

Information for Clinicians: *Aedes aegypti* and *Aedes albopictus* Mosquitoes in California and Reporting Patients with Suspected Dengue or Chikungunya to Public Health

In California, two invasive species of mosquitoes that can potentially transmit dengue and chikungunya viruses have been detected. *Aedes albopictus*, the Asian tiger mosquito, has been detected in Los Angeles County since 2011, and in Kern and San Diego counties in 2015. *Aedes aegypti*, the yellow fever mosquito, has been detected in Madera, Fresno, and San Mateo counties since 2013, San Diego, Kern, Los Angeles, and Tulare counties since 2014, and Alameda, San Bernardino, Riverside, Orange, and Imperial counties in 2015. Both *Aedes aegypti* and *Aedes albopictus* are aggressive day-biters that can potentially transmit dengue or chikungunya virus to local residents after biting an infected traveler returning from an endemic country or an outbreak area.

Currently in California the risk of local dengue or chikungunya transmission is very low. There have been no reported cases of either dengue or chikungunya that have been acquired in California. The California Department of Public Health (CDPH) is monitoring reported cases of dengue and chikungunya and is working with local public health and mosquito and vector control agencies to enhance surveillance and implement aggressive control measures for these *Aedes* mosquitoes.

Clinicians play an important role in public health surveillance for these exotic arboviruses. In 2009, an astute clinician in New York identified the first case of dengue acquired in the U.S. in 55 years. The New York resident had classic dengue fever and a history of recent travel to Key West, Florida, an area of the U.S. where the mosquito vector, *Aedes aegypti*, is established.

Clinicians in or near California counties where *Aedes aegypti* and *Aedes albopictus* mosquitoes have been detected should be aware that these mosquitoes have the potential to transmit dengue and chikungunya. Dengue is a reportable disease in California. Chikungunya became a nationally notifiable disease in January 2015.

What clinicians can do:

- Review the epidemiology and signs and symptoms of dengue and chikungunya.
- Consider dengue or chikungunya in the differential diagnosis of febrile patients with signs and symptoms consistent with each disease who:
 - have traveled to a dengue or chikungunya endemic area or a region with known virus transmission in the two weeks prior to symptom onset OR
 - live, work or have recently visited areas where *Aedes aegypti* or *Aedes albopictus* have been detected in California regardless of history of travel.

- Report suspect cases of dengue and chikungunya to the local health department, which can assist with coordinating tests needed to help confirm the diagnosis. Immediately report to the local health department any suspect dengue or chikungunya case without known travel to an endemic region.
- If chikungunya is suspected, request tests for both dengue and chikungunya as the viruses are transmitted by the same vector, have similar clinical features, and may co-circulate. Establishing the diagnosis of dengue is important because proper clinical management of dengue can improve outcome.
- Advise patients with suspect chikungunya or dengue to take measures to avoid being bitten by mosquitoes during the first week of illness to decrease risk of spreading the virus, and to have someone empty water containers around their home.

Dengue: Epidemiology and Clinical Presentation

Dengue is a mosquito-borne infection caused by any of four distinct but closely related dengue virus (a flavivirus) serotypes 1-4 (DENV-1 to -4). Worldwide, dengue is a major public health problem in the tropics and subtropics. It is the most frequent cause of acute febrile illness among U.S. travelers returning from parts of Asia, Latin America, and the Caribbean. In the U.S. since 2000, locally-acquired dengue has been documented periodically in Hawaii, Texas, and Florida where the mosquito vectors, *Aedes aegypti* and/or *Aedes albopictus* are established. *Aedes albopictus* is more cold tolerant than *Aedes aegypti* and thus its range extends further north in the Midwest and eastern U.S.

Dengue has no animal reservoir and is not contagious person to person. In rare cases, dengue can be transmitted through organ transplants, blood transfusions, or from an infected mother to her baby in utero or at delivery.

The incubation period for dengue is typically 3-14 days. A high proportion of infected people are asymptomatic or have a mild, non-specific febrile illness. Patients are viremic from approximately 1 day before to 4-5 days after onset of fever.

Classic dengue fever or "breakbone fever" is characterized by acute onset of high fever 3 to 14 days after the bite of an infected mosquito. Symptoms often include frontal headache, retro-orbital pain, myalgia, arthralgia, and maculopapular rash. Some patients progress to more severe disease such as dengue hemorrhagic fever with hemorrhagic manifestations, thrombocytopenia, and plasma leakage, and then dengue shock syndrome which can be fatal. Treatment is supportive. The U.S. Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) provide guidance on diagnosis, management, and treatment of dengue (see Resources below).

