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PUBLIC HEALTH ADVISORY

To: Health Care Providers
From: Dr. Isaac Benowitz, State Epidemiologist
Subject: **Arbovirus Update for Health Care Providers in Maine**
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Arbovirus Update for Health Care Providers in Maine

Maine CDC recently confirmed that a mosquito pool (a batch of 1–50 mosquitoes) collected from Orono in Penobscot County tested positive for Jamestown Canyon virus. This is the first local mosquito pool to test positive for any arbovirus this year.

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 fever (≥100.4°F or 38°C) during the summer and fall, particularly among returning travelers.

Eastern Equine Encephalitis virus (EEE), West Nile virus (WNV), and Jamestown Canyon virus (JCV) are serious arboviral infections transmitted by the bite of an infected mosquito. All three viruses are endemic in Maine. Maine reported zero human cases of mosquito-borne arboviral illness in 2023. Although rare, these diseases can have 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 2023, Maine experienced an EEE epizootic with 9 animals and 5 mosquito pools testing positive, in addition to 8 animals epi-linked to lab-confirmed animal cases.

In 2012, Maine reported the first human case of locally-acquired WNV neuroinvasive illness and in 2018, Maine reported the first equine case of locally-acquired WNV illness. In 2023, 3 animals and 1 mosquito pool tested positive for WNV in Maine.

Maine identified the first human case of locally-acquired JCV neuroinvasive illness in 2017, with the first JCV death occurring in 2018. In 2023, 3 mosquito pools tested positive for JCV in Maine.

Maine reported all three endemic mosquito-borne viruses in a single surveillance season for the first time in 2023 and recorded activity across 9 Maine counties (a new record). EEE and WNV detections last year were also the furthest north and latest in the year Maine reported active arboviral activity. Most of this activity was concentrated in north-central Maine and Maine detected active WNV activity in non-humans in November for the first time ever.

Chikungunya, Dengue, Oropouche, 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 Chikungunya, Dengue, Oropouche, and Zika in 2023. Refer to U.S. CDC travel health notices for more information on known arboviral activity occurring in other countries.

These resources provide level of risk by country:

- Chikungunya (U.S. CDC): www.cdc.gov/chikungunya/data-maps
    - Chikungunya (European CDC): www.ecdc.europa.eu/en/chikungunya-monthly
- Dengue (U.S. CDC): www.cdc.gov/dengue/areas-with-risk
- Oropouche (U.S. CDC): wwwnc.cdc.gov/travel/notices/level1/oropouche-fever-brazil
- Zika (U.S. CDC): www.cdc.gov/zika/geo/index.html

Clinical Presentation

Symptoms of EEE, JCV, 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 such as 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.

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 cases are fatal. The case fatality rate of JCV is not well described, but about 50% of people with symptomatic JCV infections are hospitalized.

Risk Factors

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
- Persons with immunocompromising conditions or taking immunosuppressive medications

Prevention

The best way to prevent mosquito-borne illness is to prevent mosquito bites. Maine CDC recommends:

1. Wear long sleeves and pants to reduce exposed skin for mosquitoes to bite.
2. Apply EPA-approved 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. Avoid outdoor activities from dusk to dawn when mosquitoes are most active.
4. Reduce the amount of mosquito habitat around the home. Drain artificial sources of standing water around the home to eliminate mosquito larval habitat. For containers that must hold water, like birdbaths and water bowls, change the water at least weekly to disrupt larval development.

Testing

Diagnosis of arboviral infections 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 with an onset of unexplained encephalitis, meningitis, or high fever in the summer and fall, and especially those over age 50 years or younger than age 15 years. The local presence of EEE, JCV, and WNV in animals and mosquito pools should further raise the index of suspicion. Maine CDC releases health advisories 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 surveillance report posted online.

In some instances, arboviruses from the same genus produce cross-reactive antibodies. In areas where two or more closely-related arboviruses occur, serologic testing for more than one virus may be needed and results compared to determine the specific causative virus. For example, such testing might be needed to distinguish antibodies resulting from infections within genera, e.g., flaviviruses such as West Nile, St. Louis encephalitis, Powassan, Dengue, or Japanese encephalitis viruses. Consider testing for Powassan in people with positive WNV or SLEV IgM results who report no recent out of state travel.

Maine's Health and Environmental Testing Laboratory (HETL) and many reference laboratories can test for Chikungunya, Dengue, EEE, Saint Louis Encephalitis (SLE), WNV, and Zika. Testing for JCV is only available at U.S. CDC and some reference laboratories.

If providers suspect arboviral infection based on clinical evidence, they should submit serum, whole blood, and CSF for 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.

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

Both the HETL Requisition Form 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. Providers may also submit CSF samples (free of charge) for viral metagenomics for patients with encephalitis of unknown etiology.

A negative PCR result does NOT rule out arboviral infection. Samples from persons with positive IgM and negative PCR results should be forwarded and confirmed at U.S. CDC.

Reporting:
All arboviral illnesses are reportable in Maine (State of Maine Control of Notifiable Diseases and Conditions Rule). All suspected and confirmed cases, and positive laboratory reports should be reported by electronic laboratory reporting, by fax to 1-800-293-7534, or by phone to the 24/7 disease reporting and consultation line at 1-800-821-5821.

Additional Information

- Arboviral testing in Maine for health care 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 (June to October): www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/arboviral-surveillance.shtml
- U.S. CDC mosquito website: www.cdc.gov/mosquitoes
- U.S. CDC travel health notices: wwwnc.cdc.gov/travel/notices
- Dengue testing guidance: www.cdc.gov/dengue/hcp/diagnosis-testing
- Zika testing guidance: www.cdc.gov/zika/hcp/diagnosis-testing