



The A.C.D. Newsletter

PHILADELPHIA DEPARTMENT OF PUBLIC HEALTH (PDPH)

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Summertime Fever: Thinking Beyond Respiratory Pathogens During the Peak Season for Vector-borne Infections

As temperatures warm, Philadelphians emerge from hibernation, taking full advantage of city parks and nearby hiking trails, which increases their chances of catching a vector-borne illness. Ticks and mosquitoes capable of infecting humans (Table 1) are more abundant throughout the summer, and this is also reflected with case report dates. In Philadelphia, most Lyme disease is reported between May and August, whereas West Nile virus (WNV) season occurs from May to October with peaks in August and September.

Diagnosis: Many of the vector-borne diseases seen in Philadelphia can easily be mistaken for other pathogens due to their nonspecific presentation. Patients with tick-borne infections (Lyme disease, babesiosis, anaplasmosis, ehrlichiosis, and Rocky Mountain spotted fever [RMSF]) can initially present with fever, arthralgia, fatigue, headache, along with rash (Lyme disease, RMSF, and ehrlichiosis) and blood abnormalities in some cases (babesiosis, anaplasmosis, ehrlichiosis, RMSF). Although most persons infected with West Nile virus (WNV) remain asymptomatic, 20% of individuals develop fever, headache, and fatigue. Additional complication arises in diagnosing these illnesses as their seasonality overlaps with that of respiratory pathogens, including rhinovirus and Enterovirus, which cause similar symptoms in addition to respiratory manifestations.

Risk Factors: Adults over 50 years of age are more likely to

develop symptomatic WNV than younger individuals. While infections can occur among persons of all ages, rates of symptomatic babesiosis, anaplasmosis, and ehrlichiosis increase with age. In contrast, Lyme disease and RMSF rates are more evenly distributed among all age groups. People with an immunosuppressed condition are also at a greater risk for severe disease if exposed to infected ticks and mosquitoes.

Severity: Approximately 1% of WNV infections can cause encephalitis, meningitis, or acute flaccid paralysis. Nearly 10% of WNV neuroinvasive infections result in death, while neurologic deficits may occur in those who survive. RMSF can be rapidly fatal if treatment is not initiated within 5 days of onset. Patients with untreated Lyme disease can develop disseminated infections, with neurologic, cardiac, or rheumatologic manifestations. Co-infection with Lyme disease and babesiosis or anaplasmosis may also increase severity of both diseases.

Prevention: Talking to patients about their outdoor activities during warmer months creates opportunities to discuss effective measures to prevent tick and mosquito bites. Patients can avoid insect bites by:

- Using repellent, specifically one that contains 20-30% DEET
- Wearing long sleeves and pants (weather permitting)
- Planning outdoor activities to avoid peak mosquito activity (dusk-dawn)
- Showering/bathing after spending time outdoors
- Performing full-body tick checks
- Maintaining outdoor space to make it less inviting to ticks & mosquitoes

