March 3, 2016 Briefing Summary

Lyme, West Nile, and Now Zika: *Science, Surveillance, and Policy in Wisconsin*

Briefing Materials are available at:
http://uwphi.pophealth.wisc.edu/programs/healthpolicy/ebhpp/events/index.htm

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Zika Virus Update: The Latest Emerging Arbovirus in the Americas

Jorge Osorio discussed the natural history and epidemiology of the Zika virus, and then highlighted his lab's research efforts to combat Zika. In October 2015, Osorio and research scientist Matthew Aliota were the first to identify and document the Zika virus in Colombia.

- Zika is a mosquito-transmitted virus discovered in the Zika forest in Uganda in 1947.
- Symptoms of the Zika virus are fever, rash, arthralgia, myalgia, conjunctivitis, and headache. The duration is typically several days to a week; severe cases requiring hospitalization are uncommon. Nonetheless, there is extensive concern over the disease because it is associated with microcephaly, a birth defect in which infants are born with unusually small heads, and in severe cases is also associated with Guillain-Barré syndrome, which causes temporary paralysis.
  - The World Health Organization declared the Zika virus an international public health emergency, prompted by growing concern that it could cause birth defects and infect as many as 4 million people by the end of the year.
  - In the United States at the time of the briefing there were 107 Travel-associated cases of Zika virus reported; 0 locally acquired cases reported; 9 pregnant women infected
- Several factors contribute to the spread of Zika: including the lack of Zika-specific immunity in human populations and environmental changes in the mosquito population, climate changes, and globalization.
- Documented and likely modes of transmission include: intrauterine or intrapartum, resulting in fetal loss or congenital infection; sexually, blood transfusion; or laboratory exposure. Theoretically it could be transmitted via organ transplant or breast milk.

Currently, the threat of Zika in Wisconsin is from contact with travelers to infected areas. However, one of the mosquitos that carries the disease, the Asian Tiger, is the most invasive mosquito in the world and has been identified as far north as Chicago. Depending upon the climate, the vector could possibly reach southern Wisconsin.

Research Efforts

- Osorio is a member of the Zika Global Task Force and participates in ZEST (Zika Experimental Science Team), a UW research team using non-human primate and mouse models to create antiviral

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vaccines. With funding from the Gates Foundation, Osorio's team is also taking a biological approach to block viral transmission from the mosquitos that transmit Dengue, Chikungunya, and Zika and has developed a field site in Colombia for this purpose.

Wolbachia bacteria live within the cells of up to 60% of all insects and are passed from generations. The bacteria is not, however, present in *Aedes aegypti* – the primary mosquito species involved in the transmission of Dengue. When Wolbachia is injected into the *Aedes aegypti* mosquitos it reduces the mosquito's ability to transmit dengue. Injected mosquitos then breed with wild mosquitos, whose ability to transmit are also reduced. Seeding wild mosquito populations with Wolbachia in areas where Dengue is endemic has the potential to reduce the global burden of Dengue, the leading cause of illness and death in the tropics. This method can also reduce other mosquito-transmitted diseases such as Zika. The advantage of this biologic approach over others is that it does not genetically modify species, involve putting pesticides into the environment, or involve the complexity of creating and distributing vaccines.

This approach is currently being piloted in Colombia, Brazil, Vietnam, Indonesia, and Australia. *Eliminate Dengue Colombia*, a partnership of UW and three foreign universities, is led by Dr. Ivan Dario Velez and Dr. Jorge Osorio and includes a team of doctors, biologists, entomologists, and social workers. Obtaining consent to release seeded mosquitos and building general comfort with the project in their four study sites involves extensive communications and social engagement with the local communities. Part of this effort, a Fever Clinic, has attended 200 patients and confirmed 74 cases of dengue since it started in May 2014, improving health care in the study area. The clinic also allows researchers to track and monitor prevalence rates and possible emerging diseases.

Mosquito and Tick-Borne Disease in Wisconsin

Susan Paskewitz, discussed the prevalence and the surveillance of mosquito and tick-borne illnesses in the state of Wisconsin.

- **Mosquitos** in Wisconsin transmit several viruses that cause human illness; including La Crosse (LCV), Jamestown Canyon (JCV), Eastern equine encephalitis (EEE), and West Nile virus (WNV); each virus is transmitted by different mosquitoes with different behaviors and locations.
- The West Nile virus is transmitted through a mosquito vector to both humans and animals, with birds acting as reservoir hosts.
- The majority of infected individuals with WNV do not seek medical care, as their symptoms consist of a fever. Serious side effects are rare, with less than 1% of infections cause neurological impacts.
- Mosquito surveillance and control occur at the county and the state level. Wisconsin DHS has responded to the increase of WNV through increasing education (emphasizing personal protection), creating a bird hot line, mosquito surveillance verifying case, reporting to CDC, and working with the State Lab of Hygiene on diagnosis.
- Although the Tiger mosquito, which carries Zika, has not currently been found in WI, surveillance efforts will begin this summer in southern Wisconsin.
- Paskewitz and her students test mosquito control methods. Successful techniques include vitamin B, garlic, bananas, vanilla and bats. The results of these and other scientific analyses can be found here: http://labs.russell.wisc.edu/mosquitosite/
- There are approximately 80 species **of Ticks** in the United States. In Wisconsin, deer ticks and wood ticks are the most common species that feed on humans.
- Deer ticks were first identified in the state in Lincoln County in 1965. Since that time, they have followed the landscape, expanding into open fields, and can now be found throughout the state. Their density correlates with the size of the deer populations.
- With the increasing population and migration of ticks across the state, Lyme disease numbers are also rising. In 1990's there were an average of 400-500 cases per year. Since 2000, the number almost doubled within 5 years and has been increasing by 10 fold to approximately 20-30,000 per year. There are challenges in Lyme disease diagnosis and variability in treatment approaches. Suggestions to minimize your risk from ticks http://labs.russell.wisc.edu/wisconsin-ticks/on-people/