

Report to the Boards of Health

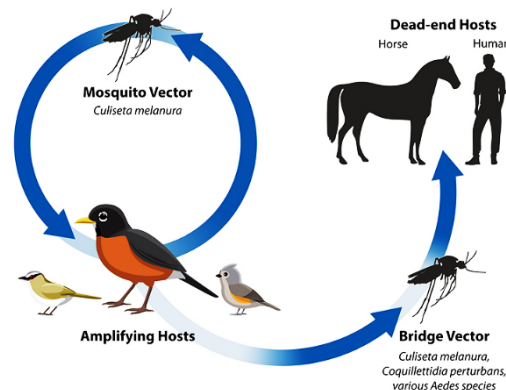
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Mid-Michigan District Health Department, Wednesday, September 23, 2020
Central Michigan District Health Department, Wednesday, September 23, 2020
District Health Department 10, Friday, September 25, 2020



Eastern Equine Encephalitis (EEE)

Eastern Equine Encephalitis (EEE) is a virus that can be spread to humans and other mammals by infected mosquitos. Mosquitos become infected with the virus after feeding on infected birds, which are the host animal for this infection. Birds carrying EEE rarely have any symptoms. Infected mosquitos can then pass the virus to humans and mammals. EEE does not pass directly between people and other mammals. There are a few types of mosquito that spread EEE. The first is *Culiseta melanura* which feed on birds in freshwater hardwood swamps and bogs. *Culiseta melanura* rarely feeds on humans. Other mosquitoes, specifically *Coquillettidia pertubans* and some species of *Aedes* and *Culex* will feed on birds and mammals, including humans, and act as a bridge for EEE. Mammals are called “dead end” hosts because the concentration of virus does not get high enough to infect a mosquito.



Eastern Equine Encephalitis Transmission

The Eastern equine encephalitis virus cycles between mosquitoes and birds. The *Culiseta melanura* mosquito, which primarily bites birds, is responsible for spreading the virus among birds. The virus then multiplies in the birds' bloodstream.

People and other animals, like horses, become infected with the virus when mosquito species that feed on many kinds animals, feed on infected birds and then bite people. People and horses are considered **dead-end hosts** because unlike birds, they don't develop high levels of virus in their bloodstream and cannot pass the virus on to other biting mosquitoes.



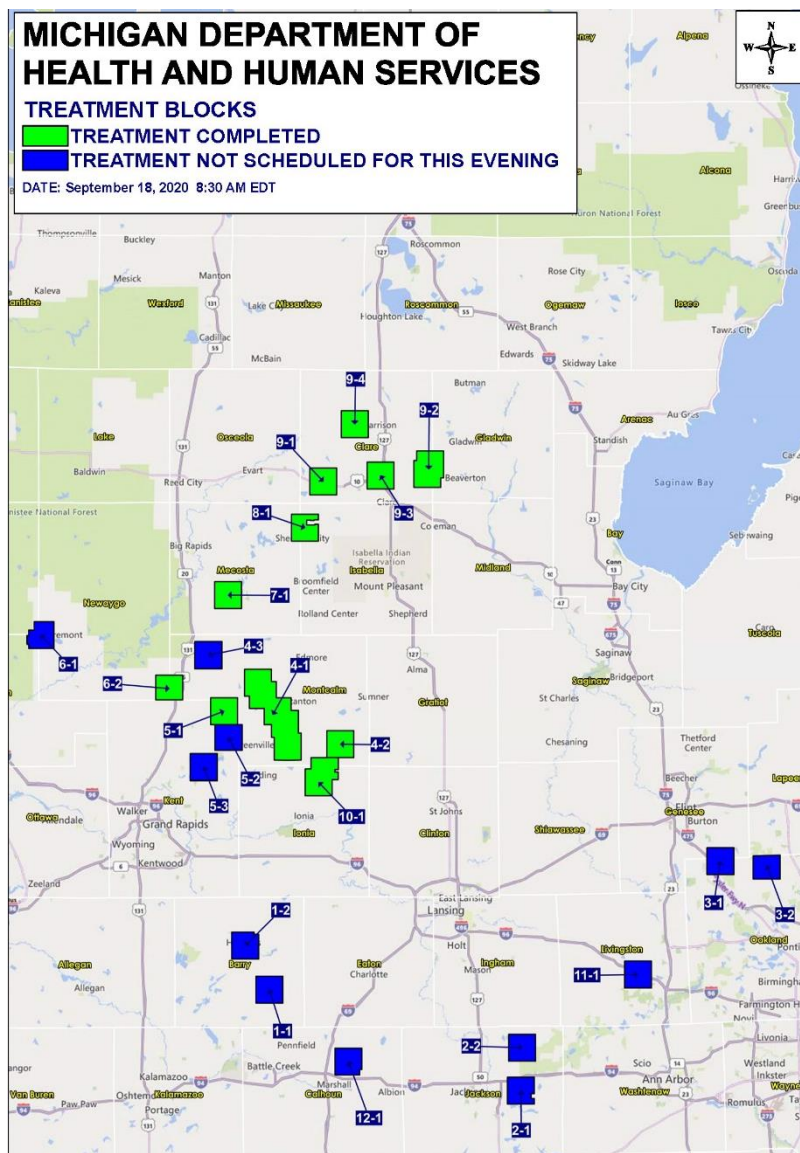
Horses are a commonly affected animal, along with donkeys, but EEE has also been reported in sheep, cattle, dogs, llamas, alpacas, pigs, and deer. In horses, the time from infection to illness is 5 to 14 days. Some animals may have asymptomatic infections or mild cases. The classic illness from EEE is encephalitis, which has a 90% fatality rate in horses. It starts with nonspecific signs like fever, decreased eating and depression, followed by neurological signs that may include altered mentation, hypersensitivity to stimuli, involuntary muscle movements, impaired vision, behavioral changes (e.g., aimless wandering, head pressing, circling), an inability to swallow, unstable walking, paralysis and/or convulsions. In horses, EEE can be diagnosed by serology (a blood test). Before vaccines were developed, EEE outbreaks in horses occurred regularly in the U.S. and Canada. One such outbreak in 1947 killed an estimated 12,000 horses in Louisiana.

