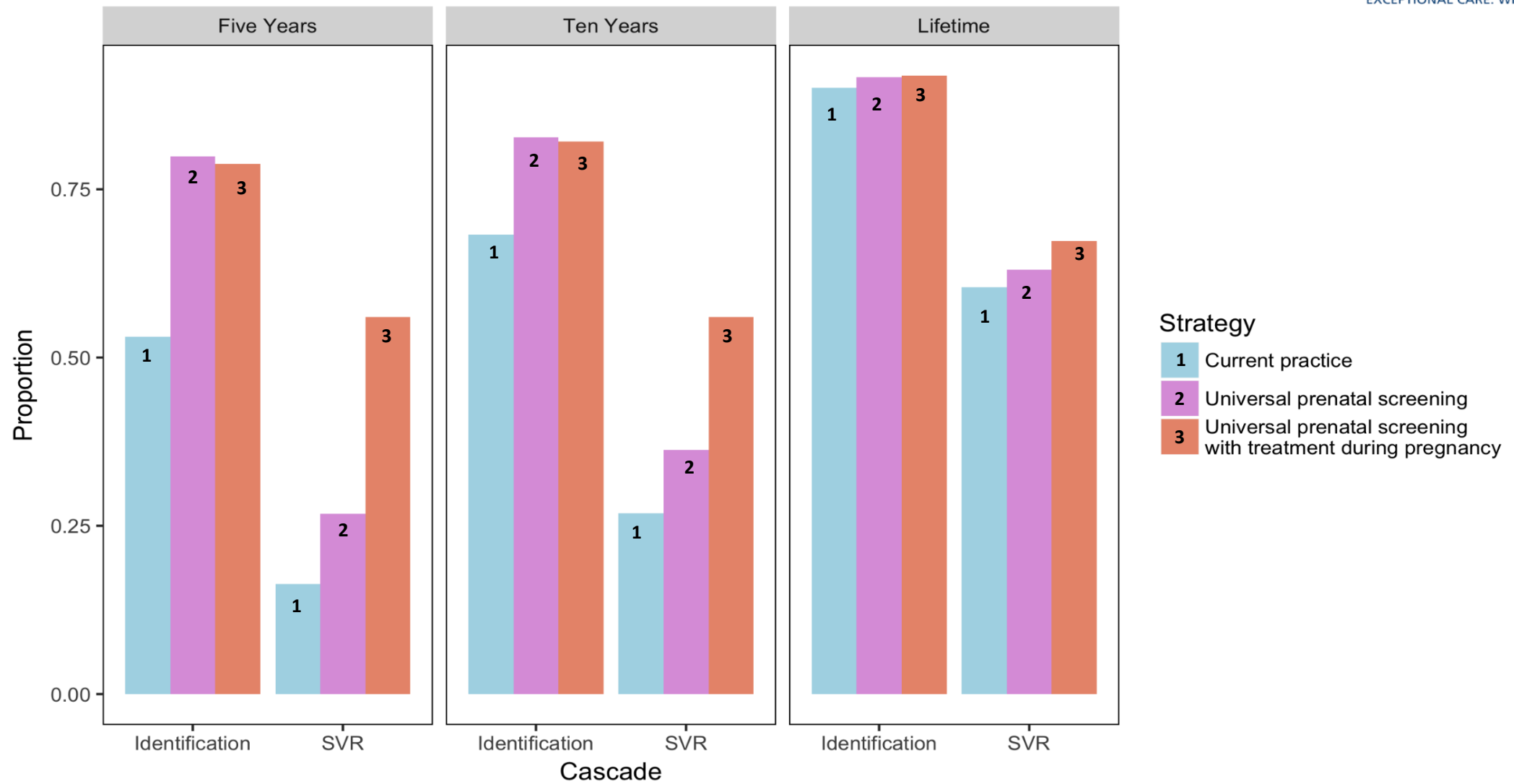
- Simulated pregnant women through their lifetimes, with HCV testing occurring during pregnancy and in other venues, modeled case identification, disease progression and treatment
- Used pregnancy rates, HCV prevalence, linkage to care and treatment rates from literature

# Universal HCV Testing in Pregnancy

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- Universal HCV Testing:
  - Increased life-expectancy for HCV-infected women by 1.21 years
  - Decreased HCV-attributable mortality by 16%
  - Found to be cost-effective compared to many other healthcare interventions in the U.S.

# Universal HCV Testing in Pregnancy



# Universal HCV Testing in Pregnancy

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- 92% HCV-infected pregnancies – and therefore HCV-exposed infants identified with universal testing (assuming perfect infant screening) - compared to 44% with current testing practices
- Through treatment prior to subsequent pregnancy: 6% decrease in proportion of HCV-exposed infants

# The BMC Experience

- **Screening protocol**
- Institutional progress to date to screen infants
- Program implementation to improve follow-up for women and infants



Recovery  
Empowerment  
Social Services  
Prenatal Care  
Education  
Community  
Treatment



# Perinatal HCV Testing Algorithm at BMC:

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- At birth: Pediatric Infectious Diseases (ID) Consult
- Before discharge: Apt scheduled with Pedi ID for 2 months of age
- HCV testing: LFTs, HCV RNA, & after 2mo: HCV Ab
  - Age  $\geq$  2 months
  - Age 9-12 months
  - Age 18 months

