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Locally-Acquired and Travel-Related Arboviral Infections: Testing and Reporting Requirements for West Nile, Chikungunya, Dengue, and Other Arboviruses

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Given the detection of mosquito pools infected with West Nile virus (WNV) in Philadelphia and neighboring counties in southeastern PA and NJ, risk for human infection is increased. Area healthcare providers should consider the potential for WNV and other arboviral infections (e.g. Powassan virus) in patients presenting with unspecified neuroinvasive infections, as well as travel-related arboviral infections, like chikungunya and dengue, among Philadelphia residents returning from subtropical and tropical regions.

All suspected and confirmed cases of arboviral infection including neuroinvasive and non-neuroinvasive WNV, chikungunya, and dengue as well as encephalitis cases should be reported immediately to the Philadelphia Department of Public Health (PDPH) Division of Disease Control (DDC) at 215-685-6740 during regular business hours or 215-686-4514 after-hours (ask for DDC on-call staff). **Your assistance with testing and immediate reporting of suspected arboviral infections enables us to determine potential exposure locations, direct additional mosquito-control efforts, and accurately monitor severe illness.**

West Nile Virus (WNV) and Other Arboviral Encephalides

Although less than 1% of infected individuals will develop WNV neuroinvasive disease (aseptic meningitis, encephalitis, or flaccid paralysis), severe illness may result in residual neurological deficits or death. The risk of neuroinvasive disease increases with age, and is highest among adults > 50 years old and among organ transplant patients. In 2014, 4 neuroinvasive WNV infections including 1 death occurred in Philadelphia, and the WNV positivity rate in mosquitoes was slightly lower than 2012 (13% vs. 18%), the last peak WNV season. Seasonal WNV activity updates are available on the PDPH Health Information Portal (<https://hip.phila.gov>).

Laboratory Diagnosis of WNV: Beginning now through the end of October or when the first hard frost occurs, PDPH urges clinicians to collect both serum and cerebrospinal fluid (CSF) for WNV testing from patients who have onset of unexplained encephalitis or meningitis. WNV-specific IgM in serum or CSF is preferred for laboratory confirmation. Consider the specimen type and timing of collection when ordering WNV-specific IgM testing.

- Serum: Collect 8 to 14 days after illness onset. Draw and test additional serum if collected too early.
- CSF: Collect within 8 days of illness onset.

Many commercial laboratories offer serologic and polymerase chain reaction (PCR) testing for WNV. Any positive specimen should be forwarded to the Pennsylvania Department of Health Bureau of Laboratories (PADOH BOL) for confirmatory testing using standard methods developed by the Centers for Disease Control and Prevention (CDC). DDC can provide consultation for testing and help facilitate specimen submission to PADOH BOL.

Providers in our area should also recognize that other arboviral infections (e.g., Powassan, Eastern Equine Encephalitis, La Crosse, Jamestown Canyon, etc.), although rare, can result in severe illness similar to WNV meningoencephalitis. Specifically, Powassan virus has emerged in upper mid-western and northeastern states including neighboring New York and New Jersey. Since black-legged ticks (*Ixodes scapularis*), which also transmit Lyme disease, are the main vector for transmitting the deer tick virus lineage of Powassan virus, this virus has the potential to emerge in the Philadelphia area. For WNV and other arboviral infection testing inquiries, contact the DDC Acute Communicable Disease Program at 215-685-6742.

SUMMARY POINTS

West Nile Virus (WNV) in Philadelphia

- Mosquito pools infected with WNV have been detected.
- Through October, collect both serum and cerebrospinal fluid (CSF) for WNV IgM testing of patients who have unexplained encephalitis or meningitis.

Chikungunya and Dengue Virus Infections

- If either is suspected, collect serum and test for both chikungunya and dengue.
 - Order PCR between day 1 and 8 of illness
 - Order IgM & IgG if ≥ day 4
- Patients with suspected chikungunya should be managed as dengue.
 - Use acetaminophen for initial fever and pain control.
- Advise patients with suspected chikungunya or dengue to stay indoors for the first 7 days of illness to prevent transmission.

