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NH DIVISION OF Public Health Services
Improving health, preventing disease, reducing costs *for all*
Department of Health and Human Services

Arboviral Disease in New Hampshire: Preparation for the 2014 Season

NH Division of Public Health Services (NH DPHS) recommends:

1. Considering mosquito-borne diseases, including West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE), in patients with compatible clinical features. Laboratory testing is recommended and may be arranged by calling (603) 271-4496 during business hours or (603) 271-5300 after hours. Forms and human testing information are available at http://www.dhhs.state.nh.us/dphs/cdcs/arboviral/index.htm.
2. Educating patients to take preventive measures, including avoiding mosquito bites by use of protective clothing and insect repellents, and environmental reduction of mosquito populations.
3. Use of equine vaccines to protect horses, which are available for both EEE and WNV. Vaccines are not available for human use.
4. Reporting all arboviral illnesses, confirmed or suspected, to the Division of Public Health Services (DPHS) within 24 hours at 603-271-4496 (after hours 1-800-852-3345, x5300).

Background

Arboviruses in New Hampshire include West Nile virus (WNV) and Eastern Equine Encephalitis (EEE) virus, both transmitted to humans through the bite of an infected mosquito. In 2013, the first human case of locally-acquired Jamestown Canyon virus (JCV) was identified in NH. EEE and WNV are maintained in a bird-mosquito cycle with humans considered incidental hosts. JCV is maintained in a deer-mosquito cycle, and reports of human illness are rare. In NH, the highest risk for human infection occurs from July through October. Year-round transmission is possible in some geographic locations in the U.S.

Nationally in 2013, there were 2,469 human cases of WNV reported in the US, including 119 deaths. Neuroinvasive Disease (meningitis and/or encephalitis) was recorded in 1,267 cases, while 1,202 cases were diagnosed with milder West Nile fever. There were 7 human cases of EEE reported in the US, one of which was in the Northeast.

In NH during the 2013 season, there were 14 WNV-positive mosquito batches, one veterinary case of WNV and one human with neuroinvasive WNV disease. There were 24 EEE-positive mosquito batches and three EEE-positive animals. No human cases of EEE were reported; the last human case of EEE in NH was reported in 2009.

When to Suspect Arboviral Illness

The incubation period following the bite of an infected mosquito ranges from 3 to 14 days. Most arboviral infections are mild and non-apparent. Mild forms of disease normally present as a febrile illness but sudden onset of symptoms can be seen with headache, myalgias and arthralgias. Approximately 20% of those infected with WNV develop a mild illness known as West Nile Fever.

The more severe forms of arboviral infection include altered mental status and/or neurological dysfunction (cranial and peripheral neuritis or other neuropathies, including acute flaccid paralysis syndrome). A minority of patients with severe disease develop a diffuse maculopapular or morbilliform rash. Approximately 1 in 150 WNV infections will result in severe neurological disease with encephalitis more common than meningitis. Older patients are at additional risk of developing severe West Nile Virus infections. For EEE, approximately one-third of all people who develop clinical encephalitis will die from the disease. Among those who recover, many suffer from permanent brain damage and severe disease can been seen in any age group, including children.

The typical laboratory findings are normal or elevated total leukocyte counts, lymphocytopenia and anemia, and hyponatremia in peripheral blood. Examination of cerebrospinal fluid (CSF) shows pleocytosis (usually with a predominance of lymphocytes), elevated protein, and normal glucose levels. For about one-third of WNV patients, magnetic resonance imaging (MRI) shows enhancement of the leptomeninges, the periventricular areas, or both, while MRI of EEE patients often reveal abnormalities of the basal ganglia and thalami.

Treatment is supportive, often involving hospitalization, intravenous fluids, respiratory support, and prevention of secondary infections for patients with severe disease.

When to Report Suspected Cases of Arboviral Illness

Clinicians, hospitals, and laboratories should report within 24 hours any patient meeting the following criteria:

1. Any patient with encephalitis or meningitis from July through November, who meet criteria a, b and c below without an alternative diagnosis:
    a. Fever ≥ 38.0 C or 100 F, and
    b. CNS involvement including altered mental status (altered level of consciousness, confusion, agitation, lethargy) and/or other evidence of cortical involvement (e.g., focal neurologic findings, seizures), and
    c. Abnormal CSF profile suggesting a viral etiology (a negative bacterial stain and culture) showing pleocytosis with predominance of lymphocytes. Elevated protein and normal glucose levels.