# The BMC Experience

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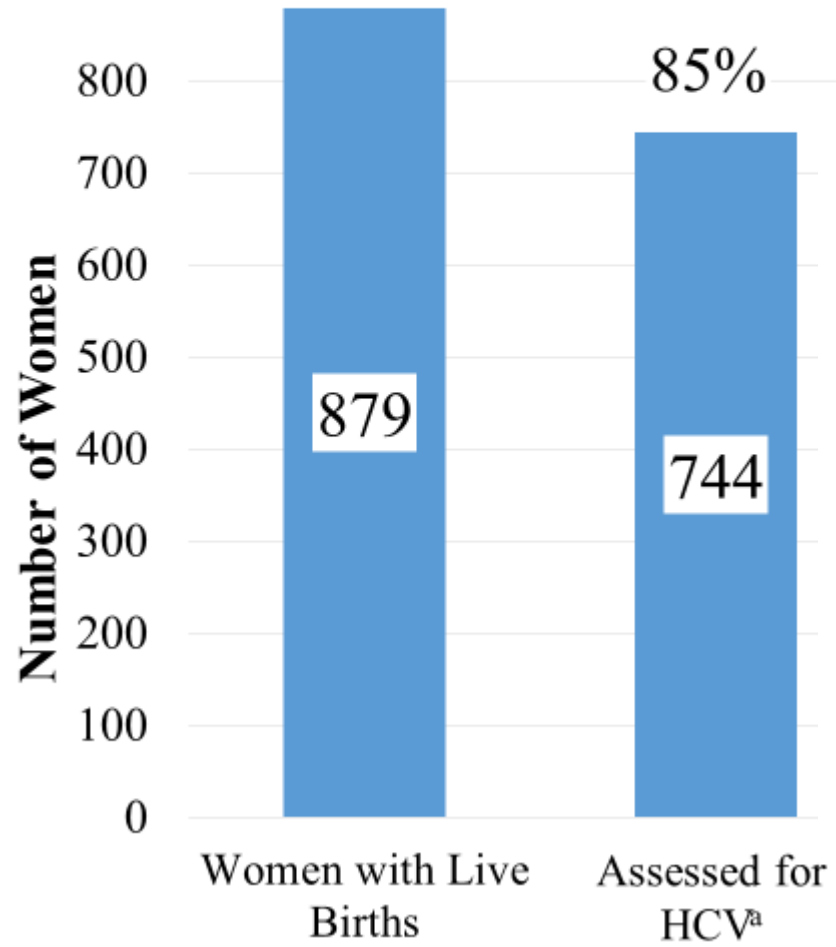
## Perinatal Transmission of Hepatitis C Virus: Defining the Cascade of Care

Rachel L. Epstein, MD, MA<sup>1,2</sup>, Vishakha Sabharwal, MBBS<sup>1</sup>, Elisha M. Wachman, MD<sup>3</sup>, Kelley A. Saia, MD<sup>4</sup>,  
Claudia Vellozzi, MD, MPH<sup>5</sup>, Susan Hariri, PhD<sup>5</sup>, and Benjamin P. Linas, MD, MPH<sup>2</sup>

- All women-infant dyads delivered at BMC 2006 – 2015, with diagnosed opioid use disorder\*
- Queried electronic medical record, chart abstraction
- Described HCV Care Cascades
- Analyzed factors associated with follow-up

