



PUBLIC HEALTH BRIEFING

RHODE ISLAND DEPARTMENT OF HEALTH

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CONTROL OF WEST NILE VIRUS, RHODE ISLAND, 2003

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West Nile virus (WNV), a flavivirus originally found in Africa, West Asia, and the Middle East, is now permanently established and widely dispersed in the United States. WNV can infect birds, mosquitoes, humans, horses, and other mammals. Birds common in the United States (crows, blue jays, and hawks) serve as a pool from which the virus is spread by mosquitoes seeking multiple blood meals from birds and mammals. Some mosquitoes seek blood meals exclusively from birds, facilitating viral spread from bird to bird, flock to flock, and territory to territory, while others seek blood meals indiscriminantly from birds and mammals, occasionally transporting the virus from birds to humans or other mammals.

Many people who become infected with WNV develop West Nile fever, a mild disease characterized by quickly resolving flu-like symptoms without long-term effect, but some go on to develop West Nile encephalitis, West Nile meningitis, or West Nile meningoencephalitis, serious conditions requiring hospitalization that may result in permanent disability or death.

Thus far in the United States, birds appear to be quite vulnerable to WNV, commonly dying from WNV-induced encephalitis. Surveillance of avian deaths has proven to be a useful, albeit crude indicator of the presence of WNV in a geographic area. Mosquito trapping and testing has also proven to be a valuable surveillance tool, more useful than bird surveillance because it yields information not only on the existence of WNV in an area, but also on species-specific density and WNV prevalence, useful in estimating risk to humans and other mammals.

In the northeastern United States, WNV over-winters in certain species of mosquitoes, spreads to birds in the spring as long-dormant mosquitoes seek blood meals, amplifies in flocks of birds throughout the spring and summer, and poses the greatest threat to humans from mid-summer through early fall. The vast majority of adult mosquitoes are killed in the fall at the time of the first killing frosts, and since water temperature at that time is too low to incubate new mosquitoes, the risk of WNV transmission to birds, humans, horses, and other mammals becomes negligible. In 2003, Rhode Island's mosquito-biting season ended on November 1, following a sustained, statewide frost.

SURVEILLANCE

In Rhode Island, surveillance is conducted on birds, mosquitoes, humans, horses, and other mammals. Populations of birds and mosquitoes are sampled for WNV infec-

tion, physicians and veterinarians report all suspected cases of WNV, and all blood donations are tested for WNV.

SAMPLING PROCEDURES

Mosquitoes: Department of Environmental Management (DEM) sampled mosquitoes from May 26, 2003 to October 28, 2003 by trapping mosquitoes in strategically-selected areas of the state. Carbon-dioxide-baited CDC traps (designed to attract females seeking blood meals) and gravid traps (designed to capture females seeking to lay eggs) were set at least weekly statewide (including Block Island), for a total of 590 trap-nights.

Birds: In 2003, DEM once again invited the public to telephone reports of bird carcasses found in their communities. DEM experts evaluated each report and picked up selected carcasses for laboratory testing. Carcasses were sampled on the basis of species, location, and condition from June 1, 2003 through October 25, 2003.

REPORTING PROCEDURES

Humans: The Rhode Island Department of Health (HEALTH) conducts surveillance to identify human cases of West Nile Virus from May to October. All licensed physicians, laboratories and hospitals are expected to report any patient with a clinical diagnosis of viral encephalitis (any age), or aseptic or suspect viral meningitis cerebrospinal fluid (CSF) pleocytosis of 10 cells or more) in persons age 17 years or greater and Guillain-Barré syndrome. Communicable Diseases tracks specimens from cases, (including obtaining convalescent sera as needed) meeting the surveillance case definition. When reporting a case it is vitally important to provide the following information: date of symptom onset, date specimen was drawn, and travel history in the 2 weeks prior to onset. Note that these tests are not offered by the State Laboratory to patients suspected of having WNV infection based on mild illness such as fever, headache and a history of mosquito bites. For outpatient testing in persons who do not meet surveillance criteria, clinicians and laboratories are advised to use commercially available tests for St. Louis encephalitis (cross reacts with WNV) or any WNV tests which may become available at commercial laboratories. All Rhode Island data are uploaded to the CDC via the ArboNet system each week for timely national reporting.

