Arboviral Encephalitis

(Eastern Equine Encephalitis, St. Louis Encephalitis, Western Equine Encephalitis, La Crosse Encephalitis and Powassan Encephalitis)

NOTE: For information on West Nile Virus (WNV) encephalitis, refer to the chapter entitled West Nile Virus (Arboviral Disease).

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Per N.J.A.C. 8:57, health care providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of arboviral encephalitis to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at http://www.state.nj.us/health/lh/directory/lhdselectcounty.shtml.

If the health officer is unavailable, the health care provider or administrator shall make the report to the Department by telephone to 609.588.7500, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.

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1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Arthropod-**bo**rne **viruses,** or arboviruses, are viruses that are maintained in nature through biological transmission between susceptible hosts (e.g., mammals) and blood-feeding arthropods (e.g., mosquitoes and ticks). More than 100 arboviruses can cause disease in humans; over 30 arboviruses have been identified as human pathogens in the Western hemisphere. In the United States, four main arboviruses can cause encephalitis (i.e., arboviral encephalitides) and are transmitted by infected mosquitoes: eastern equine encephalitis (EEE), St. Louis encephalitis (SLE), western equine encephalitis (WEE), and La Crosse encephalitis (LAC). Another arbovirus, Powassan (POW), is a minor cause of encephalitis in the northern United States, and is transmitted by infected ticks. EEE and WEE are both alphaviruses and are members of the family *Togaviridae*; SLE and POW are flaviviruses and are members of the family *Flaviviridae*; LAC is a bunyavirus and a member of the family *Bunyaviridae*.

B. Clinical Description and Laboratory Diagnosis

Most arboviral infections are asymptomatic or may result in a nonspecific fever syndrome. Onset may be sudden with fever, headache, myalgias (body aches), malaise, and occasionally prostration. Infection may lead to encephalitis (inflammation of the brain) and, for a small proportion of cases, the outcome may be fatal or lead to permanent neurologic sequelae. Case-fatality rates range from less than 1% to 60%. Arboviral encephalitis cannot be distinguished clinically from many other causes of encephalitis.

EEE is considered one of the most serious arboviral diseases in the United States, as the virus usually causes severe neurologic infection and sometimes death. Symptoms of EEE generally include a sudden onset of high fever, stiff neck, and headache increasing in severity, lack of energy, and general muscle pain. In the more severe EEE cases, seizures, coma, and death may develop rapidly. The case-fatality rate for EEE ranges from 33% to 50%. Many people who survive EEE develop residual, long-term, mild to severe neurologic deficits. In contrast, most cases of arboviral disease are subclinical (occur without apparent symptoms) or present as mild, nonspecific illness. For example, less than 1% of SLE infections are clinically

apparent and most infections remain undiagnosed. In more severe SLE cases, symptoms include headache, fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants), and spastic (but rarely flaccid) paralysis. SLE is generally milder in children than in adults, but in children who do have the disease, there is a higher rate of encephalitis. The case-fatality rate for SLE ranges from 3% to 30%, especially in the elderly. In more severe WEE cases, symptoms include sudden onset of headache, fever, nausea, vomiting, anorexia, and malaise, followed by altered mental status, weakness, and signs of meningeal irritation. Children under one year old are affected more severely than adults and may be left with permanent sequelae. The case-fatality rate for WEE is 3%. Symptoms of more severe LAC cases include seizures, coma, paralysis, and a variety of neurologic sequelae after recovery. LAC encephalitis is more common in children under the age of 16 than in adults. The case-fatality rate for LAC is less than 1%. Cases of POW include symptoms of encephalitis and infection is associated with serious long-term morbidity. POW encephalitis has a case-fatality rate of 10% to 15%.

Laboratory diagnosis is based on isolation of virus or identification of viral antigen or nucleic acids in clinical specimens, demonstration of antibodies in cerebrospinal fluid (CSF) or serum by enzyme-linked immunosorbent assay (ELISA), hemagglutination inhibition, polymerase chain reaction (PCR), and plaque-reduction neutralizing test. Serologic cross-reactions may occur within related virus groups, such as EEE, SLE, and West Nile virus.

