West Nile Virus-Impact of the 2012 Epidemic in Texas

Tom J. Sidwa, DVM, MPH
State Public Health Veterinarian

Public Health and Rabies Committee Meeting
Providence, Rhode Island
October 27, 2015
Objectives

• Describe history of West Nile virus, (WNV) in Texas 2002-2011
• Describe WNV in 2012 (National and Texas)
• Describe vector control challenges and results of related EpiAid projects
West Nile cases in Texas 2002 - 2011

• Total of 2,274 cases reported in Texas
  • WNND – 1,525 or 67%
  • WNF - 749 or 33%
• Highest number in 2003 at n=735
  • 2006 at n = 354
  • 2009 at n = 115

DOI: 10.3201/eid1901.121135
West Nile Virus in Texas 2002-2011

- Case-fatality rate of 6.3%
  - 143 deaths/2,274 cases
  - All deaths attributed to WNND
- Total economic toll of human disease in Texas was $112 million
- Attack rates and RRs higher in rural counties, specifically in northwestern Texas
- Highest reported from metropolitan cities

DOI: 10.3201/eid1901.121135
Figure 1. Reported cases of West Nile virus infection among humans, Texas, USA, 2002–2011. A) Epidemic curve. B) Incidence by calendar year.
Figure 2. Average relative risk (RR) for human infection with West Nile virus, by county, Texas, USA, 2002–2011

West Nile Virus Texas 2012

- 2012 was the warmest recorded year in both Texas and the contiguous U.S.
- Texas drought-parched landscape of 2011 was followed by one of the wettest winters on record.
West Nile virus neuroinvasive disease incidence reported to ArboNET, by county, United States, 2012
## WNV Activity, ArboNET - 2012

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Texas</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total WND</strong></td>
<td>5,674</td>
<td>1,868</td>
<td>33</td>
</tr>
<tr>
<td><strong>WNND</strong></td>
<td>2,873</td>
<td>844</td>
<td>29</td>
</tr>
<tr>
<td><strong>WNF</strong></td>
<td>2,801</td>
<td>1,024</td>
<td>37</td>
</tr>
<tr>
<td><strong>Deaths</strong></td>
<td>286</td>
<td>89</td>
<td>31</td>
</tr>
</tbody>
</table>
WNV – Clinical Course – Texas 2012

• WNND
  • 844 cases (45% of total WNV cases)
    • Encephalitis (including meningoencephalitis)
      • 493 cases (58%)
    • Meningitis
      • 351 cases (42%)
  • 97% hospitalized
  • Deaths
    • 83 (10%)

• WNF (55% of total WNV cases)
  • 1,024 cases
  • 23% hospitalized
  • Deaths
    • 6 (<1%)
Difficulty in Determining Position on Epicurve

- Lag between infection and reporting of cases
  - Incubation
    - 2-14 days
  - Date between illness onset and receipt by Public Health of laboratory reports and documentation to support case classification
    - Median of 14 days
- CDC EpiAid requested to assess utility of laboratory reports in predicting direction of epicurve in the near future
  - Information could inform intervention decisions, including use of aerial adulticide distribution for mosquitoes
HSR 2/3 Number of Confirmed West Nile Virus Cases (by Week of Onset) and Number of West Nile Virus Positive Laboratory Reports Received by the DSHS Surveillance System

Illnesses with onset during this time may not yet be reported. Average time from onset to confirmation is 14 days.
EpiAid Report Conclusions

• NEDSS laboratory results may be useful surrogates for WNV disease cases that have already occurred and will be reported to DSHS.
• The lead times provided by NEDSS laboratory results are impacted by the numbers of laboratories that report data electronically.
• WNV laboratory reports to NEDSS precede DSHS case reports by an average of 1 week, and NEDSS reports are received a median of 2 weeks after the onset of illness.
• Suspect cases identified through laboratory reports to NEDSS provide information about both the number and distribution of WNV disease cases by week of onset.
EpiAid Report
Recommendations

• If NEDSS laboratory results are used as surrogates for WNV disease cases, they should be filtered to only include cases with recent evidence of WNV infection to increase the positive predictive value of the data.

• The validity of using suspect cases identified through NEDSS laboratory results as surrogates for WNV disease cases should be periodically reassessed as use of the NEDSS system evolves.

• NEDSS laboratory results should be evaluated further to determine if they provide an early indicator of where WNV activity is occurring or when a seasonal outbreak has peaked.
Mosquito Control

- Mosquito control is a local activity in Texas
  - Need and capacity vary across the state
- Aerial and ground-based insecticide spraying may be performed for mosquito control
- Aerial spraying
  - Deliver insecticide from light planes
- Ground-based spraying from trucks
- Limited data on impact of aerial spraying on human WNV disease
DSHS Request for EpiAid

• Purpose
  • Impact of adult mosquito control activities on human incidence of West Nile virus
  • Mosquito abundance
  • West Nile virus mosquito infection rates in the counties of Dallas, Tarrant, Denton, and Collin
EpiAid Report

• On February 5, 2013, the CDC provided DSHS with its final report, Evaluation of the impact of adult mosquito control during a West Nile virus outbreak in Dallas, Tarrant, Denton, and Collin Counties — Texas, 2012

• 1. *Aerial insecticide spraying was effective at preventing cases of West Nile virus (WNV) neuroinvasive disease, the more serious form of WNV infection.*

• 2. *There was a significant reduction in mosquito infection rates in areas where aerial spraying was conducted on consecutive nights. (Data are for Dallas County only.)*

• 3. Mosquito control programs should collaborate to implement Integrated Vector Management (IVM) procedures in a coordinated, district-wide vector control program.

• 4. Ground spraying capacity is present; however, contingencies for aerial spraying capacity should be developed for use when rapid, large scale mosquito control is required to reduce human disease risk.
EpiAid Report

- Report contained recommendations for improving vector surveillance and control
- DSHS evaluated recommendations to determine possible changes and improvements
- Report acknowledged several limitations to team's ability to conduct a comprehensive evaluation of the impact of adult mosquito control measures on human disease cases
  - such as data limitations
  - timing within the season
  - outside factors that contribute to declining case counts
- Please note that the report contains findings only for the four counties included in the study – Dallas, Denton, Tarrant, and Collin, and some study findings are for Dallas County only
Examples of Changes Made by Some Local Jurisdictions

- Increase number of mosquito traps and testing in county and municipalities (use fixed locations to gather data)
- Add employees for mosquito surveillance
- Move to year-round mosquito surveillance
- Incorporate in-cab computer screens for real time GPS spray maps
- Use contractors to enhance capacity/capabilities
- Participate in monthly arbovirus response meetings held by DSHS Regional Office (Collin, Dallas, Denton, and Tarrant counties)
- Establish action thresholds based upon surveillance
- Establish contracts for aerial adulticide application
WNV Resources

• Association of State and Territorial Health Officials (ASTHO)
  • Before the Swarm: Guidelines for the Emergency Management of Mosquito-Borne Disease Outbreaks:
    http://www.astho.org/Programs/Environmental-Health/Natural-Environment/Before-the-Swarm/
  • Public Health Confronts the Mosquito: Developing Sustainable State and Local Mosquito Control Programs:
    http://www.astho.org/Programs/Environmental-Health/Natural-Environment/confrontsmosquito/
Acknowledgements

• Texas Department of State Health Services
  • Austin Headquarters
  • Health Service Region 2/3, Arlington Texas
• Dallas County Health and Human Services
• Tarrant County Health Department
• Centers for Disease Control and Prevention
Questions