Chikungunya and Dengue Virus Infections

With local outbreaks now in over 40 countries in tropical and subtropical regions of the Americas, chikungunya infection has quickly become another significant source of travel-related arboviral infection among Philadelphia residents along with dengue, the most common arboviral infection worldwide.

Clinical Characteristics of Chikungunya and Dengue Infections:

	Incubation (Range)	% with Symptoms	Symptoms	Blood Abnormalities	Outcome
Chikungunya	3–7 days (1–12 days)	72%–97%	Fever and polyarthralgia with headache, myalgia, arthritis, conjunctivitis, nausea/vomiting, or maculopapular rash	Lymphopenia, thrombocytopenia, ↑ creatinine, ↑ LFTs	Resolves in 7–10 days; some have relapsing arthralgia; rarely fatal
Dengue	4–7 days (3–14 days)	25%	Fever with headache, retro-orbital pain, myalgia, arthralgia, rash, or minor hemorrhagic manifestations 5% develop shock, respiratory distress, severe bleeding, or organ failure	Neutropenia, thrombocytopenia ↑ hematocrit	Fatal in up to 10% with severe infection

Laboratory Diagnosis: Given clinical and epidemiologic similarities, serum should be tested for both chikungunya and dengue if either is suspected. Appropriate test choice will depend on serum collection timing.

- Serum collected ≤ 3 days after symptom onset → Order chikungunya and dengue PCR
- Serum collected 4–8 days after symptom onset → Order chikungunya and dengue IgM, IgG, and PCR
- Serum collected > 8 days after symptom onset → Order chikungunya and dengue IgM and IgG

IgM/IgG antibody testing services for chikungunya and dengue along with chikungunya-specific PCR are available directly through Focus Diagnostics. Quest Diagnostics and LabCorp also will accept orders and forward to Focus Diagnostics. PCR testing for chikungunya and dengue is also now available through PADOH BOL.

Treatment: Like WNV, there are no specific antiviral treatments for chikungunya and dengue other than supportive therapy. Given the consequences of severe dengue infection, patients with suspected chikungunya should be managed as dengue with acetaminophen recommended for initial fever and pain control. If initial treatment is inadequate and dengue has been ruled out, narcotics or NSAIDs may be considered to manage pain in patients with chikungunya. Detailed guidance from the CDC on the inpatient management of severe dengue infection is available at: http://www.cdc.gov/dengue/resources/DENGUE-clinician-guide_508.pdf.

Prevention of Local Transmission: Since the cycle of transmission for chikungunya and dengue can continue if an infected person is bitten by an *Aedes spp.* mosquito while viremic, it is important to advise suspected cases to stay indoors in air-conditioned or well screened accommodations for the first 7 days of illness. *Aedes albopictus* (Asian tiger mosquito), a vector for both chikungunya and dengue has been identified in Philadelphia.

Mosquito Bite Prevention: Between April and October, discuss the following prevention measures with your patients, especially those who work or are active outdoors. Regardless of season, prevention tips should also be shared with patients traveling to areas endemic for chikungunya, dengue, and other mosquito-borne infections.

- Use repellent with DEET (≥20% to also prevent tick bites), Picaridin, or oil of lemon eucalyptus when outdoors, especially during peak biting hours (dusk and dawn for WNV, daytime for chikungunya/dengue).
- When weather permits, wear long-sleeved shirts and long pants.
- Keep well-fitted screens on windows and doors along with using air conditioning.
- Regularly check and empty standing water outside their home (e.g., unused pools, tires, containers).
- Report mosquito problems and dead bird sightings to the PDPH Vector Control Program's Mosquito Complaint hotline at 215-685-9027.

Online Resources for Healthcare Providers

- *Dengue and Chikungunya in Our Backyard: Preventing Aedes Mosquito-Borne Disease (Free CME)*. Includes an update on the recent emergence of Zika virus in Brazil and its potential to spread throughout the Americas similar to chikungunya virus: <http://www.cdc.gov/cdcgrandrounds/archives/2015/may2015.htm>
- CDC Division of Vector-borne Diseases: <http://www.cdc.gov/ncezid/dvbd/about.html>