C. Reservoirs

Arboviral encephalitides are zoonotic, persisting in nature in a cycle involving nonhuman hosts and mosquito vectors. Humans and domestic animals such as horses can become infected but are considered dead-end hosts because they do not contribute to the transmission cycle. Many arboviral encephalitides have a variety of hosts, and maintenance of the viruses in nature may be facilitated by vertical transmission (i.e., transmitted from the female through the eggs to the offspring). Certain species of birds serve as the reservoir for EEE, WEE, and SLE. The virus usually resides in birds and the mosquitoes (*Aedes*, *Culex*, and *Culiseta* species) that feed on them. Transmission to horses and humans occurs when the types of mosquitoes that bite humans pick up the virus. LAC virus is maintained in woodland habitats in a cycle involving mosquitoes that breed in tree holes or containers (*Aedes triseriatus*) and vertebrate hosts (chipmunks and tree squirrels). POW has been isolated from several tick species and small mammals, primarily woodchucks, but the exact relationship between the host, its vector, and its ability to cause disease in humans is not fully understood.

D. Mode of Transmission

EEE, WEE, SLE, and LAC are spread to humans by the bite of an infected mosquito. POW is spread to humans by the bite of an infected tick. Direct person-to-person spread of arboviral encephalitis does not occur. There is no evidence that a person can get arboviral encephalitis from handling live or dead infected birds and wildlife; however, gloves should always be worn when performing such activities.

E. Incubation Period

The incubation periods for the arboviral encephalitides are as follows: EEE, 3 to 14 days; WEE, 5 to 10 days; SLE, 4 to 21 days; LAC, 5 to 15 days; and POW, 4 to 18 days.

F. Period of Communicability or Infectious Period

Arboviral encephalitis is not transmitted from person to person.

G. Epidemiology

Signs of equine (horse) encephalitis were first noted in the eastern United States as early as 1831. Over 100 years later, EEE was recovered from a horse brain in New Jersey in 1933. The EEE virus was first isolated from a human case in 1938 during an outbreak in southeastern Massachusetts. EEE is found in the eastern and north-central regions of the United States and adjacent regions of Canada, as well as in portions of Central and South America. The greatest risk of acquiring EEE is from late July through October, or until the first sustained frost. Geographically, the risk is highest from southeastern New England to Florida and the Gulf states, especially along the coastal regions. Since 1964, there have been approximately 200 confirmed cases of EEE in the United States, with an average of five human cases reported each year. An outbreak of EEE occurred in New Jersey in 1959 and resulted in 32 cases (including 22 fatalities). Another outbreak occurred in 1968 and resulted in 12 cases. No human cases have been identified in New Jersey since 2003, when three confirmed cases were reported. The most recent EEE human activity in the Northeast occurred in 2006 and 2007, when several cases of EEE were reported from Massachusetts and New Hampshire (five and three cases, respectively). Persons over age 50 and younger than age 15 are at the greatest risk for developing severe EEE infection. Infections in horses usually precede human cases and may be used to measure the risk of EEE infection in a given area.

SLE was first identified in St. Louis, Missouri, in 1933 and is one of the most common mosquito-transmitted human pathogens in the United States. The SLE virus is found throughout the United States as well as parts of Canada, the Caribbean, and South America. Since 1964, 4,651 cases of SLE have been reported in the United States, primarily from the central and eastern states. Cases of SLE occur primarily in the late summer and early fall, although cases may occur year-round in states where the climate is warmer (e.g., southern states). Periodic SLE epidemics have occurred in the Midwest and Southeast, and New Jersey had significant outbreaks of SLE in 1964 and 1975. No cases have been reported in New Jersey since 1975. The elderly are at the greatest risk for developing more severe SLE infections.

LAC was first diagnosed in La Crosse, Wisconsin, in 1963. Prior to 2002, LAC was the most common mosquito-transmitted human pathogen in the United States. The virus is most common in areas of the upper Midwestern United States and the Appalachian region (West Virginia, North Carolina, Tennessee, and Virginia). Approximately 70 cases are reported annually in the United States. Cases occur primarily in the summer and early fall. No cases of LAC have been identified in New Jersey. Since the virus is transmitted by the treehole

mosquito, residence in woodland habitats is considered a risk factor for LAC. Children under 16 years of age and the elderly are the most susceptible to the disease.