EEE infection in humans usually does not cause any symptoms. About 4% to 5% of people will get sick when infected with EEE and illness develops 4 to 10 days after infection. Symptoms include chills, fever, weakness, muscle pain, and joint pain. Most recover completely within two weeks, but some continue to have fatigue and weakness for weeks or months. Less than 1% of people infected with EEE get encephalitis or meningitis which cause symptoms such as high fever, headache, irritability, restlessness, drowsiness, anorexia, vomiting, diarrhea, bluish discoloration of the skin, convulsions, and coma. Though anyone can get severe illness from EEE, it is more likely in young children and adults over 60 years of age. About 1 out of 3 people that develop these serious neurologic infections will die. Others may take weeks to months to recover and most are left with brain dysfunction, severe intellectual impairment, personality disorders, seizures, paralysis, and nerve dysfunction. Many who have these more severe sequelae die within a few years. Serology testing is not as accurate in humans. Testing of the spinal fluid is typically needed to confirm the disease in humans.

There is no vaccine or specific medication for EEE in humans. Reducing the risk of exposure to mosquitoes carrying EEE is the best prevention against EEE infection. This can be done by avoiding being outdoors from dusk to dawn; applying insect repellents with EPA-approved products; wearing long-sleeved shirts and long pants when outdoors, and emptying water from mosquito breeding sites around the home. Mosquito populations do not go down until temperatures drop consistently and there are at least two hard freezes.

To date this year, 29 horses in 12 counties in Michigan have been infected with EEE and one human case has been confirmed in Barry County. Some mosquito trapping was done around the areas these horses resided and the mosquitos responsible for spreading EEE were found. Cases in animals are concerning as they are a warning that EEE and the mosquitos that carry it from birds to mammals is in the area and may be a threat to humans.