How to Report Suspect Cases of Arboviral Illness

All suspected arboviral cases should first be reported to the New Hampshire Division of Public Health Services by telephone. A completed case report form (attached) must be faxed to the NH (603-271-0545) *and* a copy submitted with the laboratory specimen(s) to the NH Public Health Laboratories. DPHS staff members are available 24/7 to help determine if the clinical presentation meets the case criteria for viral meningoencephalitis and whether further testing would be appropriate. Specimen submission guidelines are attached as well.

- For additional information on arboviral illness and maps of recent activity, please visit the NH DHHS website at http://www.dhhs.nh.gov/dphs/cdcs/arboviral/results.htm.
- For fact sheets on WNV and EEE, go to http://www.dhhs.nh.gov/dphs/cdcs/arboviral/publications.htm

For additional information on WNV and EEE please refer to:

1. Our website: http://www.dhhs.nh.gov/dphs/cdcs/arboviral/index.htm

2. The Centers for Disease Control, Division of Vector-Borne Infectious Diseases website at: http://www.cdc.gov/ncidod/dvbid/westnile/clinicians/.

If you or other health care providers have questions, please call Bureau of Infectious Disease Control at (603) 271-4496 or 1-800-852-3345, extension 4496 during business hours (8 am to 4:30 pm). Nights or weekends call the New Hampshire Hospital switchboard at 1-800-852-3345 extension 5300 and request the Public Health Professional on-call.

For any questions regarding the contents of this message, please contact NH DHHS, DPHS, Bureau of Infectious Disease Control at 603-271-4496 (after hours 1-800-852-3345 ext.5300).

To change your contact information in the NH Health Alert Network, contact Denise Krol at 603-271-4596 or email Denise.Krol@dhhs.state.nh.us

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From:	Elizabeth A. Talbot, MD – Deputy State Epidemiologist
Originating Agency:	NH Department of Health and Human Services, Division of Public Health Services

Attachments:

1) NH Arboviral Case Report Form
2) Laboratory Submission Guidelines for Arboviral Testing

New Hampshire Case Report
Arboviral Infection
Encephalitis/Meningitis

This form must be faxed to the New Hampshire Communicable Disease Control Section (603-271-0545) *and* a copy submitted with the laboratory specimen(s) to the NH Public Health Laboratories

PATIENT INFORMATION

Name: _____ Date of Birth: ____/____/____ ☐Male ☐Female
Last First MI mm dd yy

Home Address: _____ Homeless ☐Yes ☐No
Street City State Zip

Phone (H)_____ (W)_____ (Cell)_____

RACE ☐White ☐Black/African American ☐Asian ☐Native Hawaiian/Pacific Islander ☐American Indian/Alaska Native ☐Unknown

ETHNICITY ☐Unknown ☐Hispanic ☐Non-Hispanic

CLINICAL INFORMATION

Current Diagnosis: ☐Encephalitis ☐Meningitis ☐Other_____

Hospitalized? ☐ Yes ☐ No If yes, Hospital: _____

Date of Admission: ____/____/____ Date of Discharge/Transfer: ____/____/____

Physician/Provider: _____ Phone: _____

SYMPTOMS: Date of first symptoms ____/____/____ Date of first *neurologic* symptoms ____/____/____

	YES	NO	UNK		YES	NO	UNK		YES	NO	UNK
Fever ≥100 °F	☐	☐	☐	Disorientation	☐	☐	☐	Convulsions	☐	☐	☐
Highest Temp (if known)	_____ °F			Delirium	☐	☐	☐	Paralysis/ Paresis	☐	☐	☐
Headache	☐	☐	☐	Lethargy	☐	☐	☐	Acute Flaccid Paralysis	☐	☐	☐
Stiff Neck	☐	☐	☐	Stupor	☐	☐	☐	Cranial Nerve Palsy	☐	☐	☐
Tremor	☐	☐	☐	Coma	☐	☐	☐	Rash	☐	☐	☐
Vomiting/ Nausea	☐	☐	☐	Muscle Weakness	☐	☐	☐	Location of Rash	_____		
Diarrhea	☐	☐	☐	Hyperreflexia	☐	☐	☐	Hemorrhage	☐	☐	☐
Confusion	☐	☐	☐	Muscle Pain	☐	☐	☐	Joint Pain	☐	☐	☐
Seizures	☐	☐	☐	Rigidity	☐	☐	☐				

Other_____

OUTCOME ☐Recovered ☐Residual Symptoms ☐Died ☐Unknown If patient died, date of death ____/____/____

LABORATORY INFORMATION/TEST RESULTS (attach laboratory sheets)

Acute specimens (serum or CSF) must be collected within 3 to 10 days after onset of symptoms. Convalescent specimens should be collected 2-3 weeks after acute sample. If CSF is collected and submitted, please include serum sample.

