



DEPARTMENT OF THE ARMY
GREAT PLAINS REGIONAL MEDICAL COMMAND
Fort Sam Houston, Texas 78234-6200

REPLY TO
ATTENTION OF

MCGP-PM

18 May 2004

MEMORANDUM FOR GPRMC MTF Commanders

SUBJECT: CY 2004 Guidelines for West Nile Virus Surveillance, Prevention, and Control

1. In CY 2003, West Nile Virus (WNV) spread rapidly across the U.S., catching many by surprise. The Centers for Disease Control and Prevention (CDC) reported a total of 9100 human cases with 222 deaths. The virus was isolated from mosquitoes, birds, and various mammals in every continental state except Oregon and Washington. It is expected to continue to spread to the rest of the continental United States in 2004 and all Medical Treatment Facilities (MTFs) should be prepared to assist with surveillance and prevention efforts.
2. In order to minimize the threat that WNV poses to the Army community, we must continue to be proactive in our approach. Conserving the fighting strength of the soldier and preserving the health of all dependents and retirees are what we do best. With the appropriate surveillance, prevention, and control efforts in place, we will be successful in protecting the health of the Army family. Enclosed are the GPRMC Guidelines for WNV Surveillance, Prevention, and Control for CY 2004. Preventive medicine and health care professionals need to ensure that they understand these guidelines and develop an installation plan for WNV surveillance, prevention, and control.
3. The point of contact for this action is COL Forrest Oliverson, Chief, Preventive Medicine Services at Commercial (210) 295-2409 or DSN 421-2409.

Encl
as


C. WILLIAM FOX, JR.
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MEMORANDUM FOR GPRMC MTF Commanders

SUBJECT: CY 2004 Guidelines for West Nile Virus Surveillance, Prevention, and Control

1. **PURPOSE.** To provide guidelines for West Nile Virus (WNV) surveillance, prevention, and control.
2. **SCOPE.** These guidelines apply to all the Medical Treatment Facilities (MTFs) within the Great Plains Regional Medical Command (GPRMC).
3. **BACKGROUND.**

a. In late summer 1999, the first domestically acquired human cases of WNV encephalitis were documented in the U.S. WNV has commonly been found in Africa, Eastern Europe, West Asia and the Middle East. More recently, WNV has become endemic in most of North America. WNV is a flavivirus and is closely related to the virus that causes St. Louis encephalitis. Mild infections are common and include fever, headache, and body aches, often with skin rash and swollen lymph glands. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions, paralysis, and, rarely, death.

b. Mosquitoes become infected when they feed on infected birds. Infected mosquitoes can then transmit WNV to humans and animals while biting to take blood. The virus is located in the mosquito's salivary glands. During blood feeding, the virus may be injected into the animal or human, where it may multiply, possibly causing illness. Transmission of WNV to humans can also occur via infected blood products, organ donations, and transplacental transmission. In CY 2003, six cases of blood transfusion-associated WNV infection were detected in the US.

c. In CY 2003, states within the Great Plains experienced the highest numbers of WNV cases. Colorado, Nebraska and South Dakota were hit the hardest with a total of 5,384 human cases and 83 deaths. Fort Carson's Evans Army Hospital diagnosed 23 WNV-positive humans with no fatalities. The majority of these individuals were dependents or civilians living off post. Fort Carson Preventive Medicine also detected positive birds and mosquitoes. Horse vaccinations were extremely successful in 2003. Only one WNV-positive civilian-owned horse was reported from a DoD installation, at Fort Meade, MD. Within the GPRMC region, West Nile virus was reported from the following installations: Camp Gurnsey, WY (16 Mosquito pools); Fort Carson, CO (8 Mosquito pools, 4 magpies and 1 crow, 23 humans); Fort Hood, TX

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(2 Mosquito pools); Fort Polk, LA (5 Mosquito pools and 6 sentinel chickens); Fort Riley, KS (2 Mosquito pools and one probable human case contracted off post); Fort Sill, OK (3 crows and 1 northern mockingbird); Pinon Canyon, CO (1 Mosquito pool)

d. In 2002, 4007 individuals in 39 states and the District of Columbia were infected with WNV. Approximately 6 percent (263 individuals) of hospitalized cases were fatal. In 2003, 9389 individuals in 46 states were infected. However, fatality rates dropped from 6 percent to 2.5 percent (246 individuals) This is likely due to increased testing and high index of suspicion. In 2004, WNV will likely have a permanent presence in all 48 contiguous states and may potentially pose a greater risk to the population than in previous years. Preventive Medicine Service and Veterinary Service assets will continue to play a vital role in determining the magnitude and scope of WNV on GPRMC installations. Surveillance by these organizations is critical to providing appropriate prevention guidelines in order to preserve the health of the soldiers and their families. Health care workers must continue to be proactive and vigilant when dealing with this disease. The latest information on WNV disseminated by the Centers for Disease Control and Prevention and access to State Health Agencies can be found by contacting the following website:

<http://www.cdc.gov/ncidod/dvbid/westnile/>

e. The CY 2004 GPRMC Guidelines for WNV Surveillance, Prevention and Control are contained in this document. This document will also be available on the GPRMC Preventive Medicine Service website:

http://www.gprmc.amedd.army.mil/pmo/pm_index.htm

4. SURVEILLANCE. GPRMC installations will participate in national WNV surveillance, prevention and control efforts as delineated in the CDC guidelines. Installations should report surveillance results to the states in which the installations are located. The states will be responsible for forwarding all the information to the CDC (with the exception that MTFs will report positive human WNV cases directly to the CDC in addition to reporting them to the state). Responsibilities for reporting to the states are detailed in the sections below.

5. ACTIVE MOSQUITO SURVEILLANCE.

a. Purpose.

(1) Determine mosquito species composition, abundance and spatial distribution within each installation by collecting larval and adult mosquitoes.

(2) Identify larval sites.

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(3) Identify potential vector species of WNV within each installation through the collection of adult mosquitoes.

