

Surveillance for Human Arbovirus Infections

In Connecticut, the State Mosquito Management Program (MMP) monitors statewide activity of West Nile virus (WNV) and other mosquito-transmitted viruses of public health importance including eastern equine encephalitis. This collaborative effort involves the Departments of Public Health (DPH), Environmental Protection (DEP), and Agriculture; the Agricultural Experiment Station (CAES); the University of Connecticut Department of Pathobiology; and local health departments.

The DPH conducts surveillance for WNV infection in humans and in wild birds, reviews surveillance data including mosquito testing results, and consults with the DEP and the CAES regarding the public health significance of such results. Based upon its evaluation of the potential human health risks, the DPH recommends personal, municipal, and state actions to reduce such risks and communicates that information to the public.

The DPH Laboratory Division tests serum and cerebrospinal fluid (CSF) specimens from persons hospitalized with specific neurologic syndromes. In 2003, the DPH tested 183 specimens from 128 persons with suspect WNV-related illness: 50 (39%) with encephalitis or meningoencephalitis, 76 (59%) with meningitis, and 2 (2%) with Guillian-Barré syndrome. At physicians' requests, 346 persons with other syndromes were also tested.

Of the 474 persons tested, 17 (4%) had laboratory evidence of acute WNV infection. They included 13 persons who were hospitalized for neurologic disease and 4 outpatients. Blood samples from 3 of the outpatients initially tested positive by a commercial laboratory; the results were later confirmed by the DPH laboratory. Eight persons had elevated IgM antibody levels specific to WNV in serum, 3 in CSF, and 6 in both serum and CSF. Cases included residents of 16 towns: 5 in Fairfield County, 3 in New Haven County, 3 in Middlesex County, 2 in Hartford County, 2 in New London County, and 1 each in Litchfield and Tolland counties.

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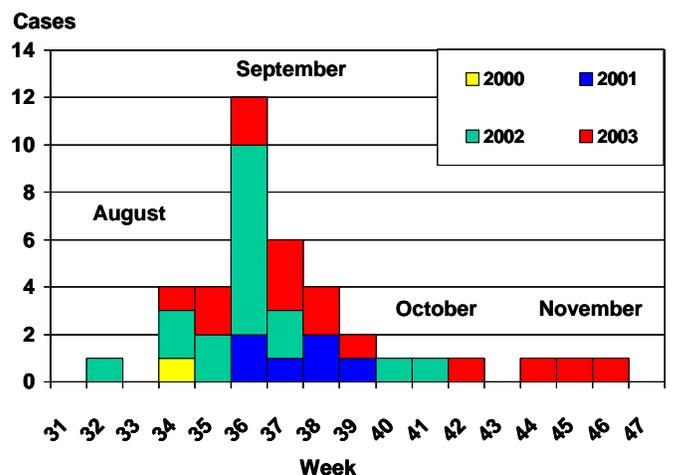
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In the 13 hospitalized cases, the median age was 55 years (range: 6-85 years). Illness was most frequently characterized by fever, headache, nausea, and muscle weakness. Onset of illness preceded hospital admission by 2-32 days (median: 4 days). The length of hospital stay ranged from 3-29 days (median: 7 days). The outpatients were slightly older (median: 57 years, range: 31-70) and most frequently had fever, headache, rash, and muscle weakness. No deaths were reported.

Two patients were infected with WNV while traveling in other states. Of the 15 patients who acquired infections in Connecticut, onset of symptoms occurred from August 26 to November 14, with 8 becoming ill from September 4 - 25 (Figure 1). Human cases coincided with statewide increases in dead bird sightings and confirmation of WNV infection in birds and mosquitoes.

During 2000-2003, 41 cases of WNV infection were identified in Connecticut; 1 in 2000, 6 in 2001, 17 in 2002, and 17 in 2003. Of the 41

Figure 1. Human cases of West Nile Virus infection by week of symptom onset, Connecticut 2000-2003



cases, 27 were WNND and 14 were WNF. Cases ranged in age from 6-89 years (median = 55). One death was reported. Onset of symptoms occurred July 29-November 14 with the peak week of onset of symptoms during early September (Figure 1). Case patients were residents of 25 towns located in seven of Connecticut's eight counties.

