



**To: CAHAN San Diego Participants**  
**Date: August 27, 2019**  
**From: Epidemiology Program, Public Health Services**

#### **HEALTH INFORMATION: VECTOR-BORNE ILLNESSES OF PUBLIC HEALTH SIGNIFICANCE**

This health notice informs local healthcare providers about vector-borne illnesses of clinical significance in San Diego County, including selected mosquito-borne illnesses of interest to those caring for travelers.

#### **Mosquito-borne Diseases**

##### ***West Nile Virus***

West Nile virus (WNV) is currently the leading cause of mosquito-borne disease in the continental United States. Over 50,000 cases have been reported since the virus was first detected in this country in 1999. Most people infected with WNV are asymptomatic. About one in five people who are infected develop a fever and other symptoms. About 1 out of 150 infected people develop neuroinvasive disease. In 2018, 2,647 cases [were reported](#) from 48 states and the District of Columbia. In [California](#), 217 symptomatic and 26 asymptomatic WNV human infections were identified in 2018. Of the 217 clinical cases, 154 (71%) had neuroinvasive disease and 11 (5%) died.

Two WNV disease cases were reported among San Diego County residents last year: a 91-year-old resident of La Jolla, with illness onset in mid-September, and a 64-year-old resident of Ocean Beach, with illness onset in early November. Both cases were classified as likely locally-acquired neuroinvasive disease. The peak number of reported WNV cases in San Diego County was 42 in 2015.

To date in 2019, 45 WNV cases have been [reported](#) in California. Three San Diego residents have been diagnosed with WNV after travel outside the county, but no residents have been confirmed to have had locally-acquired WNV. No mosquito pools have tested positive for WNV in the county this year; however, one Cooper's hawk found in Lakeside was laboratory-confirmed for the virus in March. The latest information on WNV activity in San Diego County is available at the Department of Environmental Health Vector Control Program (DEH VCP) [WNV website](#).

Local clinicians are encouraged to consider WNV infection in patients presenting with aseptic meningitis, encephalitis, atypical Guillain-Barré syndrome, or prolonged fever. WNV testing is available through most commercial laboratories and through the California Department of Public Health (CDPH) via submittal to the San Diego County Public Health Laboratory (SDCPHL). Clinical guidelines, testing algorithms, and specimen submission forms are available at the County of San Diego [WNV website](#). Information about clinical presentation, diagnosis, and management of WNV may be found at the CDPH [WNV website](#) and the Centers for Disease Control and Prevention (CDC) [WNV website](#).

## ***Saint Louis Encephalitis Virus***

[Saint Louis encephalitis \(SLE\)](#) is a viral disease spread to people by the bite of an infected *Culex* species mosquito. Most people infected with SLE virus have no apparent illness. Initial symptoms of those who become ill include fever, headache, nausea, vomiting, and fatigue. However, neuroinvasive disease (often involving encephalitis) can occur, more commonly in older adults. In rare cases, long-term disability or death can result.

With introduction of WNV into the United States in 1999, reported cases of SLE significantly decreased both nationally and in California. Since 2009, [CDC](#) has reported an annual average of seven cases nationally, with a maximum number of 19 cases noted in 2015. In California between 2009–2018, there have been seven confirmed cases; the most recent case in an individual residing in [Los Angeles County](#) in October 2018.

No SLE cases have been reported in San Diego County since July 2006. The last positive environmental finding for SLE virus in the county was in 1979 in a chicken sentinel flock. However, since 2015, hundreds of SLE virus-positive mosquitoes have been detected in California. Nearby [Imperial County](#) had a mosquito-pool test positive for SLE in July 2019.

SLE virus is in the differential for any patient in which WNV neuroinvasive disease is a consideration. Laboratory testing for SLE is available through most commercial laboratories and through CDPH via SDCPHL. More information about SLE virus may be found at the CDC [SLE virus website](#).

## ***Dengue Virus***

[Dengue](#) viruses are spread to people through the bite of an infected *Aedes* species (*Ae. aegypti* or *Ae. albopictus*) mosquito. These mosquitoes also spread Zika, chikungunya, and other viruses. As many as 400 million people are infected each year with dengue. To date in 2019, 870,410 confirmed dengue cases have been [reported](#) in the Americas including 13,420 severe cases and 740 deaths. In Mexico, 61,734 probable and confirmed dengue cases have been [reported](#) in 2019, including 36 probable and no confirmed cases in Baja California. Local transmission of dengue has occurred in Tijuana in previous years.