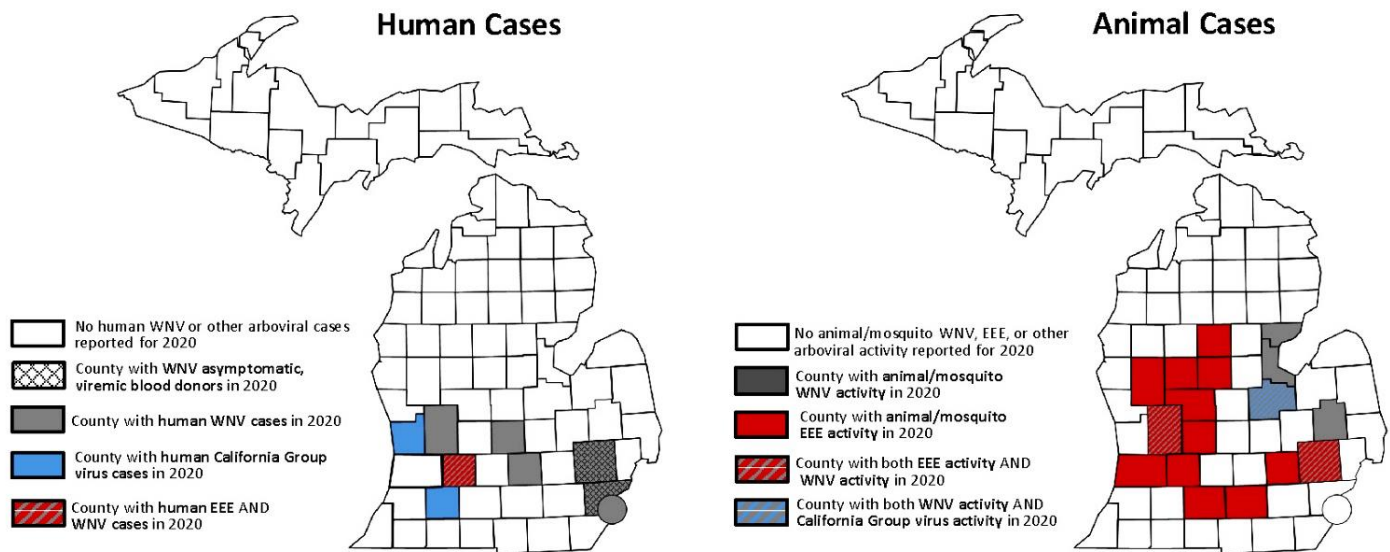
Due to the high amount of EEE activity, MDHHS announced September 11th that there be consideration to postponing, rescheduling, or cancelling outdoor activities occurring at or after dusk, particularly activities that involve children. On September 14th MDHHS announced plans to conduct aerial mosquito control treatment in areas of Michigan with high activity of EEE. These treatments started September 16th. Aerial treatment has been conducted at nighttime when mosquitoes are more active and when fish are less likely to be at the surface feeding and honeybees are most likely to be in their hives. Treatment used Merus 3.0, the same product used in 2019. Merus 3.0 is labeled for public health use over residential areas. It contains 5 percent pyrethrins, a botanical insecticide extracted from chrysanthemum flowers and are approved for use in organic agriculture. The Michigan Department of Agricultural and Rural Development (MDARD) issued an emergency rule temporarily amending the rule on notification and participation for community pesticide applications for aerial spraying treatment across affected counties. This means mosquito control treatment will be required for the areas that are identified by the aerial treatment plan with exception of federal properties and tribal lands. Aerial treatment conducted on Wednesday, Sept. 16, covered more than 157,000 acres in Blocks 4-1, 4-2, 8-1, 9-1, 9-2, 9-3 and 9-4 and treatment conducted on Thursday, Sept. 17, treated early 69,000 acres in Blocks 5-1, 6-2, 7-1 and 10-1.



Daily Outbreak Summary, Michigan 2020

**Arboviruses are viruses transmitted by mosquitoes or other insects*

Updated: September 18, 2020



Brief History of EEE in Michigan

- 1942-43: Large horse outbreak in SW Michigan, 469 horse cases of EEE
- 1973-75: Second outbreak of EEE in Michigan horses. Started in Oakland County, extended widely with scattered horse cases in SE Michigan. First mosquito and bird investigations.
- 1980: First human case of EEE in Michigan, in a 10-year-old boy from St. Joseph county
- 1980-83: Third outbreak of EEE in Michigan. EEE virus isolated from mosquitoes in state for first time, second human case.
- 1989, 1991, other years: outbreaks among animals
- 1991: SE & SW Michigan horse outbreak with two human cases.
- 1990s-2000s: Several sporadic cases and outbreaks, 1995 in particular
- 2010: Outbreak with three human cases and 132 horse cases.
- 2019: Largest human outbreak ever: 10 human cases, 6 fatal.
- 2020: 29 horses, 1 deer, 1 human to date

Recommendations:

1. Continue to use mosquito control measures until there have been at least two heavy freezes and you no longer see mosquitos in your area.
2. Be prepared for future emergency management of vector-borne disease outbreaks.
 - a. For excellent guide see "ASTHO: Before the Swarm: Guidelines for the Emergency Management of Vector-Borne Disease Outbreaks"
<https://www.astho.org/Programs/Environmental-Health/Natural-Environment/Vector-Borne-and-Zoonotic-Diseases/Before-the-Swarm-Guidelines-for-the-Emergency-Management-of-Vector-Borne-Disease-Outbreaks/>
3. Work with and support local, state, and national partners in the development of ongoing mosquito and vector-borne disease surveillance and control measures.
 - a. AMCA Best Practices for Integrated Mosquito Management: A Focused Update
https://www.naccho.org/uploads/downloadable-resources/amca-guidelines-final_pdf.pdf

- b. NACCHO Foundational Training Resources Designed for Vector Control Programs
<https://www.naccho.org/blog/articles/foundational-training-resources-designed-for-vector-control-programs>

Sources

- Michigan Department of Health and Human Services (MDHHS). Eastern Equine Encephalitis.
www.mi.gov/eee
- The Center for Food Security and Public Health (CFSPH). Eastern, Western and Venezuelan Equine Encephalomyelitis.
http://www.cfsph.iastate.edu/Factsheets/pdfs/easter_wester_venezuelan_equine_encephalomyelitis.pdf
- Centers for Disease Control and Prevention (CDC). Eastern Equine Encephalitis (EEE).
<https://www.cdc.gov/easternequineencephalitis/index.html>
- Eastern Equine Encephalitis Michigan 2019 Overview
https://www.michigan.gov/documents/emergingdiseases/2019_EEE_Outbreak_-_Website_presentation_690530_7.pdf