Reported by: *L Wilcox, MPH, R Nelson, DVM, MPH, Epidemiology and Emerging Infections Program; T Brennan, BA, State Public Health Laboratory, Connecticut Department of Public Health.*

Editorial Note:

West Nile virus (WNV) is the most frequent cause of mosquito-borne neurologic disease in the United States (1). In 2003, WNV was reported from 45 states and the District of Columbia (DC) (2). Of the 9862 human cases of WNV-associated illness, 6830 (69%) had West Nile fever (WNF), 2866 (29%) had West Nile neuroinvasive disease (WNND), and 166 (2%) had an unspecified illness. A total of 264 deaths occurred in 38 states.

In Connecticut, evidence of WNV infection was found in either mosquitoes, birds, horses, or people in 141 towns and all 8 counties. Of dead birds tested, 524 (83%) tested positive for WNV. Of these, 444 (85%) were crows, 74 (14%) were blue jays, and 6 (1%) other species. Positive birds were found between June 30 and October 5. West Nile virus was also identified in 14 horses stabled in 13 towns (3) and 72 pools of mosquitoes trapped in 15 towns (4).

Surveillance for WNV in wild birds and mosquitoes provided early warning of local virus activity. In towns with a human case of WNV, 13 of 16 towns reported an infected crow before onset of illness (median: 27 days). Of the 16 towns, 10 had mosquito-trapping sites. Positive mosquitoes were identified before the onset of human illness (median: 34 days) in 4 of the towns.

Since exposure to mosquitoes varies by season and geographic region, clinicians should take a thorough travel history from patients with neurologic illness and consider the possibility of arboviral infection, especially in persons with heavy mosquito exposure around the home. The risk of acquiring WNV infection in Connecticut is highest during August and September.

In Connecticut, encephalitis is a physician reportable disease and should be reported to the patient's Local Health Department and the DPH Epidemiology Program (860-509-7994 or 860-509-8000 after hours) by mail or phone within 12 hours of diagnosis.

References:

1. O'Leary DR, Marfin AA, Montgomery SP, et al. The epidemic of West Nile virus in the United States, 2002. *Vector Borne Zoonotic Dis.* 2004;4:61-70.
2. CDC. 2003 West Nile Virus Activity in the United States. Available at: http://www.cdc.gov/ncidod/dvbid/westnile/surv&controlCaseCount03_detailed.htm. Accessed June 2004.
3. Connecticut Department of Agriculture. M. Lis, oral communication, May 2004.
4. Connecticut Agricultural Experiment Station. Available at: <http://www.caes.state.ct.us/MosquitoTesting/2003Testing/Mosquitocumulative2003.htm>. Accessed June 2004.

West Nile Virus Transmission

Although WNV is primarily transmitted by mosquitoes, person-to-person transmission is possible by ingestion of breast milk, transplacental infection, blood transfusion, and organ transplantation. Blood and organ donations are now routinely screened for WNV.

The Centers for Disease Control and Prevention (CDC) does not recommend screening of asymptomatic pregnant women due to the largely unknown significance of WNV infection during pregnancy. Interim guidelines for the clinical evaluation of fetuses and newborns of women infected with WNV are available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5307a4.htm>

Laboratory Testing for WNV

Free arbovirus testing will be performed at the DPH Laboratory on acute and paired specimens from persons hospitalized for suspected encephalitis, meningoencephalitis, Guillain-Barré syndrome with fever, or aseptic meningitis in persons aged > 17 years. Testing for WNV is not provided for persons suspected of having WNV infection on the basis of mild illness. Specimens from outpatients can be submitted to commercial or hospital laboratories.

In some confirmed WNV-infection cases, acute specimens tested negative for IgM antibodies. It is recommended that convalescent serum specimens be submitted for patients with negative antibody test results from specimens collected during the first week of illness.

Specimen types and amounts:

Acute specimens should be collected within 14 days of symptom onset. Convalescent specimens should be collected 2-3 weeks later. Please send ≥ 5.0 ml of serum and ≥ 1.0 ml of CSF. *Do not send whole blood.* When requested, frozen brain tissue and acute CSF specimens can also be submitted for virus isolation.

To request testing for WNV, specimens must be accompanied by the **Virology Form OL9B**. Form OL9B can be obtained by calling (860) 509-8501. For WNV testing ONLY, please write "WNV TESTING" on the form.

For testing of eastern equine encephalitis, western equine encephalitis, California encephalitis group, and St. Louis encephalitis, please check the arbovirus box on form OL9B.

