Zika virus outbreak and considerations for blood transfusion safety in Puerto Rico: 2016

Sridhar V. Basavaraju, M.D.
Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion
Office of Blood, Organ, and Other Tissue Safety
Objectives

- Description of current Zika virus epidemic in the U.S. and territories
- Discuss implications for blood safety
- Present options for strengthening blood safety in Puerto Rico and other affected areas in the U.S.
- Question/Answer and further discussion
What role does CDC play in blood safety?

- Part of Federal government as a Public Health Service (PHS) agency (e.g., FDA, NIH, HRSA)
- PHS agency with primary responsibility for surveillance and detection of public health risks
  - not a regulator
  - not authorized to investigate events on own, but only by assisting local and state authorities
- Creates recommendations in concert with other PHS agencies (we cannot enforce them)
Sources of public health investigations

- CDC will support and assist in investigations upon invitation based on reports from any source.
- These have included:
  - Government agencies (e.g., FDA)
  - State/local health departments
  - Blood centers
  - Pathologists
  - Laboratory staff
  - Clinicians
Zika Virus

- Single stranded RNA virus
- Genus *Flavivirus*, family *Flaviviridae*
- Closely related to dengue, yellow fever, Japanese encephalitis, and West Nile viruses
- Transmitted to humans primarily by *Aedes (Stegomyia)* species mosquitoes
Zika Virus Epidemiology

- First isolated from a monkey in Uganda in 1947
- Prior to 2007, only sporadic human disease cases reported from Africa and southeast Asia
- In 2007, first outbreak reported on Yap Island, Federated States of Micronesia
- In 2013–2014, >28,000 suspected cases reported from French Polynesia*

Zika Virus in the Americas

- In May 2015, the first locally-acquired cases in the Americas were reported in Brazil
- Currently, outbreaks are occurring in many countries or territories in the Americas, including the Commonwealth of Puerto Rico and the U.S. Virgin Islands
- Spread to other countries likely
Zika Virus Incidence and Attack Rates

- Infection rate: 73% (95% CI 68–77)
- Symptomatic attack rate among infected: 18% (95% CI 10–27)
- All age groups affected
- Adults more likely to present for medical care
- No severe disease, hospitalizations, or deaths

Note: Rates based on serosurvey on Yap Island, 2007 (population 7,391)
Rates of Microcephaly Over Time: the Americas and the Caribbean

Comparison of the rates of microcephaly in the Americas and Caribbean from 2010-2014 and 2015

Updated as of Epidemiological Week 52 (December 27, 2015 – January 2, 2016)

Microcephaly rates by state in Brazil (cases per 1,000 live births)
- 0.1-1.0
- 1.1-15.0
- 15.1-30.0
- 30.1-45.0
- 45.1-88.6

Countries with Zika confirmed cases
- Epi Week 52 2015
- Country limits
- Brazil State Boundaries

Data Source:
Reported from the IHR National Focal Points and through the Ministry of Health websites.

Map Production:
PAHO-WHO AD CHA IR ARO

Laboratory-confirmed Zika virus disease cases reported to ArboNET by state or territory — United States, 2015–2016 (as of February 3, 2016)

<table>
<thead>
<tr>
<th>States</th>
<th>Travel-associated cases (N=35)</th>
<th>Locally acquired cases (N=0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>California</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Florida</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Georgia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Hawaii</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Illinois</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Minnesota</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Texas</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Virginia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Territories</td>
<td>(N=1)</td>
<td>(N=9)</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>US Virgin Islands</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Special considerations and clinical complications of Zika virus

- 80% of Zika-infected patients are asymptomatic
- If symptoms develop, typically self-limited illness:
  - Fever, rash, arthralgia, conjunctivitis
- Neurologic complications:
  - Possible association with microcephaly
    - >3,000 microcephaly reports in Brazil (June-Dec 2015)
    - 20 per 10,000 live births vs expected 1-2 per 10,000 live births
  - Reports of Zika and Guillain-Barre syndrome
    - French Polynesia, Central and South America
Can Zika virus be transmitted through blood transfusion?

- Probably…
- Zika is a flavivirus – same as West Nile virus and engue (both are transfusion-transmissible)
- 2.8% of blood donors in French Polynesia found Zika PCR+ (*Euro Surveill* 2014)
- 2 recent reports from Brazil
  - Not published in peer reviewed literature
What is the threat of Zika transmission via blood collections in Puerto Rico?

- 21 autochthonous cases of Zika identified in Puerto Rico (Dec 2015- Feb 2016)
- 80% of Zika infected persons are asymptomatic - so likely more than 21 cases
- Viremic blood donor can remain asymptomatic and not be identified through active follow up or self report
- Actual transfusion-transmission risk has not been quantified
  - Risk may also change based on epidemic course
How can transfusion-transmitted Zika be prevented?

- Self-deferral of blood donors
  - 80% of viremic donors may be asymptomatic

- Active follow-up of donors with quarantine of blood products
  - Currently implemented in response to Chikungunya
  - 80% of viremic donors may be asymptomatic

- Screening of blood donors
  - Nucleic acid tests are in development but not currently FDA approved
  - Implementation may be possible through investigational new drug protocol
How can transfusion-transmitted Zika be prevented? cont’d

- **Expansion of pathogen reduction technology**
  - Intercept (Cerus) approved for platelets/plasma only
  - Terumo (Mirasol) not FDA approved (for any blood component type)
  - No method approved for RBCs, but could be implemented by investigational device exemption (IDE)

- Need to understand extent of and barriers for pathogen reduction technology implementation in Puerto Rico
Transfusion-transmitted Zika prevention in Puerto Rico: Importation of blood products for select populations

- Challenge is identifying who is at risk…
- Identifying pregnancy in all women:
  - Pregnancy test may not be performed prior to transfusion (e.g. trauma)
  - Early pregnancy or becoming pregnant immediately after transfusion
- Sexual transmission
  - Transfusion-transmission in males with subsequent sexual transmission to partners
- No identified risk factors yet for Guillain-Barre syndrome
  - Measures to prevent microcephaly may not mitigate risk for GBS
Transfusion-transmitted Zika prevention in Puerto Rico: Additional considerations

- Implementation of Pathogen Reduction Technology for all platelet and plasma collections (with FDA approved technology)
  - What are the barriers to implementation?

- Importation of all red blood cell units from mainland until screening can be implemented
  - What are the concerns among Puerto Rico blood collection centers and hospitals?
  - Solutions to overcome these concerns
Next steps

- Collect additional information which can guide blood safety decisions
  - Collection and utilization survey of blood collection centers and hospitals in Puerto Rico
  - Survey to be disseminated electronically from 2/12/2016-2/24/2016
  - CDC will have a team in Puerto Rico to administer the survey
  - Survey results will be presented to stakeholders

- Enhance awareness for transfusion-transmitted Zika
  - Recognize if transfusion-transmission occurs
  - Notify public health authorities to investigate
Thank you

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone: 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov  Web: 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.