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PUBLIC HEALTH ADVISORY

To: Health Care Providers
From: Siiri Bennett, State Epidemiologist
Subject: **Human Powassan Case and Arbovirus Update for Healthcare Providers in Maine**
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Human Powassan Case and Arbovirus Update for Healthcare Providers in Maine

The purpose of this health advisory is to alert clinicians to the potential for human arboviral disease activity in Maine and to consider testing for arboviruses in patients presenting with unexplained encephalitis, meningitis or high fever (≥100.4°F or 38°C) during the summer and fall.

Maine CDC identified a human case of Powassan encephalitis in a Maine resident who resides in midcoastal Maine. The individual was symptomatic in late June and hospitalized. CDC Fort Collins confirmed the Powassan result in this individual by neutralization testing.

This individual likely acquired this Powassan encephalitis infection in the state of Maine. There are two types of Powassan virus in the United States. The first type, often called lineage 1 Powassan virus is associated with *Ixodes cookei* or the woodchuck tick. Lineage 2 POW, sometimes called Deer tick virus, is associated with *Ixodes scapularis* or the deer tick. Both can cause human disease. Powassan encephalitis is a member of the flavivirus genus which includes arboviruses like Dengue virus, West Nile virus (WNV), Yellow Fever virus, and Zika virus.

Arboviral diseases, including Eastern equine encephalitis (EEE), Jamestown Canyon virus (JCV), and WNV, are serious infections that are transmitted by the bite of an infected **mosquito**. Maine reported one human case of WNV in 2020. Additionally, Powassan virus is an arboviral disease transmitted by the bite of an infected **tick**. Maine identified one case of Powassan virus disease in residents during 2020. Although rare, these diseases have potentially severe and even fatal consequences for those who contract them.

Background

Maine first detected EEE and WNV in 2001 in birds. In 2009, Maine experienced unprecedented EEE activity with 19 animals and 2 mosquito pools testing positive. In 2014, Maine reported the first human case of locally acquired EEE neuroinvasive illness, with the first EEE death occurring in 2015. In 2019, Maine reported one equine case of locally acquired EEE illness and reported two EEE positive mosquito pools collected from York County.

In 2012, Maine reported the first human case of locally acquired WNV neuroinvasive illness. In 2018, Maine reported the first equine case of locally acquired WNV illness and reported two WNV positive mosquito pools collected from Bangor, which is the furthest north Maine has detected a positive pool. In 2020, Maine reported one human case of locally acquired WNV illness.

Maine first identified JCV in 2017 with two cases, and providers reported one additional case in 2018. Maine first identified human Powassan cases in 2000, but it is still relatively uncommon. Maine identified nine Powassan cases in the last 10 years.

Chikungunya, Dengue, and Zika virus are all travel-associated arboviral illnesses. While Maine does not have the mosquitoes that transmit these viruses, providers should also consider these viruses in symptomatic individuals who have travelled to an affected area. Maine reported zero travel-related cases of Dengue, Chikungunya, and Zika in 2020.

Clinical Features of Arboviral Infections

EEE: EEE is the most severe arboviral infection found in the United States. Symptoms of EEE usually appear 4 to 10 days after the bite of an infected mosquito and range from mild flu-like illness to high fever, encephalitis, coma, and death. The EEE case fatality rate is approximately 33% (50% in those who show symptoms) with significant brain damage in most survivors.

JCV: JCV is a relatively rare arboviral infection with symptoms that may include fever, headache, and flu-like illness. Symptoms usually appear 1-14 days after the bite of an infected mosquito. Severe cases involving the central nervous system may include meningitis or encephalitis.

Powassan virus: Many people who become infected with Powassan do not show any symptoms. Symptom onset ranges from about 1 week to 1 month after the tick bite, and includes: fever, headache, vomiting, weakness, confusion, loss of coordination, speech difficulties, seizures, encephalitis, and meningitis. Approximately 10% of Powassan virus encephalitis cases are fatal, and approximately half of survivors have permanent neurological symptoms.

WNV: Symptoms of WNV infection usually appear 3 to 15 days following the bite of an infected mosquito. Most people infected with WNV are asymptomatic. Symptoms can range from a mild flu-like illness to headache, high fever, neck stiffness, altered mental status, convulsions, paralysis, coma, and sometimes death. Fewer than 1% of people who are infected with WNV will develop serious neurological illness, and of these, about 10% will die.

Risk Groups

Many people infected with arboviral illness remain asymptomatic. The following groups of people are at higher risk for clinically significant arboviral infection:

- People who engage in outdoor work and recreational activities
- Persons over age 50 and younger than age 15

What to do after a tick bite:

- Remove the tick properly, ideally using tweezers or a tick spoon.

