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Colorado Department
of Public Health
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West Nile Virus Infection Prevention and Control Recommendations Colorado Long-term Care Facilities

What is West Nile Virus?

West Nile virus (WNV) is a disease transmitted to humans by infected mosquitoes. WNV has spread to 44 states since it was first introduced into the United States in New York City in 1999, and should become established in California this summer, after which it will likely become a seasonal epidemic that flares up in the summer and continues into the fall.

There is currently no vaccine for WNV, and local health departments must rely on preventing mosquito bites and local mosquito abatement measures to prevent transmission. Because infection with WNV results in a higher rate of serious complications and death in the elderly, it is important that facilities such as nursing homes and assisted living centers take appropriate measures to reduce mosquito populations and prevent mosquito bites. To the extent possible, residents should be informed about the disease and advised and assisted in taking the appropriate precautions to prevent infection.

The Colorado Department of Public Health and Environment is distributing the following information and recommendations for reducing the risk of West Nile virus infection for residents of skilled nursing facilities and other congregate living facilities, which were developed by the California Department of Health Services (CDHS), Division of Communicable Disease Control (DCDC) in consultation with the Licensing and Certification Program.

Information about West Nile virus, including West Nile virus activity elsewhere in the United States, is available at the Centers for Disease Control and Prevention West Nile virus web site at <http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>.

What is the epidemiology of West Nile Virus?

West Nile virus is a single-stranded RNA virus of the family *Flaviviridae*, genus *Flavivirus* and is closely related to other human viruses that cause encephalitis. In the summer of 1999, 62 cases of WNV were reported in New York. By 2003, 9858 cases from the 46 states including the District of Columbia had been reported resulting in 262 deaths. In Colorado, WNV activity can begin in early June and extend through October. In cold climate northern states, West Nile Fever activity peaks between August and September. In warmer climates activity begins in mid to late June and extends through October however year-round activity is possible in the more temperate climates.

How do people get infected with West Nile virus?

West Nile virus is transmitted to humans by infected mosquitoes. Mosquitoes become infected when they feed on the blood of infected birds. During later blood meals (when mosquitoes bite), the virus may be injected into humans and animals, where it can multiply and possibly cause illness.

West Nile virus is NOT transmitted from person-to-person. For example, you cannot get West Nile virus from touching, providing health care, or other close contact with a person who is infected, or from a health care worker who has treated someone with the disease. However there have been reports of transmission from donors of infected blood and organs to recipients and one documented report of transplacental (mother to child) transmission. Laboratory workers who handle infected specimens such as blood or cerebral spinal fluid have also acquired WNV most likely resulting from percutaneous injury.

Even in areas where the virus is circulating, very few mosquitoes are infected with the virus. Even if the mosquito is infected, less than 1% of people who get bitten and become infected will get severely ill.

Although the vast majority of infections have been identified in birds, WNV has been shown to infect horses, cats, bats, chipmunks, skunks, squirrels, and domestic rabbits. There is no evidence that a person can get the virus from handling live or dead infected birds. However, persons should avoid bare-handed contact when handling *any* dead animals and use gloves or double plastic bags to place the carcass in a garbage can.

What are the Symptoms of West Nile Virus Infection?

Most people who are infected with the West Nile virus will not have any type of illness. It is estimated that 20% of the people who become infected will develop West Nile fever. About 1 in 150 persons infected with the West Nile virus will develop a more severe form of disease, such as West Nile encephalitis or meningitis. The most significant risk factor for developing severe neurological manifestations requiring hospitalization is advanced age. The incubation period ranges from 3-14 days. Symptoms of mild disease will generally last a few days. Symptoms of severe disease may last several weeks, although neurological effects may be permanent.

West Nile fever consists of mild symptoms, including fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands. Other symptoms may include malaise, fever, anorexia, fatigue, nausea, vomiting, eye pain, and mental status changes.

West Nile encephalitis or meningitis symptoms include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Severe neurological manifestations include ataxia, cranial nerve abnormalities, myelitis, optic neuritis, polyradiculitis and seizures.

How is West Nile Virus Diagnosed and Treated?

The initial diagnosis of WNV infection is based primarily on clinical suspicion and evidence of increased WNV disease activity in animals such as horses and birds. WNV, or other arboviral diseases such as St. Louis encephalitis, should be strongly considered in adults ≥ 50 years who develop unexplained encephalitis or meningitis in summer or early fall. Total leukocyte counts are often normal or slightly elevated and lymphocytopenia and anemia may also occur. In patients with encephalitis, hyponatremia may be present. Cerebral spinal fluid often shows pleocytosis, elevated leukocyte counts with a predominance of lymphocytes, elevated protein counts and normal glucose levels. Computed tomography of the brain is generally normal but magnetic resonance imaging may show enhancement of the leptomeninges, the periventricular areas or both.

The most significant laboratory diagnostic tool is the presence of WNV IgM antibody in the serum and cerebral spinal fluid collected within 8 days after onset of illness. Since IgM antibody does not normally cross the blood-brain barrier, the presence of IgM in spinal fluid strongly suggests central nervous system infection. Healthcare providers are encouraged to consider WNV in the differential diagnosis of aseptic meningitis, encephalitis or atypical Guillain-Barre syndrome.