WEE was first identified in the United States in 1930. In 1941, a WEE epidemic in the United States resulted in 300,000 cases in horses and 3,340 cases in humans. Cases of WEE primarily occur in the plains regions of the western and central United States, and the virus has also been identified in Canada and North, Central, and South America. Since 1964, 639 human cases have been reported in the United States, with fewer than five cases reported each year. Cases occur primarily in the summer. Recent studies suggest that the risk of exposure is increasing as people move into previously undeveloped areas where WEE is endemic. No cases of WEE have been identified in New Jersey. Children under one year of age are at the greatest risk of developing more severe WEE infection and having long-term neurologic sequelae.

The first case of POW was identified in 1958 in Ontario. POW is a rare but serious tick-borne arboviral encephalitis. POW primarily occurs in the upper United States and Canada, with recent, isolated cases reported from New York, Vermont, and Maine. Symptoms of POW range in severity and may include headache, fever, confusion, and partial paralysis. The case-fatality rate is approximately 10%, and nearly 50% of cases will develop long-term neurologic sequelae. Cases occur from June to September, when ticks are most active and people may spend more time outdoors. No cases have been reported from New Jersey.

2 NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES CASE DEFINITION

A. Clinical Description

Cases of arboviral disease are classified either as neuroinvasive or non-neuroinvasive based on clinical criteria, and classified as confirmed or probable based on laboratory criteria.

Neuroinvasive disease requires the presence of fever and at least one of the following, as documented by a physician and in the absence of a more likely clinical explanation:

- Acutely altered mental status (e.g., disorientation, obtundation, stupor, or coma), OR
- Other acute signs of central or peripheral neurologic dysfunction (e.g., paresis or paralysis, nerve palsies, sensory deficits, abnormal reflexes, generalized convulsions, or abnormal movements), OR
- Pleocytosis (increased white blood cell concentration in the CSF) associated with illness clinically compatible with meningitis (e.g., headache or stiff neck)

Non-neuroinvasive disease requires, at minimum,

- The presence of documented fever, as measured by the patient or clinician, AND
- The absence of neuroinvasive disease (above), AND

- The absence of a more likely clinical explanation for the illness

B. Laboratory Criteria and Case Classification

CONFIRMED
A clinically compatible neuroinvasive or non-neuroinvasive case AND

- Four-fold or greater change in virus-specific serum antibody titer, OR
- Isolation of virus from or demonstration of specific viral antigen or genomic sequences in tissue, blood, CSF, or other body fluid, OR
- Virus-specific immunoglobulin M (IgM) antibodies demonstrated in CSF by antibody-capture enzyme immunoassay (EIA), OR
- Virus-specific IgM antibodies demonstrated in serum by antibody-capture EIA and confirmed by demonstration of virus-specific serum immunoglobulin G (IgG) antibodies in the same or a later specimen by another serologic assay (e.g., neutralization or hemagglutination inhibition)

PROBABLE
A clinically compatible neuroinvasive or non-neuroinvasive case, AND

- Stable (less than or equal to a two-fold change) but elevated titer of virus-specific serum antibodies, OR
- Virus-specific serum IgM antibodies detected by antibody-capture EIA but with no available results of a confirmatory test for virus-specific serum IgG antibodies in the same or a later specimen

POSSIBLE
Not used

C. Differences from Centers for Disease Control and Prevention Case Definition

The New Jersey Department of Health and Senior Services (NJDHSS) and Centers for Disease Control and Prevention (CDC) case definitions are the same.

3 LABORATORY TESTING AVAILABLE

Commercial laboratories may offer serology for some arboviruses by enzyme-linked immunoassay (EIA or ELISA) or immunofluorescence assay (IFA) to detect IgM and IgG antibodies that are produced in response to arboviral exposure. Laboratory tests that are IgG positive and IgM negative indicate past infection or previous exposure and do not require further investigation. Commercial laboratory tests that are positive for IgM may be false positive or may exhibit serologic cross-reactivity with other diseases or closely related arboviruses. As such, commercial laboratory tests that are positive for IgM must be retested at the NJDHSS Public Health and Environmental Laboratories (PHEL) or the CDC. Accurate

information about date of collection, date of symptom onset, travel history, and clinical symptoms are essential for test interpretation.

