

# THIS IS AN OFFICIAL NH DHHS HEALTH ALERT

Distributed by the NH Health Alert Network  
[Health.Alert@nh.gov](mailto:Health.Alert@nh.gov)  
August 8, 2019 11:00 EDT (11:00 AM EDT)  
NH-HAN 20190808



## 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>

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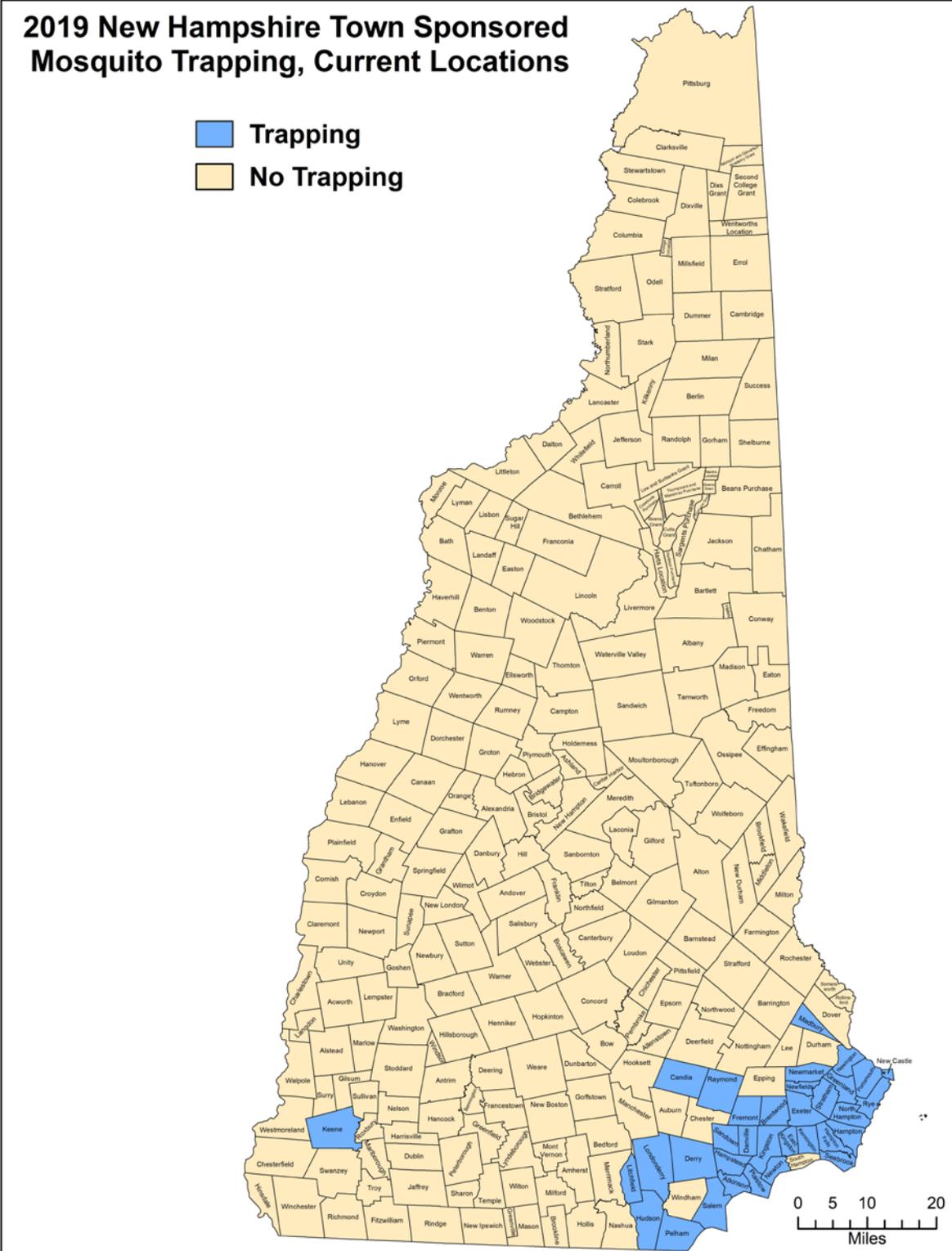
For any questions regarding the contents of this message, please call Bureau of Infectious Disease Control at (603) 271-4496 or 1-800-852-3345, extension 4496 during business hours (8 am to 4:30 pm). For after hours or on weekends call the New Hampshire Hospital switchboard at 1-800-852-3345 extension 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](mailto:adnela.alic@dhhs.nh.gov).

Status: Actual  
Message Type: Alert  
Severity: Moderate  
Sensitivity: Not Sensitive  
Message Identifier: NH-HAN 20190808 Mosquito-Borne Diseases Update, NH 2019  
Delivery Time: 12 hours  
Acknowledgement: No  
Distribution: Email, Fax  
Method:  
Distributed to: Physicians, Physician Assistants, Practice Managers, Infection Control Practitioners, Infectious Disease Specialists, Community Health Centers, Hospital CEOs, Hospital Emergency Departments, Nurses, NHHA, Pharmacists, Laboratory Response Network, Manchester Health Department, Nashua Health Department, Public Health Networks, DHHS Outbreak Team, DPHS Investigation Team, DPHS Management Team, Northeast State Epidemiologists, Zoonotic Alert Team, Health Officers, Deputy Health Officers, MRC, NH Schools, EWIDS  
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 ≥100 °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