Chikungunya and Dengue Co-Infections Among Travelers Returning to Florida

Andrea Bingham, Katie Kendrick, Lea Heberlein-Larson, and Valerie Mock

Presented by:
Andrea Bingham, PhD
Vector-Borne Disease Surveillance Coordinator
Florida Department of Health
Division of Disease Control and Health Protection

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To protect, promote, and improve the health of all people in Florida through integrated state, county, and community efforts.
Chikungunya in the Americas

- December 2013: first report of locally transmitted chikungunya in the Americas in St. Martin
- 44 countries or territories with over 1.2 million suspect and confirmed cases in 2014
- >2,000 imported cases to mainland U.S.
- >4,000 cases in Puerto Rico and the Virgin Islands
- Dengue in 2014: over 1.1 million cases, all 4 serotypes

Data courtesy of PAHO/CDC
Dengue Distribution

Chikungunya Distribution

Courtesy of WHO/PAHO
Clinical Presentation, 2014

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Chikungunya (n = 193)</th>
<th>Dengue (n = 39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>90%</td>
<td>100%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Rash</td>
<td>60%</td>
<td>100%</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Headache/retro-orbital pain</td>
<td>40%</td>
<td>100%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>Joint effusion</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>Thrombocytopenia</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Chikungunya/Dengue Co-Infections

- *Alphavirus* and *Flavivirus*
- First described in 1964 in India
- Areas of overlap
- Imported cases
  - Germany
  - Portugal
  - Taiwan
Aedes aegypti and Aedes albopictus

- Same vectors for both viruses
- Field vs. laboratory studies

Courtesy of Dr. Gary Clark, USDA ARS
Chikungunya and Dengue in Florida, 2014

- **Chikungunya**
  - Total: 508 imported cases
  - 12 local cases
  - 2015: 24 imported cases

- **Dengue**
  - Total: 83 imported cases
  - 7 local cases
  - 2015: 10 imported cases

*Human cases are placed randomly inside county of exposure and do not represent actual location of case*

- Florida Department of Health Merlin Reporting System
- 20 persons reported as both CHIK and DEN cases
  - 5 PCR-positive for both viruses
  - 7 PCR-positive for one virus and IgM positive for the other
  - 8 IgM-positive for both viruses
- All 4 dengue serotypes detected
- 80% of co-infections identified by Bureau of Public Health Laboratories (BPHL)
BPHL Testing Results, 2014-2015

_Cutoff for positive test: Ct value of 37, P/N value of 3_

*Cases 12, 19, and 20 were only tested at a commercial laboratory
Cases 13 and 15 did not have enough sample volume for PCR testing.*
Travel History of Co-Infection Cases

1 Puerto Rico resident

Top 5 countries for chikungunya cases in 2014:
- Puerto Rico (25%), Haiti (22%), Dominican Republic (19%), Jamaica (15%), and Colombia (2%)

Top 5 countries for dengue cases in 2014:
- Cuba (33%), Honduras (10%), Dominican Republic (8%), Puerto Rico (8%), and Haiti (7%)

n = 20
Case Characteristics, 2014

<table>
<thead>
<tr>
<th></th>
<th>CHIK/DEN Cases (n = 20)</th>
<th>2014 CHIK Cases (n = 508)</th>
<th>2014 DEN Cases (n = 83)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>58 yrs (range 31-78)</td>
<td>50 yrs (range &lt;1-98)</td>
<td>48 yrs (range 9-79)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>50% female</td>
<td>60% female</td>
<td>43% female</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td>70% white, 25% black</td>
<td>45% white, 34% black</td>
<td>84% white, 8% black</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td>65% Hispanic</td>
<td>48% Hispanic</td>
<td>72% Hispanic</td>
</tr>
<tr>
<td><strong>Hospitalizations</strong></td>
<td>50%</td>
<td>32%</td>
<td>38%</td>
</tr>
<tr>
<td><strong>Reason for travel</strong></td>
<td>80% VFR</td>
<td>73% VFR</td>
<td>No Data</td>
</tr>
<tr>
<td><strong>Days out of U.S.</strong></td>
<td>24 (range 3-92)</td>
<td>25 (range 3-340)</td>
<td>19 (range 3-131)</td>
</tr>
</tbody>
</table>
Clinical Presentation of Co-Infections, 2014-2015

- Fever: 100%
- Arthralgia: 90%
- Myalgia: 80%
- Rash: 70%
- Nausea/vomiting: 60%
- Headache/retro-orbital pain: 50%
- Diarrhea: 40%
- Leukopenia: 30%
- Thrombocytopenia: 20%
- Severe symptoms: 10%

n = 20
Conclusions

- Consider both DEN and CHIK
- Public health confirmation of specimens
- Lack of distinct onset dates
  - Dual, immediately consecutive, or asymptomatic secondary infections
- Co-infections underreported
  - Incomplete testing
  - Asymptomatic infections
  - Not seeking health care
Questions?

Andrea Bingham
Vector-Borne Disease Surveillance Coordinator
Florida Department of Health
Division of Disease Control and Health Protection
Andrea.Bingham@FLHealth.gov
(850) 245-4444 x 3425