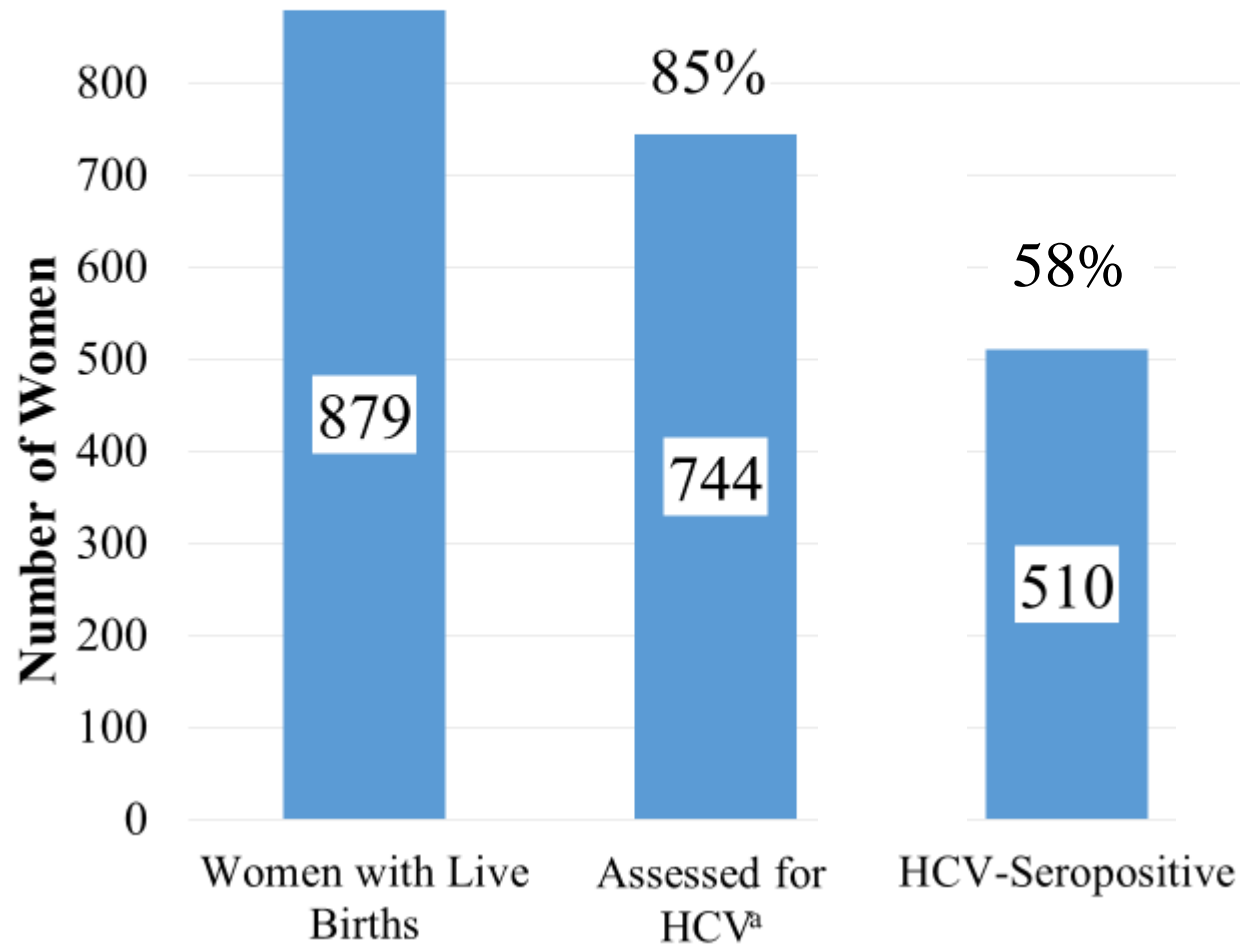


# Maternal HCV Care Cascade, Boston Medical Center, 2006-2015



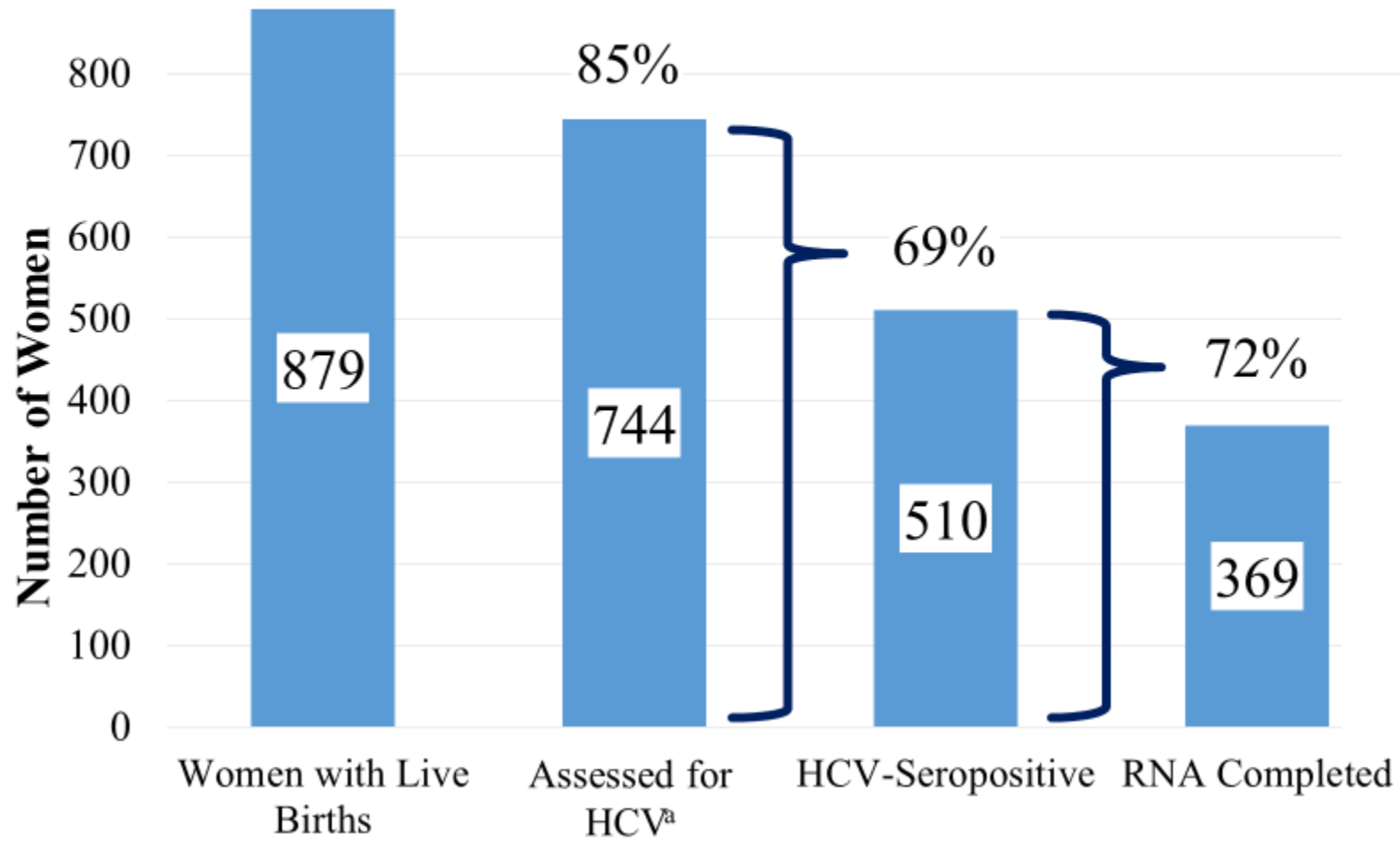
<sup>a</sup>Assessed for HCV refers to HCV testing during pregnancy or HCV on problem list 25

