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PUBLIC HEALTH ADVISORY

To: Health Care Providers
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Subject: **Arbovirus Update for Healthcare Providers in Maine**
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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 mosquito-borne arboviruses in patients presenting with unexplained encephalitis, meningitis, or high fever (≥100.4°F or 38°C) during the summer and fall. Consider testing for Powassan virus year-round.

Eastern Equine Encephalitis virus (EEE), Jamestown Canyon virus (JCV), and West Nile virus (WNV) are serious arboviral infections that are transmitted by the bite of an infected **mosquito**. Maine reported one human case of JCV in 2021. Additionally, Powassan virus (POW) is an arboviral disease transmitted by the bite of an infected **tick**. Maine identified three cases of POW in 2021 and four more cases to date in 2022. Two of the POW cases in 2022 died. 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 two EEE positive mosquito pools.

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. Additionally, a blood donation from a Maine resident screened positive for WNV in 2021.

Maine identified the first human case of locally-acquired JCV neuroinvasive illness in 2017, with the first JCV death occurring in 2018. Maine first identified human POW cases in 2000, with the first POW death occurring in 2013. Most POW cases in Maine are neuroinvasive and locally-acquired.

POW infections are caused by two clinically-indistinguishable virus lineages: lineage 1 (Powassan virus) and lineage 2 (Deer Tick virus). Both circulate in Maine tick populations, but current evidence suggests that most human POW infections in Maine are caused by POW lineage 2 or Deer Tick virus due to known endemic deer tick activity in many areas of the state.

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 2021. These resources provide level of risk by country:

- Chikungunya (U.S. CDC): www.cdc.gov/chikungunya/geo/index.html
    - Chikungunya (European CDC): www.ecdc.europa.eu/en/chikungunya-monthly
- Dengue (U.S. CDC): www.cdc.gov/dengue/areaswithrisk/around-the-world.html
- Zika (U.S. CDC): wwwnc.cdc.gov/travel/page/zika-information

Clinical Features of Arboviral Infections

Symptoms of EEE, JCV, POW, and WNV infections are similar, however most people infected by these viruses are generally asymptomatic. The clinical presentations of arboviral infections are either neuroinvasive or non-neuroinvasive.

- *Non-neuroinvasive (mild)*: flu-like symptoms like fever, headache, weakness, and neck stiffness
- *Neuroinvasive (severe)*: symptoms can include vomiting, loss of coordination, speech difficulties, encephalitis, meningitis, confusion, altered mental status, convulsions, seizures, paralysis, coma, and death

Symptoms may appear 4–10 days following a mosquito bite for EEE, 1–14 days following a mosquito bite for JCV, and 3–15 days following a mosquito bite for WNV. Symptoms of POW may appear 1 week to 1 month after a tick bite. For POW virus, transmission time from tick bite to infection is shorter than for other tickborne diseases.

Case fatality rates of arboviruses are often higher than other diseases. For EEE, the rate is about 33% (50% in those who show symptoms) with significant brain damage in most survivors. Approximately 10% of neuroinvasive WNV and POW cases are fatal, and approximately half of POW survivors have permanent neurological symptoms. The case fatality rate of JCV is not well described.

Risk Groups

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, the engorgement level, and 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.

    - Level of engorgement can be determined using the Tick Growth Comparison Chart: https://web.uri.edu/tickencounter/fieldguide/tick-growth-comparison-charts/
- Clean the area around the bite and instruct 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:
The best way to prevent tick or mosquito-borne illness is to prevent bites. Maine CDC recommends:

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 and mosquitoes to bite
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 and mosquito habitat
    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, WNV, or other arboviral infections should be considered in any individual, and especially those over age 50 years or younger than age 15 years, with an onset of unexplained encephalitis, meningitis, or high fever in the summer and fall. POW should be considered year round. 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 CSF samples submitted to HETL should be accompanied by a serum sample. Ideally, providers should submit an acute and a convalescent serum sample for each patient. Both the HETL requisition and Arboviral submission form are required for

testing. When suspicion is high, IgM testing on serum may be forwarded to U.S. CDC for confirmation based on patient symptoms and requires a completed U.S. CDC DASH form. Providers may also submit CSF samples for viral metagenomics for patients with encephalitis of unknown etiology.

HETL can test for Chikungunya, Deer Tick virus, Dengue, EEE, POW, Saint Louis Encephalitis (SLE), WNV, and Zika. If providers suspect POW, 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, and currently available tests cannot distinguish between POW and Deer Tick virus. Testing for JCV is performed at U.S. CDC, and providers should coordinate sample 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.

Additional Information

- Arboviral testing in Maine for healthcare providers: www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/documents/Arboviral-Testing-Healthcare.pdf
- 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
- Powassan human surveillance data: www.maine.gov/dhhs/powassan
- U.S. 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)