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Mosquito-Borne Diseases Update, New Hampshire, 2019

Key Points and Recommendations:

1. Our first case of Jamestown Canyon Virus (JCV) infection this season has been identified in a New Hampshire (NH) resident who also tested positive for Powassan virus co-infection.
2. Three different mosquito-transmitted infections can be acquired in New Hampshire: West Nile Virus (WNV), Eastern Equine Encephalitis (EEE), and JCV.
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 consider testing for WNV, EEE, and JCV, especially in patients hospitalized with signs or symptoms of meningitis or encephalitis (e.g. confusion or altered mental status).
5. Testing for Powassan virus (a tickborne viral infection) should also be considered in patients presenting with unexplained neurologic illness. For more information about Powassan and other tickborne disease (TBDs), please refer to our earlier HAN: <https://www.dhhs.nh.gov/dphs/cdcs/alerts/documents/tickborne-update-062019.pdf>.
6. Report all suspect or confirmed arboviral illnesses to the Division of Public Health Services (DPHS) within 24 hours at 603-271-4496 (after hours 603-271-5300 and ask for the public health nurse on call). We can help to facilitate confirmatory testing through our public health laboratories.

Situation

An adult from Kingston, NH developed encephalitis and was hospitalized in May 2019. Testing of both cerebrospinal fluid (CSF) and serum were positive for infection with Jamestown Canyon virus (transmitted by mosquitos) and Powassan virus (transmitted by ticks). Co-infection with these two viruses has previously been identified in New Hampshire and also reported in other states: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6367605/>.

Background

Mosquito-borne diseases transmitted in New Hampshire (NH) include West Nile virus (WNV), Eastern Equine Encephalitis (EEE) virus, and Jamestown Canyon virus (JCV). Other mosquito-borne diseases are possible in travelers. The greatest risk in NH for human mosquito-borne infection is between July and October. The risk for JCV, however, likely begins earlier (as early as April) when the snow melts and mosquitos are present and biting. Risk for these diseases is present in NH until hard frosts kill mosquitos.

To help communities assess their risk for mosquito-borne diseases, DPHS supports towns that trap mosquitos to have them tested at the Public Health Laboratories for WNV and EEE. JCV is not tested for in mosquitos. Mosquito trapping and testing occurs from July through mid-

October, primarily in the southeastern part of the State (see attached map). Even in communities where there is no mosquito trapping/testing, residents and visitors remain at risk for WNV, EEE, and JCV. A weekly report of NH's mosquito, animal, and human testing information can be found at: <https://www.dhhs.nh.gov/dphs/cdcs/arboviral/results.htm>.

Epidemiology

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 identified in humans, 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 identified 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 7 cases in NH; before this most recently identified infection, our last human case of JCV was in 2017 (four cases during that year).

JCV has been increasingly identified nationally since 2013 when the U.S. Centers for Disease Control and Prevention (CDC) implemented routine JCV testing 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, usually occurring from late spring to early fall.

Signs and Symptoms

WNV, EEE, and JCV can all present with a range of clinical symptoms including asymptomatic or subclinical illness, non-specific febrile illness (fever, chills, headache, weakness/fatigue, myalgia, arthralgia), and severe neurological disease (meningitis and encephalitis).

An estimated 80% of human WNV infections are subclinical or asymptomatic, and most symptomatic persons experience a non-specific febrile illness. Less than 1% of persons infected with WNV develop neuroinvasive disease, which typically manifests as meningitis, encephalitis, or acute flaccid paralysis. Approximately one-third of individuals that develop illness from EEE, however, will develop severe encephalitis and die from the disease; among those who recover, many suffer from permanent brain damage.

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

Laboratory Testing

Laboratory diagnosis of WNV, EEE, and JCV is generally through testing serum and/or cerebrospinal fluid (CSF) for virus-specific IgM antibodies and confirmed by plaque reduction neutralization tests (PRNT). The NH Public Health Laboratories (PHL) can test for EEE, WNV, and St. Louis encephalitis (SLE) IgM antibodies and positive IgM results are sent to CDC for confirmatory PRNT testing. The NH PHL and the Bureau of Infectious Disease Control can also assist in arranging testing for JCV at the CDC.

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

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 patient's 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 \geq 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 assist and to support testing. Specimen submission guidelines are attached.

For additional information:

1. NH DHHS mosquito-borne disease website:
<http://www.dhhs.nh.gov/dphs/cdcs/arboviral/index.htm>
2. For fact sheets on WNV, EEE, and JCV:
<http://www.dhhs.nh.gov/dphs/cdcs/arboviral/publications.htm>
3. CDC websites:
 - <http://www.cdc.gov/ncidod/dvbid/westnile/clinicians/>
 - <https://www.cdc.gov/easternequineencephalitis/index.html>

For any questions regarding the contents of this message, 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). For after hours or on weekends call the New Hampshire Hospital switchboard at 1-800-852-3345 extension 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) 2019 New Hampshire Town Sponsored Mosquito Trapping Map
- 2) 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) _____ ^o 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