

This is an official  
**DHEC Health Update**

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**Public Health Surveillance and Laboratory Testing for  
Mosquito-Borne Diseases, 2018**

**Summary**

This update provides healthcare professionals with the most current information about mosquito-borne diseases and includes:

- Background
- Symptoms and diagnosis
- Treatment
- Prevention
- State laboratory testing and specimen submission
- State-mandated reporting of mosquito-borne diseases
- Resource links

**Background**

Cases of mosquito-borne diseases are reported every year among South Carolinians and include endemic diseases, such as West Nile virus, and travel-associated diseases, such as malaria. Trends in reported cases of mosquito-borne diseases are seasonal and vary from year to year.

The timely identification and reporting of mosquito-borne diseases in humans is critical in preventing further spread of imported diseases such as Zika, dengue, chikungunya, and malaria. Individuals infected with these diseases who are in the viremic period or parasitemic period (malaria) can serve as hosts to propagate imported mosquito-borne diseases to SC mosquitoes. However, persons infected with Eastern equine encephalitis virus, La Crosse encephalitis virus, St. Louis encephalitis virus, and West Nile virus are considered incidental (dead-end) hosts who do not develop a sufficient level of virus to infect other biting mosquitos. Cases of these diseases are indicators of where disease is occurring making identification and reporting of such cases essential to public health surveillance activities.

**Symptoms and Diagnosis**

Symptoms of mosquito-borne diseases will vary by each disease but often include fever, headache, nausea, vomiting, fatigue, and muscle and joint pain. In severe cases of some mosquito-borne viruses, neuroinvasive disease can occur leading to confusion, disorientation, and other neurologic symptoms. With malaria, severe illness can occur when infections are complicated by serious organ failures and/or blood or metabolic abnormalities, such as severe anemia due to hemolysis.

Diagnosis of mosquito-borne diseases is often initially based on the patient's clinical features, travel history, outdoor activities, and epidemiologic history of the location where infection occurred.

For mosquito-borne viruses, laboratory testing is generally done through testing of serum or cerebrospinal fluid (CSF) to detect virus specific IgM neutralizing antibodies. It's important to note that for mosquito-borne viruses, testing serum or CSF too early in the course of illness can lead to underdiagnosis. Specimens collected at 0 to 8 days post-onset are considered to be acute phase samples while specimens collected after this timeframe are considered to be convalescent phase samples. The Centers for Disease Control and Prevention (CDC) provides guidance on how to interpret laboratory results while addressing serologic cross-reactivity, rise and fall of IgM antibodies and persistence of IgM and IgG antibodies. Please refer to the Comments section in the following link <https://wwwn.cdc.gov/nndss/conditions/arboviral-diseases-neuroinvasive-and-non-neuroinvasive/case-definition/2015/> for more details. Hyperlinks to the specific clinical and laboratory criteria for case classification are located in the resources section of this update.

For malaria, microscopic examination of the patient's blood on a blood smear can help identify the disease-causing parasite. While other test methods, such as rapid antigen detection and molecular testing, are also available, blood smears remain the gold standard for laboratory confirmation of malaria. Serology testing is not practical for routine diagnosis of acute malaria as it only provides information regarding a patient's past exposure to malaria.

## Treatment

There is no specific treatment for many mosquito-borne diseases. Specifically for mosquito-borne viruses, supportive care (e.g. rest, fluids, acetaminophen or paracetamol for pain and fever reduction) is recommended. Use of NSAIDS is not recommended until dengue infection can be ruled out due to the risk of internal bleeding.

For malaria, however, there are many pharmaceutical interventions that can be used for treatment. For a full list of these interventions, please visit [https://www.cdc.gov/malaria/diagnosis\\_treatment/treatment.html](https://www.cdc.gov/malaria/diagnosis_treatment/treatment.html). Also, the CDC provides a 24-hour consultation hotline for healthcare providers. During business hours (Monday to Friday, 9am to 5pm), call 770-488-7788. After business hours and on weekends or holidays, call 770-488-7100.

## Prevention

Prevention of mosquito-borne diseases primarily focuses on avoiding mosquito bites, including during travel. Persons should:

- Use insect repellent
- Wear protective clothing
- Install and repair screens on doors and windows
- Keep mosquitoes from laying eggs around homes by emptying standing water from items such as flower pots, buckets, barrels, and tires.
- When traveling, be aware of mosquito-borne diseases that can be transmitted in the area of travel and takes step to avoid mosquito bites.

