FIRST CONFIRMED CASE OF IMPORTED ZIKA VIRUS IN HOUSTON, TEXAS

Preventing Transmission
Objectives

- Discuss the epidemiology of Zika virus
- Describe the Zika case investigation of the first confirmed case in Houston, Texas.
- Discuss how emerging diseases are controlled by timely identification and reporting from clinicians.
- Articulate the importance of prompt surveillance and patient education in preventing the spread of vector-borne diseases.
Zika Virus Introduction

- Single stranded RNA Virus
- Family Flaviviridae, Genus Flavivirus
- Related to dengue, Japanese encephalitis, yellow fever, and West Nile Virus
- Transmitted to humans by Aedes species mosquitos.
Zika Virus Time-line
Modes of Transmission

Zika Virus Transmission Cycles

Sylvatic (jungle) cycle

Epidemic (urban) cycle

CDC
Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People™
Other Modes of Transmission

- Sexual
- Blood Transfusion
- Maternal-fetal
- Laboratory exposure

Theoretical
- Breast Milk
- Organ or tissue transplantation
Description of Illness

SYMPTOMS:
- Fever
- Rash
- Joint pain
- Conjunctivitis
- Myalgia
- Headache
- Malaise

1 in 5 people become ill.

Illness is usually mild.
Treatment

- No Vaccine
- Rest
- Fluids
- Medicine

Symptoms of Zika virus disease can be treated with common pain and fever medicines*, rest and plenty of water.

*Do not take aspirin or nonsteroidal anti-inflammatory drugs.
Prevention

Avoid Bites
Repellent
Long Sleeves/Pants
Air Conditioning
Screens/Nets
Drain Standing Water
On November 16, 2015 a Houston clinician reported to the Houston Health Department, Bureau of Epidemiology two suspected cases of Zika virus. An investigation was conducted to determine the source of infection and prevent the spread of disease.
CASE INVESTIGATION CONTINUED

Suspect Case #1:
- 59 Year Old Hispanic Female
- Onset Date: 11/10/15
- Travel to Colombia

Suspect Case #2:
- 60 Year Old Hispanic Female
- Onset Date: 11/13/15
- Travel to Colombia
CASE INVESTIGATION CONTINUED

BOTH SUSPECTED CASES TRAVELED TO SANTA MARTA, COLOMBIA BETWEEN 11/03/15 & 11/10/15
Suspected and confirmed Zika cases reported by countries and territories in the Americas, 2015-2016

(New cases by Epidemiological Week. Updated as of 23 February 2016, with data received by 24 February 2016)

Source: Cases reported by the IHR National Focal Points to the WHO IHR Regional Contact Point for the Americas and through the Ministry of Health websites, 2016.

Note: The suspected cases in Brazil are unofficial (media monitoring). Brazil Ministry of Health reported minimum 497,523 and 1,482,701 as maximum estimated cases.


Data is shared in an effort to transparently disseminate available information reported by Member States. Any subsequent interpretation and analysis should consider differences in surveillance systems and reporting requirements.

Report Production: PAHO/WHO AD CHAIR ARO


# Case Investigation Continued

## Suspect Case #1 Symptoms
- Fever
- Diarrhea
- Arthralgia
- Fatigue
- Muscle pain
- Rash
- Pain behind eyes
- Upset stomach

## Suspect Case #2 Symptoms
- Fever
- Fatigue
- Diarrhea
- Arthralgia
- Rash
- Conjunctivitis
- Headache
- Pain behind eyes
CASE INVESTIGATION CONTINUED

- Education provided to patients
- Communication with the State Health Department and CDC
- Hurdles we had to overcome
Blood samples were taken and sent to the Centers for Disease Control and Prevention at Fort Collins.
CASE INVESTIGATION TESTING

- ELISA IgM
- PRNT
- Limitations: Cross-reactivity with other Flaviviruses
- Serology results should be interpreted with caution
## CASE INVESTIGATION RESULTS

<table>
<thead>
<tr>
<th>Suspect Case #1</th>
<th>Suspect Case #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zack IgM ELISA= Positive</td>
<td>Zack IgM ELISA= Positive</td>
</tr>
<tr>
<td>Dengue = Positive</td>
<td>Dengue = Negative</td>
</tr>
<tr>
<td>Chikungunya= Negative</td>
<td>Chikungunya= Negative</td>
</tr>
<tr>
<td>West Nile = Negative</td>
<td>West Nile = Negative</td>
</tr>
<tr>
<td>St. Louis Encephalitis=</td>
<td>St. Louis Encephalitis=</td>
</tr>
<tr>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Education provided by public health investigator played a pivotal role in preventing transmission to mosquitoes in the Houston area.