CSF (specify units) Date ____/____/____ Abnormal? ☐Yes ☐No ☐Unknown Glu_____ Prot_____ RBC_____

WBC_____ Diff. Segs%_____ Lymphs%_____ Gram stain_____ Bacterial Culture_____

Fungal/Parasitic tests_____ Viral test results (Culture/Serology/PCR)_____

CBC (specify units) Date ____/____/____ WBC_____ Diff.Segs%_____ Lymphs%_____

MRI Date ____/____/____ Result_____

CT Date ____/____/____ Result_____

EMG Date ____/____/____ Result_____

ANTIVIRAL TREATMENT ☐Yes ☐No ☐Unk If Yes, list below. **Date Started**

_____ ____/____/____

RISK FACTOR INFORMATION FOR PRELIMINARY OR CONFIRMED POSITIVE CASES OF ARBOVIRAL ILLNESS

1. Does the patient's residence have screened windows? ☐Yes ☐No ☐Unknown
2. During the two weeks before onset of illness does the patient recall being bitten by mosquitoes?

   ☐Yes ☐No If yes, dates and places _____
3. Is the patient a smoker? ☐Yes ☐No ☐Unknown

   If yes, do they smoke outdoors? ☐Yes ☐No ☐Unknown
4. On average, how much time has the patient spent outdoors each day in the two weeks prior to onset? _____

   List any unusually long periods spent outside during the two weeks prior to onset:_____
5. Does the patient use any prevention measures to avoid mosquito bites? ☐Yes ☐No ☐Unknown

   If yes, list _____

   Does the patient use mosquito repellent when outdoors: ☐Always ☐Sometimes ☐Rarely ☐Never

   Does the repellent contain DEET (N, N-diethyl-meta-toluamide, or N, Ndiethyl-3-methylbenzamide), Picaridin, or Oil of Lemon Eucalyptus? ☐Yes ☐No ☐Unknown
6. During the two weeks before onset did the patient travel outside the county of residence?

   ☐Yes ☐No ☐Unknown If yes, specify when and where: _____
7. Has the patient traveled outside of New Hampshire in the two weeks prior to onset? ☐Yes ☐No ☐Unknown

   If yes, specify when and where: _____
8. Has the patient traveled outside the U.S. in the two weeks prior to onset? ☐Yes ☐No ☐Unknown

   If yes, specify when and where: _____
9. Does the patient have any underlying medical conditions? ☐Yes ☐No ☐Unknown

   If yes, specify: _____
10. What is the patient's occupation? _____

BLOOD DONATION/TRANSFUSION/TRANSPLANT HISTORY/PREGNANCY

11. Has the patient received an organ transplant or blood product transfusion in the month prior to onset?

    ☐Yes ☐No ☐Unknown

    If yes, specify when and where: _____
12. Has patient donated blood products or been a living organ donor in the one month prior to onset? ☐Yes ☐No ☐Unknown
13. Is the patient currently pregnant? ☐Yes ☐No ☐Unknown ☐Not applicable

    If yes, weeks pregnant_____ due date____/____/____
14. Is the patient breastfeeding or planning to breastfeed? ☐Yes ☐No ☐Unknown

COMMENTS: _____

_____

REPORTED BY: **DATE OF REPORT:** ____/____/____

Last Name_____First Name_____Title(ICN, Resident, Attending)_____

Work address_____City_____State_____Zip Code_____

Phone_____Pager_____

FOR DHHS USE:

Initial Report Taken by:_____ Report Completed by:_____

Case Status: ☐Confirmed ☐Probable ☐Not a Case ☐Unknown ☐Other State

STATE OF NEW HAMPSHIRE

DEPARTMENT OF HEALTH AND HUMAN SERVICES

29 HAZEN DRIVE, CONCORD, NH 03301-6527
603-271-4496 1-800-852-3345 Ext. 4496
Fax: 603-271-0545 TDD Access: 1-800-735-2964

NH DIVISION OF Public Health Services
Improving health, preventing disease, reducing costs for all

Nicholas A. Toumpas
Commissioner

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Director

NH Public Health Laboratories

How to Collect and Submit Clinical Specimens for Arboviral Testing

All suspect arbovirus cases should be reported to the Communicable Disease Control Section at 1-800-852-3345, ext. 4496 or the Public Health Laboratories at (603) 271-4661 before specimens are submitted.