Table 1: Overview of Vector-borne Pathogens Found in the Philadelphia Area

Disease (Pathogen)	Lyme disease (<i>Borrelia burgdorferi</i>)	Anaplasmosis (<i>Anaplasma phagocytophilum</i>)	Babesiosis (<i>Babesia microti</i>)	Rocky Mountain Spotted Fever (<i>Rickettsia rickettsii</i>)	Ehrlichiosis (<i>Ehrlichia chaffeensis</i> or <i>E. ewingii</i>)	West Nile fever neuroinvasive disease (West Nile Virus)
Main Vector	Blacklegged tick (<i>Ixodes scapularis</i>)	Blacklegged tick (<i>Ixodes scapularis</i>)	Blacklegged tick (<i>Ixodes scapularis</i>)	American dog tick (<i>Dermacentor variabilis</i>)	Lone star tick (<i>Amblyomma americanum</i>)	Northern House Mosquito (<i>Culex pipiens</i>)
Incubation Period	3 – 30 Days	1 – 2 Weeks	1 – 9+ Weeks	2 – 14 Days	1 – 2 Weeks	2 – 14 Days
Laboratory Testing	•Two-tier testing: EIA or IFA and Western Blot to detect IgG or IgM antibodies in serum • <i>B. burgdorferi</i> culture from blood or skin specimen	•Detection of <i>A. phagocytophilum</i> DNA via PCR • <i>A. phagocytophilum</i> -specific IgG detection via IFA in paired serum samples •CBC	•Blood smear to identify intraerythrocytic <i>Babesia</i> parasites in blood smear •Positive <i>B. microti</i> PCR analysis of blood sample •CBC	• <i>R. rickettsii</i> -specific IgG detection via IFA in paired serum samples •Detection of <i>R. rickettsii</i> DNA in skin biopsy by PCR assay •CBC	• <i>Ehrlichia</i> -specific IgG detection via IFA in paired serum samples •Detection of <i>Ehrlichia</i> DNA via PCR on whole blood •CBC	•Isolation of viral antigen or DNA from tissue, blood, or CSF •CSF/blood testing for WNV-specific IgM
Treatment*	Doxycycline, Cefuroxime axetil, or Amoxicillin	Doxycycline	Atovaquone and Azithromycin, OR Clindamycin and Quinine	Doxycycline	Doxycycline	Supportive clinical management

*Note: Empirical treatment is recommended for suspected RMSF, anaplasmosis, and ehrlichiosis infections. Delay in treatment may result in severe illness or death. Treatment dosage may vary by age, and duration may vary by disease severity.

Local healthcare providers are instrumental in the identification of vector-borne diseases. PDPH encourages reporting of all WNV infections and encephalitis cases immediately. Within 5 days of diagnosis, report all tick-borne illnesses including patients clinically-diagnosed Lyme disease (Erythema migrans without lab testing). Reporting guidelines available at <https://goo.gl/m6GEue>. PDPH can assist in coordinating specimen testing for WNV and tick-borne pathogens, and is available to provide testing guidance as needed.

Provider Resources

Tick-borne Diseases of the United States. *A Reference Manual for Health Care Providers*. – Also a mobile app!: <http://goo.gl/gICoc7>
COCA Webinar on the diagnosis, treatment and prevention of tick-borne diseases (CME Credit): <http://goo.gl/vf9ZdB>
Council of State and Territorial Epidemiologists Webinar Library: <http://goo.gl/bKEWtv>
CDC Webinar on novel and emerging tick-borne diseases: <http://goo.gl/WPxt8V>



The Emergence of Chikungunya Virus in the Western Hemisphere



Since its emergence in the Western Hemisphere in late 2013, chikungunya virus (CHIKV) has quickly become another significant source of travel-related arboviral infection among Philadelphia residents along with dengue infection, the most common arboviral infection worldwide. Now over 40 countries in the Americas particularly in tropical and subtropical regions have ongoing local transmission of CHIKV. Previously, CHIKV outbreaks mostly occurred in tropical and subtropical regions of Africa, India and Southeast Asia.

In most infected persons (72%–97%), CHIKV virus causes acute febrile illness with severe arthralgia that involves two or more joints, is usually symmetric, and affects the hands and feet. Rash, headache, nausea, vomiting, myalgia, fatigue, and/or lymphopenia may also occur. Although acute illness usually resolves in 7–10 days and fatalities are rare, polyarthralgia may continue for months.

In the US, limited local transmission of CHIKV has only occurred in southern Florida during 2014. The potential for limited local transmission in temperate regions exists as demonstrated by an outbreak on the northeastern coast of Italy in 2007. In Philadelphia, *Aedes albopictus* (Asian tiger mosquito) but not *A. aegypti* are present and active during warmer months. Factors, such as competence of *A. albopictus* in transmitting specific CHIKV clades and use of air conditioned or screened environments by residents will influence whether

local transmission occurs in Philadelphia. PDPH will continue to closely monitor surveillance data to promptly identify local transmission, since control entails educating patients and reducing mosquito breeding sites around cases' homes.

With local transmission of CHIKV established throughout tropical and subtropical regions of the Americas, PDPH encourages area healthcare providers to become familiar with the recognition, diagnosis, and treatment of both CHIKV and dengue infections.

