Infants with Congenital Zika Virus Infection and their Families

A Webinar from the Departments of Health and Human Services and Education and AUCD's Early Intervention and Early Childhood Special Interest Group

Presented by
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Webinar Overview

• Introductions
• Presentation
• Q & A after presentation
  – You can also submit any questions throughout the webinar via the ‘Chat’ box below the slides.
  – The moderator will read the questions after the presentations.
• Survey
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Objectives

1. Understand foundational Zika virus infection information.
2. Identify case numbers and sources for finding updated information about infants with congenital Zika virus infection.
3. Review current information on clinical findings in infants with congenital Zika Virus infection.
4. Discuss evolving clinical, policy and research implications for early childhood professionals serving infants with congenital Zika virus infection and their families.
5. Identify resources that may assist families with infants exposed to Zika virus infection.
Introduction

• Zika is spread mostly by the bite of an infected *Aedes* species mosquito.

• Zika is spread by sexual contact.

• Zika can be passed from a pregnant woman to her fetus.

• Zika infection during pregnancy can cause certain birth defects.

CDC, 2017
Introduction

• There is no vaccine or medicine for Zika.

• Local mosquito-borne Zika virus transmission has been reported in the continental United States – Florida and Texas.

• In most cases, Zika virus causes only mild illness with most people having no symptoms at all.

CDC, 2017
Introduction

• Danger to women who are pregnant or are trying to become pregnant is much greater.

• Zika virus disease and Zika virus congenital infection are nationally notifiable conditions.

• The impact Zika virus can have on fetal/infant health and development is concerning.

• For infants with congenital Zika virus infection and their families, the impact goes beyond microcephaly.

CDC, 2017
Introduction

• Wide-spread outbreak in US is unlikely.
• Travel-associated cases will continue.
• Infections will rise again during the summer.

Moreno-Madrinan & Turell, 2017
World Health Organization

• **February 1, 2016** Ongoing Zika virus infection outbreak is a “Public Health Emergency of International Concern.”

• **November 18, 2016** Zika virus infection outbreak is no longer a global emergency, but it should be viewed as an on-going threat.

• **February 2, 2017** Zika Situation Report
Zika virus is “a startlingly complex infection.”

Continue to warn pregnant women about the risks of Zika and the need to protect themselves, avoiding travel to places where the virus is active.

Scientists need to continue ongoing studies on the long-term effects of Zika exposure.

Better diagnostics are needed.

More effective pesticides and other mosquito control methods are needed.
Zika Cases Reported in the United States
Laboratory-confirmed Zika virus disease cases reported to ArboNET by state or territory (as of February 8, 2017)
Travel-Associated v. Local Transmission  

- Travel-associated cases reported: 5,001
- Laboratory acquired cases reported: 1
- Sexually transmitted: 41

- In the United States, locally acquired mosquito-borne cases reported: 220
  - Florida 214
  - Texas 6

- Currently, New Jersey has travel associated cases only 175 as of February 8, 2017
ZIKV infection during any stage of pregnancy

ZIKV breach of placental barrier
- Mechanism unclear
- ZIKV can cause placental insufficiency

ZIKV vertical transmission

ZIKV neurotropism
- Observed in human neural organoids
- Mouse models

Potential adverse outcomes
- Microcephaly
- Intrauterine growth restriction
- Ocular abnormalities
- Fetal demise
- Long-term outcome: unknown
How is Zika virus transmitted congenitally and perinatally?

Zika virus is transmitted to humans primarily through the bite of an infected *Aedes* species mosquito. *Aedes* mosquitoes are aggressive daytime biters and feed both indoors and outdoors. They can also bite at night. Zika virus can be transmitted from a pregnant mother to her fetus during pregnancy (congenital transmission) or around the time of birth (perinatal transmission). We do not know how often perinatal Zika transmission occurs. Additionally, spread of the virus through sexual contact and blood transfusion has been reported. Organ or tissue transplantation, and certain fertility treatments pose theoretical risks for Zika virus transmission.

What is the difference between congenital and perinatal transmission of Zika virus?

Congenital or intrauterine transmission of Zika virus occurs when a woman is infected with Zika virus during her pregnancy, but before delivery, and the virus passes to the fetus. Perinatal transmission of Zika virus occurs when a woman is infected with the Zika virus within approximately 2 weeks of delivery, and the virus passes to the infant at or around the time of delivery. When an infant acquires Zika virus infection prenatally, the infant may develop symptoms such as maculopapular rash, conjunctivitis, arthralgia, and fever.

If a mother had Zika virus infection during pregnancy or currently has Zika virus infection, should she breastfeed her infant?