There have been no confirmed or suspect locally-acquired cases of dengue in California, though the mosquito vectors have been found in San Diego and other California counties. To date in 2019, 43 imported dengue cases were reported in California, including seven San Diego residents.

Symptoms of dengue include fever, joint pain, headache, retro-orbital pain, rash, myalgia, arthralgia, general weakness, and extreme fatigue. Sometimes hemorrhagic symptoms manifest including blood in vomit, urine, and stool or from the gums. Severe cases may result in shock, fluid accumulation, and respiratory distress.

Dengue, Zika virus infection, and chikungunya should be considered in the differential diagnosis for each other. Dengue is typically [diagnosed using serology](#), but to avoid false negative or indeterminate results, serum specimens should also be collected during the convalescent phase. Ideally, both acute (first seven days post symptom onset) and convalescent phase (greater than seven days post symptom onset) specimens are needed to make a diagnosis of dengue infection. If a patient with suspected dengue infection submits a late, acute phase specimen that is negative (e.g., by RT-PCR or MAC-ELISA), and a convalescent specimen is not submitted, then the case is classified as laboratory-indeterminate.

For more information on dengue, and for clinical and laboratory guidance, go to the [CDC dengue website](#) or the [CDPH Aedes website](#). CDC maintains a continuing medical education (CME) accredited [online course on dengue](#) and the World Health Organization published a comprehensive [dengue resource](#) in 2009.

## **Zika Virus**

[Zika virus](#) is a flavivirus that can be transmitted by [mosquitoes](#), from a [pregnant woman](#) to her fetus, through [sex](#), and via [blood transfusion](#). Although reported Zika cases have decreased substantially in the Americas since 2016, transmission continues to occur in Mexico, Latin America, and other [areas](#).

Forty-five cases of Zika virus have been [reported](#) in Mexico to date in 2019, with three locally transmitted cases noted in Baja California Sur. Locally-transmitted Zika virus was reported in Ensenada in 2017, but no cases have been reported in Baja California since then. Testing for Zika virus in Mexico is primarily conducted in symptomatic pregnant women, so it is likely that some cases are undiagnosed and unreported. It is also likely that some symptomatic Zika cases in Mexico are reported as probable dengue cases.

[U.S. Zika virus case counts](#) are updated biweekly, and [California case counts](#) (which include San Diego County) are updated monthly. To date in 2019, 25 Zika cases have been diagnosed in California residents, including four cases from San Diego. All cases involved international travel to endemic areas.

Many patients infected with Zika virus will have no symptoms, but those who become ill may have fever, headache, rash, conjunctivitis, and joint and muscle pain. Recommendations for testing for Zika virus vary by travel history, pregnancy status, and the history of compatible symptoms, with details noted [here](#).

Providers should continue to review mosquito bite prevention measures and safe sexual practices with persons traveling to Zika-affected areas, as well as recommend that pregnant women and those planning to become pregnant delay non-essential travel to areas with active Zika transmission. For more details on Zika, go to the CDC [Zika virus website](#) or the CDPH [Zika website](#).

## **Chikungunya Virus**

[Chikungunya](#) virus (CHIKV) was introduced into the Americas in late 2013 and became epidemic through 2016, with 504,373 confirmed and suspected cases reported. Case reports have fallen in recent years in the Americas, though an outbreak has been occurring recently in Brazil, with 59,981 cases [reported](#) in the state of Rio de Janeiro in 2019.

Only three locally-transmitted CHIKV cases have been [reported](#) in Mexico this year. Testing for CHIKV is infrequent in Mexico, and it is possible that symptomatic cases are categorized as probable dengue cases. Local transmission of CHIKV has been reported in Baja California Sur, but not in Baja California.

To date in 2019, five imported CHIKV cases have been reported in California. Only one case of CHIKV infection has been reported in a San Diego resident this year, a 16-year-old traveler to India. The invasive *Aedes aegypti* mosquito has been [identified in several locations](#) within the county by the DEH VCP. Any indoor daytime biting mosquitoes should be reported to the DEH VCP as this is one of the hallmarks of this invasive mosquito.

