Riverside University HEALTH SYSTEM Public Health

Disease Control Branch
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PUBLIC HEALTH ADVISORY

MOSQUITO BORNE DISEASE UPDATE

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West Nile Virus (WNV) and St. Louis Encephalitis (SLEV) Update

West Nile Virus is endemic in Riverside County, which was first identified in the county in 2003. St. Louis Encephalitis is a closely related virus and co-circulates with WNV in many California counties. The viruses are transmitted primarily by mosquitoes of the genus *Culex* which are native to California and most active from dusk to dawn. Birds serve as an intermediary host and reservoir, while humans and horses serve as primary terminal hosts. Infrequently, other species may be affected in small numbers. Cases in all four hosts are tracked statewide. Disease activity reported to the public health department is not only important for disease surveillance but also guides mosquito surveillance and control. The last reported human cases of West Nile Virus in Riverside County occurred in 2021 with a total of 3 human cases. Avian and mosquito samples continue to be reported yearly. In California, there were 209 symptomatic human infections of WNV reported in 2022 with 14 fatalities. The highest incidence year on record is 2005 with 880 infections and 21 deaths. The deadliest year on record is 2015 with 860 infections and 53 deaths.

Current surveillance data may be found here: Westnile.ca.gov | California West Nile Virus Website

WNV Clinical Description and Incubation Period

The incubation period for WNV infection ranges from 2 to 14 days after a bite from an infected mosquito and may be longer in immunosuppressed individuals. 70-80% of cases are subclinical or asymptomatic. Symptomatic cases can present in two ways: non-neuroinvasive illness and neuro-invasive illness. Non-neuroinvasive illness often takes the form of acute febrile illness associated with headache, myalgia, arthralgia, rash, and/or gastrointestinal symptoms. Neuro-invasive illness takes the form of acute onset fever with headache, myalgia, stiff neck, altered mental status, seizures, limb weakness, or cranial nerve palsies leading to encephalitis, meningitis, acute flaccid paralysis, myelitis, neuritis, or demyelinating neuropathy.

Disease activity will be posted on the Public Health website's Disease Watch section located at: https://www.ruhealth.org/public-health/disease-control/disease-watch

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Actions Requested of All Clinicians

The diagnosis of WNV/SLEV infection is based on a high index of clinical suspicion and specialized testing. Testing of blood and CSF samples is available through California Department of Public Health VRDL Laboratory. CSF or whole blood specimens must be submitted with an accompanying serum sample. The guidelines for specimen collection and shipping can be found here: WNV-SLE Testing Guidance (ca.gov). Three tests are available to detect WNV/SLEV: serologic (IgM/IgG) screening tests, plaque reduction neutralization test, and molecular testing (PCR). Serologic testing with immunofluorescence (IFA) or enzyme immunoassay (EIA) serology can be used for screening of IgM antibodies, but a negative test does not rule out flavivirus infection. Paired acute and convalescent IgG serology showing a 4-fold rise in titer may indicate recent infection. These tests do not distinguish well between flaviviruses and require confirmatory testing. Plaque Reduction Neutralizing Test can detect virus specific antibodies and is the most specific test to distinguish between WNV and SLEV, however it is still limited by cross-reactivity with previous vaccination and previous (non-acute) exposure to flaviviruses. Molecular testing, such as RT-PCR, is highly specific but has very low sensitivity and is not recommended as a primary test for laboratory diagnosis. If, however, the test is positive, no confirmatory testing is required. Guidelines for selecting an appropriate test based on the specimen type may be found here: West Nile and St. Louis Encephalitis Viruses in California: Guidelines for Human Testing, Surveillance and Reporting.

Due to cross-reactivity with other infections in the genus *Flavivirus*, testing of Powassan, Zika, Dengue, Japanese Encephalitis, and Yellow Fever (among other flaviviruses) should be considered in patients with recent exposure to a correspondent geographic area. WNV/SLEV should be considered in any patient with a febrile or acute neurologic disease with recent exposure to mosquitos, blood transfusion, or organ transplant, especially during summer months where disease activity has been reported. It is highly recommended that clinicians test whenever there is a history of unexplained encephalitis, meningitis or unexplained febrile illness > 7 days. This is especially important if the fever is accompanied by a headache, rash, swollen lymph nodes, eye pain and nausea or vomiting.

Clinician information is available at:

West Nile and St. Louis Encephalitis Viruses in California: Guidelines for Human Testing, Surveillance and Reporting

Information for Healthcare Providers | West Nile Virus | CDC.

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Zika Virus Disease (ZVD) Update

Since 2018, no locally acquired mosquito borne Zika cases have been reported in the United States. California has reported 756 travel associated ZVD cases since 2015. There have been nine cumulative infections due to sexual transmission. The monthly Zika virus infections report is posted at:

https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/TravelAssociatedCasesofZikaVirusinCA.pdf

Twenty-one travel associated ZVD cases were reported in Riverside County between 2015 and 2019. The last confirmed case and probable case were reported in 2019.