(4) Map the distribution of vector genera or species, both adult and larvae.

(5) Submit potential vectors for identification and virus testing.

b. Procedures.

(1) All mosquito surveillance activities and virus testing must be coordinated with either USACHPPM-South/USACHPPM-West and/or local and state agencies. In many cases, the CDC is supporting state and local governments in surveying mosquitoes for evidence of WNV infection. The intensity and duration of these surveillance efforts will vary among the states. Installations within the GPRMC should contact local and state health departments to become familiar with mosquito surveillance and testing already planned by these organizations and to establish points of contact. Coordination among installation activities such as Preventive Medicine Service, Veterinary Service, and the Directorate of Public Works (Environmental Coordinator, Wildlife and Pest Control personnel) is also necessary.

(2) USACHPPM-South/USACHPPM-West are actively involved in supporting WNV mosquito surveillance activities in the GPRMC region. USACHPPM subordinate commands have the ability to identify mosquitoes of concern and to conduct virus testing at the request of Preventive Medicine. In CY 2003, many of the GPRMC installations began submitting mosquitoes to their appropriate subordinate CHPPM command rather than state agencies. This was partly due to faster turnaround times for submitted samples and the ease of reporting. On the other hand, some state agencies have very effective surveillance programs or established good rapport with Preventive Medicine Services. Each Preventive Medicine Service must determine whether they will have their mosquitoes tested by the State Health Agency or USACHPPM-South / USACHPPM-West.

(3) Although adult surveillance is important, larval surveillance can be of much greater value to target control at the larval stage, when they are most vulnerable. Prior to the beginning of the mosquito surveillance season, preventive medicine personnel should identify potential breeding areas for mosquitoes especially within a 2-mile radius in and around areas of high human concentrations (i.e. housing). These areas should be monitored weekly throughout the summer for the presence of mosquito larvae. In addition, any new breeding sites should be monitored weekly.

c. Reporting. All mosquito surveillance data must be forwarded through the appropriate CHPPM subordinate command in addition to the GPRMC. The results of mosquito identification and WNV testing performed by CHPPM-South/West will be reported to the GPRMC Entomologist, the DOD-GEIS, CHPPM-Main Entomological Sciences Program (ESP) and the

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installation Preventive Medicine Service that submitted the samples. If arboviral testing is conducted through a state laboratory, the submitting Preventive Medicine Service will forward the information to the appropriate CHPPM subordinate command upon notification of results. All data will be submitted to the GPRMC WNV Tracking System regardless of the laboratory that performed WNV testing. The GPRMC Tracking System is located at the following link: http://gprmc.amedd.army.mil/wnv/wnv_login.cfm

To obtain a password for data input, contact the GPRMC Entomologist at (210) 295-2500 (DSN 421). Questions or requests regarding mosquito control and surveillance activities should be directed to the GPRMC Entomologist, USACHPPM-South (404) 464-2564 (DSN 367), or USACHPPM-West (253) 966-0083 (DSN 347).

6. SENTINEL CHICKEN SURVEILLANCE.

a. Purpose. Sentinel chicken surveillance is a sensitive early detection system for WNV. In 2002 and 2003, Fort Polk Preventive Medicine used sentinel chickens to effectively determine the presence of WNV and Saint Louis Encephalitis on the installation. The presence of WNV in sentinel chickens will typically precede the virus being found in mosquitoes. Sentinel chickens allow for more effective WNV surveillance and management efforts.

b. Procedures. In 2004, Fort Polk will most likely be the only installation to use sentinel chickens as a surveillance tool. Fort Polk Preventive Medicine will work with Louisiana Department of Health and Hospitals to have the chickens tested for WNV. Animal use protocols should be established and updated when necessary. Any positive results should be shared with all relevant activities on the installation.

c. Reporting. All results should be forwarded to the GPRMC entomologist using the GPRMC WNV Tracking System cited in Paragraph 5c.

7. ACTIVE BIRD SURVEILLANCE.

a. Purpose. Avian morbidity/mortality surveillance will include the timely reporting and analysis of dead bird sightings and the submission of selected individual birds for WNV testing.

b. Procedures. The Veterinary Treatment Facilities (VTFs) within the Great Plains Regional Veterinary Command (GPRVC) will be coordinating and implementing dead/sick bird collection at the discretion of the District Veterinary Command (DVC) commanders. Installation Preventive Medicine activities will ensure that Military Police and PWBC activities submit dead birds to veterinary personnel for processing and submission for WNV analysis. Dead birds will generally be analyzed for WNV by the US Geological Service Wildlife Health Center in Madison, Wisconsin, but may be sent to state public health laboratories

c. Reporting. The VTFs in the GPRVC will be reporting results of all analyses (to include negative results) to the GPRVC Commander. The GPRVC Commander will provide a report of bird surveillance activities or any animal testing to VETCOM, GPRMC Preventive Medicine Services, USACHPPM and DOD-GEIS and will coordinate reporting to the applicable state health department. The servicing VTFs will also report positive results to the installation Preventive Medicine Service. Questions regarding animal surveillance for WNV should be directed to the servicing veterinary activity. Points of contact are COL Cliff Walker, COL Leslie Huck or SFC Laura Miller at (210) 295-2465 (DSN 421).

8. ENHANCED PASSIVE VETERINARY SURVEILLANCE.

a. Purpose. As a backup system to detect the presence of WNV and to monitor the extent of its transmission outside the bird-mosquito cycle, enhanced passive surveillance (passive surveillance enhanced by general alerts to veterinarians) for neurologic disease in horses and other animals will be implemented.

b. Procedures. The GPRVC VTFs will be alert for neurologic symptoms in any veterinary patient and will send appropriate specimens for testing when WNV is suspected. Most horses in the GPRVC region have received the WNV vaccination. Therefore, passive surveillance for WNV in horses will be very limited.

c. Reporting. The reporting process will be the same as for bird surveillance cited in Paragraph 7c.

