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

**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-

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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 mosquitos 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 mosquitos 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:

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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).

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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