# Maternal HCV Care Cascade, Boston Medical Center, 2006-2015

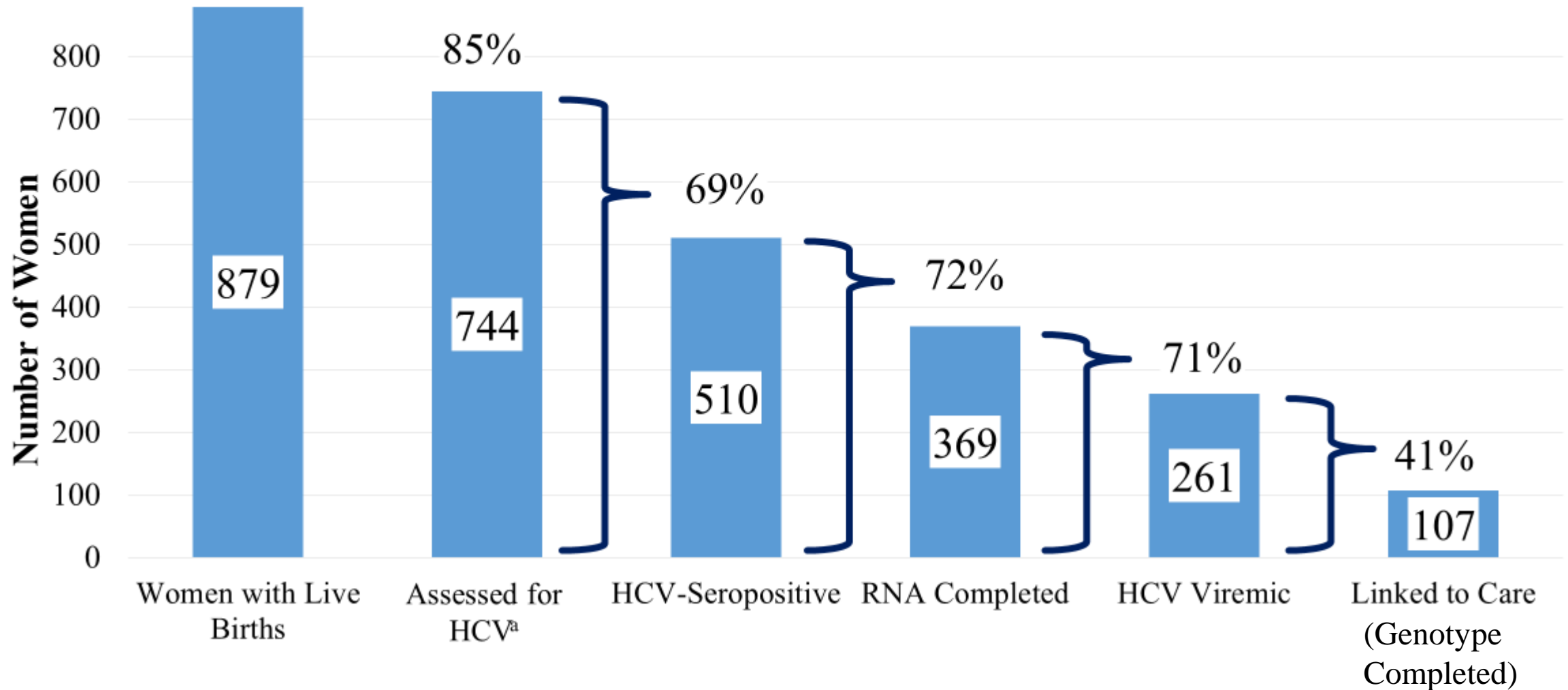


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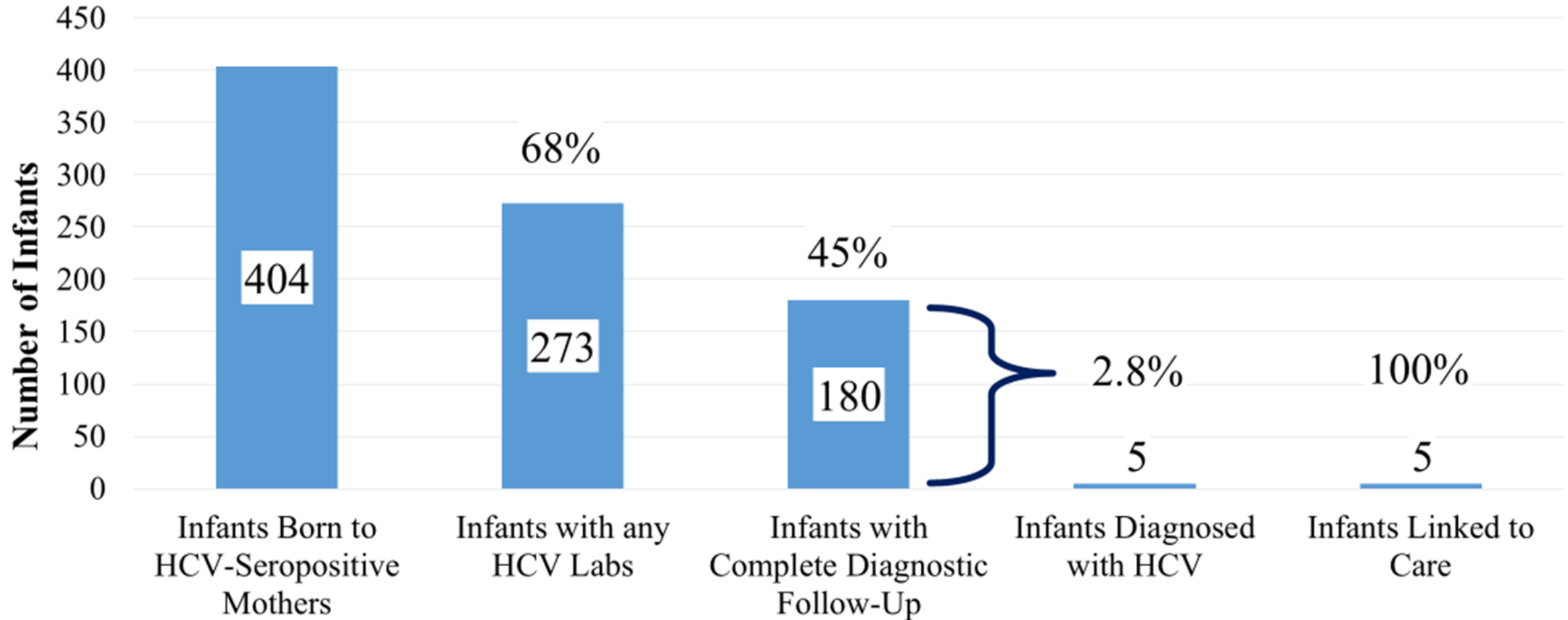


# Maternal HCV Care Cascade, Boston Medical Center, 2006-2015



<sup>a</sup>Assessed for HCV refers to HCV testing during pregnancy or HCV on problem list 28