Zika and Pregnancy

Zika virus infection in pregnant women has potentially serious consequences for the baby which include fetal loss, microcephaly, and other birth defects. As of 2015, 243 infections in pregnant women have been reported in California resulting in 13 live births with birth defects. Cases of travel associated Zika have numbered five or less since 2020. As of 2019, there has been low to no global Zika virus transmission. It is recommended that pregnant women be evaluated for possible Zika virus exposure during each prenatal care visit, however routine laboratory screening for zika virus is not recommended if the patient is asymptomatic. Current recommendations are located at Zika Information for Health Professionals (ca.gov)

Laboratory Testing for Zika

Laboratory testing is available through approved commercial laboratories in addition to the California Department of Public Health (CDPH) Viral and Rickettsial Disease Laboratory (VRDL). Serum, whole blood, CSF, urine, and amniotic fluid specimens can be tested for Zika if done within the specific time frame. Whole blood, CSF, urine, or amniotic fluid specimens must be accompanied by a serum. CDPH guidance for non-pregnant symptomatic suspect patients and asymptomatic pregnant women located at:

https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/ZikaLaboratoryTestingGuidance_VRDL.pdf

Suspected Zika cases must be reported to Disease Control prior to submitting specimens to the Public Health laboratory. Hospital laboratories should coordinate with the Infection Preventionist on reporting suspected cases. Patients must meet the clinical and travel history criteria to be approved for Zika testing. The CDPH Zika screening algorithm and VRDL submittal form are located at: VRDL Specimen Submittal Forms (ca.gov) under

"General Purpose Specimen Submittal Form." The VRDL form should be submitted to the RUHS PH Lab with the specimen. Given the current low worldwide incidence of Zika virus infection, co-testing for Chikungunya and Dengue should also be considered in symptomatic patients. Questions on specimen collection and submission should be directed to the Public Health Laboratory Director at (951) 358-5070.

Zika virus resources for health care providers:

CDPH: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/ZikaInformationforHealthProfessionals.aspx

CDC: https://www.cdc.gov/zika/hc-providers/index.html

Dengue and Chikungunya

Certain regions of Mexico and Latin America have experienced an increase in chikungunya cases and ongoing dengue infections. Both viruses are transmitted by *Aedes albopictus* and *Aedes aegypti* mosquitos. Both mosquito species are not native to California but have been found in many counties including those in Southern California. Only Aedes aegypti has been found specifically in Riverside County. Mosquito and vector control agencies monitor and implement aggressive control measures when these species are found. These two mosquitos are aggressive day biters which can potentially transmit the virus after biting an infected person.

Updated distribution of these invasive mosquitos can be found here: CDPH Aedes Distribution Map (ca.gov)

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. Travel-associated cases of Dengue peaked in 2019 with a total of 267 cases. Travel-associated cases of Chikungunya peaked in 2016 with a total of 60 cases. Dengue infections are usually asymptomatic but when symptomatic present with acute onset high fever associated with frontal headache, retroorbital pain, severe myalgia and arthralgia (giving it the colloquial name "breakbone fever"), and a maculopapular rash. Some patients may progress to a more severe and potentially fatal form of the disease known as dengue hemorrhagic fever which includes hemorrhagic manifestations, thrombocytopenia, plasma leakage, and eventually dengue shock syndrome. Chikungunya infections are usually symptomatic with a fever occurring 3-7 days (range 1-12 days) after the bite of an infected *Aedes* mosquito. Chikungunya is usually characterized by acute onset of fever (typically >39°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 or vomiting, or maculopapular rash. After acute phase disease resolution, some patients

may have persistent joint pains or develop complications mainly involving inflammation of a wide variety of organs and tissues. Chikungunya is rarely fatal.

Laboratory Diagnosis for Dengue and Chikungunya

Dengue and chikungunya can be diagnosed by serological or molecular methods. For serologic testing, DENV or CHIKV-specific IgM antibodies are often detected by the sixth day 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. DENV and CHIKV can also be detected with molecular methods in blood (serum) and CSF from patients using reverse-transcription-polymerase chain reaction (RT-PCR) during the first seven (for DENV) to eight (for CHIKV) days of symptoms.

Information on the clinical presentations and laboratory diagnosis for chikungunya and dengue is posted at: https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/MosquitoesandMosquitoBorneDiseases.aspx

Patient Education

It is important to educate patients about preventive measures to reduce exposure to mosquitoes. The use of mosquito repellant and appropriate clothing when outside, and elimination of even trivial amounts of standing water, will reduce bites and breeding of any local mosquito species. Individuals who have traveled to an area with active Zika transmission should take steps to prevent mosquito bites including using insect repellant for 3 weeks after returning home. This will avoid infecting *Aedes* mosquitos which in turn can bite other people and potentially lead to locally acquired Zika cases. Educational materials are available by contacting Julie Monte at 951-358-5107, or JMonte@rivcocha.org.

Disease Reporting

Suspected and confirmed cases of Zika, chikungunya and dengue should be reported to Disease Control by calling (951) 358-5107 during regular business hours or to the Public Health Duty Officer after hours at (951) 782-2974. Please note that microcephaly from any cause is locally reportable by order of the Public Health Officer for Riverside County. ZVD and dengue are reportable immediately by telephone; WNV and chikungunya are reportable within one day of identification.