9. ENHANCED PASSIVE HUMAN SURVEILLANCE.

a. Purpose. As a backup system to detect the presence of WNV activity, enhanced passive surveillance (passive surveillance enhanced by general alerts to health-care providers) for human cases of viral encephalitis and aseptic meningitis will be implemented.

b. Procedures.

(1) Increase Clinical Awareness. MTFs within the GPRMC should raise awareness of WNV encephalitis among all health care providers. Information on the clinical manifestations of this condition should be disseminated to all health care providers with emphasis on the areas of primary care and internal medicine. A fact sheet for health care providers that provides a brief overview of the diagnosis and medical management of WNV is included as encl 1. Additional information can be obtained from the CDC WNV website:

http://www.cdc.gov/ncidod/dvbid/westnile/clinical_guidance.htm

(2) Specimens for Diagnosing Suspected Cases.

(a) Cerebrospinal Fluid (CSF). As early as the first few days of illness, IgM antibody to WNV can be demonstrated in CSF by antibody-capture ELISA. The virus also may be isolated, or detected by RT-PCR, in acute-phase CSF samples.

(b) Serum. Paired acute-phase (collected 0-8 days after onset of illness) and convalescent-phase (collected 14-21 days after the acute specimen) serum specimens are useful for demonstration of seroconversion to WNV and other arboviruses by ELISA or neutralization tests. Although tests of a single acute-phase serum specimen can provide evidence of a recent WNV infection, a negative acute-phase specimen is inadequate for ruling out such an infection, underscoring the importance of collecting paired samples. Antibody synthesis in immunocompromised individuals might be delayed or absent altogether.

(c) Tissues. When arboviral encephalitis is suspected in a patient who undergoes a brain biopsy or who dies, tissues (especially brain samples, including various regions of the cortex, midbrain, and brainstem) and, in fatal cases, heart blood and buffy coat samples should be submitted to CDC or other specialized laboratories for arbovirus and other testing. Individual tissue specimens should be divided, and half should be frozen at minus 70 degrees C and the other half placed in formalin. Available studies include gross pathology, histopathology, RT-PCR tests, virus isolation, and immunohistochemistry.

(3) Laboratory Testing.

(a) Commercial kits for human serologic diagnosis of WNV infection are currently in development. Until these kits are available, the CDC-defined IgM and IgG ELISA should be the front-line tests for serum and CSF.⁴⁶⁻⁴⁸ These ELISA tests are the most sensitive screening assays available. The hemagglutination inhibition (HI) and indirect immunofluorescent antibody (IFA) test may also be used to screen samples for flavivirus antibodies. Laboratories performing HI assays need be aware that the recombinant WNV antigens produced to date are not useful in the HI test; mouse brain source antigen (available from CDC) must be used in HI tests. The recombinant WNV antigen is available from commercial sources.

(b) Most state public health laboratories can perform these diagnostic tests on human specimens. The U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) also has the capability to perform these tests if other laboratories are not available or are insufficiently responsive to requirements. Appropriate human specimens should include, but are not limited to, serum and cerebrospinal fluid (CSF). When specimens are collected, USAMRIID or the state public health laboratory should be contacted for test menu, specimen collection, and shipping requirements. Before shipping to USAMRIID, specimen submission should be coordinated with

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Dr. George Ludwig at (301) 619-4941 (DSN 343). Interpretation of test results should be conducted in consultation with the Infectious Disease Service staff at BAMC (210) 916-5554 (DSN 429) or the fellow on call at 513-2717.

c. Reporting.

(1) Surveillance Reporting. The CDC has developed working surveillance case definitions of WNV encephalitis that will be used for case identification and reporting. (Encl 2) The CDC is now using the term neuroinvasive disease to refer to severe disease cases, particularly West Nile meningitis and West Nile encephalitis. The CDC will be collecting information from state health departments on a weekly basis regarding persons who are being evaluated for possible WNV infection. Health care providers should evaluate and test all suspected cases of WNV neuroinvasive disease and notify their servicing Preventive Medicine Service. Installation Preventive Medicine Services will report to their state health department any persons for whom a diagnosis of WNV infection is being considered and for whom a clinical sample has been submitted for testing. The WNV case form attached as Encl 3 must also be completed and faxed to the GPRMC Preventive Medicine Service at FAX: (210) 295-2456. The GPRMC Preventive Medicine Service will notify DOD-GEIS.

(2) WNV Case Reporting.

(a) Reporting to GPRMC Preventive Medicine Service. Once the suspected case of WNV has been confirmed or ruled out, the health care provider will update the data on the WNV case form (Encl 3) that had been previously submitted and fax the completed form to the GPRMC Preventive Medicine Service at FAX: (210) 295-2456. In addition, all cases of WNV which meet the CDC surveillance case definitions (laboratory-confirmed, laboratory-probable and laboratory-equivocal) must be telephonically reported to the Chief, Preventive Medicine Service, GPRMC (210) 295-2500 /GPRMC Community Health Nurse Epidemiologist (210) 295-4461 (DSN 421). The GPRMC Preventive Medicine Service will notify CMDR Clara Witt at DOD-GEIS (301) 319-9743 (DSN 285).

(b) Reporting to the State Health Department. All cases of WNV which meet the CDC surveillance case definitions must be reported by the installation Preventive Medicine Service to the State Health Department of the state in which the installation is located. Coordination should be made with the State Health Department to ensure that their reporting requirements are met.

(c) Reporting to CDC. All cases of WNV which meet the CDC surveillance case definition must be reported telephonically by the installation Preventive Medicine Service to the CDC Division of Vector-Borne Infectious Diseases (DVBID), Fort Collins, Colorado. A dedicated telephone line is available at DVBID 24 hours/day for reporting WNV case data or other urgent WNV related business, (970) 266-3592. During nights and weekends, calls to the dedicated phone line will be forwarded to the cellular phone of an on-call DVBID staff scientist.