# Infant HCV Care Cascade, Boston Medical Center, 2006-2015

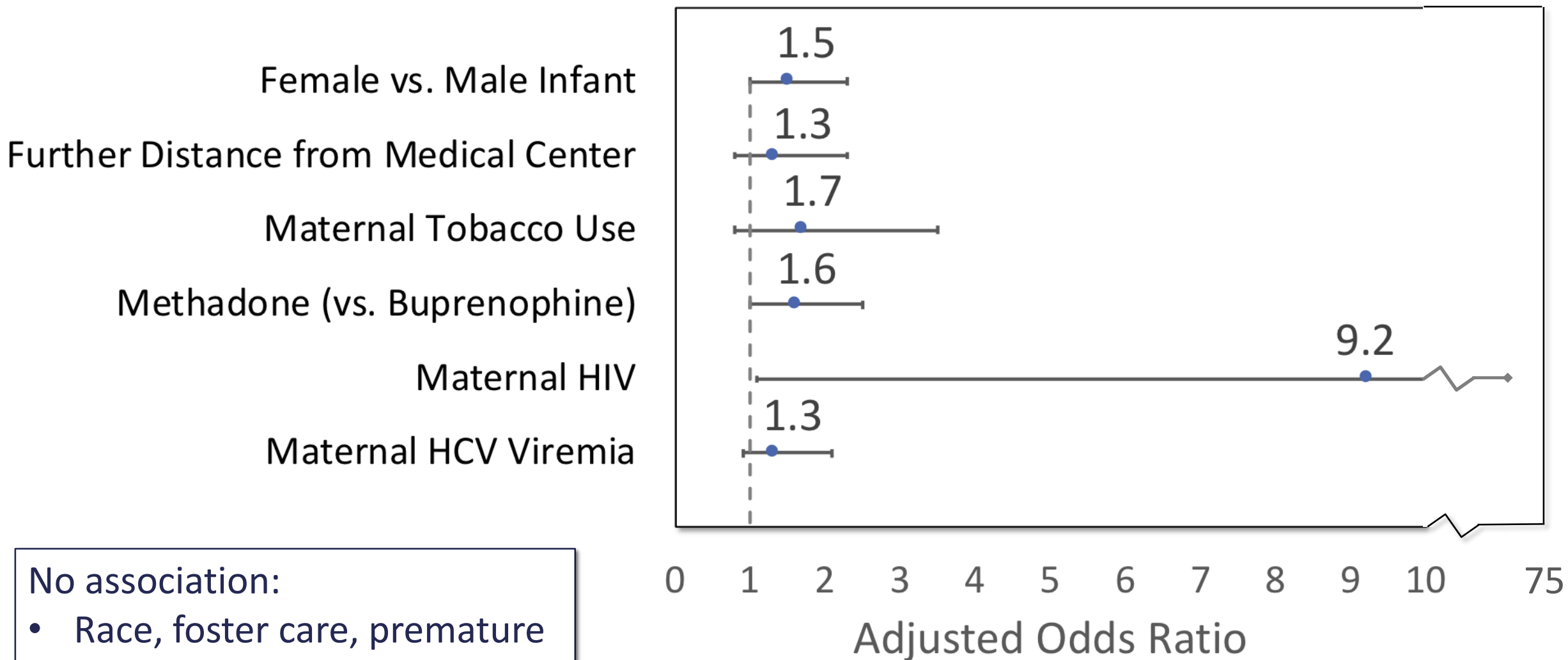


# Further Analysis: BMC Follow-up

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- 56% (234/404) of infants had  $\geq 1$  visit with pediatric ID
  - 72% (169/234) completed follow-up
- 30% (120/404) of infants had continued primary care at BMC
  - 81% (97/120) completed follow-up

# Predictors of Infant Follow-up



No association:

- Race, foster care, premature delivery, ongoing drug use

# The BMC Experience

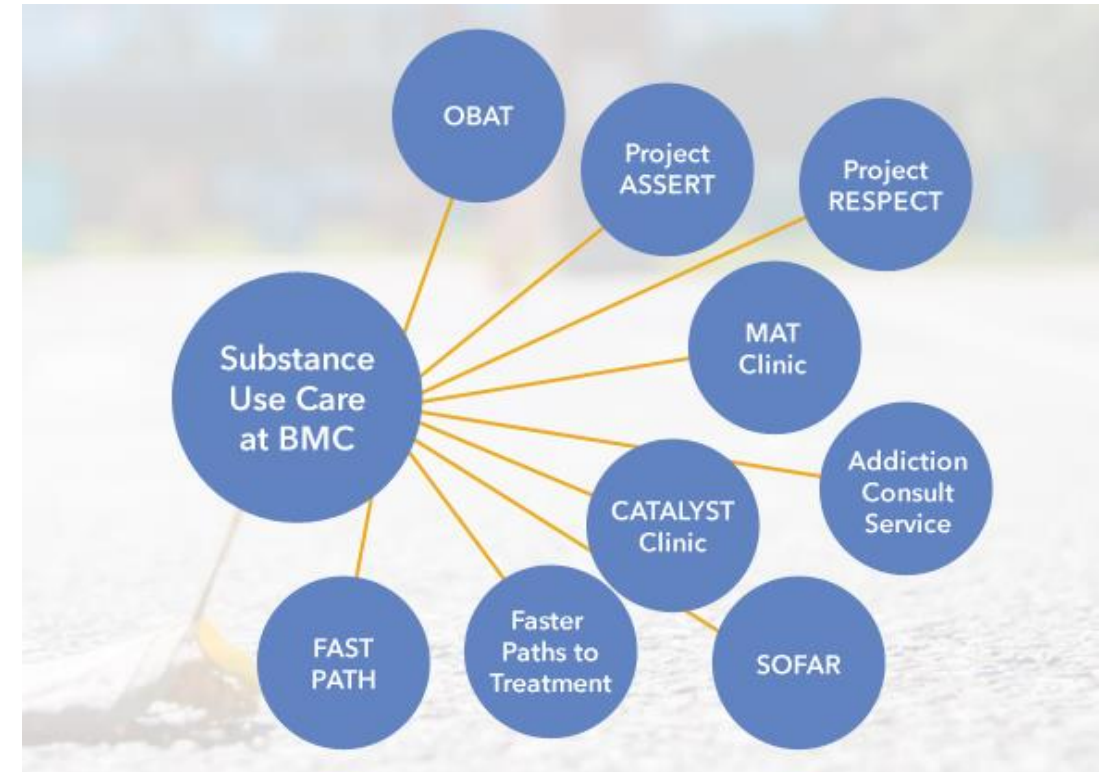
- Program implementation to improve follow-up for women and infants



Recovery  
Empowerment  
Social Services  
Prenatal Care  
Education  
Community  
Treatment

SOFAR

(Supporting Our Families through Pediatric Infectious Diseases)





# The BMC Experience

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- Pediatric Infectious Diseases Consult for every HCV-exposed infant (10/2016 - )
  - Purpose: Link mother, infant (and father) to HCV care
- SOFAR (Supporting Our Families through Addiction and Recovery)
  - Co-located multidisciplinary follow-up clinic (7/2017 - )
  - Created to improve both primary care and subspecialty follow-up and outcomes