Zika virus has been identified in breast milk, but infant Zika virus infection associated with breastfeeding has not been reported. Current evidence suggests that the benefits of breastfeeding outweigh the theoretical risk of Zika virus infection transmission through breast milk. CDC encourages mothers with Zika virus infection and mothers living in areas with ongoing Zika virus transmission to breastfeed their infants.
Pregnant Women with Any Laboratory Evidence of Possible Zika Virus Infection in the United States and Territories

- United States and District of Columbia (1,455)*
- US Territories and Puerto Rico (3,156)

*Includes aggregated data reported to the US Zika Pregnancy Registry as of February 7, 2017

• Outcomes of Pregnancies with Laboratory Evidence of Possible Zika Virus Infection in the United States, February 7, 2017
  • Completed Pregnancies with and without birth defects (1,047)
  • Liveborn with birth defect (43)
  • Pregnancy losses with birth defect (5)

CDC, Outcomes of Pregnancies with Laboratory Evidence of Possible Zika Virus Infection in the United States, 2016-2017
Live-Born Infants

• Liveborn infants with birth defect 43  (February 7, 2017)

CDC, Outcomes of Pregnancies with Laboratory Evidence of Possible Zika Virus Infection in the United States, 2016-2017
New Jersey Experience

• NJ was one of the 1st States to get their United States Zika Pregnancy Registry up and running.

• Efforts are a collaboration between several different departments including Reproductive & Perinatal Health Services, Early Identification and Monitoring and Center for Disease Services.

• Evolving evidence and guidelines.
Where to find information about Zika in your state

**NJ 24/7 Zika Call Center**

**1-800-962-1253**
DOH & NJ Poison Information and Education System partner to open call line.
Clinical Findings

- Arthrogryposis
- Clubfoot
- Eye anomalies
- Hearing loss
- Hypertonia
- Hypotonia

Clinical Findings

• Irritability
• Microcephaly and other serious brain anomalies
• Seizures
• Spasticity
• Sucking impairment
• Swallowing dysfunction

Clinical Findings

• Moore and colleagues did a comprehensive review to evaluate what the evidence says about the pattern of anomalies for infants with congenital Zika infection
  • Brain
  • Eyes
  • Muscles and joints

Moore et al. (2016). Characterizing the pattern of anomalies in congenital Zika infection for pediatric clinicians. JAMA Pediatrics.
Pattern of anomalies

Found 5 features rarely seen with other congenital infections or are unique to congenital ZIKV infection

1. Severe microcephaly with partially collapsed skull
2. Thin cerebral cortices with subcortical calcifications
3. Macular scarring and focal pigmentary retinal mottling
4. Congenital contractures
5. Marked early hypertonia and symptoms of extrapyramidal involvement

Moore et al. (2016). Characterizing the pattern of anomalies in congenital Zika infection for pediatric clinicians. JAMA Pediatrics.
Growing Up AFTER ZIKA

Zika’s Effects on the Developing Brain
Infants exposed to Zika in the womb can be born with a small head, a condition called microcephaly. But a small head is only the most visible result. Researchers are finding that Zika also can affect the structure and function of a baby’s brain, regardless of head size.

- Healthy brain
- Microcephaly: Zika damages cells in the developing brain so the brain and head do not reach full size.
- Brain calcifications: Calcium builds up in brain tissue and weakness in brain function.
- Enlarged ventricles: Spaces inside the brain, called ventricles, will grow larger, leading to fluid buildup (hydrocephalus) and pressure.

Other Zika-associated brain abnormalities include a smooth brain with no or few folds (anecephaly), the collapse of the wall (fetal brain disruption sequence), an asymmetrical brain, and the absence of some normal brain structures.

The long-term consequences of exposure to Zika in the womb are still unclear. Based on what is known about fetal exposure to Zika and other infections, problems may include:

- Hearing problems
- Vision problems
- Balance issues
- Developmental and learning delays
- Problems swallowing
- Seizures
- Stiffness and impaired movement
- Low birth weight
- Behavioral issues

NICHD investigates development throughout the entire life process, including fetal development and early childhood.

Studying Zika and its effects will help us care for children—both now and as they grow—as they can reach their potential for healthy lives. Learn more about NICHD-supported research on Zika virus at [www.nichd.nih.gov/zikaresearch](http://www.nichd.nih.gov/zikaresearch).
Implications for Early Intervention Professionals

• Recognize that knowledge about infants with Congenital Zika Virus is limited and still evolving.

• Knowledge about health and developmental outcomes for infants with Congenital Zika Virus (ZIKV) is lacking.

Lopes & Miroff, 2017; Porter & Mimm, 2017
Implications for Early Intervention Professionals

• Prepare for potential increased demand for services.
• Prepare for cohort of infants and families who may exhibit more intense health and developmental needs than the typical children enrolled in early intervention services.

