Chikungunya Cases Identified in the Americas United States

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Objectives

- Describe chikungunya (CHIK) cases diagnosed in the U.S. from 1995–2009
- Determine importation risk by comparing location of CHIK cases to distribution of known chikungunya virus (CHIKV) vectors
- Explore if national surveillance adequate to detect CHIK cases or outbreak
CHIK Testing and Reporting Practices in U.S.

• Testing available at
  Early 1990s 2000 2005 2007 2009
  CDC
  One State Public Health Lab
  One Commercial Lab

• Since 2006, state health departments have the ability to report CHIK cases to ArboNET (CDC’s national arbovirus surveillance system)
  – CHIK is not nationally notifiable
CHIK Case Definition

- Laboratory evidence of an acute CHIKV infection
  1. Detection of CHIK viral RNA or virus, or
  2. Detection of anti-CHIKV IgM antibodies (Ab)*, or
  3. Four-fold increase in neutralizing Ab titers between acute and convalescent samples

*CDC cases also require CHIKV-specific neutralizing Ab
From 1995-2009, 109 persons diagnosed with CHIKV infections in U.S. (all travel associated)

- 106 cases since 2006
Demographics (n=109)

- Median age 48 years (range 20-78 years)
- 57% (62) female
- U.S. cases have similar age and sex distribution as CHIK cases from European Travelers

<table>
<thead>
<tr>
<th>Age group (yrs)</th>
<th>Number</th>
<th>(%)</th>
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<tbody>
<tr>
<td>0-19</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>20-39</td>
<td>31</td>
<td>(28)</td>
</tr>
<tr>
<td>40-59</td>
<td>57</td>
<td>(52)</td>
</tr>
<tr>
<td>≥60</td>
<td>16</td>
<td>(15)</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>(5 )</td>
</tr>
</tbody>
</table>
Travel History (n=78)

- 92% of cases traveled to country experiencing a CHIK outbreak
- Prior to 2006, all cases originated from Africa
- Since 2006, 92% from Asia
  - Most commonly India
- Different from European CHIK cases (travelers), who traveled most frequently to Indian Ocean
  - Vacation preference or cultural ties
Diagnosis – RT-PCR

- CHIKV RNA detected in 33% (13/39) of cases tested by RT-PCR
  - 12% (13/109) of total cases

- Of 39 cases tested by RT-PCR
  - 80% (8/10) positive ≤3 days post illness onset
  - 50% (5/10) positive 4-6 days post illness onset
  - 0% (0/19) positive ≥7 days post illness onset

- Of note, 60% of cases had illness onset within 7 days of returning to U.S.
### Diagnosis – Serology

- Majority (88%) diagnosed by serologic testing

<table>
<thead>
<tr>
<th>Test results</th>
<th>≤7 days (n=24)</th>
<th>&gt;7 days (n=54)</th>
<th>&gt;4 weeks (n=38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgM positive</td>
<td>54%</td>
<td>92%(^1)</td>
<td>NA</td>
</tr>
<tr>
<td>IgG positive</td>
<td>25%</td>
<td>82%</td>
<td>95%(^2)</td>
</tr>
<tr>
<td>PRNT positive</td>
<td>59%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

\(^1\) Samples not IgM positive were indeterminate or equivocal (day 54 sample)

\(^2\) Samples not IgG positive were indeterminate
Illness onset (n=109)

- Two-thirds (64%) of cases had their illness onset during summer and early fall when vectors likely to be active.
Specimen Origin and Vectors (n=94)

• Positive specimens originated from 25 states and District of Columbia (DC)

• 81% also reported CHIKV vectors (Ae. aegypti or Ae. albopictus) in their jurisdiction

• 13 viremic cases originated from 7 states; 6 (85%) of these states also reported CHIKV vectors in at least one location
Number of CHIK Cases and Location of CHIKV Vectors, by State

Number of chikungunya cases:
- 0
- 1 - 5
- 6 - 10
- >10
- Ae. albopictus or Ae. aegypti reported
Reporting of Cases

• Of 106 cases diagnosed from 2006-2009, only 25% were reported to ArboNET

• All reported cases diagnosed at CDC or state lab; none from commercial lab
  – Not nationally notifiable (no legal obligation)
  – Commercial lab calls physician with RT-PCR+ results

• Reporting time: median 122 days (range 44 to 273 days)
Proportion of Cases Reported to ArboNET, by Year

- 2006: N=42
- 2007: N=22
- 2008: N=12
- 2009: N=30
Conclusions

• Over last 4 years, 25 CHIK cases imported into the U.S. each year
  – Likely underestimate as rely on clinical suspicion and test being ordered

• Several cases viremic upon entry into U.S. and entered a state with CHIKV vectors

• Reporting to ArboNET incomplete and delayed

• U.S. at risk for CHIKV importation and spread
Recommendations

• Traveler education about disease and ways to prevent it (mosquito prevention)

• Increase awareness among clinicians of symptoms of disease, testing that can be performed, and the need to alert public health

• Inform public health community of risk of CHIKV importation to facilitate timely recognition and reporting of cases
Actions taken by CDC

- Added chapter on CHIK to 2010 Traveler’s Health Information Book (yellow book)
- Published information on CHIKV cases and risk of importation
- Presented at Council of State and Territorial Epidemiologists (CSTE) meeting in 2010 to increase awareness of risk and need to report
- Worked with PAHO to draft a Preparedness Plan and train regional laboratories
Next Steps

• Finalize with PAHO and regional experts a CHIK Preparedness Plan for the Americas
  – Provide CHIK lab training courses to regional labs

• Create CHIK-specific training materials for physicians and public health officials

• Maintain current practice to alert public health officials of CHIK cases diagnosed at CDC

• Continue to share information on CHIK cases and risk with clinicians and public health officials
Questions?