Treatment for mild or severe WNV infection is supportive, including intravenous fluids. Persons requiring hospital admission may require intensive care and mechanical ventilation support. Ribavirin in high doses and interferon alpha-2b were found to have some activity against WNV in vitro, but no controlled clinical trials have been completed on these or other medications including steroids, anti-seizure medications, or osmotic agents in the management of WNV encephalitis. To date there is no approved vaccine, and it will be several years before an effective vaccine is available for wide distribution.

Any suspicion of viral encephalitis or meningitis should be reported immediately to the local public health agency. In Colorado, infection with West Nile virus is a reportable condition. Laboratories are required to report all IgM positive test results to the health department within 7 days of diagnosis.

How is West Nile Virus Monitored?

The public can become part of the state's monitoring effort for WNV by reporting crows, ravens, magpies and jays that may have been dead for less than 48 hours to the local public health agency. Individuals reporting dead birds should note the bird's location and its condition (absence of maggots and decomposition) before calling for further instructions, including assistance with identifying the type of bird found. Although there is no indication that dead birds transmit WNV, people should not attempt to handle them with bare hands.

How is Mosquito Control Conducted?

- Mosquito control programs include non-chemical forms of prevention and control, as well as ground and aerial application of mosquito control products.
- Most local mosquito control agencies target the immature stages of the mosquito that live in water. This approach prevents the mosquito from becoming a biting adult, capable of transmitting disease.
- Adult mosquito control may be required to suppress populations of infected mosquitoes and stem a disease outbreak.
- Pesticides used for mosquito control have been evaluated for this use by the Environmental Protection Agency (EPA) and found to pose minimal risks to human health and the environment when used according to label directions.

What steps can a nursing home take to prevent West Nile Virus?

A typical yard can generate thousands of mosquitoes every week. The key to prevention is an infection control risk assessment (ICRA) and taking the appropriate precautions to reduce the mosquito population. The ICRA should include an evaluation of places where even small amounts of standing water may accumulate. An ICRA should be performed at least weekly or more frequently during and after the rainy season (see Appendix A). The following are general measures to reduce mosquitoes at your facility.

- Drain Standing Water
Mosquitoes lay their eggs in standing water. Limit the number of places around your facility for mosquitoes to breed by getting rid of items that hold water, such as:
 - At least once or twice a week, empty water from flower pots, pet food and water dishes, birdbaths, swimming pool covers, buckets, barrels, and cans.
 - Check for clogged rain gutters and clean them out.
 - Remove discarded tires, and other items that could collect water.
 - Be sure to check for containers or trash in places that may be hard to see, such as under bushes or under the facility.
- Install or Repair Screens
Some mosquitoes like to come indoors. Keep them outside by having well-fitting screens on both windows and doors.

How can residents/clients be protected from West Nile Virus?

If mosquitoes are abundant, nursing home residents and clients should remain indoors in the early morning and at twilight, when mosquitoes are most active. The most common repellent products contain the chemical DEET. It has been in use for more than 40 years and is still considered the most effective product according to Consumer Reports. Repellents should be used cautiously especially in children and the elderly. For additional information on the use of chemical repellents, administrators or infection control practitioners should consult the Centers for Disease Control and Prevention (CDC) web site at http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm.

The following is a summary of the CDC recommendations for repellent use:

- Persons using repellents should read and follow the manufacturers insert directions before using any chemical product on the skin of children, elderly persons and persons with open skin lesions or irritated skin.
- Repellents containing DEET should be applied sparingly to exposed skin.
- Do not spray repellents around food.
- Avoid inhaling (breathing) repellent spray.
- Repellents may irritate the eyes and mouth and should not be applied to the hands of children or other persons who commonly put their hands or fingers in their mouth.
- A higher percentage of DEET does not mean that protection is stronger, it means that protection will last longer. Choose a product that provides for the amount of time the person will be outdoors. Reapply the product if the time outdoors is extended or if mosquitoes begin to bite.
- A product containing:
 - 23.8% DEET provides an average of about 5 hours of protection.
 - 20% DEET provides an average of about 4 hours of protection.
 - 6.65% DEET provides an average of about 2 hours of protection.
- Wear long pants, long sleeve shirts and socks when outside at dawn and dusk. Spray clothing to prevent mosquitoes from biting through thin clothing. Repellents should not be used under clothing.

For additional information, long term care facilities can contact:

Statewide Toll-Free Help line: 1-877-462-2911
(general questions, reporting dead birds)

CDPHE Communicable Disease Epidemiology: 303-692-2700
(reporting cases of West Nile virus infection, clinical questions)

Appendix A

The following table has been developed to assist nursing homes and other congregate living facilities to assess the environment for potential mosquito breeding places.

Facility Name:			Date of Inspection:	
Inspector's Name:			Date Submitted to Administration for Review:	
Weekly Observation	Yes	No	If yes, action taken to eliminate source	Date
Rain gutters clogged				
Down spouts clogged				
Roof top air conditioners drained periodically as suggested by manufacturer				
Drain tiles not intact				
Flower pot trays/dishes contain standing water				
Trash receptacles contain standing water				
Discarded tires contain standing water				
Windows screens missing/torn				
Doors screen (kitchen, patio, etc.) missing/torn				
Ornamental ponds/fountains drained/cleaned weekly				
Bird bath drained cleaned weekly				
Pool/hot tub covers contain standing water				
Drain ditches dry				
Watering system functioning on timer; not over watering				
Empty buckets, pans, flower pots dry				
Vector control notified of standing water reservoirs such as road side ditches				
Other water collecting devices identified and emptied				
Tree holes plugged				