Diagnostic testing: The arboviral testing panel is a serological test for West Nile virus (WNV), Eastern Equine Encephalitis virus (EEE), St. Louis Encephalitis virus (SLE), and may include Powassan virus (depending on availability of reagents).

- The most efficient diagnostic method measures IgM antibodies in CSF or serum collected within 8 days of illness onset. The PHL uses the Microsphere Immunoassay (MIA) for detection of IgM antibody.
- Since the MIA is a preliminary test, Plaque Reduction Neutralization test (PRNT) is required for case confirmation.
- The IgM antibody does not cross the blood-brain barrier; IgM antibody in CSF strongly suggests central nervous system infection.
- Serologic tests have a lower sensitivity due to cross-reactivity to related flaviviruses (e.g., yellow fever, Japanese encephalitis, dengue) and the persistence of WNV IgM antibodies in serum for 6 months or longer after infection.

Fee Schedule:

TEST	CPT
Eastern Equine Encephalitis (EEE) virus antibodies, IgM	86652
St. Louis Encephalitis virus antibodies, IgM	86653
West Nile Virus (WNV) antibodies, IgM	86788

All specimens submitted to the Public Health Laboratories will be screened for EEE, SLE, and WNV.
The Total Cost Per Screen is $105.00.

Note: All spinal fluid submissions must be accompanied by a corresponding serum sample. There will be only a single charge for the paired specimens.

Specimens:

Cerebrospinal fluid (CSF): As early as the first few days of illness, IgM antibody can be demonstrated in CSF by MIA.

Since other viruses can cause encephalitis, culture for additional viruses (other arboviruses, enteroviruses, and herpesviruses) may be performed at the discretion of the laboratory.

Submit 2-5 ml in sterile, empty, screw-capped container.

- **Serum:** Acute serum (3ml) should be collected and sent immediately to PHL for testing. Serum will be tested for IgM arboviral antibody. If specimen is IgM positive, then a convalescent specimen will be requested to determine the timing of infection.

Ideal timing of specimens for serology:

Specimen	Timing
Acute	3 to 10 days after onset of symptoms
Convalescent	2-3 weeks after acute sample

All spinal fluid submissions must be accompanied by a corresponding serum sample.

The following information is critical for accurate interpretation of test results and should be recorded on the accompanying case report form:

- **Date of onset of disease symptoms**
- Date of specimen collection
- Unusual immunological status of patient (e.g. immunosuppression)
- Brief clinical summary including suspected diagnosis (e.g., encephalitis or meningoencephalitis)
- Current address and travel history to flavivirus-endemic areas
- History of prior vaccination against flavivirus disease (e.g., yellow fever, Japanese encephalitis, or Central European encephalitis)
- Disease history (e.g., previous history of viral encephalitis or Dengue fever)

Procedure for submission of serum or CSF:

1. Perform lumbar puncture or venipuncture (SST or whole blood tube) by standard aseptic technique.
2. Label the specimen tubes with patient's full name and the date of collection.
3. If possible, centrifuge blood to separate serum.
4. For CSF, tightly seal cap and then wrap parafilm around seal to provide additional protection from leakage during transport.
5. Fill out requisition form completely, being sure to request "Arbovirus IgM"
6. Place CSF inside zip-lock biohazard bag and seal.
7. Place blood tube inside inner metal liner. Be sure there is enough absorbent material to cushion tubes in transit or to absorb liquid in case of leaking or broken tubes. Cap liner tightly.
8. Wrap the requisition form around the OUTSIDE of the inner metal liner.
9. Insert the metal liner into the outer cardboard container, and cap tightly. Make certain that the mailing container is labeled with the name and address of the NH PHL.
10. Mail first class or hand/courier deliver to the PHL. For emergency pickup after hours, contact the PHL at 1-800-852-3345. Refrigerate at 2-8^{o} C if it is not possible to send specimen immediately.

The arboviral collection kit consists of:

- A labeled cardboard outer mailing container
- An aluminum inner liner
- An SST vacutainer blood collection tube
- A polypropylene tube and parafilm for transport of CSF
- Absorbent material
- Requisition form

To order specimen collection kits, please call 271-4661, or 1-800-852-3345, extension 4661.
For further technical information regarding diagnostic testing, please call Denise Bolton, at 271-3684, or 1-800-852-3345, extension 3684.