Pregnant Women & Infants: Improving the Hepatitis C Care Cascade

Rachel Epstein MD, MA
Attending Physician, Department of Pediatrics, Section of Infectious Diseases
Post-Doctoral Research Fellow, Department of Medicine, Section of Infectious Diseases
Boston Medical Center
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Disclosures

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Objectives

• 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

Source: CDC, National Notifiable Diseases Surveillance System (NNDSS)
Proportion of infants born to women with HCV infection

Kentucky

Wisconsin


*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.
HCV Testing in Pregnancy

• Current CDC/USPSTF recommendations: Risk factor-based

• May 2018

• Test all pregnant women, at entry to prenatal care

• Why? Poor testing rates, substantial cases without identified risk factors\(^1,2\)

Perinatal Transmission of HCV: Implications

- 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

- Venue for testing and identifying women
Identification of HCV in pregnancy: Advantages

• Venue for testing and identifying women
• Avoid risk factors during pregnancy
Identification of HCV in pregnancy: Advantages

- Venue for testing and identification of women
- Avoid risk factors during pregnancy
- Ability to identify exposed infant
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Identification of HCV in pregnancy: Advantages

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- 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 ≥ 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

- Delgado-Borrego 2011 (FL): 6%
- Delgado-Borrego 2011 (US): 12%
- Kuncio 2016 (Philadelphia): 16%
- Watts 2017 (Wisconsin Medicaid): 34%
- Chappell 2018 (Pittsburgh): 30%
- Epstein 2018 (Boston): 45%
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Original Research

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

Abriana Tasillo, Golnaz Estekhari 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

• 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.

*Tasillo et al Obstetrics and Gynecology, 2019*
Universal HCV Testing in Pregnancy

Tasillo et al Obstetrics and Gynecology, 2019
Universal HCV Testing in Pregnancy

• 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

Tasillo et al Obstetrics and Gynecology, 2019
The BMC Experience

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

**RESPECT**

- Recovery
- Empowerment
- Social Services
- Prenatal Care
- Education
- Community
- Treatment
Perinatal HCV Testing Algorithm at BMC:

- 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 ≥ 2 months
  - Age 9-12 months
  - Age 18 months
The BMC Experience

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

**RESPECT**

Recovery  
Empowerment  
Social Services  
Prenatal Care  
Education  
Community  
Treatment
Perinatal Transmission of Hepatitis C Virus: Defining the Cascade of Care

Rachel L. Epstein, MD, MA\textsuperscript{1,2}, Vishakha Sabharwal, MBBS\textsuperscript{1}, Elisha M. Wachman, MD\textsuperscript{3}, Kelley A. Saia, MD\textsuperscript{4}, Claudia Vellozzi, MD, MPH\textsuperscript{5}, Susan Hariri, PhD\textsuperscript{5}, and Benjamin P. Linas, MD, MPH\textsuperscript{2}

- 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

*By problem list or agonist use on chart abstraction
Maternal HCV Care Cascade, Boston Medical Center, 2006-2015

Number of Women

- Women with Live Births: 879
- Assessed for HCV: 744

85%

*Assessed for HCV refers to HCV testing during pregnancy or HCV on problem list*
Maternal HCV Care Cascade, Boston Medical Center, 2006-2015

- Women with Live Births: 879
- Assessed for HCV: 744
- HCV-Seropositive: 510

*aAssessed for HCV refers to HCV testing during pregnancy or HCV on problem list*
Maternal HCV Care Cascade, Boston Medical Center, 2006-2015

- Women with Live Births: 879
- Assessed for HCV\(^a\): 744 (85%)
- HCV-Seropositive: 510 (69%)
- RNA Completed: 369 (72%)
Maternal HCV Care Cascade, Boston Medical Center, 2006-2015

- Assessed for HCV refers to HCV testing during pregnancy or HCV on problem list.

- Women with Live Births: 879
- Assessed for HCV: 744 (85%)
- HCV-Seropositive: 510 (69%)
- RNA Completed: 369 (72%)
- HCV Viremic: 261 (71%)
- Linked to Care (Genotype Completed): 107 (41%)
Infant HCV Care Cascade, Boston Medical Center, 2006-2015

- Infants Born to HCV-Seropositive Mothers: 404
- Infants with any HCV Labs: 273
- Infants with Complete Diagnostic Follow-Up: 180
- Infants Diagnosed with HCV: 5
- Infants Linked to Care: 5

68% of infants had any HCV labs.
Further Analysis: BMC Follow-up

• 56% (234/404) of infants had ≥ 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

*By problem list or agonist use on chart abstraction
Predictors of Infant Follow-up

Female vs. Male Infant
Further Distance from Medical Center
Maternal Tobacco Use
Methadone (vs. Buprenophine)
Maternal HIV
Maternal HCV Viremia

No association:
• Race, foster care, premature delivery, ongoing drug use

Adjusted Odds Ratio

1.5
1.3
1.7
1.6
1.3
9.2

0 1 2 3 4 5 6 7 8 9 10 75
The BMC Experience

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

SOFAR (Supporting Our Families through Addiction and Recovery)

Pediatric Infectious Diseases

Recovery
Empowerment
Social Services
Prenatal Care
Education
Community
Treatment
The BMC Experience

• 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
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HCV in Adolescents

- HCV diagnoses in pediatric hospitals increased 37% 2006-2012\(^1\)

- Reported acute HCV cases in Massachusetts doubled 2002-2009 among 15-24 year olds (with enhanced surveillance)\(^2\)

Knowledge Gap: Pediatric HCV Testing

• 15-30 year-olds are more likely to link to care,\textsuperscript{2} and most likely to transmit\textsuperscript{3}

• <0.5\% commercially insured youth <18 years HCV tested, 2006-2014\textsuperscript{1}

→ 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
- ≥1 FQHC visit
- 1/2012 – 9/2017

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

Epstein et al, IDWeek 2018, OFID November 2018
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

Epstein et al, IDWeek 2018, OFID November 2018
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
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
Discussion Questions

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)
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Additional Slides
Time to Clearance of Maternal HCV Ab

- Age at Last Positive HCV Ab
- Imputed age at HCV Ab Loss
- Age at First Negative HCV Ab

Epstein et al J Pediatrics 2018
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,1 Lawrence Leeman, MD, MPH,2 Steven Bishop, M.S.,3 Sandra Cano, M.A.,3 Ludmila N. Bakhireva, MD, PhD, MPH1,2,3
HCV Perinatal Transmission: Ongoing Studies

- **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