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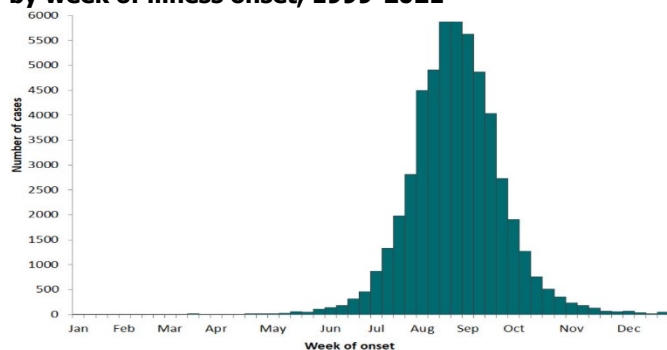
Introduction

West Nile virus (WNV) is the leading cause of mosquito-borne disease in the continental United States.<sup>1</sup> However, there are no vaccines to prevent infection, nor medications to treat human cases of WNV. As such, taking preventive measures are key to avoid possible infection, which can sometimes be serious and even fatal.

Epidemiology

The annual number of reported WNV disease cases fluctuate widely year to year, but are reported across the country with activity typically occurring during the summer months and into the fall [Fig. 1].<sup>2</sup> In the past decade (2012-2022), there were 25,064 reported cases of WNV in the United States ranging from a high of 5,674 cases in 2012, to a low of 731 in 2020, with 1,126 deaths.<sup>2</sup> In the same period of time, Nevada reported 170 cases (high of 67 in 2017, low of zero in 2022) and 19 deaths, while Washoe County reported 35 cases (high of 25 in 2017, low of zero in 2012, 2020, 2021, and 2022) with two deaths.<sup>2,3,4</sup> In terms of age distribution, the average annual incidence of WNV neuroinvasive disease are reported lowest in <10 years of age and increase stepwise by age group, with the highest in those ≥70 years of age.<sup>2</sup>

Figure 1: West Nile virus disease cases reported to CDC by week of illness onset, 1999-2021



Source: <https://www.cdc.gov/westnile/statsmaps/cumMapsData.html>

Prevention & Risk Factors

With no vaccine for WNV, preventing WNV-carrying mosquito bites is the primary prevention method for infection.<sup>2</sup> Community-level mosquito control programs are used to reduce mosquito breeding,

but personal deterrence methods, especially for people who engage in outdoor work and recreational activities, include the use of insect repellent, wearing skin-covering clothing, and use of personal environmental control measures.<sup>2,5</sup>

When using insect repellent, use of an EPA-registered insect repellent with either DEET, picaridin, IR3535, oil of lemon eucalyptus, PMD, or 2-undecanone is recommended as natural insect repellents not registered with the EPA are of unknown effectiveness.<sup>5</sup> Insect repellents are considered safe for most people, even for pregnant and breastfeeding women, but ensure to always follow label instructions. A second layer of protection is the wearing of long-sleeved shirts and long pants and limiting outdoor exposure from dusk to dawn. By treating clothing and gear (e.g., boots, socks, tents) with 0.5% permethrin, this will help in killing and repelling mosquitos and can be effective even after multiple washings. Further actions that can be taken include the use of screens on windows and doors, patching holes in screens, use of air conditioners over opening windows for cooling, and ensuring no water-holding containers are filled with standing water (e.g., buckets, flowerpots, planters, toys, pools, trash containers) as they can be breeding sites for mosquitos.<sup>2,5</sup> If traveling out of the country, similar prevention efforts can be utilized, with the addition of the use of sleeping under mosquito nets, preferably treated with permethrin.

Those at highest risk for severe illness are people over 60 years of age, people with cancer, diabetes, hypertension, kidney disease, and people who have received organ transplants.<sup>6</sup>

Signs & Symptoms

The incubation period for WNV disease is typically 2 to 6 days with a range of 2 to 14 days but can be several weeks in immunocompromised people.<sup>7</sup>

Most people (80%) never develop symptoms after infection with WNV.<sup>6</sup> About 20% of those infected with WNV go on to develop fever with headache, weakness, myalgia, arthralgia, gastrointestinal

symptoms, or transient maculopapular rash, followed by recovery, with fatigue and weakness lasting weeks to months.<sup>6,7</sup>

Less than 1% (about 1 in 150 people) develop serious symptoms, referred to as neuroinvasive disease, affecting the central nervous system or resulting in meningitis or acute flaccid paralysis.<sup>6,7</sup> Symptoms associated with severe illness include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness, and paralysis. Recovery from severe illness may take weeks to months, although some central nervous system effects may remain permanent. WNV acute flaccid paralysis is usually clinically and pathologically identical to poliovirus-associated poliomyelitis; however, WNV poliomyelitis often presents as isolated limb paresis or paralysis and can occur without fever or apparent viral prodrome.<sup>7</sup> Rarely, cardiac dysrhythmias, myocarditis, rhabdomyolysis, optic neuritis, uveitis, chorioretinitis, orchitis, pancreatitis, and hepatitis have been described in patients with WNV disease.<sup>7</sup> About 10% of those with severe illness die, with higher fatality rates with those with WNV encephalitis and poliomyelitis compared to those with WNV meningitis.<sup>6,7</sup>

## Diagnosis & Testing

Testing of serum or cerebrospinal fluid (CSF) to detect WNV-specific IgM antibodies via commercial or state public health lab is often the primary detection method.<sup>6</sup> IgM antibodies are usually detectable 3-8 days after illness onset and may be detectable for 30-90 days. Positive immunoassays may result from cross-reactive antibodies after infection with other flaviviruses or from non-specific reactivity, thus, all positive results obtained with these assays should be confirmed by neutralizing antibody testing of acute- and convalescent-phase serum specimens. WNV IgG antibodies generally are detected shortly after IgM antibodies but persist for many years following infection. Viral cultures and tests to detect viral RNA can be performed on serum, CSF, and tissue specimens that are collected early in the course of illness but likelihood of detecting a WNV infection through these methods is fairly low. Plaque-reduction neutralization tests (PRNTs) performed in reference laboratories, can help determine the specific infecting flavivirus and can confirm acute infection by demonstrating a fourfold or greater change in WNV-specific neutralizing antibody titer between acute- and convalescent-phase serum samples collected 2 to 3 weeks apart.

WNV disease should be considered in any person with a febrile or acute neurologic illness who has had recent exposure to mosquitoes, blood transfusion, or organ transplantation, especially during the summer months in areas where virus activity has been reported.<sup>7</sup> The diagnosis should also be considered in any infant born to a mother infected with WNV during pregnancy or while breastfeeding.

## Treatment

There are no specific medications to treat WNV in humans.<sup>6</sup> Rest, fluids, and some over-the-counter medications can be used to relieve some symptoms. In severe cases, supportive medical treatments are needed, including intravenous fluids, pain medications, and possibly ventilatory support.<sup>5,6</sup>

## Reporting

WNV is a reportable disease in Nevada, including WNV fever cases and the more serious forms of illness. 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.

## References

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