Zika in Florida 2016
The Laboratory Response

Association of Public Health Laboratories
Annual Meeting
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Division of Disease Control and Health Protection
To protect, promote and improve the health of all people in Florida through integrated state, county, and community efforts.
Outline

• The Laboratory Response
  • Arbovirology in Florida
  • Timeline
  • Testing Capability
  • Challenges
  • Successes

• Conclusions
Arbovirology Testing in Florida

- Many years of arbo testing
- Clinical (human, animal) and environmental (mosquito pools)
- Chicken surveillance program
- Arboviruses in FL:
  - West Nile virus
  - Dengue
  - Eastern Equine Encephalitis virus
  - Chikungunya virus
  - St Louis Encephalitis virus
Arbovirology Testing in Florida

- Major player in testing birds during the West Nile virus outbreak of 2001
- Identified Dengue outbreaks in Florida Keys (2009) and St. Lucie/Martin Counties (2013)
- BPHL identified first local case of Chikungunya in US in 2014
- Typically test over 50,000 chicken samples per year as part of the surveillance program
- Test horses, wild birds and other exotic animals (e.g. dolphins), in addition to clinical samples
Zika Tests – PCR and ELISA

**PCR Test**
- PCR will detect Zika virus <14 days after symptom onset
- Use of Lab Developed Test (LDT)
- Detects presence of Zika RNA
- Switched to CDC Trioplex
  - Detects Zika RNA, PLUS Dengue and Chikungunya (serum only)

**MAC ELISA Test**
- Used as back up to negative PCR, and for asymptomatic priority samples
- Detects immune response to infection by a flavivirus
- Not Zika specific
- Need for follow up testing of positives with plaque reduction neutralization test (PRNT)

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Zika Testing – Algorithm

- Specimens collected from all symptomatic individuals < 14 days after the onset of symptoms
  - PCR on serum/urine
  - Negative PCR, test serum for anti-Zika IgM
- Serum collected from symptomatic individuals presenting ≥ 14 days following symptom onset
  - Test serum for anti-Zika IgM
- Asymptomatic pregnant women meeting epidemiological criteria for testing
  - PCR test if exposed (travel etc.) < 14 days
  - Anti-Zika IgM if PCR negative
  - Anti-Zika IgM 2-12 weeks following possible exposure
BPHL Response

Testing at BPHL

- BPHL-Jacksonville and BPHL-Tampa
  - Zika PCR (LDT) and MAC ELISA Test by January 2016
  - Switched to Trioplex, December 2016
- BPHL-Miami
  - Zika PCR Test (Trioplex) July 2016

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Florida Timeline

- Zika PCR test on board in July 2015
- MAC ELISA test on board January 2016
- Testing samples from international travelers begins January 2016
- First PCR positive traveler identified in January 2016
- Emergency Declaration February 2016
The Laboratory Response

First Local Investigation, July 2016
• Identified in Wynwood area of Miami
• PCR detection of Zika virus
• Subsequent testing of friends and family
• Urine surveys of inhabitants of box (area possibly served by mosquito, 150 meters) to identify other possible exposures
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Wynwood Zika Activities Timeline

Total # of locally transmitted cases - 28

- 7/1/2016: Possible Cluster Identified Through Epi Link
- 7/21/2016: CONFIRMED and ANNOUNCED Active Local Transmission
- 9/19/2016: END of Active Transmission

**Not pictured are day-to-day on the ground activities, such as source reduction and backpack spraying.**
The Laboratory Response Testing in 2016

# Tests

1st Local Case

IgM Tests

PCR Tests

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- August 2016
  - Free Zika testing for all pregnant women in Florida
  - Approximately 200,000 births per year in Florida
  - Would overwhelm testing in BPHL very quickly
  - Contracted with LabCorp to help with testing asymptomatic pregnant women for Zika IgM
The Laboratory Response Challenges

Instrumentation:

- At the beginning of 2016 BPHL was not geared for Zika surge testing
- Equipment not high throughput:
  - Added later in the year:
    - PCR extraction capacity increased – added MagnaPure 96 robots in each laboratory
    - ELISA testing increased – added additional plate washers and readers in each laboratory
The Laboratory Response Challenges

Staffing:

- Shortage of Zika testing staff in all three laboratories
  - Internal surge, by moving staff around to help out
  - Had to meet state & CLIA licensure regulations
  - External surge – deployment of CDC staff (not licensed)
The Laboratory Response Challenges