Chikungunya: Epidemiology and Clinical Presentation

Chikungunya is a mosquito-borne infection caused by chikungunya virus (CHIKV), an alphavirus. It is characterized by acute onset of fever and severe polyarthralgia. Worldwide, outbreaks have occurred in countries in Africa, Asia, Latin America, and the Indian and Pacific oceans. In late 2013, chikungunya arrived in the Americas with locally-acquired cases reported in the Caribbean. As of October 2015, local transmission had been identified in 44 countries or territories in the Caribbean, Central America, South America, or North America, with approximately 1.2 million suspected and 36,000 laboratory-confirmed chikungunya cases reported. In 2014, over 2,700 cases among returned travelers were reported in the U.S. from most states and 11 locally-acquired cases were reported in Florida.

Similar to dengue, chikungunya has no animal reservoir and is not contagious person to person. In rare instances, chikungunya has been transmitted from an infected pregnant mother to her infant in utero or during delivery. Transmission has been reported in laboratory workers and a healthcare worker via a needle stick. CHIKV may potentially be transmitted by an infected donor through organ transplants or blood transfusions.

Chikungunya fever occurs 3-7 days (range 1-12 days) after the bite of an infected *Aedes* mosquito; unlike dengue, most people infected with CHIKV become symptomatic. Chikungunya is usually characterized by acute onset of fever (typically $>39^{\circ}\text{C}$ [102°F]) and polyarthralgia. Joint symptoms are usually bilateral and symmetric involving the hands and feet and can be severe and debilitating. Other symptoms may include headache, myalgia, arthritis, conjunctivitis, nausea/vomiting, or maculopapular rash.

Acute symptoms typically resolve within 7–10 days. However, some studies report variable proportions of patients with persistent joint pains for months to years. Rare complications include uveitis, retinitis, myocarditis, hepatitis, nephritis, bullous skin lesions, hemorrhage, meningoencephalitis, myelitis, Guillain-Barré syndrome, and cranial nerve palsies. Persons at risk for severe disease include neonates exposed intrapartum, older adults (e.g., > 65 years), and persons with underlying medical conditions (e.g., hypertension, diabetes, or cardiovascular disease). Some patients might have relapse of rheumatologic symptoms (e.g., polyarthralgia, polyarthritis, tenosynovitis) in the months following acute illness. Mortality is rare and occurs mostly in older adults.

Laboratory Diagnosis for Dengue and Chikungunya

Dengue and chikungunya can be diagnosed by serological or molecular methods. Serology: DENV or CHIKV-specific IgM antibodies are often detected by 6 days after onset of symptoms. Acute and convalescent sera (2 to 3 weeks between samples) for detection of dengue or chikungunya-specific IgM and IgG antibodies are encouraged for generating the most accurate evidence of acute arbovirus illness. Antibodies to dengue and chikungunya may cross-react with other flaviviruses and alphaviruses respectively in

serologic assays.

Molecular testing: DENV and CHIKV can be detected in blood (serum) and other body fluids from patients using reverse-transcription-polymerase chain reaction (RT-PCR) during the first 7 (for DENV) to 8 (for CHIKV) days of symptoms.

Diagnostic tests are available through some commercial laboratories, CDPH, and CDC. The CDPH Viral and Rickettsial Disease Laboratory (VRDL) offers RT-PCR testing for detection of DENV and CHIKV RNA, and serologic tests for the diagnosis of dengue and chikungunya. Please contact your local health department for guidance on submitting specimens.

Resources:

[CDPH Vector Borne Diseases Section \(VBDS\)](#): *Aedes aegypti*, fact sheets (English and Spanish) and more.

[CDPH VRDL Laboratory](#): See "Guidelines for Laboratory Services" under the "Resources" section.

[CDC: Information on Dengue](#)

- [CDC-HealthMap Collaboration: Global Map on Dengue](#)
- [CDC Dengue: Information for Health Care Providers](#)
- [CDC-USGS: Diseases Map](#)

[WHO Dengue Guidelines for Diagnosis, Treatment, Prevention, and Control, 2009](#)

[CDC Information on Chikungunya](#)

- [CDC-Information for Health Care Providers](#)
- [CDC-Map of distribution of chikungunya worldwide](#)
- [CDC Nowcast for the Americas](#)

APHA: Control of Communicable Diseases Manual, 18th Edition, DL Heymann, Editor

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