

IN THIS ISSUE: WESTERN EQUINE ENCEPHALITIS

Mosquito Borne Illness: Western Equine Encephalitis

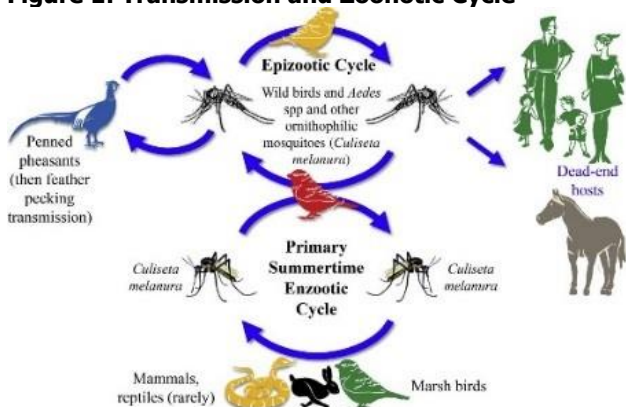
Introduction

Western Equine Encephalitis (WEE) is a mosquito-borne disease caused by an alphavirus in the *Togaviridae* family of viruses. Although birds and rodents are the primary reservoirs of WEE, it is spread to humans, horses, and small wild animals by infected *Culex* and *Aedes* mosquito species. It circulates in wildlife, but human cases are rare.<sup>1,2</sup> WEE infections occur more frequently in the summertime, when mosquitos are more active, and are reported in the western United States and Canada.<sup>2</sup> WEE is part of a group of similar viral diseases transmitted by mosquitoes that includes West Nile Virus, Eastern equine encephalitis (EEE), St. Louis encephalitis (SLE), and La Crosse encephalitis.<sup>3</sup>

Epidemiology

The primary species of mosquito that transmits WEE is the *Culex tarsalis* mosquito. Birds are the primary target in spring and serve as amplifying hosts. As summer progresses, the mosquitos move on to feeding on larger mammals. Once bitten by an infected mosquito, the virus invades the nervous system. Human epidemics usually are found where there is an outbreak in mules, horses, pheasants, or other birds. However, there is no sign of person-to-person transmission, nor is there any aerosolized transmission. The virus is almost always transmitted between hosts by vector, but there is risk of the virus crossing the placenta from mother to fetus or transmission through infected blood transfusion.<sup>3,2</sup>

Figure 1: Transmission and Zoonotic Cycle



Source: <https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/equine/eee-wee-vee/equine-encephalitis>

Overtime, most reported cases have occurred either west of the Mississippi River, west of the Rocky Mountains, or in California. The incidence of reported cases is variable due to infection activity being centered around outbreaks. Conditions that normally lead to higher vector populations, such as warm weather and heavy rainfall, increase the risk of infection with infectivity peaking in July and August.<sup>2</sup> Since 1964, the Center for Disease Control and Prevention (CDC) reported 639 confirmed cases in humans in the United States.<sup>3</sup>

Significant national outbreaks occurred in 1941, 1977, and 1987. The 1941 outbreak was the largest with over 3,000 confirmed human cases.<sup>2</sup> In 1977, there were 41 human cases reported and in 1987 there were 37 WEE cases in humans and 132 in horses reported in the Plains and Rocky Mountain states.<sup>4</sup>

Currently, infectivity rates are reported to be 1:1,000 for adults, 1:58 for children aged 1-4, and 1:1 in infants.<sup>2</sup> However, in the 1987 outbreak, when there was statewide evidence of virus transmission in Colorado, the crude attack rate was calculated as 1:100,000.<sup>4</sup>

Figure 2: Distribution of Western Equine Encephalitis



Map: Denice Adams, APHC. Source USGS disease map

Distribution of WEE in the U.S. as of 2012  
States with a potential risk for contracting WEE are shaded in grey.