Texas case counts

Both cases were imported from Colombia where local transmission is ongoing.

Rapid identification of disease and notification by the clinician.
Conclusions Continued

- Mosquito-based Surveillance
- Vector Control
- Outbreaks

**MOSQUITO CONTROL**

**Eliminate Standing Water**
- Eliminating standing water is the best way to prevent mosquitoes from breeding.
- The earlier you eliminate standing water, the better off your home and neighborhood will be.

**Use Larvicide**
- There are many types of larvicides, but they all prevent mosquitoes from developing into adults.
- Apply directly to water sources that hold mosquito eggs, usually standing bodies of water that cannot be drained.
- Remember that limiting the size of the next generation of mosquitoes does not affect current adult mosquitoes.

**Use Adulticide**
- These are aerosolized product that kills adult mosquitoes.
- They can have an immediate impact to reduce the number of adult mosquitoes, but it won’t affect existing mosquito eggs and larva.

Larvicide and adulticides are regulated by the EPA and have been judged not to pose an unreasonable risk to human health.

Impact on a pesticide’s environment is provided by the EPA or the National Pesticide Information Center, which can be reached toll-free at (800) 858-7378.

Local mosquito control efforts are led by the Harris County Mosquito Control.
Strategy to Respond to Zika

- Develop laboratory testing capacity
- Investigate cases and their contacts
- Coordinate with mosquito control surveillance
  - Maintain situational awareness in the city and region
- Improve our understanding of the virus and its effects
- Conduct neighborhood outreach to vulnerable communities
- Clean-up garbage in neighborhoods
- Eliminate standing water
- Educate travelers & expecting mothers
- Mosquito Control (HCPHES)
# Zika Virus Complications

## Cumulative Zika suspected and confirmed cases reported by countries and territories in the Americas, 2015-2016

Updated as of 25 February 2016, with data received by 24 February 2016.

<table>
<thead>
<tr>
<th>Sub-Region</th>
<th>Country / territory</th>
<th>Suspected</th>
<th>Confirmed</th>
<th>Deaths among Zika cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>Mexico</td>
<td>0</td>
<td>93</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>0</td>
<td>93</td>
<td>0</td>
</tr>
<tr>
<td>Central America</td>
<td>Costa Rica</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>El Salvador</td>
<td>8,584</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Guatemala</td>
<td>278</td>
<td>105</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Honduras</td>
<td>4,590</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Nicaragua</td>
<td>0</td>
<td>66</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Panama</td>
<td>0</td>
<td>86</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>13,452</td>
<td>265</td>
<td>0</td>
</tr>
<tr>
<td>Latin Caribbean</td>
<td>Dominican Republic</td>
<td>365</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>French Guiana</td>
<td>790</td>
<td>89</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Guadeloupe</td>
<td>221</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Haiti</td>
<td>328</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Martinique</td>
<td>6,050</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Puerto Rico</td>
<td>0</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Saint Martin</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>7,695</td>
<td>196</td>
<td>0</td>
</tr>
<tr>
<td>Andean</td>
<td>Bolivia</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Colombia</td>
<td>35,399</td>
<td>1,612</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Ecuador</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Venezuela</td>
<td>4,050</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>40,055</td>
<td>1,642</td>
<td>4</td>
</tr>
<tr>
<td>South Cone</td>
<td>Brazil</td>
<td>72,062</td>
<td>534</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Paraguay</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>72,062</td>
<td>540</td>
<td>4</td>
</tr>
<tr>
<td>Non Latin Caribbean</td>
<td>Aruba</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Barbados</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Bonaire</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Curacao</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Guyana</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Jamaica</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Saint Vincent and the Grenadines</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sint Maarten</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Suriname</td>
<td>1,097</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Trinidad and Tobago</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>United States Virgin Islands</td>
<td>59</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
<td>1,156</td>
<td>29</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>134,460</td>
<td>2,765</td>
<td>12</td>
</tr>
</tbody>
</table>

**Source:** Cases reported by the IHR National Focal Points to the WHO IHR Regional Contact Point for the Americas and through the Ministry of Health websites, 2016.