The incubation period is typically 3-7 days (range 1-12 days) after exposure. Acute onset of fever and polyarthralgia are the primary clinical findings. Joint symptoms are usually symmetric, often occur in the hands and feet, and can be severe and debilitating. Other symptoms may include headache, myalgia, arthritis, conjunctivitis, nausea/vomiting, or maculopapular rash. More information about the clinical presentation, diagnosis, and management of CHIKV infection may be found at the [CDC chikungunya website](#).

Clinicians should consider the illness in travelers with fever and polyarthralgia. Serologic testing (IgG and IgM by IFA) for CHIKV is available through commercial laboratories (e.g., Focus/Quest), as well as from the CDPH Viral and Rickettsial Disease Laboratory ([VRDL](#)).

## Tick-borne Diseases

### *Lyme Disease*

[Lyme disease](#) is the most common tick-borne disease in the United States, with approximately 30,000 cases reported each year to CDC. The illness is caused by the spirochete *Borrelia burgdorferi* and symptoms include dermatologic, rheumatologic, neurologic, and cardiac abnormalities. The most common clinical marker for the disease is *erythema migrans* (EM), the initial skin lesion that occurs in 60-80% of patients and usually appears 3 to 32 days after tick exposure (mean 7 to 10 days).

San Diego County tick surveillance by DEH VCP has occasionally found ticks that harbor *Borrelia burgdorferi*. Locally-acquired Lyme disease is uncommon, so a travel history is important when evaluating patients with compatible symptoms. To date in 2019, one case of Lyme disease, not acquired locally, has been reported in a San Diego County resident.

Tests for Lyme disease are available at commercial laboratories. CDC recently [updated recommendations](#) for the serologic diagnosis of Lyme disease. A guide for clinicians on testing, including a list of tests that are not recommended, may be found [here](#). Other resources for providers, including a free CME course on Lyme and other tick-borne diseases, may be found [here](#).

### *Rocky Mountain Spotted Fever and Other Spotted Fevers*

[Rocky Mountain spotted fever](#) (RMSF) is a tickborne disease caused by the intracellular bacterium *Rickettsia rickettsii*. [Spotted fever group Rickettsia](#) have been detected in local ticks, with approximately 5% of Pacific Coast ticks harboring *Rickettsia philipii*, which can cause an [eschar-associated febrile illness](#). Clinicians should be aware of [continued reports](#) of RMSF transmitted by the brown dog tick (*Rhipicephalus sanguineus*) in Mexico, especially in northern Baja California, where large epidemics have occurred in recent years.

Early symptoms of RMSF are nonspecific (fever, headache), but the illness can progress rapidly to become life threatening. Tick exposure and travel histories should be obtained in patients with fever and petechial rash or with persistent fever of unclear origin. The most recent RMSF case reported in a San Diego County resident was in 2018. A pediatric patient residing in Imperial County with frequent travel to Mexicali with was diagnosed with RMSF in a San Diego hospital in July 2019.

Clinicians should **never delay treatment** for suspected rickettsiosis while awaiting laboratory confirmation. Doxycycline is the antibiotic of choice for all patients. The adult dose is 100 mg bid for 14 days or until three days after fever subsides. The pediatric dose is 2.2 mg/kg (up to 100 mg) bid. For more information on the symptoms, diagnosis, treatment, and prevention of tick-borne diseases, please visit the [CDC Tick-borne disease website](#) where the most recent (2018) reference manual for healthcare providers entitled "[Tickborne Diseases of the United States](#)" is available to download.

### *Tularemia*

*Francisella tularensis*, the cause of [tularemia](#), has been found in *Dermacentor occidentalis* (Pacific Coast tick) and *Dermacentor variabilis* (American dog tick) in San Diego County. To date in 2019, five batches of positive ticks have been found in San Diego, all in Lopez Canyon (see the map maintained by DEH VCP [here](#)). The last human case of tularemia in San Diego was locally acquired and reported in 2005. A local animal case of tularemia was [reported](#) in 2014.

The signs and symptoms of tularemia vary depending on how the bacteria enter the body, although all forms include fever. The major forms of tularemia are ulceroglandular, glandular, oculoglandular, oropharyngeal, pneumonic, and typhoidal. Details on the various clinical presentations of tularemia can be found at the CDC [tularemia website](#).