(d) Reporting to Army Medical Surveillance Activity (AMSA). Encephalitis is one of 70 conditions that must be reported through the Army's Reportable Medical Events System (RMES). Confirmed or probable cases, to include WNV fever, are reported using the ICD-9 code 066.4 (West Nile Virus fever, encephalitis, encephalomyelitis, West Nile Virus). Use this same ICD-9 for the Ambulatory Data System diagnosis code (ambulatory care visits) and for inpatient coding where appropriate. Case definition can be found under "Documents/DOD" on the AMSA web page http://amsa.army.mil/AMSA/amsa_home.htm. The installation Preventive Medicine Service will ensure the case is reported to the Army Medical Surveillance Activity, USACHPPM, located at Walter Reed Army Medical Center, Washington, DC (202) 782-0471 (DSN 662).

10. PREVENTION AND CONTROL.

a. Source Reduction. Source reduction is the alteration or elimination of mosquito larval habitat to prevent mosquitoes from breeding there. This remains the most effective and economical method of providing long-term mosquito control in many habitats. Source reduction ranges from sanitation activities such as tire removal, stream restoration, catch basin cleaning, container removal to extensive water management projects. Preventive Medicine should identify potential larval breeding areas and work with installation personnel to eliminate them.

b. Chemical Control. When source reduction and water management are not feasible, chemicals should be used judiciously to control both larval and adult mosquito populations. In addition, chemical controls may be required to prevent disease when surveillance indicates the presence of infected adult mosquitoes poses a risk to health. If DOD-certified for pesticide application, Preventive Medicine technicians should conduct larval control at the same time larval surveillance is being performed after first obtaining the approval of the Installation Pest Management Coordinator (IPMC). If not certified, they should coordinate with installation pest control personnel. When surveillance provides evidence of WNV activity near or on an Army installation, the Preventive Medicine Service should consult with the GPRMC Entomologist or the USACHPPM activity serving the region. USACHPPM will assist installations in developing control plans and strategies.

c. Public Education. Preventive Medicine Services within GPRMC should educate the public on vector-borne disease prevention within their area. The education materials should include information on other arthropod vector-borne diseases such as Lyme disease, ehrlichiosis, and various forms of encephalitis. Personal protective measures for preventing or reducing the risk for exposure should be emphasized. Information is available from the following websites:

<http://www.cdc.gov/ncidod/dvbid/westnile/index.htm>

<http://chppm-www.apgea.army.mil>.

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d. Mosquito Management Policy. If the Installation Pest Management Plan does not cover mosquito management in sufficient detail, it may be necessary to aid the IPMC in developing an installation mosquito management policy. Encl 5 includes a draft mosquito management policy for Fort Sam Houston/Camp Bullis. If necessary, use this as a guide or a template to delineate mosquito management responsibilities for the installation. The policy should be tailored to meet the needs of the installation.

e. Press Releases. Coordinate with local/state health officials and the public affairs office prior to the release of any information to the public regarding a confirmed case(s) of WNV in humans or animals. If necessary, use the Fort Sam Houston Press Release in Encl 4 as a guide.

11. GPRMC WNV Program Committee. GPRMC has established an ad hoc committee to provide oversight of this program and consultation to GPRMC MTFs. This committee will monitor WNV activity in the GPRMC and provide additional information to the MTFs as needed. The members of the committee and their phone numbers are:

a. COL Forrest Oliverson, MC, Chief, Preventive Medicine, GPRMC (210) 295-2500 (DSN 421)

b. COL Cliff Walker, VC, Commander, GPRVC, (210) 295-2438 (DSN 421)

c. COL David Dooley, MC, Chief, Infectious Disease Service, BAMC (210) 916-1286/5554 (DSN 421)

d. LTC William Nauschuetz, MS, Pathologist, MEDCOM (210) 221-6948 (DSN 421)

e. 1LT Sarah Learmoth, MS, Chief, Virology and Immunology, BAMC (210) 916-8322 (DSN 421)

f. LTC John Teyhen, MS, Senior Environmental Science Officer, GPRMC (210) 295-2423 (DSN 421)

g. 1LT Joshua Bast, MS, Entomologist, GPRMC (210) 295-2742 (DSN 421)

h. SFC Laura Miller, Operations NCO, GPRMC, (210) 295-2465 (DSN 421)

12. REFERENCE INTERNET SITES.

a. www.cdc.gov/ncidod/dvbid/westnile/index.htm CDC Division of Vector-Borne Infectious Diseases WNV Home Page

b. http://chppm-www.apgea.army.mil/armydocs.asp?pub_type=FS USACHPPM Fact Sheets

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c. http://cindi.usgs.gov/hazard/event/west_nile/west_nile.html United States Geological Survey West Nile Virus Maps

13. POINTS OF CONTACT. Questions should be directed to COL Forrest Oliverson, Chief, Preventive Medicine Service, GPRMC at (210) 295-2500 (DSN 421). Technical questions regarding specimen collection and handling should be referred to the points of contact named in the above paragraphs.

5 Encl

1. Appendix A
2. Appendix B
3. Appendix C
4. Appendix D
5. Appendix E


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Appendix A

West Nile Virus (WNV) Encephalitis

Fact Sheet for Health Care Providers

Agent. The mosquito-transmitted West Nile Virus causes West Nile Virus Encephalitis. The virus was first reported in the United States in New York in the late summer of 1999. Of 62 symptomatic cases, 7 died. In 2000, 21 persons were reported with acute illness attributed to WNV (one death). Although the number of sub-clinical infections is unknown, based on studies done in the Middle East the ratio of clinical to sub-clinical cases is 1:140 to 1:320. Being transmitted by mosquitoes, the cases occur in summer and early fall. WNV is a flavivirus and is closely related to the virus that causes St. Louis encephalitis.

