



West Nile Virus

2005 Action Plan and Recommendations

Introduction

Since the first U.S. cases were reported in 1999, West Nile Virus (WNV) has spread rapidly across the country. In 2004, the virus was detected in birds or mosquitoes in 46 states and there were 2,470 human cases in 40 states, with 88 deaths. Although Michigan reported the second highest number of human WNV cases (614) in the nation in 2002, there were only 19 human cases during 2003. No human WNV cases were reported in Kent County in 2003 and there were two human cases of WNV reported in Kent County and 16 in the state during 2004.

Most humans who acquire WNV either have no symptoms or have (mild) flu-like symptoms. Onset of disease may be sudden with fever, headache, muscular pain, general discomfort, and fatigue. West Nile Virus infection can lead to encephalitis and/or meningitis, with permanent neurological impairment, and in rare instances death. Fortunately, only a small percentage of infected persons – less than 1% according to CDC estimates — progress to encephalitis and other complications. The primary mosquito carrier of WNV continues to be the *Culex* group.

West Nile Virus is now considered endemic in the United States and some level of WNV infection – in mosquitoes, birds, and humans – can be expected every year. Accordingly, recognized strategies to limit individual exposure to mosquitoes and to reduce mosquito habitat should become routine during mosquito season.

Kent County Action Plan

Following the West Nile Virus outbreak of 2002, the Kent County Health Department anticipated the need for a coordinated and proactive plan of action to address WNV in the community. Although it is impossible to predict how one year's West Nile Virus season will compare to the next, the Health Department has developed a three-pronged plan that focuses on **public education, surveillance, and mosquito control**. This three-pronged approach helps individuals reduce their risk of WNV infection, and allows health officials to monitor WNV indicators in the community.

The Health Department's WNV response team includes Environmental Health staff; Communicable Disease Epidemiologists, investigators, and public health nurses; data support staff; public information staff; and community health educators. This team guided the development of public educational materials, and oversees the Health Department's West Nile Virus web site that is a resource for community members, public officials, clinicians and health care providers, and veterinarians.

Public Education and Information

Public education is considered a leading strategy for helping Kent County residents reduce their individual risk for WNV infection and learn appropriate environmental controls that can be implemented at the household level. Educational activities take several forms so key prevention messages are repeated, reinforced, and consistent.

Mass Media: Primary among public education activities will be the use of the mass media to disseminate information. In both 2003 and 2004 WNV received extensive coverage in the local, state, and national media, and interest in the subject remains high. The Health Department continues to issue media news releases on the following aspects of WNV:

- Personal protection and risk reduction, including household environmental measures;
- The availability of Health Department WNV educational presentations;
- The Health Department WNV web site;
- Request to notify the Health Department of dead birds found, how to dispose of dead birds;
- Presence of human WNV case(s);
- Various updates on bird and human cases throughout the summer and fall, emphasizing personal protection, and directing people to the web site for more information.

Community Education: In order to disseminate WNV information at the community/grass roots level, the Health Department has developed a “Basic Information about West Nile Virus” educational presentation. The presentation is given by Health Department staff and is available at no cost.

World Wide Web: In order to make WNV information accessible in a variety of formats, the Health Department has developed a WNV web site. The WNV site contains basic information about WNV (a basic West Nile Virus Q&A handout developed by the Health Department is available for download), links to other sites with WNV information, technical and epidemiological information about WNV for health care providers, and copies of all WNV news release and health advisories issued by the Health Department. In addition, Kent County residents are able to visit the site and use an interactive online form to report finding a dead bird. The web site address is www.accesskent.com/westnile.

Health Provider Alerts: In addition to WNV information for the community at large, the Health Department also targets health care providers and veterinarians with general information about WNV, as well as with faxed health advisories and health alerts as WNV activity warrants. These advisories not only provide timely information to clinicians seeing WNV patients, but reinforce public health reporting requirements, and enhance surveillance of human cases of the disease.

Surveillance

Disease surveillance is a fundamental public health activity, the importance of which was made all the more clear during the 2002 WNV outbreak. West Nile Virus surveillance focuses mainly on dead birds and humans, and to a lesser extent mosquitoes (the latter because the presence of WNV-infected dead birds is evidence of the presence of WNV-infected mosquitoes). All surveillance data is shared regularly with the Michigan Department of Community Health.

Bird Surveillance: Studies of (dead) bird surveillance data from all years of previous WNV outbreaks in the U.S. (1999-2004) have shown that the peak of dead bird reports has tended to precede the first human cases of WNV by approximately two weeks. (This trend was first observed in New York City in 1999 and was observed both in Kent County and in Michigan in 2002.) Because of this, dead bird surveillance is considered a critical WNV surveillance activity due to its predictive value. The Health Department conducts active community-based surveillance of dead birds from May through October, requesting that Kent County residents report dead birds to the Health Department (in 2004, the Department received approximately 1,800 calls reporting dead birds). Residents may either call the Department or can report through the Health Department's WNV web site or the State's web site at www.michigan.gov/emergingdiseases. Bird surveillance data is entered into a database and locations of dead birds are mapped to identify any linkages between dead bird density and human cases.