The NJDHSS PHEL performs IgG and IgM ELISA tests on human serum and PCR on CSF specimens for EEE, SLE, and WNV. Since flaviviruses (i.e., SLE and WNV) may demonstrate serologic cross-reactivity, all specimens submitted to PHEL for arboviral testing may require further testing at the CDC. PHEL does not provide testing of clinical specimens for WEE, LAC, or POW. However, arrangements can be made for sample testing by the CDC. All suspect cases must be approved by the NJDHSS Infectious and Zoonotic Diseases Program (IZDP) prior to submission for testing at PHEL or the CDC.

4 PURPOSE OF SURVEILLANCE AND REPORTING AND REPORTING REQUIREMENTS

A. Purpose of Surveillance and Reporting

- To identify locally acquired cases of arboviral encephalitis in humans to better understand the local epidemiology of arboviruses
- To identify locally acquired cases of arboviral encephalitis in humans to help target mosquito control measures
- To provide residents of New Jersey and travelers to the state with appropriate preventive health information

B. Laboratory Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.6) stipulates that laboratories report (by telephone, by confidential fax, or over the Internet using the Communicable Disease Reporting and Surveillance System [CDRSS]) all cases of arboviral encephalitis to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of the person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

C. Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (NJAC 8:57-1.4) stipulates that healthcare providers report (by telephone, confidential fax, or in writing) all cases of arboviral encephalitis to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain the name of the disease; date of illness onset; and name, age, date of birth, race, ethnicity, home address, and telephone

number of the person they are reporting. In addition, the name, address, institution, and telephone number of the reporting official should be reported.

D. Health Officer Reporting

The New Jersey Administrative Code (NJAC 8:57-1.7) stipulates that each local health officer must report the occurrence of any case of arboviral encephalitis within 24 hours of receiving the report. Written or electronic copies of the reports must be made to NJDHSS and may be submitted over the Internet using the confidential and secure CDRSS.

5 CASE INVESTIGATION

A. Forms and Laboratory Reports

It is requested that the local health officer complete a CDS-2 form, which can be found online at http://www.state.nj.us/health/forms/vir-1.dot, for any IgM-positive laboratory reports by interviewing the clinician, patient, and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the patient's healthcare provider or the medical record.

IgM results for EEE, SLE, WEE, LAC, and POW from a commercial laboratory may indicate a false positive or may exhibit serologic cross-reactivity with other diseases or closely related arboviruses. In order to accurately classify suspect cases of arboviral encephalitis, all IgM results from a commercial laboratory must be retested at PHEL or the CDC. The local health officer may be asked to assist with forwarding a clinical specimen from a commercial laboratory for retesting at PHEL or the CDC, or obtaining another acute and convalescent specimen from the healthcare provider.

NOTE: IgG-positive/IgM-negative results indicate previous infection or past exposure and do not require further investigation.

B. Entry into CDRSS

The mandatory fields in CDRSS include disease, last name, county, municipality, gender, race, ethnicity, case status, and report status.

The following table can be used as a quick reference guide to determine which CDRSS fields need to be completed for accurate and complete reporting of arboviral encephalitis. The "Tab" column includes the tabs that appear along the top of the CDRSS screen. The "Required Information" column provides detailed explanations of what data should be entered.

CDRSS Screen	Required Information
Patient Info	Enter the disease name ("EASTERN EQUINE ENCEPHALITIS," "LA CROSSE ENCEPHALITIS," "ST. LOUIS ENCEPHALITIS," "WESTERN EQUINE ENCEPHALITIS," OR "POWASSAN ENCEPHALITIS"), patient demographic information, illness onset date, and the date the case was reported to the local health department (LHD). There are no subgroups for the arboviral encephalitides.
Addresses	Enter any alternate address (e.g., rehabilitation facility). Use the "COMMENTS" section in this screen to record any pertinent information about the alternate address (e.g., length of stay at rehabilitation facility). Entering an alternate address will allow other disease investigators access to the case if the alternate address falls within their jurisdiction.
Clinical Status	Enter any treatment that the patient received and record the names of the medical facilities and physician(s) involved in the patient's care. If the patient received care from two or more hospitals, be sure that all are entered so the case can be accessed by all infection control professionals (ICPs) covering these facilities. If the patient died, date of death should be recorded under the "MORTALITY" section.
Signs/Symptoms	Check appropriate boxes for signs and symptoms and indicate their onset. Make every effort to get complete information by interviewing the physician, family members, ICP, or others who might have knowledge of the patient's illness. Also, information regarding the resolution of signs and symptoms should be entered.
Risk Factors	Enter complete information about risk factors (i.e., travel history outside of the United States, travel history to other states in the United States, and local outdoor exposure) to facilitate mosquito control activities in New Jersey.