Clinicians who suspect an imported mosquito-borne disease should encourage patients to stay indoors during the viremic or parasitemic period (duration will vary by disease) and take the steps listed above to avoid mosquito bites.

For malaria, medications can be taken as prophylaxis when traveling to areas where malaria is endemic. A yellow fever vaccine is available that can prevent infection. For more details on availability and vaccination clinic locations; please visit <https://wwwnc.cdc.gov/travel/page/search-for-stamaril-clinics>.

## State Laboratory Testing and Specimen Submission

### Laboratory Testing

The PHL offers the following laboratory testing for suspected cases:

- West Nile IgM Capture ELISA
- Chikungunya, dengue, and zika Trioplex RT-PCR and IgM Capture ELISA

The PHL does not perform testing for Eastern equine encephalitis, La Crosse encephalitis, malaria (*Plasmodium* spp.), St. Louis encephalitis, or yellow fever. However, the PHL can facilitate specimen submission to the CDC for virus or parasite serology.

Clinicians should contact the regional health department in the region where the patient resides for testing requests and reporting.

### Specimen Submission

- Serum or CSF are acceptable specimens for West Nile IgM Capture ELISA.
- Serum is the only acceptable specimen for chikungunya, dengue and Zika IgM Capture ELISA.
- Trioplex RT-PCR can be performed on serum and urine. If submitting urine, a serum specimen must be submitted for testing.
- Specimens should be submitted on cold packs within 72 hours of collection or frozen and shipped on dry ice.

## State-mandated Reporting of Mosquito-Borne Diseases

SC State Law # 44-29-10 and Regulation # 61-20 requires reporting of diseases and conditions to local and state health departments. The mosquito-borne diseases listed below are urgently reportable within 24 hours by phone. **Report upon recognition of a suspected case, diagnosis, or positive laboratory evidence. Suspected means clinical suspicion and/or initial laboratory detection, isolation, identification, or presence of supportive laboratory results.**

- Chikungunya, dengue, Eastern equine encephalitis, La Crosse encephalitis, malaria (*Plasmodium* spp.), St. Louis encephalitis, West Nile virus, Yellow Fever, and Zika.
- Specimen submission to the Public Health Laboratory (PHL) is required for all diseases listed above except malaria and yellow fever.
- Healthcare providers are reminded to inquire about travel history if patients present with clinical symptoms consistent with a mosquito-borne disease.

### Resources for Additional Information

- [CDC Traveler's Health Website](https://wwwnc.cdc.gov/travel)  
<https://wwwnc.cdc.gov/travel>
- [CDC Malaria and Travelers: Choosing a Drug to Prevent Malaria](https://www.cdc.gov/malaria/travelers/drugs.html)  
<https://www.cdc.gov/malaria/travelers/drugs.html>
- [CDC Malaria Diagnosis and Treatment in the United States](https://www.cdc.gov/malaria/diagnosis_treatment/index.html)  
[https://www.cdc.gov/malaria/diagnosis\\_treatment/index.html](https://www.cdc.gov/malaria/diagnosis_treatment/index.html)
- [DHEC Clinical Guidance for Healthcare Providers \(West Nile Virus and Zika\)](http://www.scdhec.gov/Health/FHPF/DiseaseResourcesforHealthcareProviders/)  
<http://www.scdhec.gov/Health/FHPF/DiseaseResourcesforHealthcareProviders/>

- DHEC Lab Services Guide  
<http://www.scdhec.gov/Health/FHPF/LabCertificationServices/LabServicesGuide/>
- DHEC Arbovirus Activity – Maps and Data  
<http://www.scdhec.gov/HomeAndEnvironment/Insects/Mosquitoes/DataReports/>
- National Notifiable Disease Surveillance System: Arboviral Diseases, Neuroinvasive and Non-neuroinvasive 2015 Case Definition  
<https://wwwn.cdc.gov/nndss/conditions/arboviral-diseases-neuroinvasive-and-non-neuroinvasive/case-definition/2015/>
- National Notifiable Disease Surveillance System: Dengue Virus Infections 2015 Case Definition  
<https://wwwn.cdc.gov/nndss/conditions/dengue/case-definition/2015/>
- National Notifiable Disease Surveillance System: Malaria (*Plasmodium* spp.) 2014 Case Definition  
<https://wwwn.cdc.gov/nndss/conditions/malaria/case-definition/2014/>
- National Notifiable Disease Surveillance System: Yellow Fever 1997 Case Definition  
<https://wwwn.cdc.gov/nndss/conditions/yellow-fever/case-definition/1997/>
- National Notifiable Disease Surveillance System: Zika Virus Disease and Zika Virus Infection 2016 Case Definition  
<https://wwwn.cdc.gov/nndss/conditions/zika-virus-disease-congenital/case-definition/2016/06/>

