

Understanding West Nile Virus

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Throughout history, society has dealt with outbreaks of disease. Measures to control the spread of disease have varied widely and produced extremely variable results. Epidemics of dreaded diseases continue to arouse fear as the medical and scientific communities rush to calm the citizenry and provide education as to the best means of protection and prevention. The 2002 dramatic increase in incidence of West Nile virus caused the Centers for Disease Control, along with state and local health officials, to appropriately urge the public to become informed and protect themselves from this potentially fatal disease. What is West Nile virus, who is at risk, and what can be done to prevent the spread of this disease? We offer this paper for the edification of the AAMA members who will clearly become involved in prevention and treatment of this disorder. The onset of Winter typically reduces the spread of mosquito-borne illnesses such as West Nile virus, but the return of Spring 2003 makes this an entirely appropriate time to present such information.

“West Nile virus” referred to as both an arbovirus and flavivirus originated in Uganda but is also found in West Asia, Africa, and the Middle East. This virus can infect humans, birds, mosquitoes, horses, and some other mammals such as dogs and cats. Scientists are not sure how long the virus has been in the United States, but believe it has been in the eastern states since the early summer of 1999. Although it is not known how the virus was first introduced into the U.S., to date it has spread to at least 44 states and the District of Columbia, and has affected more than 4,000 people.

(Insert graphic from CDC Website here)

The typical transmission cycle of West Nile virus involves the *Culex pipiens* (common household) mosquito and various species of birds. Blood feeding insects such as mosquitoes contract the virus when they feed on a bird carrying the virus in its blood. The virus is then transmitted to humans and animals through bites that can cause West Nile fever, West Nile encephalitis, West Nile meningitis, or West Nile meningoencephalitis. Encephalitis refers to inflammation of the brain, meningitis is an inflammation of the membrane surrounding the brain and spinal cord, and meningoencephalitis refers to inflammation of both the brain and the membrane surrounding it.

Following transmission by an infected mosquito, the incubation period (or time from infection to onset of disease symptoms) is usually 3 to 15 days. During this time period, the virus crosses the blood brain barrier, reaching the brain. The virus interferes with normal central nervous system function and causes inflammation..

The risk of a human becoming ill with West Nile virus from a single mosquito bite is extremely low. In areas where mosquitoes carry the virus, less than 1% of all individuals bitten, and subsequently infected, become severely ill. For humans, the risk associated with West Nile virus

is greatest for those over 50 years of age and those who are very young. Most people bitten by an infected mosquito never get sick and most of the rest exhibit only flu-like symptoms, often these symptoms are mild or even clinically unapparent. Approximately 20 % of those infected with the virus will develop a mild illness. The mild form of the disease is usually described as a febrile illness of sudden onset generally lasting 3 to 6 days and often accompanied by headache, body rash, malaise, loss of appetite, vomiting, eye pain and swollen lymph glands.

In approximately 1 out of 150 individuals, infection will result in severe illness or neurological disease. The most significant risk factor for developing severe disease is advanced age, with encephalitis more commonly reported than meningitis. Symptoms occurring which often require hospitalization are high fever, change in mental status, gastrointestinal symptoms, rash involving the neck, trunk, arm, and legs, severe muscle weakness, stiff neck, flaccid paralysis, seizures, and even coma.

While there is no specific treatment for West Nile virus, in severe cases intensive supportive therapy will be required. This can involve acute hospitalization, hemodynamic support through intravenous fluids, airway management, respiratory support or use of a ventilator, and prevention of secondary infection such as pneumonia and urinary tract infections through excellent nursing care.

Until recently it was believed that West Nile virus could not be transferred from human to human. The latest reports indicated that transplanted organs were the source of West Nile virus infection in four recipients of organs from a single donor. It is not known how the organs became infected, but it is suspected that the infection originated in blood that was transfused to the original donor. Evidence of West Nile virus was also recently found in breast milk from a nursing mother in Michigan, prompting concerns of a new transmission pathway for the disease. If this route of

transmission were found to be correct, that would make a proposed fourth route of transmission for the disease.

Preventing and controlling of future outbreaks of West Nile virus is linked to eliminating exposure to mosquitoes by any number of methods. The importance of eliminating mosquito breeding grounds and taking precautions against mosquito bites cannot be stressed enough.

Reduction of mosquito breeding habitats by reducing sources of standing or stagnant water to minimize breeding places is one method of control. It

is important to note that the mosquitoes which carry West Nile Virus will only breed in stagnant water, not in fresh or running water.

You can further reduce your chances of becoming ill by protecting yourself from mosquito bites.

This can be achieved by the use of insect repellents containing DEET (N, N-diethyl-meta-toluamide), which is highly recommended for use but requires caution as repellents can irritate the eyes and mouth. Clothing can be sprayed with repellents containing DEET since mosquitoes may bite through thin clothing. When possible, long-sleeved shirts and long pants should be worn outdoors. Mosquito netting should be placed over infant carriers when outdoors. Window and door screens should be installed or replaced so that mosquitoes cannot get indoors, and the public should consider staying indoors at dawn, dusk, and in the early evening which are peak mosquito biting times. Reducing the number of mosquitoes in outdoor areas can be achieved by eliminating standing water, which is where mosquitoes lay their eggs and breed. Items such as buckets, discarded tires, cans, clogged rain gutters, pet food and water dishes, birdbaths and empty flowerpots should be checked once or twice per week for standing, stagnant water.

Federal health officials state that the current outbreak of West Nile virus in the United States has thus far sickened 4,161 people and claimed 277 lives (most current CDC data,

March 13, 2003). Prevention and control of West Nile virus is most effectively accomplished through integrated vector management programs. These programs should include surveillance for West Nile virus activity in mosquito vectors, birds, horses, other animals, humans and implementation of appropriate mosquito control measures to reduce mosquito populations when necessary. Additionally residents should be alerted and advised to increase measures to reduce contact with mosquitoes when virus activity is detected in an area.

The continued expansion of West Nile virus in the United States indicates that it is permanently established in the Western Hemisphere. With the return of Spring, the public can play a very important role in monitoring West Nile virus through the reporting of dead birds to state and local health departments, reducing standing water, remaining indoors during dusk and dawn, and reporting symptoms of the virus to their physicians. Rapid diagnosis of the virus allows physicians to offer early intervention with antiviral therapy to individuals who test positive for West Nile virus and may help public health authorities take measures to prevent further spread of the infection.

The authors hope that this background information has proven useful to readers who will most certainly be involved with the prevention, diagnosis and treatment of West Nile virus as warm weather returns to the United States this Spring.

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