Source: [https://phc.amedd.army.mil/PHC%20Resource%20Library/WesternEquineEncephalitis\\_FS\\_18-045-0317.pdf](https://phc.amedd.army.mil/PHC%20Resource%20Library/WesternEquineEncephalitis_FS_18-045-0317.pdf)

Clark County, in southern Nevada, documented WEE in a mosquito pool in 2013 and in three birds in 2003<sup>5</sup> and Washoe County stated in a West Nile Virus press release in 2008 that WEE is sometimes seen in the area.<sup>6</sup> However, there are no human cases documented in Nevada.

## Prevention

While there is no vaccine currently in use for humans, there is an experimental Western Equine Encephalitis Vaccine (WEEV) that has been used for humans by the U.S. Army Medical Research Institute of Infectious Disease in clinical trials as an investigational new drug since 1976.<sup>7</sup> The equine vaccine, on the other hand, is very effective and is widely used on horses. Horses should be vaccinated if you live in or travel to an area with mosquitos or previously reported cases of WEE.<sup>1</sup>

Since there is no vaccine, prevention is crucial. The best prevention measures are those that protect from mosquito bites, such as covering as much skin as possible, use of insect repellent products, elimination of mosquito breeding site like outdoor containers that collect water, ensuring that window screens and screen doors are properly installed and used.<sup>2,3</sup> Even if vaccinated, horse exposure to mosquitos should be reduced in any way possible by limiting outdoor activities at dawn and dusk (when mosquitos are most active), eliminating standing water (mosquito habitat and breeding sites) around horse stalls, barns, or homes, and use of equine approved mosquito deterrent or repellent.<sup>1,8</sup>

## Signs & Symptoms

Symptoms usually appear 5 to 15 days after an infected mosquito bite<sup>5,9</sup> and can include fever, chills, malaise, weakness, myalgias, headache, neck stiffness, nausea, and vomiting.<sup>2,10</sup> If infection progresses to neuroinvasive, it can cause meningitis and encephalitis. In these severe cases, patients might present with vertigo, photophobia, confusion, agitation, somnolence, coma, spasticity, convulsions or seizure, or death.<sup>1,2,3,9,10</sup> Young children and the elderly have a higher chance of developing more severe symptoms.<sup>2,9</sup> Children that develop neurological disease are more likely to have permanent disabilities such as seizures, spasticity, and cognitive or behavioral disorders and the elderly are more likely to die from WEE associated complications.<sup>2</sup> The survival rate in humans is higher, with the disease fatality rate being around 4%<sup>2</sup> with major complications reported in 13% of cases.<sup>3</sup>

## Diagnosis & Testing

Diagnosis of WEE is difficult as the signs and symptoms of infection are non-specific and commonly experienced by those with other forms of viral meningitis and encephalitis. WEE diagnosis is primarily completed with blood or cerebral spinal fluid (CSF) by enzyme-linked immunosorbent assay (ELISA) or polymerase chain reaction (PCR) testing for antibodies specific to WEE.<sup>11</sup> The IgG and IgM antibodies in infected patients are detectable within one to three weeks of symptom onset and are indicative of acute infection. The WEE test also can have a false positive due to cross-reacting with the SLE virus, adding difficulty distinguishing between the two.<sup>2</sup> Virus can also be isolated from tissue, blood, CSF, or other body fluid; however, isolation of virus is difficult.<sup>2,10</sup>

## Treatment

There are no medical or antiviral treatments for WEE infection. Therefore, treatment is supportive and is focused on relieving symptoms and preventing and managing complications.<sup>3,2</sup> Patients who develop encephalitis may require mechanical ventilation. As a neuroinvasive disease, WEE infection may cause increased intracranial pressure that would need management. If seizures occur, the patient may require anticonvulsants.<sup>2</sup>

## Reporting

The list of reportable communicable diseases and reporting forms can be found at:

<http://tinyurl.com/WashoeDiseaseReporting>

**Report communicable diseases to the Washoe County Health District. To report a communicable disease, please call 775-328-2447 or fax your report to the WCHD at 775-328-3764.**

## Acknowledgement

Thank you to all health care providers, infection control practitioners, laboratory staff, as well as schools and daycares for their reporting and collaboration to make this work possible.

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