



Department of Health

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TO: Healthcare Providers, Hospitals, and Local Health Departments (LHDs)

**FROM: New York State Department of Health (NYSDOH)
Bureau of Communicable Disease Control (BCDC)**

HEALTH ADVISORY: TESTING AND REPORTING OF MOSQUITO- AND TICK-BORNE ILLNESSES

Please distribute to the Infection Control Department, Emergency Department, Infectious Disease Department, Obstetrics/Gynecology (including Nurse Practitioners and Midwives), Family Medicine, Travel Medicine Service, Pediatrics, Director of Nursing, Medical Director, Laboratory Service, Pharmacy, and all patient care areas.

NYSDOH is reminding healthcare providers of the procedures for testing and reporting of mosquito- and tick-borne illnesses. Providers are reminded to ask patients about outdoor activities as part of routine telehealth, outpatient, and inpatient assessments. Prompt recognition and treatment for tick-borne diseases is crucial to minimizing morbidity and mortality. Healthcare provider recognition of mosquito-borne illnesses is also a key component of mosquito-borne disease surveillance activities and can assist public health authorities with appropriate implementation of intervention measures, including mosquito control activities. NYSDOH is therefore advising physicians on the procedures to test and report suspected cases of mosquito-borne illnesses, including West Nile virus (WNV), eastern equine encephalitis (EEE), dengue fever, chikungunya, Zika virus, and yellow fever virus as well as tick-borne illnesses including Lyme disease, babesiosis, anaplasmosis, ehrlichiosis, Rocky Mountain spotted fever, and Powassan virus.

SUMMARY

- Mosquito-borne (arboviral) illnesses:
 - During the mosquito season (early summer until late fall), healthcare providers should consider mosquito-borne infections in the differential diagnosis of any patient with clinical evidence of viral encephalitis or viral meningitis.
 - All cases of suspected viral encephalitis should be reported immediately to the LHD of the county where the patient resides.
 - Dengue, chikungunya, and/or Zika virus should be suspected year-round in patients presenting with fever, arthralgia, myalgia, rash, or other illness consistent with infection and recent travel to endemic areas¹.
 - Yellow fever should be considered in the differential diagnosis of any adult or pediatric patient with clinical evidence of fever, nausea, vomiting, epigastric pain, jaundice, renal insufficiency, and cardiovascular instability along with recent

- travel to Africa, South America, or any other area with risk of yellow fever virus transmissionⁱⁱ.
 - NYSDOH provides testing for many domestic and travel-associated viruses. The tests performed will depend on the clinical characteristics, patient status, travel history and availability of commercial testing.
 - Tick-borne illnesses:
 - Tick-borne disease symptoms vary by type of infection and can include fever, fatigue, headache, and rash.
 - While Lyme disease continues to be the most prevalent tick-borne disease in New York State (NYS), other tick-borne diseases, including babesiosis and anaplasmosis, are spreading geographically within the State. Prompt recognition of and treatment for these diseases is crucial to minimizing morbidity and mortality.
 - Clinicians are reminded to use NYS-permitted commercial laboratories for routine tick-borne disease testing. Public health testing is available for more complex cases where symptoms suggest infections with viral illnesses such as Powassan, Heartland, or Bourbon; however, specimens should not be sent to NYSDOH without first consulting the LHD of the patient's county of residence or BCDC.
- Providers should report cases of tick-borne and mosquito-borne diseases to the LHD of the patient's county of residence as soon as possible after diagnosis.

BACKGROUND

Domestic mosquito-borne diseases, such as EEE and WNV, continue to occur annually in NYS. EEE is regarded as one of the most serious mosquito-borne diseases in the United States because of its high mortality rate. WNV continues to be detected across NYS each year, occasionally resulting in human fatalities. Recently, Jamestown Canyon, and Cache Valley viruses have been implicated in serious human infections. A critical component of mosquito-borne disease surveillance activities is the rapid detection and timely reporting of potential cases by medical providers.