Sample Volume & Integrity:

- Samples arriving from new submitters
- Mislabeled/unlabeled samples
- Poor condition – cracked, leaking
- Reached out to submitters to improve packaging and shipping
The Laboratory Response Challenges

Testing algorithm – a moving target:

- CDC and Florida made changes to the testing algorithm as more was known
- Testing staff had to accommodate and implement changes rapidly
- BPHL had to ensure sample submitters knew of changes
The Laboratory Response Challenges

Data management:
• Complex accessioning
  • Multiple test options depending on patient history
• Data on submission form often missing (pregnancy, travel, symptom onset)
• Laboratory Information Management system needed updating as needs changed
The Laboratory Response Challenges

Data management (asymptomatic pregnant women):

- Samples from new partners (hospital labs, clinics)
- Limited information on submission forms
- Where to laboratory results?
The Laboratory Response Successes

Surge capability:
- BPHL surged internally
  - Each laboratory moved staff around
  - Samples could be redirected to each laboratory in BPHL
  - BPHL-Miami was brought on board for PCR testing when local cases identified
- CDC deployed staff
- External surge
  - Use of CDC for surge samples – approximately 1500 samples sent over a 6 week period)
The Laboratory Response Challenge/Success

Sending Samples to CDC:

- Initially challenging
- Added work during accessioning
- Repackaging samples for shipment
- Data input/generation of data file for CDC
- Result and reporting (email nightmare!)

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The Laboratory Response Challenge/Success

Sending Samples to CDC:

- Challenges became successes:
  - Utilized additional staff with accessioning and repackaging to CDC
  - Utilized dedicated personnel for data input and generation of data file for CDC
  - Developed macro for downloading results
The Laboratory Response

Successes

Guidance documents for those submitting samples:

• Developed guidance documents for sample submission
  • Help with what sample types, how to package, how and where to ship
• Developed FAQ documents for those submitting samples
  • Answered the commonly asked questions

1. What is Zika virus?
   Zika fever is a mild illness caused by a mosquito-borne virus similar to those that cause dengue and chikungunya virus infection. It has been identified in several countries in Central and South America, Mexico, and the Caribbean since 2015. Outbreaks have previously been reported in Africa, Southeast Asia, and the South Pacific. Local transmission has been reported in Duval, Broward, and Palm Beach Counties.

<table>
<thead>
<tr>
<th>Zika Virus Laboratory Diagnosis</th>
<th>Focus Area: Collection, Packaging and Shipping of Laboratory Specimens</th>
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<tbody>
<tr>
<td>Guidance document number 2016-02</td>
<td></td>
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<tr>
<td>Zika Virus Diagnostic Specimen Collection, Packaging and Shipping Guidance for Laboratories and County Health Departments</td>
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<td>Version 4.0</td>
<td>February 28, 2017</td>
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</tbody>
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The Laboratory Response Successes

Communications:

• FL Department of Health utilized an Incident Command Structure and formed an Incident Management Team early on in the outbreak response
• Excellent communications between BPHL, Bureau of Epidemiology and Bureau of Preparedness and Response
• Regular conference calls between all parties
• BPHL held their own daily “huddle” calls
The Laboratory Response Successes

Maintaining A Happy Workforce:

• Worked long hours
• Maintaining a Zika–free zone
  • Food, drink, puzzles, games
• T-shirt competition
The Laboratory Response Successes

Outreach and Publications:

- MMWR publication
- Use of urine as an additional sample type
  - Virus retained longer than in serum
  - CDC added urine to the Trioplex EUA
- Worked with researchers in Florida to provide extracted nucleic acid for whole genome sequencing
- Significant studies transmission of Zika virus in Florida
  - At least two Nature publications
The Laboratory Response

Successes

Other:

• Commercial laboratories to help with increase in testing – LabCorp, Quest
• Additional staff recruited at all three BPHLs
  • All trained (and licensed)
  • Young staff in public health
• Flexible staff
  • Adjust to changes in testing algorithm
  • Adjust to changes in work
  • Making on the fly changes to practices (e.g. sample accessioning)

BPHL-Tampa:
2016: Average age 44
Median 40
2017: Average age 40
Median 32
Conclusions

• 2016 was a very busy year for BPHL
• Zika testing involved all three laboratories
• Just about all staff in all three laboratories were involved!
• Keys to success:
  • Preparedness, Communication, Flexibility, Troubleshoot often!
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Thank You