State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services

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West Nile Virus
Infection Prevention and Control Recommendations
California Long-term Care Facilities - 2005

What is West Nile virus?

West Nile virus (WNV) is a disease transmitted to humans by infected mosquitoes. WNV has spread to 48 states (all but Hawaii, and Alaska) since it was first introduced into the United States in New York City in 1999. California was severely affected in 2004, during which there were a total of 830 WNV infections reported from 23 counties in California and 27 fatalities, compared to just 3 cases in 2003. WNV activity was present in mosquitoes or animals in all 58 California counties last year, compared to 6 in 2003. As of April 1, 2005, there have been no reports of human illness due to WNV this year, yet West Nile virus has already been detected in 19 California counties. The early season detection of WNV indicates that the virus successfully survived the winter in California and will pose a statewide public health threat in 2005.

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 California Department of Health Services (CDHS), Division of Communicable Disease Control (DCDC) in consultation with the Licensing and Certification Program have developed the following recommendations for reducing the risk of West Nile virus infection for residents of skilled nursing facilities and other congregate living facilities. Questions about WNV infection and control measures should be referred to Jon Rosenberg MD at jrosenbe@dhs.ca.gov or Chris Cahill MS, RN, Infection Control Consultant at ccahill@dhs.ca.gov.

Questions related to mosquito control in a specific city or county should be referred to the local mosquito and vector control agency or health department. Information about West Nile virus in California is available at the CDHS West Nile virus web site at http://www.westnile.ca.gov.

Additional 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 flaviviruses that cause encephalitis. In the summer of 1999, 62 cases of WNV were reported in New York. In 2004, there were almost 2500 human cases of WNV detected nationally, including 88 deaths. In 2003, there were over 10,000 cases with 263 deaths. In cold climate northern states, the number of human WNV cases peaks between August and September. In warmer climates, WNV activity may be year-round, with the number of human cases peaking from July through September.

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 generally 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. Donated blood is now routinely screened for the presence of WNV.

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 will get severely ill.

Although the vast majority of infections have been identified in birds, WN virus has been shown to infect horses, 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 to moderate symptoms, including fever, headache, and body aches, occasionally with a skin rash swollen lymph glands, eye pain, and nausea and vomiting. Other symptoms may include prolonged malaise, anorexia, and fatigue. West Nile encephalitis or meningitis symptoms include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, and muscle weakness Severe neurological manifestations include ataxia, cranial nerve abnormalities, myelitis, optic neuritis, polyradiculitis and seizures. WNV can also cause an acute flaccid paralysis syndrome that may be misdiagnosed as atypical Guillain Barre Syndrome. WNV should be considered in anyone presenting with a paralysis especially if the paralysis is asymmetric, often monoplegic, often bowel/bladder dysfunction. The EMG may show decreased of absent compound muscle action potentials.

How is West Nile virus diagnosed and treated?

Clinical suspicion of West Nile should occur when there is evidence of WNV disease activity in animals such as horses and birds in your geographic area. WNV, or other arboviral diseases such as St. Louis encephalitis, should be strongly considered in adults $\geq$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. Cerebrospinal fluid (CSF) 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 and MRI is often normal early in the course of the illness but later shows non-specific changes.

Diagnosis of WNV is based on detection of WNV IgM antibody in the serum and CSF collected within 5 days after onset of illness. Healthcare providers are encouraged to consider WNV in the differential diagnosis of prolonged flu-like illness, aseptic meningitis, encephalitis or atypical Guillian-Barre syndrome. Physicians should first contact their local health department if WNV is suspected. Serum and CSF for serology and PCR testing at no charge can be submitted to the CDHS, Viral and Rickettsial Diseases Laboratory, through the local health department. Skilled nursing facility administrators should consult with the local health department for specific packaging and transporting instructions before submitting serum and CSF fluid for analysis. Some local health departments conduct WNV testing “in-house”.

Treatment for mild or severe WNV infection is supportive, including intravenous fluids. Persons requiring hospital admission may require intensive care and mechanical ventilation support. Information on clinical trials of investigational treatment of WNV infection is available at http://www.cdc.gov/ncidod/dvbid/westnile/clinicalTrials.htm. To date there is no approved vaccine but trials of experimental vaccines are underway.

Any suspicion of viral encephalitis or meningitis should be reported immediately to the local health department and, upon request, serum or cerebrospinal fluid should be submitted for testing.

How is West Nile virus monitored?

A comprehensive surveillance program to monitor WNV activity has been established by CDHS in collaboration with the University of California, Davis, the state Department of Food and Agriculture, local mosquito and vector control districts and other state and local agencies. The program includes testing suspect cases in humans and horses, collecting and testing mosquitoes, and evaluating dead birds. Approximately 220 flocks of sentinel chickens at sites throughout the state are tested for WNV every two weeks.

The public can become part of the state's monitoring effort for WNV by reporting dead birds on-line at http://westnile.ca.gov/bird_report_id.htm, or to the CDHS toll-free line 877-WNV-BIRD. 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.

Are there ongoing mosquito control programs in California?

Over 70 local agencies, including mosquito and vector control districts, environmental health departments, and county health departments, conduct regular mosquito surveillance and control throughout California. Personnel from these agencies are certified and trained to conduct safe and effective mosquito control practices.

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 thousand 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.

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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 your home.

- 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.

- 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.

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				