Human Surveillance: Human cases of West Nile Virus are required to be reported to the Health Department, and every individual diagnosed with WNV in Kent County receives follow-up from the Department's Communicable Disease Unit. Public Health Nurses interview all WNV victims to gather demographic data and information about exposure risk, mosquito bite history, and symptoms and duration of illness (as well as complications, if any). Human case surveillance helps public health investigators better understand environmental factors in infection, identify geographical 'hot spots,' and refine and enhance public education efforts accordingly. In addition, human case surveillance allows the Health Department to provide timely and accurate clinical information to local health care providers.

Mosquito Surveillance: In 2002 and 2003 the Health Department piloted limited mosquito trapping and testing. While some interesting data can be gathered from mosquito surveillance, the presence of infected (dead) birds presupposes the presence of the infected mosquitoes, and mosquito surveillance is of limited value in predicting human cases. For this reason, the Health Department will not be conducting mosquito surveillance in 2005.

Mosquito Control

Given the relative newness of WNV and many environmental variables, it is difficult to predict how Kent County will continue to be impacted by West Nile Virus. For WNV control, mosquito control activities targeting *Culex* mosquitoes and their known habitats are generally recommended. While the focus of the Health Department's mosquito control efforts is on public education, insecticide-based mosquito control programs have been shown to be effective at reducing mosquito populations, and consequently have the potential to be a useful component of community efforts to reduce WNV risk.

Most insecticide-based programs fall into two broad categories: larvaciding (treating mosquito breeding areas to kill mosquito larvae) and adulticiding (measures to kill adult mosquitoes, generally very-low-density spraying). Under typical environmental conditions and seasonal weather patterns, an effective larvae control and elimination program precludes the need for adulticiding measures (and, in general, widespread spraying is not recommended **unless** it is demonstrated that habitat reduction and larvae control are inadequate, **and** the presence of a substantial human health risk has been identified).

The Health Department is not currently planning to implement a County-wide insecticide-based mosquito control program. Instead, the Health Department continues to recommend that formal mosquito control programs be undertaken at the city or township level, if there is citizen support for such activities, and if there are sufficient resources to implement them.

Mosquito Control Program Recommendations. For municipalities wishing to implement local insecticide-based mosquito control programs, the Kent County Health Department recommends a comprehensive larvaciding program that includes identification of local *Culex* breeding habitats, surveillance of larvae within those habitats, and treatment of those areas with larvacide to reduce the growth and subsequent breeding of adult mosquitoes. The components of an effective larvaciding program include:

- A surveillance and treatment program that runs during the typical mosquito breeding months, roughly May through September/October, and/or when water in breeding habitats is at or above 60 degrees Fahrenheit;
- Training designated staff (or volunteers) in larvae surveillance and larvacide application;
- Inventory of suspected mosquito breeding areas (for *Culex*, generally catch basins, storm water retention ponds, sewage lagoons, etc. or other man-made or natural areas where water is less than three feet deep), especially those in close proximity to population densities. (Note that if property in question is considered a wetland, the Michigan Department of Environmental Quality should be consulted.);
- Surveillance ('dipping') of larvae in suspected and identified breeding areas, generally conducted biweekly (an average of 10 or more times during breeding season). Because heavy rains effectively flush out catch basins and any larvae within them, larval surveillance

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is particularly important during dry or drought periods when breeding may proliferate. Three larvae within an identified surveillance area is generally considered the threshold at which larvacide application should begin;

- Application of larvicidal agent *Bacillus sphaericus** (Bs) to breeding areas exceeding threshold larvae counts. Recommended application of Bs is every 21 days (four to six times over the course of the mosquito breeding season).
- If resources do not permit all breeding areas to be treated, larvaciding of catch basins generally should be a priority, particularly in mature neighborhoods where older trees tend to shed organic material into the basins making them more conducive to *Culex* breeding.
- Bs larvacide is available under the trade name Vectolex in single-use ‘drop-in’ packets labeled “General Use/Ready to Use.” With this label designation, use of Vectolex packets does not require licensure or special certifications, and can be used by anyone. Application of one packet per catch basin is recommended (one packet is effective for up to 80 square feet of water surface area; larger areas may require a greater number of packets per treatment).

**Bacillus sphaericus* is an environmentally friendly bacterium that occurs naturally in soil. When consumed by mosquito larvae, Bs produces a toxin that disrupts the gut of the larvae by binding to receptor cells. Bs is not toxic to mammals or other animal groups, and degrades in water approximately three weeks after application. Heavy rains and other ‘washout events’ will reduce the duration of residual effectiveness.

In accordance with Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) record keeping requirements, use of all pesticides including larvacides must be documented. Pesticides applied to surface waters, including catch basins, must be reviewed by the Michigan Department of Environmental Quality. MDEQ can be contacted at (517) 373-1320, fax (517) 373-9958.

Conclusion

While no initiative is likely to reduce mosquito exposure risk to zero, or to prevent all cases of human West Nile Virus infection, the Health Department’s three-pronged plan of public education, surveillance, and mosquito control monitoring provides a comprehensive, coordinated, and evidence-based strategy to address and control West Nile Virus in Kent County. This action plan is designed to help individuals reduce their risk of WNV infection, allow health officials to monitor WNV indicators in the community, and make timely and appropriate recommendations for environmental controls.