An encephalitis panel is also available that includes WNV, organisms in the arbovirus panel, herpes, varicella, cytomegalovirus, and Jamestown Canyon virus. To order these tests, please check the encephalitis box.

Testing for WNV is by a Capture ELISA method and by indirect immunofluorescence for the other arboviruses. Acute specimens are tested for IgM antibodies. Paired samples are tested for IgM and IgG antibodies.

The **Encephalitis/Meningoencephalitis Initial Report Form** must also be completed and accompany each specimen or set of specimens submitted. For forms or questions concerning WNV surveillance, please contact the Epidemiology Program at (860) 509-7994.

**For Public Health Emergencies
after 4:30 P.M. and on weekends;
call the
Department of Public Health
emergency number
(860) 509-8000**

West Nile Virus Knowledge, Attitudes, Behavior and Preventability in Connecticut, 2003.

In 2003, the Department of Public Health conducted a survey of state residents to assess the level of public awareness of WNV and the use of recommended prevention measures, and to determine whether documented WNV cases were potentially preventable. In August - October, WNV-specific questions were added to the Connecticut Behavioral Risk Factor Surveillance System (BRFSS). Telephone interviews were conducted statewide with adult members from randomly selected households. Patients diagnosed with WNV infections were also interviewed.

Among the 1130 persons interviewed, 45% were aware that WNV has caused serious illness among state residents (Table 1). Overall, 22% of persons removed standing water and checked screens to reduce mosquitoes in and around their home, and 35% always took one or more protective measures to avoid mosquito bites. Among the 56% of persons who spent time outdoors at least 7 of the previous 14 days, 33% always took precautions and 15% never did, including 18% of persons aged ≥ 50 years.

When asked how worried they were about getting WNV, 83% of participants said they were only a little or not at all worried, including 74% of people who were aware of Connecticut cases, 77% of persons who spent time outdoors, 90% of persons who never took personal precautions, and 74% of persons aged ≥ 50 years.

Of the 17 persons with WNV illness in 2003, 14 were interviewed. Two (14%) were aware of WNV illness in Connecticut, 9 (64%) never took personal protection precautions, 14 (100%) were a little or not at all worried and 1 (7%) always took personal protection precautions. Nine of 10 (90%) spent time outdoors at least 7 of the previous 14 days (median = 13 days).

Reported by: R Nelson, DVM, MPH, J Hadler, MD, MPH, Epidemiology and Emerging Infections Program, Connecticut Department of Public Health; K Griffith, MD, MPH, Centers for Disease Control and Prevention; L Belin, MPH, Yale University School of Epidemiology and Public Health.

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Editorial Note:

In 2003, nearly all WNV cases may have been preventable. After five seasons of WNV activity in Connecticut, a majority of residents do not view WNV as a substantial personal threat and do not always take recommended precautions when outdoors.

Additional methods of communicating risk and appropriate response are needed to effectively prevent cases of WNV. In 2002, similar questions were included in the Connecticut BRFSS (1). In both the 2002 and 2003 surveys, use of

precautions was much higher among survey respondents than among patients with WNV infection.

Persons at greatest risk for serious illness, including persons aged ≥ 50 years who frequently spend time outdoors, should be encouraged to always take precautions to avoid mosquito bites during the summer and early fall when the potential for WNV infection peaks.

References:

1. CDC. Knowledge, attitudes, and behaviors about West Nile virus-Connecticut, 2002. MMWR 2003;52:886-888.

Table 1. Knowledge attitudes, behaviors of WNV cases and general population (BRFSS survey population), Connecticut 2003.

	General Population	Cases
Spent time outdoors during ≥ 7 days in past 2 weeks	56%	90%
Aware of prior human cases	45%	14%
Moderately-very worried about getting infected	17%	0%
Always take precautions to avoid mosquito bites outdoors	33%	17%
Never take precautions to avoid mosquito bites outdoors	15%	64%

M. Jodi Rell, Governor
J. Robert Galvin, MD, MPH Commissioner of Health

James L. Hadler, MD, MPH
State Epidemiologist
Division of Infectious Diseases

HIV/AIDS Surveillance (860) 509-7900
Epidemiology (860) 509-7994
Immunizations (860) 509-7929
Pulmonary Diseases (860) 509-7722
Sexually Transmitted Diseases (STD) (860) 509-7920

Connecticut Epidemiologist
Editor: Matthew L. Cartter, MD, MPH
Assistant Editor & Producer:
Starr-Hope Ertel