Porter & Mimm, 2017
Clinical Implications

• Range of findings
• Benefit from expertise of multiple disciplines
• Information Resources
• Checklist for EI Providers

Porter & Mimm, 2017
Clinical Implications

- Family-centered
- Culturally appropriate
- Social determinants of health
- Privacy and confidentiality

Porter & Mimm, 2017
Clinical implications

• Emotional health
• Psychosocial services
• Parent support
• Self-care and respite
Clinical Implications

• Growth parameters
• Hearing
• Vision
• Nutrition, feeding, breastfeeding
• Irritability
• Sleep
• Muscles and joints
• Safety

Porter & Mimm, 2017
INITIAL EVALUATION AND OUTPATIENT MANAGEMENT
DURING THE FIRST 12 MONTHS OF LIFE FOR INFANTS WITH POSSIBLE CONGENITAL ZIKA VIRUS INFECTION

**Mother Not Tested, Or Tested Outside of Appropriate Window**
- **Yes:**
  - Does infant have abnormalities consistent with congenital Zika syndrome?
  - **Yes:**
    - Follow management and follow-up recommendations indicated in Outpatient Management Checklist
  - **No:**
    - Follow management and follow-up recommendations indicated in Outpatient Management Checklist
- **No:**
  - Does infant have lab evidence of Zika virus infection?
  - **Yes:**
    - Perform infant Zika virus testing if evidence of Zika virus infection on maternal testing※
  - **No:**
    - Follow management and follow-up recommendations indicated in Outpatient Management Checklist

**Initial Evaluation**
- Before hospital discharge:
  - Consider transfer to hospital with subspecialty care
  - GEC, metabolic panel, LFTs
  - Ophthalmology exams
  - ABR
  - Consider further monitoring
  - Consult with multiple specialists
- Before hospital discharge:
  - Routine newborn care: physical exam, including head circumference, weight, length and neuro exam
  - Head ultrasound
  - Infant testing for congenital Zika virus infection※ (See Table 3)

**Mother Tested with Positive Result**
- **Yes:**
  - Consider transfer to hospital with subspecialty care
  - GEC, metabolic panel, LFTs
  - Ophthalmology exams
  - ABR
  - Consider further monitoring
  - Consult with multiple specialists
- **No:**
  - Does infant have lab evidence of Zika virus infection?
  - **Yes:**
    - Follow management and follow-up recommendations indicated in Outpatient Management Checklist
  - **No:**
    - Follow management and follow-up recommendations indicated in Outpatient Management Checklist

※Follow management and follow-up recommendations indicated in Outpatient Management Checklist.
CDC's Response to Zika

MEASURING HEAD CIRCUMFERENCE

- Use a measuring tape that cannot be stretched
- Securely wrap the tape around the widest possible circumference of the head
  - Broadest part of the forehead above eyebrow
  - Above the ears
  - Most prominent part of the back of the head
- Take the measurement three times and select the largest measurement to the nearest 0.1 cm
- Head circumference measurements should be taken on the first day of life because commonly-used birth head circumference reference charts by age and sex are based on measurements taken before 24 hours of age

For more information: www.cdc.gov/zika
Policy Implications

• Capacity and resource assessment
• Screening and rescreening; track and follow
• ‘ZIKV’ Cohort
• Severe Deficits
• Transition planning
• Palliative and hospice care
• Protection of childbearing age staff and parents

Research Implications

• Improve understanding of the long-term outcomes for infants exposed to Zika virus in utero (Oussayef et al, 2016)
• Short-term and longer-term developmental outcomes
• Intervention case descriptions
  • Irritability
  • Feeding (breastfeeding)
  • Contractures
  • Vision impairment
  • Family support

Porter & Mimm, 2017
Resources

**CDC Fact Sheets (12/23/16)**


Resources

• Centro de Recursos sobre Virus Zika http://zika-virus-resource-center.elsevier.com.br/
• El virus del Zika: Lo que los padres deben saber https://www.healthychildren.org/Spanish/ages-stages/prenatal/Paginas/zika-virus.aspx
• Facts about Microcephaly http://www.cdc.gov/ncbddd/birthdefects/microcephaly.html
• MMWR Zika Reports http://www.cdc.gov/mmwr/zika_reports.html
Resources


Resources


• HRSA Maternal and Child Health Optimizing Family Support for Families of Children with or at-risk for Congenital Zika Virus Infection https://mchb.hrsa.gov/fundingopportunities/?id=f366b327-d462-4674-8fcb-3ac306a6d5f4

Wrap-up

• Much is still unknown about Zika virus infection.
• Knowledge about health and developmental outcomes for infants with Congenital Zika Virus (ZIKV) is especially limited.
• Early intervention/early childhood professionals need to keep current about the state of the science.
• Early childhood professionals may want to add to the body of knowledge.
Questions

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References


References


References


• Steenhhuysen, 2016 More work lies ahead to fight Zika, other threats: CDC chief  http://www.reuters.com/article/us-health-zika-frieden-idUSKBN14J1HW
References


Thank you!
Visit the Websites

- AUCD Website: http://www.aucd.org
- EIEC SIG Website: http://www.aucd.org/eiec

Questions about the SIG?

- SIG Co-Chairs
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