Horses and Other Animals: The Rhode Island State Veterinarians Office receives reports from veterinarians (and

animal owners) on cases of potential viral encephalitis in animals. Reports are investigated by the Animal Health Staff of the Rhode Island Division of Agriculture on a case by case basis. Samples of serum, cerebro-spinal fluid, and organ tissues are taken and tested for a battery of known pathogens by the Rhode Island Department of Health Laboratory, the National Veterinary Services Laboratory, Cornell University Veterinary Diagnostic Laboratory, and the Massachusetts Department of Health Laboratory.

Blood Donations: All blood donations collected by the Rhode Island Blood Center are tested for several pathogens, including WNV.

LABORATORY TESTING PROCEDURES

Mosquitoes and Birds: The identification of arboviruses in mosquito and bird surveillance specimens involve the use of several laboratory techniques that include direct inoculation in live tissue culture cells with subsequent observation of cytopathic effects induced by the presence of virus. The positive viral cultures are then identified by either immunofluorescence techniques or polymerase chain reaction (PCR) procedures.

Horses: Brain tissue samples are directly subjected to nucleic acid extractions followed by PCR methodology for the identification of either WNV or eastern equine encephalitis (EEE).

Humans: The presence of WNV in humans is assessed from either serum and/or cerebral spinal fluid specimens. These human serological specimens are processed by enzyme-linked immunosorbent assay (ELISA). Serum IgM positives (acute or convalescent) are confirmed using plaque reduction neutralizing assays. Identification of IgM in CSF is considered confirmatory.

REPORTS

Mosquitoes: Of 22,661 mosquitoes in 2,375 pools tested for arboviruses, seven pools were positive for WNV and 17 were positive for EEE.

Birds: Of all the calls to DEM about dead bird sightings in 2003, 557 yielded information considered to be suggestive of WNV. Of the 557 suspect cases, 75 birds were sampled and tested. Forty-seven of the 75 tested positive for WNV (all crows and blue jays except for one great horned owl and one goldfinch). Four of the 75 tested positive for EEE (one blue jay and three homing pigeons). The 47 birds testing positive for WNV were distributed widely throughout the State.

Horses and Other Animals: The Animal Health Staff of the Rhode Island Division of Agriculture investigated 18 cases of reported potential viral encephalitis in animals. The suspected animals included nine equines, two emus, one llama, two dikurs and two canines. Of the reported cases, six equines and two emus were confirmed positive for EEE, two equines were confirmed positive for West Nile Virus (WNV), one equine was confirmed positive for both EEE and WNV, and one canine considered suspect for

WNV. The remaining animals were considered negative or inconclusive for these diseases. Of the positive animals, five equines were either euthanized or died due to illness and the two emus died from clinical disease. The remaining patients survived or were still receiving treatment as of mid-November, 2003. The confirmed EEE cases were located in Washington County (four equines and one emu), Newport County (two equines) and Providence County (one emu). The confirmed West Nile Virus cases were located in Washington County (two equine) and the confirmed mixed EEE/WNV case was located in Providence County (one equine). The estimated time of exposure for all cases ranged from August 22, 2003 through October 6, 2003. The results represent a significant increase in EEE cases and an expected incidence of West Nile Virus.

Humans: In 2003 a total of 232 (99 CSF, 99 acute, and 33 convalescent) specimens from 138 individuals were tested in Rhode Island. Of these, six were confirmed positive for WNV. One of these individuals died on November 21, 2003 after an illness of about two months' duration, and was confirmed to have died from WNV. (During the 2003 season, the CDC reported 8470 confirmed human cases of WNV and 189 confirmed WNV deaths.)

BLOOD SUPPLY

In 2003, no donations from RI residents tested positive for WNV.