Symptoms. Patients with WNV infections may present with a mild illness of fever, headache and body aches. They also may present with signs and symptoms of meningitis, such as stiff neck and severe headache. Encephalitis will be manifested by mental status changes from mild disorientation to coma. It is important for the clinician to consider WNV as a cause of any case of aseptic meningitis and encephalitis, in order to identify this virus in the community. It is also important to exclude treatable causes of encephalitis, such as Herpes Simplex Virus, CMV, Varicella-zoster, and other non-viral etiologies such as cancer, vasculitis, rickettsial diseases, mycoplasma, cat scratch disease, Lyme disease, syphilis, tuberculosis, cryptococcus, and meningococcus. WNV Encephalitis is characterized by high fever, mental status changes, nausea, vomiting, a maculopapular rash, and lymphadenopathy. Interestingly, muscle weakness and paralysis were such prominent symptoms in some patients that they were considered to have Guillian-*Barre* Syndrome. The disease is more severe in persons over fifty. The overall mortality rate is 3 percent to 15 percent of hospitalized cases. However, approximately 80 percent of all infections are asymptomatic.

Laboratory Tests. Routine laboratory tests show lymphopenia and normal to mildly elevated liver enzymes. CT of the head is generally unremarkable but may be abnormal in other causes of encephalitis, such as Herpes Simplex. Lumbar puncture (LP) shows pleocytosis with lymphocytes, mildly elevated protein and normal glucose. The LP is especially important to exclude other causes of encephalitis. The definitive diagnosis of WNV requires antibody testing in the serum and spinal fluid. There are no commercially available, FDA approved, clinical laboratory tests to detect human infection with WNV. Available assays for human infection are restricted for research use only. These assays include serological detection of specific antibody, viral isolation and viral identification. Most state public health laboratories can perform these diagnostic tests on human specimens. The U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) also has the capability to perform these tests if other laboratories are not available or are insufficiently responsive to requirements. Appropriate human specimens should include, but are not limited to, serum and cerebrospinal fluid (CSF). When specimens are collected, USAMRIID or the state public health laboratory should be contacted for test menu,

Appendix B

specimen collection, and shipping requirements. Before shipping to USAMRIID, specimen submission should be coordinated with Dr. George Ludwig at (301) 619-4941 (DSN 343). Interpretation of test results should be conducted in consultation with the Infectious Disease Service staff at BAMC (210) 916-5554 (DSN 429) or the fellow on call at 513-2717.

Treatment. WNV can be spread through organ transplants, blood donations, and via the placenta. Measures are currently being taken by the CDC to mitigate the risk of transmission via these pathways. The usual CDC standard precautions should be observed when seeing patients. There is no specific treatment for this disease. Good supportive measures are indicated. This may include mechanical ventilation.

Prevention. This disease can be prevented by good mosquito control and the use of personal protective measures, including using DEET on exposed skin areas and permethrin on clothing. There is no vaccine available.

Disease Diagnosis and Reporting. It is extremely important that health care providers evaluate and test all suspected cases of encephalitis and aseptic meningitis for WNV and notify promptly the local Preventive Medicine Service which is responsible for reporting to the Army's Reportable Medical Events System, the state health department, CDC and the GPRMC. The case definition of WNV encephalitis should be used to classify cases once appropriate laboratory results have been received. The definition can be found in the CDC Revised Guidelines for WNV Surveillance, Prevention and Control. (Reference 1) Prompt reporting of suspected cases and follow-up reporting after laboratory results are received will help to alert the GPRMC to the possibility of West Nile encephalitis in your community. This will prompt efforts to increase mosquito control and to educate the public on the use of personal protective measures.

Questions. Any questions concerning WNV diagnosis and treatment should be directed to the Infectious Disease Service at BAMC at (210) 916-4355 (DSN 429).

References.

1. Centers for Disease Control and Prevention Epidemic /Epizootic West Nile Virus in the United States: Revised Guidelines for Surveillance, Prevention and Control, October 2003. <http://www.cdc.gov/ncidod/dvbid/westnile/resources/wnvguidelines2003.pdf>
2. Just the Facts--West Nile Encephalitis. USACIIPPM. <http://chppm-www.apgea.army.mil/imo/dcb/dmd/dmd/FACT/34-001.pdf>
3. West Nile Virus Questions and Answers. CDC. <http://www.cdc.gov/ncidod/dvbid/westnile/q&a.htm>

Appendix B

WNV Encephalitis Surveillance Case Definitions

(Modified from: "CDC. Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control", "CDC. Case definitions for infectious conditions under public health surveillance" at MMWR 1997;46:12-3 and the "2001 Case Definition of Encephalitis or Meningitis, Arboviral.")

The following working surveillance case definition of WN encephalitis was used in the 1999 New York epidemic and is an adaptation of the national arboviral encephalitis surveillance case definition. The case definition is a public health tool intended only for the surveillance of health events in populations. It is neither 100 percent specific nor 100 percent sensitive, and it is not intended for use in clinical diagnosis or management decisions in individual cases. It should also be emphasized that the current national arboviral encephalitis surveillance case definition was approved and implemented by the Council of State and Territorial Epidemiologists--in consultation with CDC--at a time when SLE virus was the only neurotropic flavivirus with epidemic potential known to occur in the U.S. However, it is now conceivable that WN and SLE viruses coexist in this country. Antibodies to these closely related neurotropic flaviviruses and dengue viruses, which are increasingly imported, cross-react extensively in enzyme immunoassays (EIA) and hemagglutination-inhibition (HI) tests, to a lesser extent, in neutralization tests. (To an even lesser extent, serologic cross-reactivity also occurs between these two viruses and Powassan virus, a tick-borne flavivirus endemic to the northeastern U.S. and eastern Canada and which causes rare, sporadic, encephalitis cases in humans.) Thus, in future epidemics and sporadic viral encephalitis cases alike, the potential for initial misclassification of SLE cases as WN encephalitis cases--and vice versa--must be recognized and addressed, mainly by the use of cross-neutralization tests of serum or cerebrospinal fluid (CSF) or both, by virus isolation, or by detection of viral genome or antigens. Once WN virus (or SLE virus) has been determined to be the cause of an epidemic/epizootic (e.g., by cross-neutralization tests and/or virus isolation from, or direct virus detection in humans, birds, or mosquitoes), further cross-neutralization tests generally may be unnecessary to classify human cases for surveillance purposes. While theoretically possible, concurrent epidemics of SLE and WN encephalitis in the same area should be unlikely, particularly in temperate areas where the near-simultaneous introduction of both viruses would be required. In any case, epidemiologically, clinically and in terms of prevention and control methods, the differences between these two viruses generally are subtle and largely academic.