- Identify the tick and the engorgement level, or length in time of attachment. Tick identification is available for free through the Tick Lab at the University of Maine Cooperative Extension. More information can be found at www.ticks.umaine.edu.
- Clean the area around the bite and instruct the patient to watch for signs and symptoms for 30 days.
- Testing of the tick is not routinely recommended because even if the tick tests positive for a tickborne disease, that does not mean it was attached long enough to transmit the disease. Even if the tick tests negative that does not mean it was a patient's only tick exposure.
- Prophylaxis after a tick bite is **not** routinely recommended.

Prevention:

For Powassan virus, transmission time from tick bite to infection is shorter than for other tickborne diseases. The best way to prevent any tick or mosquito-borne illness is to prevent bites. Maine CDC recommends the "Stop. Check. Prevent." approach:

1. Wear protective clothing
    a. Wear light colored clothing to make ticks easier to see
    b. Wear long sleeves and pants to reduce exposed skin for ticks to attach
2. Use an EPA approved repellent
    a. Apply repellents to bare skin according to label instructions. Permethrin is a good option to treat clothing and gear and will remain protective through several washings
3. Use caution in tick infested areas
    a. Avoid wooded and bushy areas with high grass and stay in the middle of trails whenever possible
4. Perform daily tick checks
    a. Check for ticks immediately after exiting high risk areas. Bathe or shower (preferably within 2 hours after being outdoors) to wash off and find ticks on your body. Conduct a full-body tick check. Also examine clothing, gear, and pets.
5. Avoid outdoor activities when mosquitoes are most active.
    a. In Maine, mosquitoes are most active from dusk to dawn.
6. Reduce the amount of tick and mosquito habitat around the home.
    a. To reduce tick habitat, keep grass mowed, remove leaf piles from around the home, move wood piles away from the house, and consider using a dry border of gravel or woodchips to separate the yard from surrounding deciduous forest.
    b. To reduce mosquito habitat, drain artificial sources of standing water around the home to eliminate larval habitat. For containers that must hold water, like birdbaths and water bowls, change the water at least weekly to disrupt larval development.

Diagnostic Tests for Arboviral Infections

Diagnosis relies on a high index of suspicion and on results of specific laboratory tests. EEE, JCV, Powassan, WNV, or other arboviral infections should be considered in any individual – but especially those over age 50 or younger than age 15 – with an onset of unexplained encephalitis, meningitis, or high fever in the summer and fall. The local presence of EEE, JCV, and WNV in animals and mosquito pools should further raise the index of suspicion. Maine CDC releases health alerts to providers whenever an arboviral disease is detected for the first time in a human, non-human mammal, or mosquito pool. Providers can find up to date information on reported (mosquito-borne) arboviruses in the weekly arboviral report posted online.

If providers suspect arboviral infection based on clinical evidence, they should submit serum samples and CSF for arboviral testing. Maine's Health and Environmental Testing Laboratory (HETL) and

many reference laboratories perform arboviral testing. All samples of CSF submitted to HETL should be accompanied by a serum sample. Ideally, providers should submit an acute and a convalescent serum sample for each patient. A HETL requisition and Arboviral submission form are required for testing. When suspicion is high, IgM testing on serum may be forwarded to federal CDC for confirmation based on patient symptoms and requires a completed federal CDC DASH form.

HETL can test for Chikungunya, Deer Tick virus, Dengue, EEE, POW, Saint Louis Encephalitis (SLE), WNV, and Zika. If providers suspect Powassan encephalitis, they should submit EDTA whole blood (purple cap) for PCR testing along with the serum and CSF. There is no commercial testing available for POW virus. Testing for JCV is performed at CDC Fort Collins, and providers should coordinate samples submission through HETL.

- Acute serum samples should be collected within 14 days of onset of symptoms
- Convalescent serum samples should be collected 10 days to 4 weeks following the acute specimen

Reporting:

Arboviral illness is reportable in Maine. All suspect cases, and positive laboratory reports should be reported by phone to the 24/7 disease reporting and consultation line at 1-800-821-5821 or by fax to 1-800-293-7534. Zika virus was added to the Maine Notifiable Diseases and Conditions List on February 17, 2021.

Additional Information

- How to submit human arboviral specimens to HETL: www.maine.gov/dhhs/mecdc/public-health-systems/health-and-environmental-testing/micro/submitting-samples.shtml
- Maine CDC arboviral diseases website: www.maine.gov/dhhs/vectorborne
- Weekly arboviral reports (July to October): www.maine.gov/dhhs/arboviral-surveillance
- Federal CDC mosquito website: www.cdc.gov/mosquitoes
- Zika and Dengue testing guidance: www.cdc.gov/zika/hc-providers/testing-guidance.html
- Maine CDC disease reporting and consultation line: **1-800-821-5821** (available 24/7)