CDRSS Screen	Required Information
Laboratory Eval	For all IgM-positive tests, select "AB.IGM" for ELISA, EIA, or IFA. In the "TEST RESULT" field select "POSITIVE/REACTIVE." If available, titers should be placed in the "VALUE" field. For all IgG-positive tests, select "AB.IGG" for ELISA, EIA, or IFA. In the "TEST RESULT" field select "POSITIVE/REACTIVE." If available, titers should be placed in the "VALUE" field. The "Reference Range" field should be completed for all ELISA, EIA, and IFA tests. In addition, the "Paired Sera" field should be completed by selecting "ACUTE" or "CONVALESCENT." Specimen type, specimen collection date, test result, and, if applicable, test value should also be recorded. If arrangements have been made to retest a specimen at PHEL or the CDC, enter the specific information in the "LABORATORY COMMENTS" section.
Contact Tracing	Information regarding contacts is not required for this disease.
Case Comments	Enter general comments (i.e., information that is not discretely captured by a specific topic screen or drop-down menu) in the "COMMENTS" section. **NOTE:** Select pieces of information entered in the "COMMENTS" section CANNOT be automatically exported when generating reports. Therefore, whenever possible, record information about the case in the fields that have been designated to capture this information; information included in these fields CAN be automatically exported when generating reports.
Epidemiology	Record name of and contact information for case investigators from other agencies (e.g., CDC, out-of-state health departments). Document communication between investigators in the "COMMENTS" section.
Case Classification Report Status	Case status options are "REPORT UNDER INVESTIGATION (RUI)," "CONFIRMED," "PROBABLE," "POSSIBLE," and "NOT A CASE." • All cases entered by laboratories (including LabCorp electronic submissions) should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • Cases still under investigation by the LHD should be assigned a case status of "REPORT UNDER INVESTIGATION (RUI)." • Upon completion of the investigation, the LHD should assign a case status on the basis of the case definition. "CONFIRMED," "PROBABLE," and "NOT A CASE" are the only appropriate options for classifying a case of arboviral

CDRSS Screen	Required Information
	encephalitides (see section 2B). Report status options are "PENDING," "LHD OPEN," "LHD REVIEW," "LHD CLOSED," "DELETE," "REOPENED," "DHSS OPEN," "DHSS REVIEW," and "DHSS APPROVED." • Cases reported by laboratories (including LabCorp electronic submissions) should be assigned a report status of "PENDING." • Once the LHD begins investigating a case, the report status should be changed to "LHD OPEN." • The "LHD REVIEW" option can be used if the LHD has a person who reviews the case before it is closed (e.g., health officer or director of nursing). • Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to "LHD CLOSED." • "LHD CLOSED" cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to "REOPENED" and the LHD will be notified by e-mail. Cases that are "DHSS APPROVED" cannot be edited by LHD staff (see section 4C below). If a case is inappropriately entered (e.g., a case is entered as West Nile Virus instead of Western Equine Encephalitis), the case should be assigned a report status of "DELETE." A report status of "DELETE" should NOT be used if a reported case of arboviral encephalitis simply does not meet case definition. Rather, it should be assigned the appropriate case status, as described above.

C. Other Reporting/Investigation Issues

1. Case report forms (CDS-2 and labs) DO NOT need to be mailed to NJDHSS as long as mandatory fields in CDRSS indicated in Section 5B are completed.

2. Once the LHD completes its investigation and assigns a report status of "LHD CLOSED," NJDHSS will review the case. NJDHSS will approve the case by changing the report status to "DHSS APPROVED." At this time, the case will be submitted to the CDC and the case will be locked for editing. If additional information is received after a case has been placed in "DHSS APPROVED," you will need to contact NJDHSS to reopen the case. This should be done only if the additional information changes the case status of the report.