Confirmed cases: A confirmed case of WN encephalitis is defined as a febrile illness associated with neurologic manifestations ranging from headache to aseptic meningitis or encephalitis, plus at least one of the following:

- Isolation of WNV from, or demonstration of WN viral antigen or genomic sequences in, tissue, blood, CSF, or other body fluid (see note 1)

Appendix B

- Demonstration of IgM antibody to WN virus in CSF by IgM- capture EIA (see note 2-4)
- ≥ 4 -fold serial change in plaque-reduction neutralizing (PRNT) antibody titer to WN virus in paired, appropriately timed serum or CSF samples (see note 2,3,5)
- Demonstration of both WN virus-specific IgM (by EIA) and IgG (screened by EIA or HI and confirmed by PRNT) antibody in a single serum specimen. (see note 2,4,6)

Probable case: A probable case is defined as a compatible illness (as above) that does not meet any of the above laboratory criteria, plus at least one of the following:

- Demonstration of serum IgM antibody against WN virus (by EIA) (see note 3,4)
- Demonstration of an elevated titer of WN virus-specific IgG antibody in convalescent phase serum (screened by EIA or HI and confirmed by PRNT) (see note 3-6)

Non-Case: A non-case is defined as an illness that does not meet any of the above laboratory criteria, plus;

- A negative test for IgM antibody to WN virus (by EIA) in serum or CSF collected 8-21 days after onset of illness (see note 3,4)

and/or

- A negative test for IgG antibody to WN virus (by EIA, HI, or PRNT) in serum collected ≥ 22 days after onset of illness (see note 3-5).

Notes:

1. Although tests of tissues or fluids by PCR, antigen detection, or virus isolation can be used to confirm WN encephalitis cases, they cannot be used to rule out cases because the negative predictive values of these test methods in this disease are unknown.
2. See the above discussion concerning serologic cross-reactivity between WN and SLE viruses. Prior to a more definitive demonstration of WN virus as the cause of an epidemic or a sporadic viral encephalitis case, this serologic criterion should be used to classify human cases as probable only, pending definitive identification of the circulating flavivirus type (see discussion above).
3. Although the antibody response to human infection with WN virus has not been thoroughly or systematically studied, the following are reasonable assumptions, based on extensive experience

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with other flaviviruses, or preliminary conclusions based on empirical observations made during the 1999 and 2000 New York epidemic of WN encephalitis.

- IgM antibody in serum: By the eighth day of illness, a large majority of infected persons will have detectable serum IgM antibody to WN virus; in most cases it will be detectable for at least 1-2 months after illness onset; in some cases it will reach undetectable levels prior to 1 month after illness onset; in some cases it will be detectable for 12 months or longer.
- IgG antibody in serum: By 3 weeks post-infection (and often earlier), virtually all infected persons should demonstrate long-lived serum IgG antibody to WN virus by EIA, HI, and PRNT.
- IgM antibody in CSF: In WN encephalitis cases, IgM antibody will virtually always be detectable in CSF by the eighth day of illness and sometimes as early as the day of onset; the duration of WN virus-specific IgM antibody in CSF has not been studied.
- IgG antibody in CSF: IgG antibody in CSF often does not reach detectable levels and thus is a relatively insensitive indicator of infection.
- Specificity of IgM-capture EIA: Serum (and CSF) from recently WN virus-infected persons will cross-react in IgM-capture EIAs when either WN virus or any closely related flavivirus is used as antigen. The homologous (infecting) serotype should be determined by cross-neutralization.
- Specificity of IgG EIA: WN viral IgG antibody detectable by EIA (or HI) is broadly cross-reactive with all closely related flaviviruses, and this usually cannot be resolved with comparative EIAs (or HIs) using various flavivirus antigens. The homologous serotype should be determined by cross-neutralization.
- Specificity of PRNT: In previously WN virus-infected persons without an antecedent history of infection with another flavivirus (e.g., yellow fever vaccine virus or dengue), serum cross-neutralization tests against a battery of flaviviruses will usually implicate WN virus as the homologous virus. Serum from previously WN virus-infected persons with an antecedent history of infection with another flavivirus is often broadly cross-reactive by PRNT against a variety of other flaviviruses, and comparative titers are often insufficiently different to implicate the homologous virus.

Based on these assumptions or preliminary conclusions:

- Persons whose acute-phase serum or CSF specimens (collected 0-7 days after illness onset) test negative for IgM antibody to WN virus should have convalescent-phase serum specimens submitted or testing. Generally, convalescent-phase specimens

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should be drawn at least 2 weeks after acute-phase specimens. These intervals are arbitrary and not part of the national arboviral encephalitis surveillance case definition. In some cases, for example, seroconversion to WN virus can be demonstrated in specimens collected only a few days apart during the late acute or early convalescent phase of the illness.

- Negative tests for IgM antibody to WN virus in serum specimens collected more than 3 weeks after illness onset could be due to rapid waning of antibody; these results should be considered as potential false-negatives, pending IgG antibody testing.
- The EIA (or HI) for serum IgG antibody is a sensitive but relatively nonspecific test for previous WN virus infection. Positive results should be confirmed by PRNT.
- CSF should generally not be tested by WN viral IgG EIA (or HI). Instead, it should usually be reserved for testing by IgM-capture EIA and possibly by other means, including virus isolation, PCR, and neutralization.

4. At the CDC, EIA results are based on “P/N ratios”, which are optical density (OD) ratios or signal-to-noise ratios, not titers. A P/N ratio is calculated by dividing the OD of the test sample, P, by the OD of a normal, N, human antibody control.