In NYS, dengue, chikungunya, and Zika virus infections are associated with travel to endemic areas; however, there is the potential for local transmission of these viruses if *Aedes albopictus* (Asian tiger) mosquitoes feed on infected persons during their viremic period after being infected in and returning from an endemic area.

Travelers are reminded to visit the CDC Travel Notice page prior to travel as the page informs travelers and clinicians about current health issues that impact travelers' health, like disease outbreaks, special events or gatherings, and natural disasters, in destinations around the world. Currently, the CDC has issued a Level 2 Travel Alert for Nigeria due to an ongoing outbreak of yellow fever. Additional information is available at <https://wwwnc.cdc.gov/travel/notices#warning>.

Lyme disease continues to be the most prevalent tick-borne disease in NYS with over 140,000 cases estimated since 1986. The tick that carries the bacteria that causes Lyme disease (black-legged/deer tick) can also carry pathogens that cause babesiosis and anaplasmosis. Surveillance trends for both of these diseases show an expanding geographic range beyond the Hudson River valley to areas further north in the Capital District region and west in the Central and Western regions than has been seen in previous years; case numbers are steadily increasing as well. The seasonal pattern seen in Lyme disease is also true of ehrlichiosis, which

is transmitted by the Lone Star tick. Rocky Mountain spotted fever (RMSF), transmitted by the American dog tick, is more rare than other tick-borne diseases; however, cases continue to be reported across NYS annually. Powassan encephalitis, a tick-borne viral illness that can cause encephalitis or meningitis, is reported each year in NYS as well, although case numbers are very low (generally 1-5 cases per year).

Although most often associated with residence in or travel to the Midwest and Southern United States, a single case of Heartland virus has been reported in NYS, and Bourbon virus has been isolated from ticks in Suffolk County. Both viruses are transmitted by the bite of an infected Lone Star tick; initial symptoms of Heartland and Bourbon virus disease are very similar to those of ehrlichiosis and include fever, fatigue, anorexia, nausea, and diarrhea. Cases have also had leukopenia, thrombocytopenia, and mild to moderate elevation of liver transaminases. Heartland and Bourbon virus disease should be considered in patients being treated for ehrlichiosis who do not readily respond to treatment with doxycycline.

A recent introduction to NYS, the Asian longhorned tick (*Haemaphysalis longicornis*), continues to be identified in parts of the Hudson River Valley, New York City, and Long Island. Although bites from these ticks have been known to cause human illness in other countries, to date no harmful pathogens have been found in Asian longhorned ticks collected in the United States. With ongoing testing of ticks collected in the United States, it is likely that some ticks will be found to contain pathogens that can be harmful to people. However, we do not yet know if these ticks are able to pass these pathogens along to people and make them ill. Additional information is available at <https://www.cdc.gov/ticks/longhorned-tick/index.html>.

REPORTING CASES OF ARBOVIRAL AND TICK-BORNE ILLNESS

Under NYS Public Health Law 2102 and 10 NYCRR 2.10, health care providers must **immediately report** by telephone any patient with suspected viral encephalitis. The report should be made to the LHD of the patient's county of residence. Viral meningitis is also reportable under public health law, but immediate notification is not required.

Other suspected presentations of arboviral infection, including those associated with dengue, chikungunya, Zika virus, and yellow fever, are also reportable. Prompt reporting of suspected cases with no travel history is particularly important as these may indicate local transmission and the need for public health intervention.

Provider reporting requirements also apply to patients who are diagnosed and treated based solely or in part on clinical presentation and history.

SPECIMEN COLLECTION AND REFERRAL FOR TESTING

The NYSDOH's Wadsworth Center laboratories offer testing for domestic mosquito-borne viruses, including WNV, EEE, and St. Louis Encephalitis (SLE) as well as tick-borne viruses including POW, Heartland, and Bourbon. Cerebrospinal fluid (CSF) and serum testing by polymerase chain reaction (PCR) is more sensitive early in infection, while serology testing (for antibody) will better detect cases that are beyond the viremic phase. Therefore, ideally, **BOTH** CSF and acute/convalescent serum specimens should be submitted for testing when neuroinvasive disease is suspected. Otherwise, acute and convalescent serum specimens can be used for diagnosis. Convalescent specimens should be drawn at least 3 weeks after acute specimens. Instructions on the collection and submission of clinical specimens can be found at <http://www.wadsworth.org/programs/id/virology/services/arbovirus-testing>.

