Mosquito and Tick-borne Disease in Wisconsin

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Wisconsin: mosquito-transmitted viruses causing human illness

- La Crosse (LCV)
- Jamestown Canyon (JCV)
- Eastern equine encephalitis (EEE)
- West Nile virus (WNV)

Each virus is transmitted by different mosquitoes with different behaviors and locations.
Reported Arboviral Diseases,
Wisconsin, 2007 - 2014 (N= 186)

Number of Cases

Year of Illness Onset

2008 2009 2010 2011 2012 2013 2014

WNV LAC/CA POW EEE JC

8 1 2 3 4 9 11 6 4 2 5

2009 2010 2011 2012 2013 2014
First West Nile Virus case in Wisconsin in 2002

West Nile virus and La Crosse virus

[Graph showing the number of cases of West Nile Virus (WNV) and La Crosse Virus (LAC) from 2002 to 2014, with a peak in 2012.]
WNV cycle differs from Zika: *Culex pipiens* mosquitoes like birds while *Aedes aegypti* prefers people.
Neuroinvasive Disease

Symptoms

- **West Nile encephalitis**: less than 1%
- Stiff neck, headache, muscle weakness, high fever, confusion, change in thinking
- Loss of consciousness, coma, death
- Neurological damage permanent
- Rare congenital cases
WDHS and WNV response

Education (emphasizing personal protection)

Bird Hot Line (early warning)
Mosquito surveillance (early warning)

Verify case reports for reporting to CDC

Work with State Lab of Hygiene on diagnosis
Mosquito Surveillance & Control
Why do surveillance?

• Collect data on mosquito population abundance and virus infection rates

• Provide indicators of the threat of human infection and disease and identify geographic areas of high risk.

• Support decisions regarding the need for and timing of intervention activities (i.e., enhanced vector control efforts and public education programs).

• Monitor the effectiveness of vector control efforts
Go to http://labs.russell.wisc.edu/mosquitosite
Tick-borne disease

• Most common species that feed on humans:

  Dermacentor variabilis
  “wood tick”
  American dog tick

  Ixodes scapularis
  “deer tick”
  Black-legged tick
Diseases Transmitted by the Deer Tick in Wisconsin

- Lyme disease - bacteria *Borrelia burgdorferi*, [B. mayonii]
- Anaplasmosis - caused by the bacteria *Anaplasma phagocytophilum*
- Ehrlichiosis – bacteria *Ehrlichia muris*
- Powassan virus - tickborne virus
- Babesiosis - *Babesia microti* parasite
Early record of deer tick in Wi in 1952
1965: Forestry workers in Lincoln County
Hunter-killed deer survey:
Changes in deer tick distribution
Deer ticks expand into new areas

1981

1994

2008-2009

Dark color of the pie = % deer infested with *Ixodes* ticks.
Lyme disease expands
Wisconsin, 1990-2010, incidence by county
Previous to 2008 only confirmed cases were reported. Beginning 2008, the total number of cases includes confirmed and probable cases.
Total Tickborne Cases in Wisconsin, 2009-2014 (n=3,550)

- Anaplasma
- E. chaffeensis
- EML
- Powassan
- Babesia

Year of Illness Onset:
- 2009
  - Total: 281
  - Anaplasma: 34
  - E. chaffeensis: 17
  - EML: 3
  - Powassan: 2
  - Babesia: 3

- 2010
  - Total: 499
  - Anaplasma: 20
  - E. chaffeensis: 5
  - EML: 4
  - Powassan: 4
  - Babesia: 5

- 2011
  - Total: 697
  - Anaplasma: 31
  - E. chaffeensis: 10
  - EML: 7
  - Powassan: 4
  - Babesia: 4

- 2012
  - Total: 517
  - Anaplasma: 18
  - E. chaffeensis: 4
  - EML: 10
  - Powassan: 2
  - Babesia: 4

- 2013
  - Total: 619
  - Anaplasma: 30
  - E. chaffeensis: 5
  - EML: 5
  - Powassan: 4
  - Babesia: 7

- 2014
  - Total: 477
  - Anaplasma: 12
  - E. chaffeensis: 7
  - EML: 4
  - Powassan: 2
  - Babesia: 39
Geography of Human Anaplasmosis
50-70% in Midwest
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<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Tick zone</td>
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<tr>
<td>2</td>
<td>Wood chip barrier</td>
</tr>
<tr>
<td>3</td>
<td>Wood pile</td>
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<tr>
<td>4</td>
<td>Tick migration zone</td>
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<tr>
<td>5</td>
<td>Tick safe zone</td>
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<tr>
<td>6</td>
<td>Gardens</td>
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<tr>
<td>7</td>
<td>Play sets</td>
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*Based on a diagram by K. Stafford, Connecticut Agricultural Experiment Station*
Go to http://labs.russell.wisc.edu/wisconsin-ticks/
Or Google “Wisconsin Ticks”
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