5. At the CDC, serum specimens are routinely tested at a dilution of 1:400 and CSF specimens are tested undiluted. Empirically, CSF P/N ratios of ≥ 3 are considered positive for flavivirus IgM antibody at CDC, and serum IgM P/N ratios of 2.00-2.99 are considered to be equivocal pending further serologic testing (e.g., EIA endpoint titration), and ratios < 2 are considered uninterpretable if the OD of the test sample with viral antigen is < 2 times the OD of the test serum with normal mouse brain antigen. Because of the potential for inter-laboratory variability in P/N ratios generated for identical serum samples, appropriate positive, negative, and equivocal ranges of P/N ratios must be empirically determined by each laboratory.

6. At the CDC, a serum PRNT titer of 10 (i.e., a 1:10 dilution of serum neutralizes at least 90 percent of the test virus dose) or greater is considered positive.

7. Longitudinal studies of WN encephalitis cases have shown that WN virus-specific IgM antibody can persist in serum for 12 months or longer. Thus, the presence of serum anti-WN viral IgM antibody is not necessarily diagnostic of acute WN viral infection. For this reason, especially in areas where WN virus is known to have circulated previously, suspected cases of acute WN encephalitis or meningitis should be confirmed by the demonstration of WN virus-specific IgM antibody in CSF, the development of WN virus-specific IgG antibody in convalescent-phase serum, or both.

Appendix C

West Nile Virus Reporting Form

Human Suspect or Confirmed Positive Case

REPORTING INSTRUCTIONS

Health care providers should evaluate and test all suspected cases of encephalitis and aseptic meningitis for West Nile Virus (WNV). Initiate this form for all suspected cases, even if all data are not known, and fax to Preventive Medicine Service (PMS), Fort Sam Houston, Brooke Army Medical Center Fax: (210) 295-2456. Also report to your State Health Department. After WNV laboratory results have been received, complete the rest of the form and fax the completed form to PMS, BAMC, Fax: (210) 295-2456. Confirmed cases of WNV must also be telephonically reported to PMS, BAMC at (210) 295-2500 and to your State Health Department and CDC.

PATIENT INFORMATION

Last Name: _____ First Name: _____ MI: _____

FMP/SSN: _____

Patient Beneficiary Category (e.g. A11): _____ Grade: _____

Date of Birth: _____

Sex (M or F): _____ Race/Ethnicity: _____

Place of Residence:

Address: _____

City: _____ County: _____

State: _____ Zip Code: _____

Phone: Duty: _____ Home: _____

Occupation: _____ Military Unit (if applicable): _____

CLINICAL INFORMATION

Date of onset of illness: ___/___/___

Clinical symptoms: (check all that apply):

- _____ Encephalitis
- _____ Meningitis
- _____ Fever
- _____ Other

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Hospitalized? Yes (Hospital: _____) / No

Date of hospital admission: ___ / ___ / ___

Date of discharge: ___ / ___ / ___

Was patient transferred to another hospital?

Yes (Hospital: _____) / No / Unknown

Outcome: Survived / Died / Unknown

Date of death: ___ / ___ / ___ Was autopsy performed? Yes/ No

Facility where autopsy was performed: _____

Date of autopsy: ___ / ___ / ___ Facility phone number: _____

Autopsy results: _____

Additional information related to this case: _____

RISK FACTOR INFORMATION

Has patient traveled outside the U.S. in the one month prior to onset? Yes / No / Unknown

If yes, specify when and where: _____

Has patient traveled outside the state in the one month prior to onset? Yes / No / Unknown

If yes, specify when and where: _____

Has patient ever traveled outside the U.S.? Yes / No / Unknown

If yes, specify when and where: _____

Has patient had known mosquito bite(s) in the one month prior to onset? Yes / No / Unknown

If yes, specify when and where (geographic location): _____

Has patient had contact with ticks (attached to the skin) in the one month prior to onset? Yes/No/Unknown

If yes, specify when and where (geographic location): _____

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CASE STATUS INFORMATION

INITIAL REPORT

 Suspect WNV

Date of report: ___/___/___

FINAL REPORT (check one)

___ Laboratory-confirmed WNV

___ Laboratory-probable WNV

___ Laboratory-equivocal WNV

___ Non-case WNV

Other diagnosis: _____

Date of report: ___/___/___

REPORTING SOURCE

Name: _____ Title: _____ Phone: (____) _____

Fax: (____) ____ - ____ E-mail: _____

Military Installation and Facility: _____

Appendix D

Draft Mosquito Management Policy

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Fort Sam Houston/Camp Bullis Mosquito Management Policy

1. References:

- a. AR 40-5, Preventive Medicine, 15 October 1990.
- b. AR 200-5, Pest Management, 30 October 1999.
- c. Centers for Disease Control and Prevention web site:
<http://www.cdc.gov/ncidod/dvbid/westnile/>.
- d. DOD-Global Emerging Infections System (GEIS) web site,
<http://www.geis.ha.osd.mil>.
- e. FM-8-33, Control of Communicable Diseases.
- f. Fort Sam Houston Installation Pest Management Plan 2003
- g. Great Plains Regional Medical Command CY 2004 Guidelines for West Nile Virus Surveillance, Prevention, and Control
- h. MEDCOM Pamphlet 40-3, Environmental Health, 1999.
- i. TB Med 561, Occupational and Environmental Health Pest Surveillance, 1 June 1992.
- j. Texas Department of Health web site:
<http://www.tdh.state.tx.us/zoonosis/diseases/>.
- k. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) web site, "USACHPPM Fact Sheets" <http://chppm-www.apgea.army.mil/westnilevirus/>.

2. Purpose. Provide command guidance in order to efficiently and effectively manage mosquito populations on Fort Sam Houston and Camp Bullis in order to minimize the mosquito-borne disease risk to residents and employees.