**Report Production:** PAHO/WHO AD CHA IR ARO


* As of February 29, 2016
Zika Virus Complications

- Guillain-Barre syndrome (GBS)
  - Symptoms
  - Treatment

- Countries Reporting Cases
Birth Defect

- Microcephaly

Number of microcephaly cases reported in the Northeast Region of Brazil by Epidemiological Week (8 November 2015 - 13 February 2016).
Brazil Microcephaly Cases

There have been a total of 5,640 microcephaly cases reported by the Ministry of Health of Brazil.

So far 583 of these are confirmed cases. The others are being investigated.
## Laboratory-confirmed Zika virus disease cases reported to ArboNET United States, 2015–2016

<table>
<thead>
<tr>
<th>State</th>
<th>Travel-associated Cases as of 2/24/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>1</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1</td>
</tr>
<tr>
<td>California</td>
<td>6</td>
</tr>
<tr>
<td>Delaware</td>
<td>1</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>3</td>
</tr>
<tr>
<td>Florida</td>
<td>28</td>
</tr>
<tr>
<td>Georgia</td>
<td>1</td>
</tr>
<tr>
<td>Hawaii</td>
<td>4</td>
</tr>
<tr>
<td>Illinois</td>
<td>4</td>
</tr>
<tr>
<td>Indiana</td>
<td>1</td>
</tr>
<tr>
<td>Iowa</td>
<td>1</td>
</tr>
<tr>
<td>Louisiana</td>
<td>1</td>
</tr>
<tr>
<td>Maryland</td>
<td>3</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>2</td>
</tr>
<tr>
<td>Minnesota</td>
<td>3</td>
</tr>
<tr>
<td>Nebraska</td>
<td>2</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1</td>
</tr>
<tr>
<td>New York</td>
<td>17</td>
</tr>
<tr>
<td>Ohio</td>
<td>4</td>
</tr>
<tr>
<td>Oregon</td>
<td>1</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>4</td>
</tr>
<tr>
<td>Tennessee</td>
<td>1</td>
</tr>
<tr>
<td>Texas</td>
<td>13</td>
</tr>
<tr>
<td>Virginia</td>
<td>3</td>
</tr>
<tr>
<td>Washington</td>
<td>1</td>
</tr>
</tbody>
</table>
U.S. Territories Confirmed Zika Cases

<table>
<thead>
<tr>
<th>Territory</th>
<th>Locally acquired cases</th>
<th>Travel-associated cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Samoa</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>34</td>
<td>1</td>
</tr>
<tr>
<td>US Virgin Islands</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Legend:
- Orange: Locally acquired cases
- Blue: Travel-associated cases
Distribution of *Aedes*

**Aedes aegypti**
Most likely originated in Africa

**Aedes albopictus**
Originated in Asia

*Maps were developed using currently available information. Mosquito populations may be detected in areas not shaded on this map, and may not be consistently found in all shaded areas.*
Mosquitos are “container breeders”

Eliminate all breeding sites in and around your home to prevent disease transmission.

You can protect yourself and your family by keeping mosquitoes away.
Mosquito Fun Facts

- Where do mosquitos live?
- How do they spread?
- Mosquitos have evolved
- “Sip feeders”

People catch Zika virus by being bitten by an infected Aedes mosquito.
References

- Centers for Disease Control and Prevention. Zika Virus-What clinicians need to know power-point. Clinician Outreach and Communication Activity Call January 26, 2016


Thank You For Joining Me

Presenter:
Amanda Eckert, MPH
Surveillance Investigator
Houston Health Department
Bureau of Epidemiology
8000 North Stadium Drive
Houston, TX 77054
Phone: 832-393-4318

Thank you to everyone who helped with this investigation especially: Thomas Johnson Jr., BS, Brenda Thorne, MS, Salma Khuwaja, MD, MPH, DrPH, and Raouf Arafat, MD, MPH.