## **DHEC contact information for reportable diseases and reporting requirements**

Reporting of chikungunya, dengue, Eastern equine encephalitis, La Crosse encephalitis, malaria (*Plasmodium*), St. Louis encephalitis, West Nile virus, yellow fever, and Zika is consistent with South Carolina Law requiring the reporting of diseases and conditions to your state or local public health department. (State Law # 44-29-10 and Regulation # 61-20) as per the DHEC 2018 List of Reportable Conditions available at:

<http://www.scdhec.gov/Library/CR-009025.pdf>

Federal HIPAA legislation allows disclosure of protected health information, without consent of the individual, to public health authorities to collect and receive such information for the purpose of preventing or controlling disease. (HIPAA 45 CFR §164.512).

## Regional Public Health Offices – 2018

Mail or call reports to the Epidemiology Office in each Public Health Region

### MAIL TO:

<p><b><u>Lowcountry</u></b> 4050 Bridge View Drive, Suite 600 N. Charleston, SC 29405 Fax: (843) 953-0051</p>	<p><b><u>Midlands</u></b> 2000 Hampton Street Columbia, SC 29204 Fax: (803) 576-2993</p>	<p><b><u>Pee Dee</u></b> 145 E. Cheves Street Florence, SC 29506 Fax: (843) 661-4859</p>	<p><b><u>Upstate</u></b> 200 University Ridge Greenville, SC 29602 Fax: (864) 282-4373</p>
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### CALL TO:

<p><b><u>Lowcountry</u></b> <b>Berkeley, Charleston, Dorchester</b> Phone: (843) 953-0043 Nights/Weekends: (843) 441-1091</p> <p><b>Beaufort, Colleton, Hampton, Jasper</b> Phone: (843) 549-1516 ext. 218 Nights/Weekends: (843) 441-1091</p> <p><b>Allendale, Bamberg, Calhoun, Orangeburg</b> Phone: (803) 268-5833 Nights/Weekends: (843) 441-1091</p>	<p><b><u>Midlands</u></b> <b>Kershaw, Lexington, Newberry, Richland</b> Phone: (803) 576-2749 Nights/Weekends: (888) 801-1046</p> <p><b>Chester, Fairfield, Lancaster, York</b> Phone: (803) 286-9948 Nights/Weekends: (888) 801-1046</p> <p><b>Aiken, Barnwell, Edgefield, Saluda</b> Phone: (803) 642-1618 Nights/Weekends: (888) 801-1046</p>	<p><b><u>Pee Dee</u></b> <b>Chesterfield, Darlington, Dillon, Florence, Marlboro, Marion</b> Phone: (843) 661-4830 Nights/Weekends: (843) 915-8845</p> <p><b>Clarendon, Lee, Sumter</b> Phone: (803) 773-5511 Nights/Weekends: (843) 915-8845</p> <p><b>Georgetown, Horry, Williamsburg</b> Phone: (843) 915-8804 Nights/Weekends: (843) 915-8845</p>	<p><b><u>Upstate</u></b> <b>Anderson, Oconee</b> Phone: (864) 260-5581 Nights/Weekends: (866) 298-4442</p> <p><b>Abbeville, Greenwood, McCormick</b> Phone: (864) 260-5581 Nights/Weekends: (866) 298-4442</p> <p><b>Cherokee, Greenville, Laurens, Pickens, Spartanburg, Union</b> Phone: (864) 372-3133 Nights/Weekends: (866) 298-4442</p>
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**For information on reportable conditions, see**  
<http://www.scdhec.gov/Health/FHPF/ReportDiseasesAdverseEvents/ReportableConditionsInSC/>

**DHEC Bureau of Disease Control**  
**Division of Acute Disease Epidemiology**  
2100 Bull St • Columbia, SC 29201  
Phone: (803) 898-0861 • Fax: (803) 898-0897  
Nights / Weekends: 1-888-847-0902

Categories of Health Alert messages:

<b>Health Alert</b>	Conveys the highest level of importance; warrants immediate action or attention.
<b>Health Advisory</b>	Provides important information for a specific incident or situation; may not require immediate action.
<b>Health Update</b>	Provides updated information regarding an incident or situation; unlikely to require immediate action.
<b>Info Service</b>	Provides general information that is not necessarily considered to be of an emergent nature.