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Mosquito-Borne Diseases in New Hampshire (NH), 2018

Key Points and Recommendations:

1. Patients continue to be at risk for acquiring West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) in NH through the bite of an infected mosquito.
2. Jamestown Canyon Virus (JCV) is another mosquito-borne disease recently recognized as posing a risk to NH residents and visitors.
3. All three mosquito-borne diseases can cause a range of clinical symptoms including asymptomatic infection, non-specific febrile illness, and severe neurological disease including meningitis and encephalitis.
4. Clinicians should maintain an index of suspicion for these infections and consider testing patients presenting with a clinically compatible illness, especially patients presenting with an unexplained febrile neurologic illness.
5. Laboratory confirmation of WNV, EEE, and JCV can 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>.
6. Clinicians should advise patients to avoid mosquito (and tick) bites by use of insect repellents, wearing protective clothing, and environmental reduction of mosquito populations.
7. Report 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

Mosquito-borne diseases transmitted in New Hampshire include West Nile virus (WNV), Eastern Equine Encephalitis (EEE) virus, and Jamestown Canyon virus (JCV). EEE and WNV are maintained in a bird-mosquito transmission cycle with humans considered incidental hosts. JCV is maintained in a deer-mosquito transmission cycle. The greatest risk for human acquisition of WNV and EEE in NH is between July and October. Risk for JCV acquisition begins as early as April when the snow melt mosquitoes are present and biting. Year-round transmission for these and other mosquito-borne diseases is possible in some geographic locations in the US.

In NH, WNV was first identified in mosquitoes in 2000 with the first human case occurring in 2003. Since 2003, there have been 7 cases of WNV in humans in NH, most recently in 2017. EEE was first identified in NH mosquitoes in 2004 with the first human case also occurring in 2004. Since 2004 there have been 15 cases of EEE in humans in NH; our last human case of EEE was in 2014 (three cases during that year).

JCV was first identified in a NH resident in 2013. Since then we have identified a total of 5 cases in New Hampshire, including three cases in 2017. Nationally, since 2000, there have been more than 100 cases of JCV confirmed by or reported to the Centers for Disease Control and Prevention (CDC). A majority of these cases have been identified in the last five years since the CDC implemented routine JCV IgM antibody ELISA testing in 2013 on all samples submitted to

the CDC for arboviral disease testing. A majority of cases are being identified in the upper mid-west and northeast regions of the United States, occurring from late spring to early fall.

While not transmitted locally in NH, Zika virus, chikungunya virus (CHIKV), dengue, and other mosquito-borne diseases are possible among travelers returning from endemic regions. There were no new detections of Zika virus or CHIKV in NH travelers in 2017. NH DPHS will continue enhanced efforts to detect Zika virus mosquito vectors (*Aedes aegypti* and *Aedes albopictus*) by deploying additional traps specific for catching these species of mosquitoes during the 2018 season. At this time, local transmission of Zika virus by mosquitoes is extremely unlikely.

To help communities assess their risk for mosquito-borne diseases, every year DPHS supports towns that trap mosquitoes to have them tested at the Public Health Laboratories for WNV and EEE. This occurs from July through mid-October, primarily in the southeastern part of the State. Mosquito trapping and testing does not occur statewide, and even in communities where there are no mosquitos tested, residents and visitors remain at risk for WNV, EEE, JCV and other arthropod-borne illnesses.

Signs and Symptoms

The incubation period for WNV following the bite of an infected mosquito ranges from 2 to 14 days, and the incubation period for EEE ranges from 4 to 10 days, while the incubation period for JCV is currently unknown. An estimated 70-80% of human WNV infections are subclinical or asymptomatic, and most symptomatic persons experience an acute systemic febrile illness that often includes headache, weakness, myalgia, or arthralgia. Less than 1% of persons infected with WNV develop neuroinvasive disease, which typically manifests as meningitis, encephalitis, or acute flaccid paralysis. For EEE, approximately one-third of individuals that develop symptoms of EEE will develop severe encephalitis and die from the disease. Among those who recover, many suffer from permanent brain damage. For JCV, symptoms may include flu-like symptoms including fever; in severe cases, individuals may develop neurologic symptoms including meningitis and encephalitis. Severe disease can be seen in any age group, including children.

Treatment for WNV, EEE, and JCV is supportive, such as intravenous fluids, respiratory support, and prevention of secondary infections for patients with severe disease.

When to Report Suspected Cases of Mosquito-borne Illness

Clinicians, hospitals, and laboratories should report within 24 hours any patient suspected of having a mosquito-borne disease, especially patients meeting the following criteria:

1. Any patient with encephalitis or meningitis from April 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 Mosquito-borne Illness

All suspected mosquito-borne disease 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 Infectious Disease Investigation Section (603-271-0545) *and* a copy submitted with the laboratory specimen(s) to the NH Public Health Laboratories (PHL). DPHS staff members are available 24/7 to help determine if the clinical presentation meets the case criteria and to support testing. Specimen submission guidelines are attached.

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, EEE, and JCV go to <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/publications.htm>

Laboratory Testing for Mosquito-borne Illnesses

Laboratory diagnosis of mosquito-borne infections is generally accomplished by testing serum and/or cerebrospinal fluid (CSF) for virus-specific IgM and neutralizing antibodies. The NH Public Health Laboratories (PHL) can test for EEE, WNV, and St. Louis encephalitis (SLE) IgM. Positive IgM results are sent to CDC for confirmatory testing. The NH PHL and the Bureau of Infectious Disease Control can also assist in arranging testing for JCV at the CDC.

The PHL can also test for Zika (IgM and PCR), CHIKV (PCR) and dengue (PCR). Please consult the Bureau of Infectious Disease Control at (603) 271-4496 prior to sending specimens to the PHL for these tests.

For more information, including specimen collection instructions, please refer to: <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/documents/arboguidelines.pdf>

For additional information on WNV and EEE please refer to:

1. The NH DHHS website at: <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/index.htm>
 2. The Centers for Disease Control, Division of Vector-Borne Infectious Diseases websites at:
 - <http://www.cdc.gov/ncidod/dvbid/westnile/clinicians/>
 - <https://www.cdc.gov/easternequineencephalitis/index.html>
- For any questions regarding this notification, please call the NH DHHS, DPHS, Bureau of Infectious Disease Control at (603) 271-4496 during business hours (8:00 a.m. – 4:30 p.m.).
 - If you are calling after hours or on the weekend, please call the New Hampshire Hospital switchboard at (603) 271-5300 and request the Public Health Professional on-call.
 - To change your contact information in the NH Health Alert Network, contact Adnela Alic at (603) 271-7499 or email adnela.alic@dhhs.nh.gov.

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From: Benjamin P. Chan, MD, MPH, State Epidemiologist

Originating Agency: NH Department of Health and Human Services, Division of Public Health Services

Attachments:

- 1) NH Arboviral Case Report Form

**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

Prior to submission of suspect Chikungunya virus specimens for testing, a Public Health Nurse at the Bureau of Infectious Disease Control must be consulted in order to avoid a testing fee.

Please indicate the nurse contacted for tracking purposes: _____

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 $\geq 100^{\circ}\text{F}$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disorientation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Convulsions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highest Temp (if known) _____ ^{°F}				Delirium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Paralysis/Paresis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lethargy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Acute Flaccid Paralysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stiff Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stupor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cranial Nerve Palsy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tremor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Coma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vomiting/Nausea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Muscle Weakness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of Rash			
Diarrhea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hyperreflexia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hemorrhage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Muscle Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Joint Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seizures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rigidity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

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**Patient Name:** _____ **DOB:** ____/____/____

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