# Objectives

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- **Explore prevention prior to pregnancy**

# HCV in Adolescents

- HCV diagnoses in pediatric hospitals ↑ 37% 2006-2012<sup>1</sup>



- Reported acute HCV cases in Massachusetts doubled 2002-2009 among 15-24 year olds (with enhanced surveillance)<sup>2</sup>



# Knowledge Gap: Pediatric HCV Testing

- 15-30 year-olds are more likely to link to care,<sup>2</sup> and most likely to transmit<sup>3</sup>
- <0.5% commercially insured youth <18 years HCV tested, 2006-2014<sup>1</sup>
  - Compared with 2.5 - 4.1% of adults

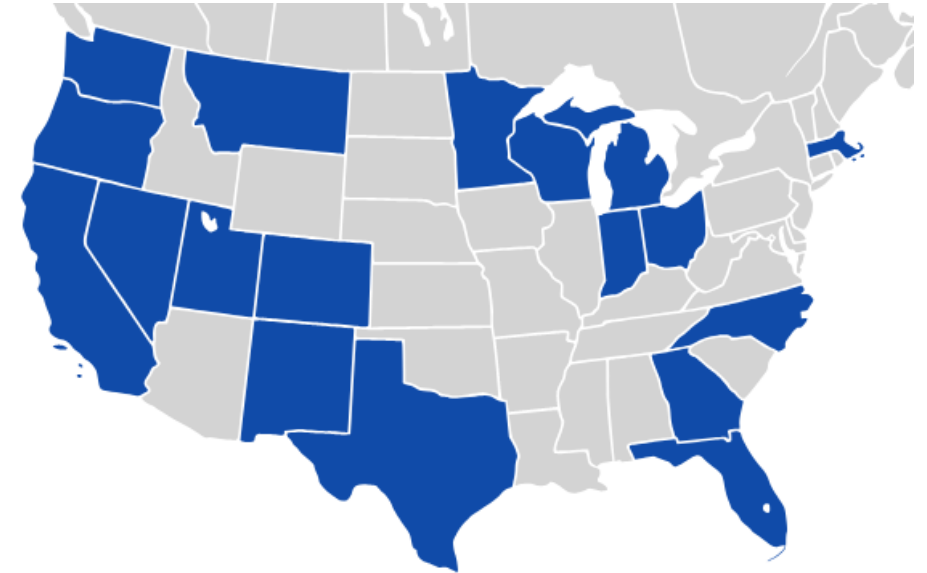
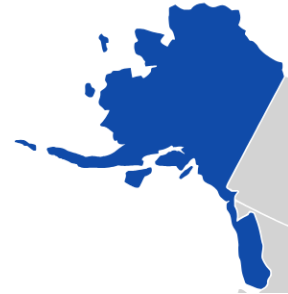


# HCV Testing Among Adolescents and Young Adults in a National Sample of Federally Qualified Health Centers

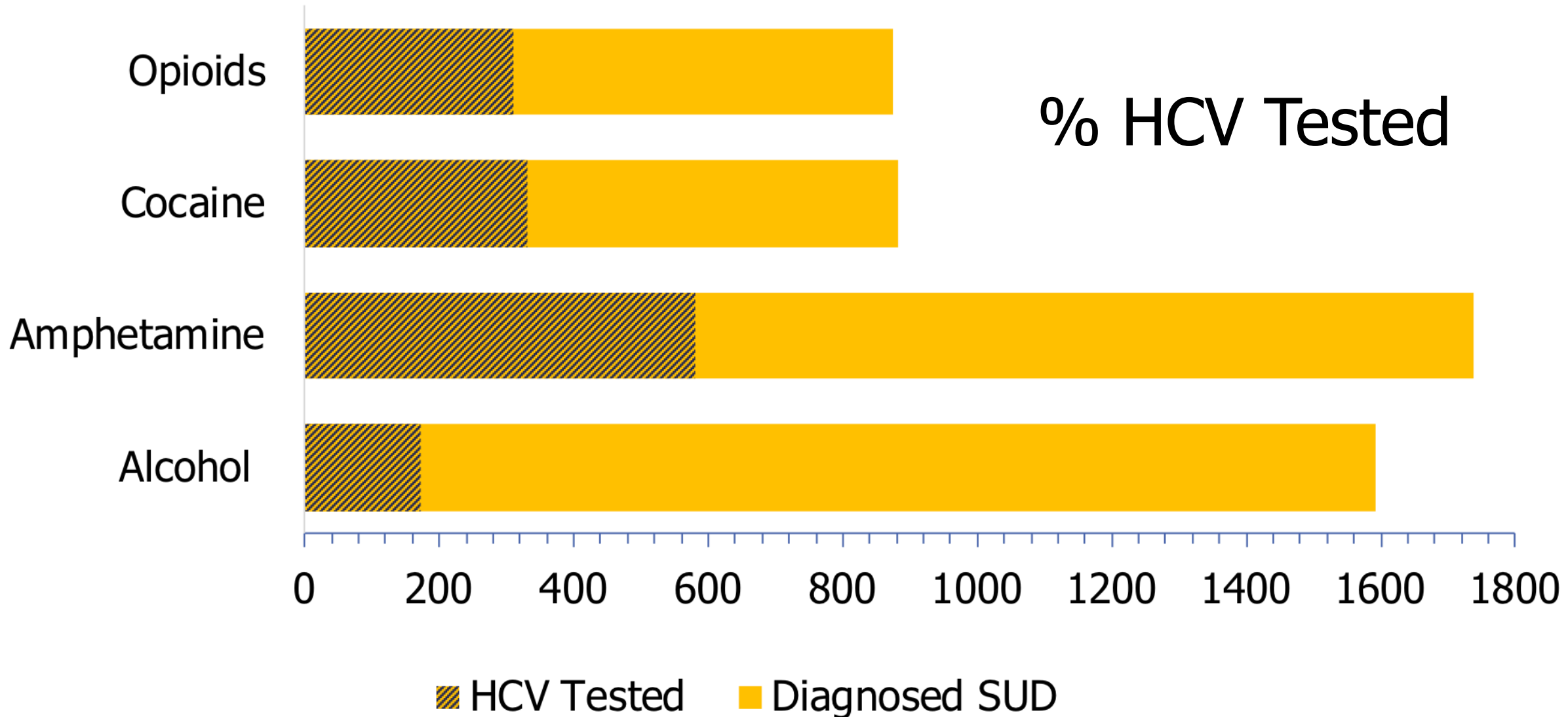


- 13-21 years old
- $\geq 1$  FQHC visit
- 1/2012 – 9/2017

- OCHIN Network Federally Qualified Health Centers (FQHCs)
- 340 Clinic Sites, 19 States