The Wadsworth Center is requesting that in addition to serum (and CSF if there is neurologic involvement), urine and whole blood should also be sent to improve the opportunity for detection and identification of suspected arboviral infections if submitting samples to Wadsworth for testing. WNV and Zika virus reach higher titers and are present longer in urine and whole blood than in CSF. Published studies have shown that molecular detection is improved by the inclusion of these additional specimen types for Flavivirus testing. Although there is very little data available for other arboviruses, the Wadsworth Center will test the entire panel of arboviruses in these four specimen types to see where improved detection rates are achieved.

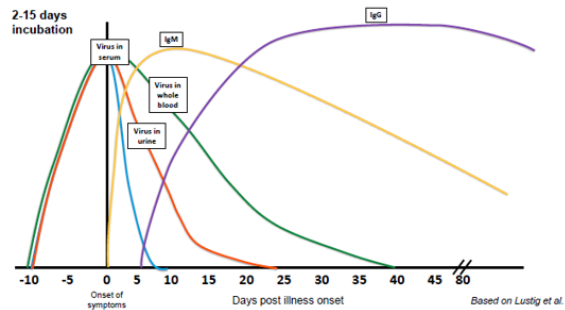


Figure based on Lustig et al. J Clin Micro 2016;54(9).

Testing for dengue (PCR and serology), chikungunya (PCR and serology), and Zika virus (PCR and serology) is available through a number of NYS-permitted commercial laboratories and the Wadsworth Center. Testing for yellow fever is available through Wadsworth Center and a limited number of specialized laboratories nationally.

In consultation with LHDs or BCDC, public health testing is available for non-routine or specialized tick-borne disease testing. Depending upon the disease, testing may involve whole blood smear examination, PCR, or serologic testing. Confirmation of cases of tick-borne disease via collection of both acute and convalescent serum specimens is necessary unless the virus has been detected with a specific PCR assay. Further information on accessing public health testing for tick-borne disease can be obtained by calling your LHD or BCDC.

- Required specimen volumes, storage and shipping for virologic testing:
 - CSF: > 1.5 mL requested for PCR and serology, minimum 300 uL for PCR only, stored frozen and shipped on dry ice, minimum 300 uL for serology only
 - Serum: SST spun and aliquoted, > 2.5 mL requested for PCR and serology, minimum 1000 uL for PCR only, minimum 500 uL for serology only
 - Urine: > 2.5 mL requested for PCR only, minimum 1000 uL
 - Whole blood: > 0.5 mL requested for PCR only, minimum 200 uL
- Serum, urine, and whole blood should be stored cold and shipped on cold packs but may be shipped frozen on dry ice with or without CSF.

Information about Online Test Requests for testing at the Wadsworth Center, supporting information and Report Access can be found here: <https://www.wadsworth.org/electronic-test-request-reporting-new> .

In all cases where clinicians are seeking testing through Wadsworth Center, it is imperative that specimens be sent to Wadsworth Center only after consultation with the LHD of the patient's county of residence or BCDC.

Providers are reminded to use NYS-permitted commercial laboratories for routine testing of patients with suspected Lyme disease and other routine tick-borne diseases such as anaplasmosis, ehrlichiosis, babesiosis, and Rocky Mountain Spotted Fever. For Lyme disease, a two-tier testing protocol is recommended by CDC and NYSDOH. It is important to note that serologic tests for Lyme disease are insensitive during the first few weeks of infection.

Collection of convalescent sera may be required for serologic diagnosis. During the early stage, patients with an erythema migrans rash may be diagnosed clinically.