3. Background.

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a. Mosquitoes breed in a variety of habitats. On Fort Sam Houston/Camp Bullis, mosquito larvae can be found in a variety of areas such as the following:

- (1) Pools of water around Salado Creek
- (2) Manholes
- (3) Artificial Containers (i.e. toys, recycling bins)
- (4) Water beneath homes
- (5) Buckets and pools of water in the horse stables
- (6) Storm drains
- (7) Ditches (especially around construction areas)

b. Even during the driest months of the year, larvae can be found in any of the locations listed in 3a. The first line of defense in the fight against mosquitoes is to control the breeding areas. Larval habitats must be identified early in the season (about mid-March) and monitored throughout the year. Whenever possible, cultural and physical control methods must be used to control larval populations. If this is not possible, larvicides must be applied.

c. Surveillance for adult mosquitoes is typically conducted from May through October. Traps are positioned throughout Fort Sam Houston and Camp Bullis. Mosquitoes are tallied, identified, and then tested for the presence of West Nile Virus, St. Louis Encephalitis, and Eastern Equine Encephalitis.

d. In all mosquito management operations, chemicals should be used only as a last resort to control mosquito populations. Ultra-low volume (ULV) fogging should only be performed at the recommendation of the post entomologist. The recommendation is based on surveillance data and the health threat to employees and residents. In addition, the determination must be made that all other means of control have been exhausted.

e. ULV fogging operations must follow all applicable federal, state, and local laws. The ULV fogger must be calibrated (for flow rate and droplet size) annually or prior to the use of a new chemical.

4. Specific Guidance.

- a. Housing residents.

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(1) Eliminate all areas of standing water around the home. If necessary, submit a work order to the PWBC.

(2) Wear insect repellent if outside after dusk or before dawn. Adults should wear repellent with a DEET concentration of 20-30 percent while children between the ages of 2 and 12 years should wear repellent with a DEET concentration of 5-10 percent.

(3) If outside after dusk or before dawn, wear long sleeve shirts and long pants.

b. Military Police.

(1) Ensure holes in orange barriers are treated or covered to prevent the breeding of mosquitoes.

(2) Wear permethrin-treated uniforms and DEET if outside after dusk or before dawn.

(3) Procure DEET from the Public Works Business Center (PWBC) Pest Control Shop.

c. Horse Stable Workers.

(1) Ensure that areas of standing water are minimized.

(2) Turn off water spigots when not in use.

(3) Do not allow water to sit in containers or drinking barrels for more than 4 days without being emptied or changed.

d. On-post Units and Organizations.

(1) Eliminate areas of standing water around buildings. If necessary, submit a work order to the PWBC.

(2) If DEET or repellent is required, it must be procured by individual organizations. Preventive medicine and PWBC do not supply repellent to on-post organizations.

e. Post Entomologist/ Preventive Medicine.

(1) Identify, survey, and treat larval breeding areas. Recommend larval control measures where necessary.

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(1) Conduct adult mosquito surveillance 2-3 nights/week. Identify, tally, and test the mosquitoes for the presence of disease

(2) Recommend adult control measures based on surveillance data and the health threat

(3) Inform the Garrison Commander if mosquito-borne disease is found on Fort Sam Houston/Camp Bullis.

f. Public Works Business Center.

(1) Identify and control larval breeding areas such as manholes, drains, and ditches.

(2) Conduct ULV fogging operations based on the recommendations of the post entomologist.

(3) Calibrate the ULV fogger at the beginning of each mosquito season and whenever a new chemical is used.

(4) Fog only between the hours of 0430 and 0630 and between the hours of 1930 and 2130.

g. Installation Pest Management Coordinator.

(1) Oversee all mosquito management operations on Fort Sam Houston and Camp Bullis.

5. Duration of guidance will remain in effect until rescinded or superceded.

Appendix E

Draft Press Release

Positive WNV Confirmation

**Positive Isolation of West Nile Virus Confirmed
in a Dead Bird found on Fort Sam Houston**

Fort Sam Houston was notified today that a dead grackle collected on post was confirmed as testing positive with West Nile Virus. The bird was submitted to the Fort Sam Houston Veterinary Activity on 24 July 2002 and was shipped to the USGS (United States Geological Survey) National Wildlife Health Lab, Madison Wisconsin for testing. No human cases or positive pools of mosquitoes have been found.

An extensive, enhanced surveillance and testing program is in place on Fort Sam Houston. Mosquito traps to monitor mosquito population density and to collect adult female mosquitoes for WNV analysis are placed in several locations throughout the installation by Preventive Medicine Environmental Health Section personnel. Mosquito traps generally operate 2-3 nights per week. Trapped mosquitoes are sent to The Texas Department of Health for WNV testing. The Installation Veterinary Activity will send dead birds suspected of being infected with West Nile Virus, to the United States Geological Survey Activity in Wisconsin for analysis.

Larviciding in specific areas will be performed where necessary. PWBC will provide notification of dates and times of fogging to tenant commands and housing residents.

Managing the mosquito populations and protecting ourselves from WNV is a cooperative effort. Fort Sam Houston residents and building managers are urged to continue to look for ways around homes, buildings and general use areas to reduce mosquitoes' primary breeding ground, standing water, and report dead bird sightings to the Installation Veterinary Activity, Phone: 295-4260 or to BAMC Preventive Medicine Services, Phone: 295-2500.

Fort Sam Houston residents are urged to reduce standing water around the home in a variety of ways. Source reduction activities include:

- Do not allow puddles to form on your lawn as a result of excessive watering.
- Place tiny holes in the bottom of recycling bins that do not have lids.
- Repair leaky pipes and outside faucets.
- Replace the water in birdbaths.
- Get rid of old tires.
- Prevent bottles, tin cans, buckets or drums from collecting water.
- Wear a long sleeve shirt or pants if you are going to be outdoors at dawn, dusk, or the early evening.

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- Spray insect repellent on your clothing and rub it gently on your face, ears, neck, and hands (especially if you will be outdoors after dusk or before dawn). For children between the ages of 2 and 12 years, recommend a DEET concentration between 5 percent and 10 percent. For older individuals, recommend a concentration from 20 percent to 30 percent.

Following the precautions above will support command initiatives to protect the health and quality of life of the post community.