# HCV Testing by Diagnosed SUD



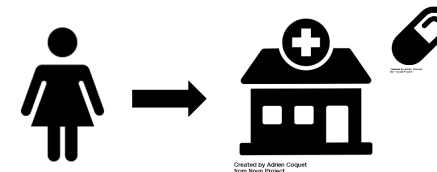
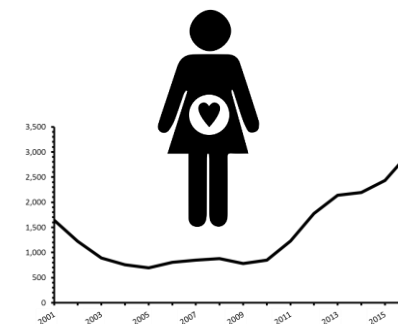
†SUDs not mutually exclusive

# HCV Testing Among Adolescents and Young Adults

- Of youth with diagnosed OUD, tested for HCV  
→ 11% HCV seropositive
- Of all HCV-tested, only 11% tested for HIV
- Efforts are needed to increase screening for substance use, HCV and HIV

# Summary:

- HCV incidence is increasing, including in pregnant women
- Efforts to follow HCV-exposed infants are needed, as well as consensus on best testing protocols
- Increasing HCV testing and linkage in prenatal care, among other venues, could help to achieve HCV elimination goals



Courtesy of Adnan Coggett from Nonan Project



# HCV testing in prenatal setting: Summary

- Venue for testing and identification of women
- Allows risk factor minimization during pregnancy
- Ability to identify exposed infant
- Opportunity to link to care during/after pregnancy
- Treatment after pregnancy should eliminate risk to any subsequent pregnancies



Created by Adrien Coquet  
from Noun Project

Created by Josephine Aucoin  
from Noun Project

# Discussion Questions

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1. Are there any initiatives in your state to implement universal HCV testing or enhanced linkage to care for pregnant women?
2. What barriers might exist in your state to implementation of universal HCV testing in pregnancy? (coverage of testing, treatment, availability of HCV providers)

# Acknowledgements



EXCEPTIONAL CARE. WITHOUT EXCEPTION.

Mentors: Drs. Sabrina Assoumou, Benjamin Linas, C. Robert Horsburgh, Vishakha Sabharwal, and Stephen Pelton


Collaborators: Carole Moloney, Elisha Wachman, Kelley Saia, Jenny Wang, Jon Puro, Kenneth Mayer



And of course, all the patients, faculty and staff of the RESPECT, SOFAR, OCHIN and BMC Pediatric ID Clinics



## Funding:

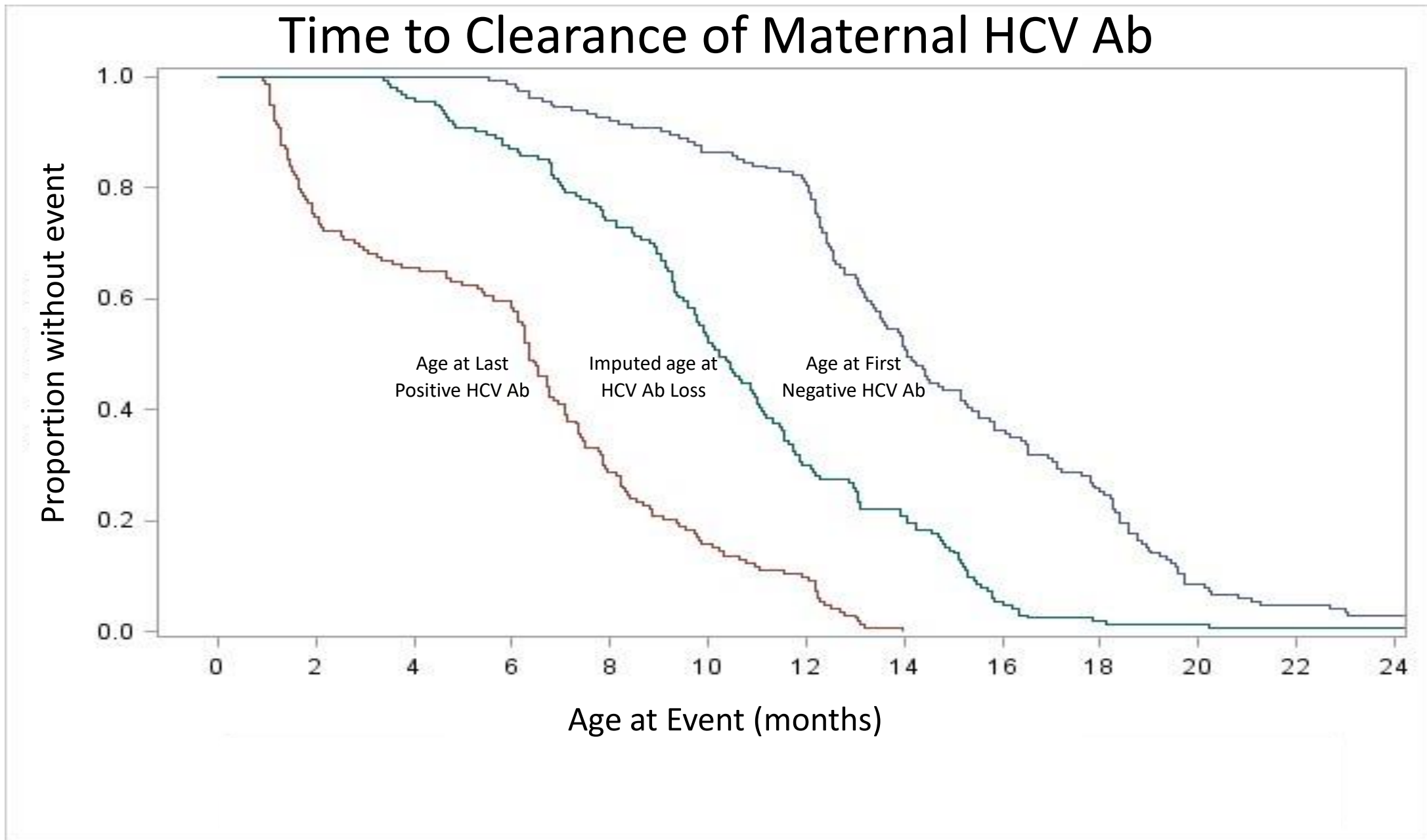
- Centers for Disease Control and Prevention, National Center for HIV, Viral Hepatitis, STD, and TB Prevention Epidemiologic and Economic Modeling Agreement (5U38PS004644)
-  Clinical & Translational Science Institute (1UL1TR001430), BU-CHART T32 (5T32AI052074-12)
- NIDA (K23 DA044085, R01DA046527, P30 DA040500, R25DA013582)
- Center for Health Economics of Treatment Interventions for Substance Use Disorder, HCV, and HIV (CHERISH)(P30DA040500)
- BMC Department of Pediatrics, Providence/Boston Center for AIDS Research (P30AI042853).