YELLOW FEVER VACCINATION

Yellow fever vaccine is recommended for people aged ≥9 months who are traveling to or living in areas with risk for yellow fever virus transmission as determined by persistent or periodic yellow fever virus transmission. In addition, some countries require proof of yellow fever vaccination for entry. For country-specific yellow fever vaccination recommendations and requirements, see <https://wwwnc.cdc.gov/travel/yellowbook/2020/preparing-international-travelers/yellow-fever-vaccine-and-malaria-prophylaxis-information-by-country>

Because of the risk of serious adverse events after yellow fever vaccination, clinicians should only vaccinate people who are at risk of exposure to yellow fever virus or who require proof of vaccination to enter a country.

As of April 5, 2021, Sanofi Pasteur announced that YF-VAX (yellow fever vaccine) is once again available for purchase in the United States; YF-VAX is the only yellow fever vaccine licensed for use in the United States. Providers with a current Yellow Fever Vaccination Stamp issued by their state or territorial health department may now order YF-VAX from the manufacturer. A map of clinics with yellow fever vaccine can be found at: <https://wwwnc.cdc.gov/travel/yellow-fever-vaccination-clinics/search>

Additional detailed information on yellow fever vaccination can be found at: <https://wwwnc.cdc.gov/travel/yellowbook/2018/infectious-diseases-related-to-travel/yellow-fever>

ADDITIONAL INFORMATION

Additional information on mosquito and tick-borne diseases can be found at:

http://www.health.ny.gov/diseases/west_nile_virus/

http://www.health.ny.gov/diseases/communicable/arboviral/fact_sheet.htm

<http://www.health.ny.gov/diseases/communicable/lyme/index.htm>

http://www.health.ny.gov/diseases/zika_virus/

<http://www.cdc.gov/Dengue/>

<http://www.cdc.gov/chikungunya/>

<http://www.cdc.gov/zika/>

<https://wwwnc.cdc.gov/travel/diseases/yellow-fever>

If you have any questions regarding this information, please contact your LHD or the NYSDOH Bureau of Communicable Disease Control at (518) 473-4439 or via email at bcdc@health.ny.gov. Contact information for LHDs is available at [Contact Your County Health Office - NYSACHO](#)

ⁱ A map of the current geographic distribution of dengue can be found at: <http://www.healthmap.org/dengue/en/>

A map of the current geographic distribution of chikungunya can be found at: <http://www.cdc.gov/chikungunya/>

A map of the current geographic distribution of Zika virus can be found at: <http://www.cdc.gov/zika/>

ⁱⁱ A map of the current geographic distribution of yellow fever can be found at:

<https://www.cdc.gov/yellowfever/maps/index.html>

Endemic arboviruses: Type of testing available at NYSDOH, Wadsworth Center

Mosquito-borne Viruses	Molecular Testing	Serology
Eastern equine encephalitis	X	X
West Nile	X	X
St. Louis encephalitis	X	X
Cache Valley	X	X*
California group (Jamestown Canyon, LaCrosse)	X	X
Tick-borne Viruses		
Powassan (Deer tick virus)	X	X
Heartland	X	X*
Bourbon		X*
Colorado tick fever		X*

Travel-associated arboviruses: Type of testing available at NYSDOH, Wadsworth Center

Chikungunya	X	X
Dengue 1-4	X	X
Japanese encephalitis		X*
Mayaro		X*
Venezuelan equine encephalitis		X*
Yellow Fever	X	X*
Zika	X	X

Testing sample requirements:

- CSF: > 1.5 mL requested for PCR and serology, minimum 300 uL for PCR only, stored frozen and shipped on dry ice, minimum 300 uL for serology only
- serum: SST spun and aliquoted, > 2.5 mL requested for PCR and serology, minimum 1000 uL for PCR only, minimum 500 uL for serology only
- urine: > 2.5 mL requested for PCR only, minimum 1000 uL
- whole blood: > 0.5 mL requested for PCR only, minimum 200 uL

*Only PRNT (plaque reduction neutralization test) is currently available. Although a single time point specimen will be accepted, a second sample is required for confirmation. Testing must be coordinated with the NYSDOH Bureau of Communicable Disease Control (518-473-4439) or contact your Local County Health Department for approval.