3. Every effort should be made to complete the investigation within three months of opening a case. Cases that remain open for three months or more and have no investigation or update notes will be closed by NJDHSS and marked as not a case.

6 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (NJAC 8:57-1.10)

Because arboviral encephalitis is not transmitted from person to person, there are no restrictions for case-patients or contacts of case-patients.

B. Protection of Contacts of a Case

There are no recommendations for protection of contacts of a case. There is no approved human vaccine available for any of the arboviral encephalitides listed in this chapter, and person-to-person transmission does not occur.

C. Managing Special Situations

Locally Acquired Case

If it is suspected that a case was acquired locally (e.g., no recent travel to an endemic area), it may be necessary to investigate local risk factors for viral transmission or to conduct surveillance for other people with the illness. The local health officer should obtain accurate exposure information, including outdoor activity during the incubation period (refer to section 1E). The local mosquito control agency should be notified of the case and the local travel history. The agency will conduct mosquito surveillance and abatement activities as indicated.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If an outbreak is suspected, contact the NJDHSS IZDP at 609.588.7500. The situation may warrant an investigation of clustered cases or implementation of effective prevention and control measures (e.g., spraying for mosquitoes). The NJDHSS IZDP staff helps determine a course of action to prevent further cases and can perform surveillance for cases across jurisdictions that would be difficult to identify at a local level.

D. Preventive Measures

Environmental Measures

The New Jersey State Mosquito Control Commission and the New Jersey Department of Environmental Protection Office of Mosquito Control Coordination provide funding for mosquito surveillance for EEE, SLE, and WNV. Local mosquito control agencies also conduct surveillance and control activities. Decisions about the need for mosquito pesticide

spraying are made by the county mosquito control agencies based on mosquito habitat and density as well as surveillance for viruses in mosquitoes, birds, and humans. Results of mosquito surveillance can be accessed on the Rutgers University Center for Vector Biology Web site at http://www.vectorbio.rutgers.edu[URL did not exist; please check].Residents may also contact their local mosquito control agency; contact information for each county mosquito agency can be obtained by calling 1.800.NO.NJWNV (toll-free).

Personal Preventive Measures/Education

People, particularly those living in or visiting high-risk areas (e.g., areas with documented virus activity in mosquitoes, birds, horses, or humans), are encouraged to protect themselves from mosquito bites by using insect repellents. Repellents should always be used following the manufacturer's instructions found on the product label. Choose a product that will provide sufficient protection for the amount of time spent outdoors. Products containing DEET, picaridin, IR3535, oil of lemon eucalyptus (PMD), and permethrin (for use on clothing/equipment only) have been approved by the Environmental Protection Agency and are recommended by the CDC for use in protecting against mosquitoes that may carry diseases. Repellents that contain DEET (diethyltoluamide) should be used in concentrations no higher than 30% and DEET should never be used on children under two months old. Permethrin is a repellent that can be applied only to clothing, NOT to exposed skin.

Other personal preventive measures include staying indoors at dawn and dusk when mosquitoes are most active and wearing light-colored or protective clothing when outdoors during these peak times. Gloves should be worn whenever handling horses and birds that are sick with, or have died from, known or suspect arboviral infection. Screens should be in good repair to prevent mosquitoes from entering houses.

Prevention of arboviral encephalitis also involves reducing mosquito breeding around the home through

- Disposal of old cans, plastic buckets, ceramic pots, or other containers that may collect water
- Disposal of old, discarded tires
- Cleaning clogged gutters
- Eliminating water collecting in pool or boat covers
- Turning over plastic wading pools and wheelbarrows when not in use
- Frequently changing water in birdbaths
- Draining standing puddles, ditches, tree holes, and tree stumps

Additional Information

Fact sheets for arboviral encephalitis can be obtained at the NJDHSS Web site at http://www.state.nj.us/health/cd/.

Additional information can also be found on the CDC Web site at http://www.cdc.gov/ncidod/dvbid/arbor/arbdet.htm.

Disease maps for SLE, EEE, LAC, and POW can be found on the U.S. Geological Survey Web site at http://diseasemaps.usgs.gov/.

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