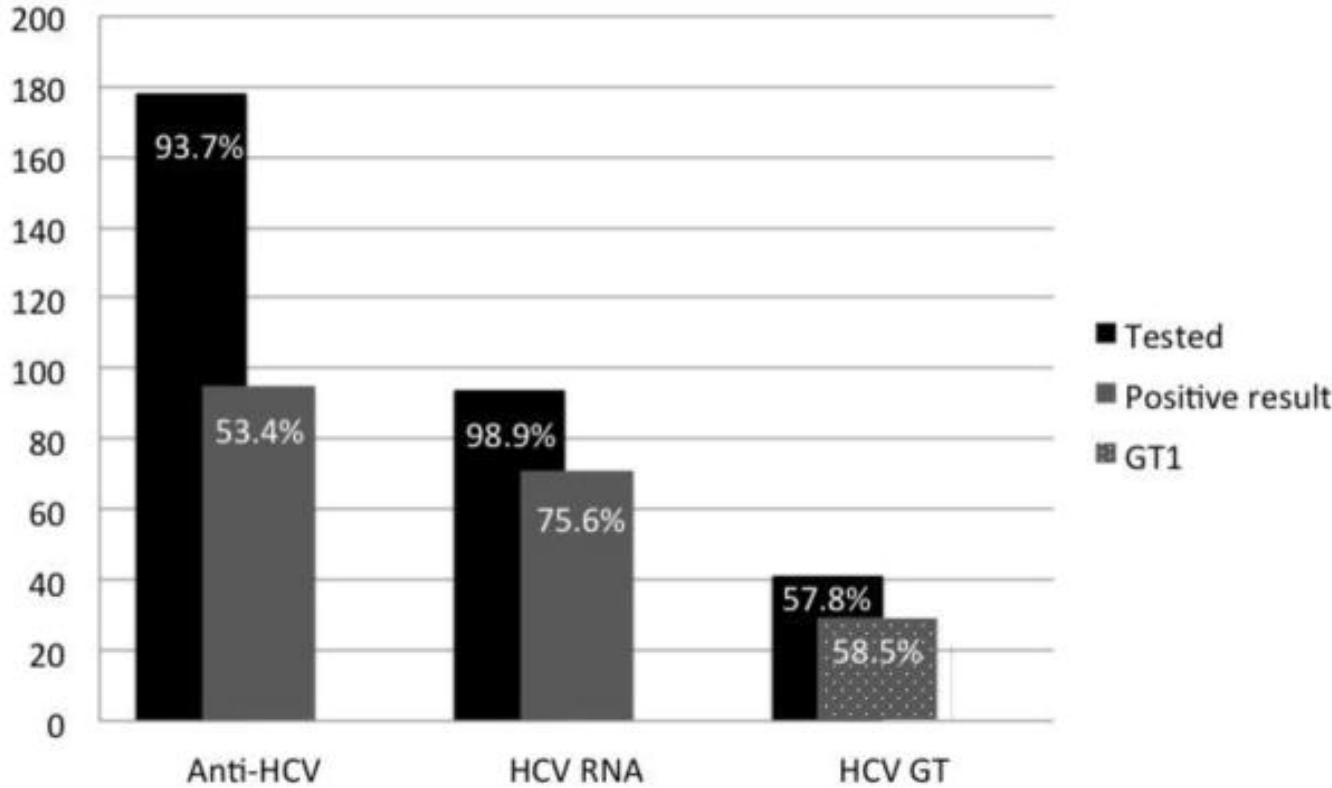
# Additional Slides

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# Time to Clearance of Maternal HCV Ab



# HCV Care Cascade in Pregnancy



HCV Testing Cascade and Results among 190 Pregnant Women attending the Milagro Clinic and enrolled in the BIPS and ENRICH cohorts

Hepatitis C Cascade of Care among pregnant women on opioid agonist pharmacotherapy attending a comprehensive prenatal program  
Kimberly Page, PhD, MPH,<sup>1</sup> Lawrence Leeman, MD, MPH,<sup>2</sup> Steven Bishop, M.S.,<sup>3</sup> Sandra Cano, M.A.,<sup>3</sup> Ludmila N. Bakhireva, MD, PhD, MPH<sup>1,2,3</sup>

# HCV Perinatal Transmission: Ongoing Studies

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- **Transmission Risk Factors:**

- Multi-site Observational Study of HCV in Pregnancy (NCT01959321) - Maternal-Fetal Medicine Units Network  
<https://clinicaltrials.gov/ct2/show/NCT01959321>

- **Treatment during pregnancy:**

- Ongoing Phase 1 study of ledipasvir/sofosbuvir started at 23-24 weeks gestation, PK data (NCT02683005)  
<https://clinicaltrials.gov/ct2/show/study/NCT02683005>