CONTROL LARVICIDING

In 2003 (for the third consecutive year) DEM's Division of Agriculture & Resource Marketing distributed mosquito larvicide to municipalities, state agencies, and federal agencies with responsibility for areas in Rhode Island. Most of the larvicide distributed was in the form of Altosid for use in catch basins, but *Bacillus Thuringensis* (BTI) was also distributed in smaller amounts for use in other selected mosquito-breeding environments. In early June, 2,128 pounds of Altosid was distributed for use during the months of June and July. In August, another 620 pounds of Altosid was distributed for use during the months of August and September. Of the communities that reported usage to DEM, 36 communities and 2 state agencies reported treating 43,298 catch basins in June, 29 communities and 1 state agency reported treating 47,770 catch basins in July, 11 communities and 2 state agencies reported treating 16,501 catch basins in August, and 11 communities and 2 state agencies reported treating 17,471 catch basins in September.

HEALTH PROMOTION

News Releases: HEALTH sent out 10 news releases between June 17 and October 30, 2003 on overall WNV efforts, health advice, WNV/EEE in mosquitoes and birds, and human cases. DEM issued 16 press releases from April 24 to October 28 on mosquito awareness and control, personal protection, bird surveillance, and mammal and mosquito test results.

Web: In close collaboration with DEM, HEALTH reported all testing results for birds, mosquitoes, horses and other animals, and humans by county on the HEALTH.ri.gov website. HEALTH also tracked the municipal larviciding program for the month of June (the initial larviciding effort for 2003) on its website.

Posters and Fliers: HEALTH distributed posters and "palm" cards to school nurse teachers and school nurses, retail pharmacies, physicians, and senior centers. DEM distributed mosquito-disease-awareness fliers at DEM-run facilities where disease-positive mosquitoes were found, and modified the flyers for use by private entities.

Special Advisories: In addition we sent our special advisories to school nurse teachers regarding EEE on September 2 and October 30, 2003. We placed posters in bus shelters and distributed 200 laminated posters to DEM for placement in public recreational areas.

Telephone Information: DEM and HEALTH responded to many calls from the public on WNV-related issues, e.g., disease specifics, personal protection and the protection of animals, mosquito prevention, and bird and mosquito sampling and testing. DEM and HEALTH also responded to calls from public officials concerning the protection of school children and other members of the public during outdoor activities.

SUMMARY

Thanks largely to systematic larviciding by the State's 39 municipalities, and aided by the public's destruction of "backyard" mosquito habitats and adoption of personal protective measures (clothing, repellent), Rhode Island mini-

mized the potential human burden of WNV during the 2003 mosquito season (six serious WNV cases, one death, and no reports of WNV-tainted blood donations). The potential burden of WNV on domestic animals was also reduced through immunization. Nonetheless, the State's first WNV death reminds us of the danger this disease poses for the very young, for elders, and for people of all ages who are immune-compromised. Similarly, the widespread location of birds positive for WNV signifies the ubiquity of risk. *All* mosquitoes must be avoided.

Based on its experience with WNV control over the past few years, the State will continue and enhance its surveillance and control efforts in 2004. Once again, systematic larviciding by municipalities and continuing public education through multiple channels will form the backbone of control, supported by active surveillance for the virus in the wild, in domestic animals, and in humans. For the latter effort, the vigilance of the health care community is of signal importance to the protection of the public. Every human case is investigated thoroughly, to establish as accurately as possible the time and place of exposure. DEM and HEALTH use this information to assess potential weaknesses in WNV control efforts, and to take corrective action, as necessary.

Health care providers also play an essential role in public education, reminding patients (all patients, but especially the very young, elders, and the immune-compromised) to avoid mosquito bites. Discussing the avoidance of mosquito bites with patients who engage in regular outdoor activity is especially important. School physicians and the medical directors of nursing homes are well-positioned to keep mosquito control and avoidance on the agenda of their respective institutions. Together, we can control the burden of this disease among domestic animals and humans, if we continue to pursue mosquito control and personal protection aggressively. If we don't, the potential for tragedy is tremendous, as evidenced by the recent experience of other regions of the country. ■

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