Testing: If either CHIKV or dengue is suspected, collect serum and test for both pathogens. Testing is available through the Pennsylvania Department of Health's Bureau of Laboratories (PADOH BOL) and Focus Diagnostics. Quest Diagnostics and LabCorp also will forward orders to Focus.

- Order polymerase chain reaction (PCR) between day 1 and 8 of illness (*Now available through PADOH BOL*)
- Order IgM & IgG if \geq day 4 of symptom onset

Treatment: Patients with suspected CHIKV infection should be managed as dengue with acetaminophen used 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.

Control and Prevention:

- Encourage patients traveling to areas with local transmission of CHIKV to take personal prevention measures such as using mosquito repellent, staying in well-screened, air-conditioned accommodations, and wearing long pants and sleeves when weather permits.
- Adults > 65 years of age and persons with underlying conditions (e.g., hypertension, diabetes, etc) who are at risk for severe disease along with women late in pregnancy due to the risk to neonates should consider not traveling to areas with ongoing CHIKV outbreaks.
- Advise patients with suspected CHIKV or dengue infections to stay indoors and avoid mosquito bites for the first 7 days of illness to prevent transmission.

Reporting: Suspected and confirmed cases of CHIKV and dengue are reportable to PDPH.

For further information, view **Chikungunya Virus – An Emerging Threat to the Americas (Free CME):**

<http://goo.gl/E4LKKb>

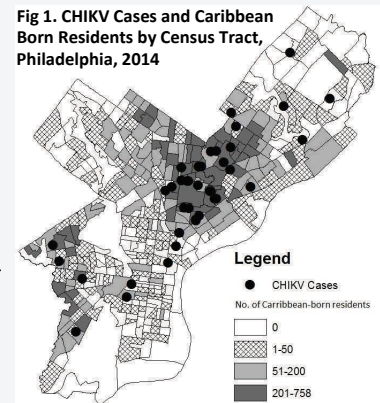
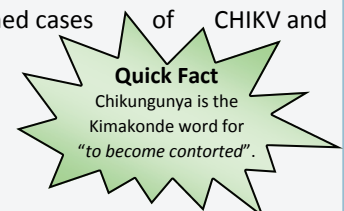


Fig 1. CHIKV Cases and Caribbean Born Residents by Census Tract, Philadelphia, 2014

Table 1. Chikungunya Virus Characteristics	
Vector	<i>Aedes spp.</i> Mosquitoes (<i>A. aegypti</i> & <i>A. albopictus</i>) <ul style="list-style-type: none"> ▪ Daytime biters with short flight range ▪ Also transmit dengue virus
Transmission	Mosquitoes \leftrightarrow humans or non-primates
Other modes of transmission	Bloodborne (i.e., transfusions) Maternal-fetal transmission
Incubation	1 to 12 days (typically 3–7 days)
Viremia duration	Up to 7 days after illness onset

Travel-Related Chikungunya Cases, Philadelphia, 2014

In 2014, PDPH identified 42 travel-related cases of CHIKV among Philadelphia residents since late May. Median age of the cases was 43 years (range: 5–78 years). Cases reported travel to the Dominican Republic (20), Puerto Rico (12), Jamaica (4), Haiti (3), Trinidad (1), Guatemala (1), or Columbia (1). Over two-thirds (29, 69%) were born in the Caribbean and traveled to visit friends and relatives. Similarly, 29 cases (69%) resided in areas of North Philadelphia with the highest number of Caribbean-born residents (Figure 1).

All cases had clinically compatible symptoms and positive laboratory results (IgM–28, PCR–12, 4-fold IgG titer increase–2). Twenty-five (60%) cases returned to Philadelphia while viremic and before the first hard frost in fall; none reported mosquito bites after onset. One-half had an underlying condition or were over 65 years of age. Despite this, only 8 (19%) CHIKV cases were hospitalized and none were fatal. However, infection caused ongoing arthralgia in 20 of 34 (59%) cases.

REPORT OUTBREAKS AND REPORTABLE DISEASES AND CONDITIONS TO PDPH

PHONE: (215) 685-6748

FAX: (215) 238-6947

Reporting requirements and forms are posted online at <https://hip.phila.gov>

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