Clinicians who suspect tularemia should immediately report this to the County Epidemiology Program (see below). Rapid diagnostic testing for tularemia is only available through SDCPHL. Should specimens be submitted to a commercial laboratory from a case having any initial index of suspicion for tularemia, laboratorians should be alerted so that they can take special safety precautions.

## **Other Vector-borne Diseases**

### ***Murine Typhus***

[Murine typhus](#), also known as flea-borne typhus, is an acute febrile illness caused by *Rickettsia typhi*. Worldwide, the disease is mainly transmitted by the fleas of rodents and is associated with cities and ports where urban rats (*Rattus rattus* and *Rattus norvegicus*) are abundant. Contrary to the classic rat-flea-rat cycle, the most important reservoirs of infection in Southern California are opossums and cats. The cat flea, *Ctenocephalides felis*, has been identified as the principal vector. Cases are more common in summer and fall. After an incubation period of 7-14 days, most patients present with fever, and many have rash, headache, and arthralgia.

Serologic testing is available at most commercial laboratories as part of rickettsial disease panels. Confirmatory testing can be performed through the CDPH VDRL. Doxycycline is the antibiotic of choice and has been shown to shorten the course of illness, though most immunocompetent patients resolve their infection without treatment.

Murine typhus outbreaks have recently occurred in [Los Angeles County](#). The most recent serologically confirmed case in a San Diego resident was in April 2018. The case had no travel history and reported a flea-infestation in the home.

Clinicians should consider murine typhus in the differential diagnosis if a patient presents with persistent fever of 3 to 5 days duration without explanation, and if a history of local exposure to opossum or cats and flea contact is likely, or if there is a history of travel to tropical or semitropical environments where large rat populations are likely to exist.

### ***Plague***

[Plague](#) is endemic in limited areas of San Diego County with California ground squirrels as the primary reservoir and ground squirrel fleas the primary vector. Local evidence of infection was most recently detected in a [big-eared woodrat in Tecate](#) in 2018. No human case of plague has been reported in the county in decades, although two human cases were reported in [California in 2015](#).

Plague symptoms depend on how the patient was exposed to the plague bacteria. Plague can take different clinical forms, but the most common are bubonic, pneumonic, and septicemic. Details on the various clinical presentations of plague may be found at the [CDC plague website](#).

Clinicians who suspect plague should immediately report this to the County Epidemiology Program (see below). Rapid diagnostic testing for plague is only available through SDCPHL. Should any specimens be submitted to a commercial laboratory from a case with any initial index of suspicion for plague, laboratorians should be alerted so that they can take special safety precautions.

## **Hantavirus**

[Hantaviruses](#) are a family of viruses spread mainly by rodents and can cause varied disease syndromes in people worldwide. Hantaviruses in the Americas are known as “New World” hantaviruses and may cause [hantavirus pulmonary syndrome](#) (HPS). Other hantaviruses, known as “Old World” hantaviruses, are found mostly in Europe and Asia and may cause [hemorrhagic fever with renal syndrome](#) (HFRS).

Each hantavirus serotype has a specific rodent host species and is spread to people via aerosolized virus that is shed in urine, feces, and saliva, and less frequently by a bite from an infected host. The most important hantavirus in the United States that can cause HPS is the Sin Nombre virus, spread by the deer mouse.

Hantaviruses have been found in different rodents in various locations throughout the county, the most recent being in a deer mouse in Warner Springs in July 2019. DEH VCP maintains a map of hantavirus detections [here](#). The last locally-acquired human case of HPS in San Diego County was reported in 2004.

Symptoms of HPS occur one to six weeks after exposure and include severe muscle aches, fever, headache, and progressive respiratory symptoms. Testing for hantavirus is available in some commercial laboratories and through the CDPH VDRL. A free CME course on hantavirus from CDC may be found [here](#).

***Report suspected cases of any of the vector-borne diseases noted in this health advisory to the Epidemiology Program*** by calling 619-692-8499 during normal business hours, or 858-565-5255 after hours, weekends or County-observed holidays. For more information on preventive measures for the public and about vector-borne disease surveillance in San Diego County, visit [www.SDVector.com](http://www.SDVector.com) or call the Vector Control Program at 858-694-2888.

Thank you for your continued participation.

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